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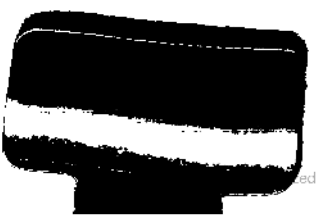
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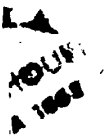
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J. C. OAKENFULL

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AVENIDA CENTRAL, RIO DE JANEIRO, WITH THE "JOURNAL OF COMMERCE" BUILDING.

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MUMMY OF AN INDIAN, FOUND AT RIO NOVO, MINAS GERAES.

Collection of the National Museum, Rio Janeiro. By the kindness of Professor Roquette Pinto.

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INTRODUCTION

FULLY aware as I am of the many errors and shortcomings in this fourth annual edition of my little compilation, I sincerely trust that it is in some respects better than its predecessors, and that the Press and the public, always tolerant, will receive it with the same charity that was bestowed upon the three others. I would especially ask those who have practical suggestions to make for the betterment of any future editions, to send them along, and I will gratefully acknowledge any I am able to make use of. It would be possible to make an entire encyclopædia on Brazil, but *Festina lente* is a very good motto, and one must hope for gradual progress in this direction. The coloured plate of precious stones is an innovation and an experiment, but of course does not do anything like justice to the beauty, depth of tone, and wonderful optical properties of some of the gems, and I am very disappointed at not being able to procure a diamond worth showing amongst its satellites.

In thanking the many persons who have helped me, I must first acknowledge the kindness of Dr. Pedro de Toledo, the most distinguished Minister of Agriculture, Industry and Commerce; to whom the publication of the book is due.

A debt of gratitude must be paid also to Dr. Enéias Martins, Under-Secretary for Foreign Affairs, and I

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think his advice not to put anybody's portrait in my book is the best key to his character, typical of that of many eminent men in the Republic. The difficult thing is to thank people for their kindness, and to remember all to whom I am indebted, and in remembering, to pay something of what is due to those who often put themselves to a great deal of trouble to help me along. I must in any case express my sense of the ready kindness of the following gentlemen amongst others: Drs. Mario Carneiro, Director of the Financial Department, Affonso Costa, Chief of the Foreign and Home Propaganda, Werneck of the Cabinet of the Minister, José B. Cavalcanti, Acting Director of the Indian Department, Lacerda, Director of the National Museum, and Carlos Moreira, Professor of Applied Entomology, and to Dr. Delfim Carlos B. da Silva, Director of Propaganda in Paris. Also to Messrs. Chalmers and Bensusan, Superintendents of the Morro Velho and Passagem Gold Mines; to Senhor Papf, photographer, of Petropolis, and to the Secretary and Librarian of the Municipality of that city, and to Mr. Wainwright of Birmingham, Herr Julius Scriba of Oberstein, and Messrs. Hopkins of London for the loan of some of the gems shown on the coloured plate.

Last, but not least, my sincere thanks are due to my energetic and always helpful friend, Dr. Florambel Pinto Peixoto, of the above Ministry. To each and all, and to any others I have unwittingly forgotten, I wish to tender my sincere thanks.

J. C. OAKENFULL.

ARCACHON (FRANCE),
January, 1913.

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CHAPTER I

GEOGRAPHY AND TOPOGRAPHY

ALMOST the whole of Brazil is in the Southern Hemisphere. It attains its greatest dimensions between the Equator and the Tropic of Capricorn. The only South American countries which are not in contact with it are Chili and Ecuador.

The Atlantic Ocean forms the natural boundary on the east and a greater part of the north, for an extension of about 5,000 miles, from Cape Orange, frontier of Dutch Guiana, to Chuy on the boundary line of Uruguay. The number of degrees from north to south are about 37, and between Pernambuco, on the eighth parallel south of the line, and the Cordillera of the Andes, there are as many east to west, or a distance of 4,350 kilometres. In area, Brazil is nearly sixteen times as large as France, and excluding Alaska from the United States, she is the fourth largest country in the world. A most remarkable fact may be noted, viz.: that there are few natural harbours or bays of a great size, those of São Salvador (Bahia) and Rio de Janeiro being by far the most important. To make up for this, however, the river system is a magnificent one. Americans are proud of calling the Mississippi the father of waters, but its volume is far less than that of the Amazon.

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This gigantic stream freshens the waters of the ocean for a distance of at least 180 miles out. It is so deep that its very slight incline is sufficient to give it an impulse powerful enough to retard considerably the speed of vessels bound up stream. In the estuary, depths of 150 fathoms are common, whilst the average is 25, and the minimum 15 fathoms. Over 1,100 tributaries flow into this majestic river, 1,200 kinds of birds are exclusive to its valley, and Bates found some 8,000 new varieties of animal life on or near the river. The soil of its basin is so rich that for every bushel of maize, beans and rice planted, 800 are often harvested. Its lower part, from Manáos to the sea, appears to have been formerly a bay, 1,000 miles deep and 400 wide.

The area subject to inundation at the present day is probably not much less. Like the Paraguay, it may be said to be navigable throughout its course. The latter river rises in the State of Matto Grosso, not a great distance from the head waters of the Tapajoz, the last great affluent of the Amazon on its course to the sea, but unlike the latter river, its course is almost due south from its source to its junction with the Paraná, at the point where Paraguay and Argentina meet. There are in all some 30,000 miles of navigable waterways in the Amazon valley. The Paraná itself rises in a range of mountains of the same name forming a natural boundary on the east, to the State of Goyaz.

This serra also contains the source of the Tocantins, which falls into the sea near Pará, whilst further west, in the same state, springs the Araguayá, which joins the Tocantins at the junction of Goyaz with Maranhão and Pará on the north. The Madeira, rising in the Acre territory, and the Rio Negro from Guiana, are the two remaining important tributaries of the Amazon.

Coming southwards, we find the Parnahyba between

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Maranhão and Piauhy, and then there are no more considerable rivers until the mouth of the São Francisco is reached. This stream rises in southern Minas Geraes, and wends its way right through the central part of that state and Bahia, running almost parallel with the coast for more than three-fourths of its course, and then taking a sudden turn eastward, and a series of tremendous leaps at Paulo Affonso falls, before reaching the sea at Sergipe. The principal feeder of this great river is the Rio das Velhas, having its origin in the central part of Minas, and flowing through a great deal of the diamondiferous region of this state. There are several large rivers falling into the sea in Bahia, and the most important are the Itapicurú, Paraguassú, Rio de Contas, Pardo and Jequitinhonha. The Rio Doce is the principal waterway in Espirito Santo, whilst the Parahyba forms the natural boundary between the States of Rio de Janeiro and Minas Geraes.

The whole of the great rivers watering the south rise in the interior and flow westwards towards the Paraná basin.

Where Argentina, Paraguay and Brazil meet, and the Iguassú joins the Paraná, we find one of the world's wonders, the seven falls of the latter. The Iguassú itself is noteworthy for a vast semicircle of cascades, the largest of which is 200 feet high. There are several other rivers which empty themselves into the Paraná, the great stream which drains most of South Brazil. At the Seté Quedas falls, or cataracts, it opens out into a lake 4½ miles long by 2½ miles wide, and after rushing through a profound gorge, falls some 310 feet, with a volume of water averaging 13,000,000 cubic feet a minute, and reckoned at 4,300,000 H.P. From Guayara (Seté Quedas), the mightiest cataracts on earth, to the falls of Iguassú, is a distance of 125 miles, all

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torn and scarred with cascades. The column of mist above the latter falls is visible for a distance of 12 miles. Total width of fall, 13,133 feet.

The principal tributaries of the Paraná are the Paranápanema and Rio Grande, and the Tieté, flowing through the city of São Paulo. These, together with the Uruguay (bounding Rio Grande do Sul on the north and west), all rise in the coast ranges, or in their offshoots on the Atlantic side.

We have then a vast network of streams watering almost the whole of Brazil. The volume of some of the principal rivers gives a somewhat clear idea of the enormous extent of territory through which they wend their way, and the sketch map at the beginning of the book will demonstrate their relative position and course.

There is an absolute continuity between the Campos at the head waters of the Paraná, and those of the upper Amazon, which river has a basin of 3,356,400 square miles.

This does not include any part of the river extra-Brazilian. The territory to the north-east of the Amazon valley (Brazilian Guiana) is of a hilly nature, and consequently dry.

NORTHERN AFFLUENTS.

Rio Negro—basin,	429,000	sq. miles ;	length,	1,020	miles.
Japurá ,,	186,000	,, ,,	,,	2,779	,,

SOUTHERN AFFLUENTS.

Javary—basin,	45,600	sq. miles ;	length,	573	miles.
Juruá ,,	144,000	,, ,,	,,	1,200	,,
Purús ,,	233,200	,, ,,	,,	2,190	,,
Madeira ,,	637,600	,, ,,	,,	3,000	,,
Tapajoz ,,	258,300	,, ,,	,,	1,158	,,
Xingú ,,	237,000	,, ,,	,,	1,260	,,

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The Tocantins is 1,560 miles, the Araguary 1,080 miles, the São Francisco 1,820 miles, and the Jequitinhonha 680 miles long. The length of the Paraná is 2,634 miles, the Paranáhyba 573, Iguassú 792, the Tieté 672, Rio das Velhas (navigable) 650, Paranápanema 400, Parnahyba (Piauhy) 1,030, Itapicurú 990, Jequitinhonha 650, Doce 600, whilst the Pardo, Paraguassú, Rio de Contas, Mucury, Gurupi and Parahyba do Sul are from 300 to 600 miles long.

Supposing one wished to travel by water from Cuyabá in Matto Grosso to Manáos on the Amazon, the distance would be from Cuyabá to Rio de Janeiro, via River Plate and Montevideo, 3,242 miles, Rio de Janeiro to Manáos, 3,204 miles, total distance 6,446 miles, and it would be necessary (at present) to allow at least six weeks for the journey, which would be performed in Brazilian steam-vessels the whole distance. It might, however, be possible in a very wet season to go by canoe (with perhaps a little portage) from Cuyabá into the Amazon direct. The voyage might thus take a third or a fourth part of the time.

By looking at the map, one may see that there are very few spots indeed in Brazil that are not well provided with water. The natural source of most of the rivers seems to be the central plateau, and the majority flow either south or north, from the States of Matto Grosso and Goyaz. As we have already remarked, a narrow mountain chain forms the watershed, in many cases, of two rivers whose course is widely divergent. Thus, we may call Brazil a country of many mountains. This is due naturally to the erosive influences of the rivers throughout the ages dividing and multiplying the mountain ranges. We shall observe a curious instance of this if we turn our attention to the Serra da Sincora, in the State of Bahia. The river Paraguassú has, with

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its feeders, separated that range into three or four distinct sections, confronting each other. There are many great cataracts and falls besides the Iguassú. The Rio Branco fall on the Ivahy (Paraná) being 80 metres high. The Onça on the Rio Grande 600,000 H.P. Dourado on the Parahyba 400,000. In São Paulo there are some 2 million H.P. unexploited, and in Minas over 200 falls and cascades. One Fall on the Rio Preto in Goyaz is 240 feet high, one on the Tocantins 200 feet, the Salta Grande, Jequitinhonha 140 feet, and that of Benevente (Espirito Santo) 160 feet.

More than half of Brazil consists of an elevated plateau cut into by a vast number of rivers. The mean altitude is from 2,000 to 3,000 feet, with isolated ranges up to 7,000 feet, and one peak (Itatiaiá) reaching 9,000 feet. We find the highest summits along the eastern side of the country, near the sea, and in the centre forming three long chains separated by the basins of the São Francisco and Paraguay rivers. Thus the elevation of the land is by no means commensurate with the length and volume of the rivers, and it may perhaps be safely asserted that the accidence of the topography is responsible for the extent of the fluvial system.

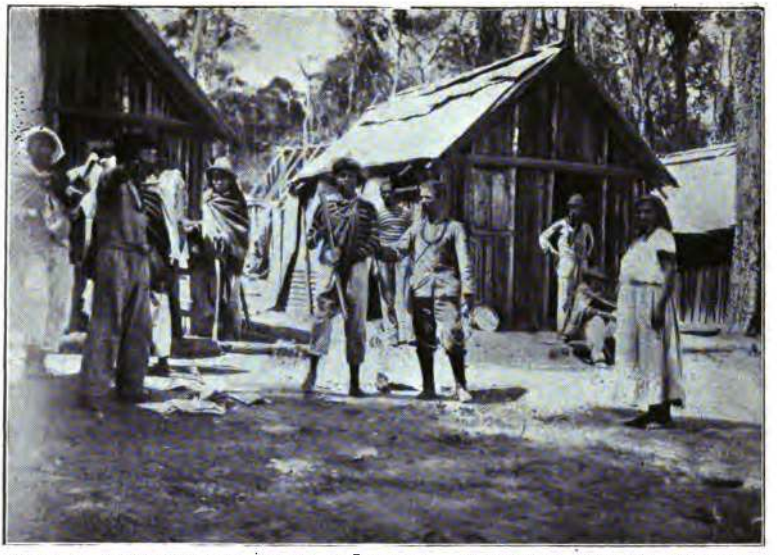
There are then, four quite distinct mountain ranges :—

(1) The Andes, and their offshoots, in which nearly all the great tributaries of the Amazon find their sources, in territory extra-Brazilian.

(2) The ranges which separate the valleys of the Amazon and the Orinoco, and which divide Venezuela and the Guianas from Brazil.

(3) The central plateau, rising in various localities into elevated peaks. This covers the greater part of Matto Grosso, Goyaz, central and western Minas and São Paulo, Pernambuco, Piauhy and Maranhão, and forms the watershed of the Paraguay, Paraná

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CAMP AT RIBEIRÃO DOS PATOS, S. PAULO. KAINGANG INDIANS (PACIFIED).



SEMI-CIVILIZED COROADOS, RIO GRANDE DO SUL.

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THE KAINGANG CACIQUE (CHIEF) RERIM AND HIS SISTER. SÃO PAULO.



MONUMENT COMMEMORATING THE OPENING OF THE AMAZON TO INTERNATIONAL COMMERCE, MANÁOS.

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and Uruguay rivers on the one side, and of the lower tributaries of the Amazon on the right bank, and of the Tocantins and the branches on the left hand of the São Francisco on the other.

(4) The coastal ranges, extending from the São Francisco river on the north, to the southern part of the State of Rio Grande. Here we find the sources of all the minor streams that discharge their waters into the Atlantic, as far south as the River Plate basin. These ranges are practically unbroken. There are no extensions of plain or wide valleys intervening. Here and there they approach quite close to the sea, in the vicinity of Rio Janeiro and Santos notably, and lower down they recede, leaving a wide alluvial strip in the State of Rio Grande, and in the north, in Bahia (at Cannavieiras), a boggy district, but in general the line is more or less parallel to the coast, and, like it, shows no very great tendency to become broken or undulating.

The coastal range is, however, divided into three distinct parts. The first, called the Serra do Mar, is very near the sea, and lies principally in the States of Espirito Santo, Rio de Janeiro, S. Paulo, Paraná, and Santa Catharina. In the State of Rio it is partly bounded on the west by the Parahyba river, which forms a natural limit in this direction. Its highest point is Itatiaiá, considered to be the culminating peak of the Brazilian mountain system. There are many different figures given for its altitude, but 9,000 feet is as near as possible. To the northward of the city of Rio, a short spur (separated from the rest by the Piabanha stream) is known as the Serra dos Orgãos (Organ Mountains). Here, within 40 miles of the capital of the Republic, we find a mean altitude of 6,500 feet, with one or two summits (Itaiassú) reaching 7,000–7,300

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feet. The massif of the latter peak is noteworthy for being isolated on the east from the main range of the Organs, by tremendous precipices. At Theresopolis (2½ hours from Rio) we find the finger-like peaks, " Dedo de Deus," etc., which give their name to the range. The southern half of the Organ Mountains is known as the Serra da Estrella, and reaches in the Cortiço (near Petropolis, two hours from Rio) about 4,500 feet, or some 2,000 feet above the valley in which lies Petropolis (the summer residence of the well-to-do). Behind Rio Janeiro itself we find the Corcovado (hunchback), 2,200 feet, the Tijuca, 3,300 feet, and more to the north, an isolated mountain of somewhat different formation to the surrounding peaks. It is called Tinguá, and gives its name to some curious mineral found in nodules, and known as Tinguáite. Its origin has been presumed to be volcanic, although no crater can be said to exist now. Altitude about 5,000 feet.

The second range (Mantiqueira) lies in the States of S. Paulo and Minas Geraes. At Itatiaiá, or near it, it becomes allied to the Serra do Mar, thus this mountain may be said to belong to two systems, as it may be stated to be in two distinct states. Like the Tinguá, it is of a different nature to the others in its vicinity, being composed mainly of later eruptive rocks, such as syenites and phonolites. The crest of this Mantiqueira Range lies at an average of 6,500 feet above the sea, thus forming the most dominating and imposing mountain chain in the east of South America. Its direction from the valley of the Tieté is N.E. generally, contrary to that of the third section of the system, the backbone of Brazil, as it is called (Espinhaço), which trends N.W. This latter forms part of the eastern edge of the São Francisco basin.

The Roraima range in Amazonas attains over 8,000 feet and Ibipaba in Ceará 3,300 feet. The most impor-

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tant mountains in the Mantiqueira besides Itatiaiá are situated near the pass by which the central railway makes its way westward at Barbacena. This little city has an altitude of about 4,000 feet, and may be termed the gate of the mineral district.

In the Espinhaço Range we find Itacolumi (near Ouro Preto), 5,700 feet; Caraça, 6,300 feet; Piedade, 5,800 feet, and Itambé, 6,000 feet. Pedra Branca (Caldas) is 5,560 feet, and Itabiré do Campo 5,000 feet, with other peaks approaching this altitude.

In Goyaz we find the Pyrenees, attaining nearly the height of 4,500 feet, and the Serra da Canastra reaching 4,200 feet. Amaro in Pernambuco is 4,000 feet, and the Pico das Almas (Bahia) 4,100 feet. In Espirito Santo the Serra de Itapemirim attains 6,800 feet, and that of Itabapoana 4,600 feet.

The culminating point in the Federal district is the Tijuca, 3,330 feet. São Paulo has several summits over 6,000 feet, and in Santa Catharina the Serra do Mar reaches an elevation of 4,000 feet.

The highest summit in Matto Grosso does not however reach 3,000 feet. The Paraná Plateau (Campos Geraes) extends into Santa Catharina and Rio Grande do Sul, and thrusts out spurs into Minas and São Paulo, and its maximum height is about 5,000 feet, with a mean level of about 2,000 feet.

The broken series of mountains to the west of the São Francisco, in Minas, and Bahia, attain some 2,500 feet.

It should be noted that the triangulation of most of the peaks in every state, but São Paulo and Minas, has not been completed, and that in consequence most of the *old* maps are topographically incorrect. There are very few lakes of any importance in Brazil, the largest being salt water lagoons in Rio Grande do Sul, viz., Laguna, dos Patos and Mirim.

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CHAPTER II

CLIMATE AND DISEASES

IT is impossible to speak of the climate of Brazil as a distinct concrete thing. The country is so immense, and its topography, as we have seen, so varied, that it has at least three different zones. Generally speaking, we find that the latitude in Brazil has hardly anything to do with its climate. Of course, it is naturally warmer (on the coast) in the winter at Pará than it is at Rio Grande, but the maximum summer heat is quite as great in all probability in the latter state. The average temperature of Pará is 26° centigrade, or 78° Fahrenheit. In spite of this rather high percentage (owing to the absence of winter, as far as loss of solar heat is concerned), the death rate is only 20 per thousand per annum. To show how figures prove misleading at first sight, we may note that Rio de Janeiro (within the tropic of Capricorn) has a maximum temperature of about 37° centigrade (98° Fahrenheit), whilst Buenos Aires (11 degrees further south) has a maximum of 105° Fahrenheit (shade). How can one account for such apparent anomalies? To understand the reason for this, one must consider the question of winds, and therein lies the secret of the relative healthiness of places lying well within the tropics, and in some instances almost on the line itself. We shall now proceed to deal systematically

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with the three different zones into which we propose to divide Brazil. It may be safely concluded, in fact boldly asserted, that the climate of Brazil, generally speaking, is quite suited to European colonists, whether from the north or south, and any government warning its subjects to the contrary acts either in blind ignorance, or stupid antipathy, with some reason for its calumny which may not be very difficult to ascertain. To those who are inclined to listen to warnings as to the unsuitability of the climate, I would say—Reflect, and see if the detractors have any other reason besides that of the welfare of the inquirer.

The average temperature of the first, or tropical zone, is 25° centigrade (77° Fahrenheit), but it must be divided by its relative humidity into three parts. (1) The upper Amazon; (2) the interior of the States of Maranhão, Pará, Matto Grosso, Piauhy, Parahyba, and Pernambuco; and (3) the coast line itself.

In the first region, the season of rains is from February to June. From the middle of October till January there is a modicum of wet weather, and from July to October, and January to February, the weather is dry. The temperature rises and falls rapidly in some parts of the Amazon valley. Now and then the thermometer has marked only 51° Fahrenheit. Although the day may be too hot, as soon as the evening approaches, the influence of the breeze is felt. Agassiz noted that a peculiarity of this climate was the almost continual action of a wind blowing from east to west. Maury said: "The rains falling abundantly during some months are invigorating." It is very rare that the wind becomes violent. There is between the Amazon region and India, for example, the same difference as between Rome and Boston, U.S.A. The two cities are situated in the same latitude, but their climates are, of

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course, very different. It must not be supposed that the average minimum of 64° Fahrenheit and maximum of 98° Fahrenheit is uniform all over Amazonia. In the elevated parts of the state, frosts have been observed; and the climate may be considered as temperate. At a contest in Paris, in 1898, between 1,200 children, the first prize for healthy appearance and physical development was given to a boy who had been born in Manáos, of Amazonian parents. Longevity is common. An authenticated case is chronicled of a man who lived to 145 years. Malarial fevers, found in some zones in the valley, are identical with the Italian forms, and in the Campagna of Rome are far more dangerous and difficult to cure.

The dangerous parts of the Amazon valley are limited to a very small section indeed of the country. There are 204,000 square miles of territory where, to quote Bates (naturalist on the Amazon), the climate is glorious. According to Hartt, part of the plateau has the best climate in the world, and one finds in the Campos Geraes, at least 600,000 square miles of lands well suited to stock raising, and even the cultivation of such cereals as oats and barley, as well as wheat.

Wallace says: "The temperature is marvellous, and the nights are noteworthy for the balsamic perfumes wafted through the air."

Herbert Smith wrote: "I have travelled through Amazonas during four years, without the least touch of fever. There are no sunstrokes ever known in this country."

Orton says: "Pará is an invalid's paradise."

Bates says, further, "that Englishmen who have lived 30 years in Pará, conserve the same aspect, and the same freshness of colour as they had when they left their native land."

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A British Scientist writes me: "During a residence in Manãos, I gained more than two stones in weight."

The Medical Officer of a British cruiser, which penetrated as far as Peru, told me the health of the crew was very good all the while the ship was in the river.

The extension of this first zone may be calculated as from the second degree north of the line to the tenth south. With regard to its diseases, there are *none* peculiar to the country, and certainly none which are not more the result of carelessness or unhygienic habits than of climatic or topographical defects.

Manãos is only some inches above the sea, and Pará about 22 feet, yet, surrounded as it were by water, they present the following remarkable figures.

	Lat.	Absolute max. temp.	Absolute min. temp.	Death rate per 1000.
Pará ..	1·27	91° (Fahr.)	66° (Fahr.)	20·2
Manãos ..	3·8	97° „	64° „	

Compare this with Madras, mortality 58·7; Bombay, 48·6; Mexico, 48·5; Lima, 34·7; Cairo, 34·6; Calcutta, 34·4.

The second division comprises the interior of the northern states of Brazil. The prevailing winds are from the N.W. and from the S.E. They are now warm and humid, now dry and cold, causing variations in the temperature of as much as 68° Fahrenheit. In the month of August the day temperature has reached over 90° Fahrenheit, whilst at night the thermometer has gone down to 44° Fahrenheit. However hot the weather may be, the wind and the rain cause it to sink rapidly. The dry season lasts about two months, with, at most, two days' rain during this time, but an exception must be made of the States of Ceará, Parahyba, Piauhy, and Rio Grande do Norte, where the dry season some-

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times extends to three or four months. The climate of the plateau of Matto Grosso is exceedingly healthy, the water is excellent, the air dry, and the temperature mild. There are no endemic diseases. Although this zone is within the torrid zone, frosts are frequently seen during the winter. There are also many parts of the States of Parahyba, Pernambuco, and Piauhy, where the average temperature does not exceed 68° Fahrenheit. It must also be particularly noted, in comparing such a temperature with that of Great Britain, for example (of about 50° Fahrenheit), that the latter is greatly reduced by the low winter ratio. Presuming that in England we had winters such as in the south of France, the mean temperature would not be much less than that of the whole of Brazil. The maximum heat encountered in London is quite as high as Rio de Janeiro (or even Pará, with a difference of 50 *degrees of latitude*), whilst, as every one knows, the extremes of temperature are extraordinary in the British Isles. I have noted a November reading of 12° Fahrenheit, and an August one of 95° Fahrenheit in the shade.

The extension of this zone may be reckoned from 10° south of the Equator, to the line of Capricorn, 23½° south (about), comprising Sergipe, Bahia, Goyaz, Espirito Santo, Rio de Janeiro, Minas Geraes, almost all Matto Grosso, and the western part of São Paulo.

The third zone is to be calculated from the tropic of Capricorn to the southern frontier. It must be divided into two parts, the first comprising the coast line of part of Rio de Janeiro, São Paulo, Paraná, Santa Catharina, and Rio Grande do Sul, where there is an average temperature of not more than 66° Fahrenheit. The climate along the whole of this zone, and indeed much further north, is very equable. The Serra do Mar, being very steep on the Atlantic side, and covered with luxuriant

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and dense vegetation right up to its summits, or to within four or five hundred feet of them, attracts the rain and retains humidity. The highest point attained by the mercury at Rio Janeiro, shut in as it is by high mountains, is quite 6° lower than at Paris. If we take the train northward, after crossing the bay at Rio, we shall find two summer resorts; one, 3,250 ft. above the sea, has a mean temperature of 60° Fahrenheit, with a maximum of about 89° Fahrenheit, and a minimum, July–August, of perhaps 28° or 29°. The other, situated 2,500 ft. above (and so near Rio that the city may be seen from the summit of the pass in fine weather), has a mean heat of 64° Fahrenheit, a maximum of 91°–92° Fahrenheit, and a minimum of 1° below freezing point. Novo Friburgo, situated some little distance further on another line, is 2,845 ft. in altitude, and has a mean annual temperature of 62° Fahrenheit, a maximum of 75° Fahrenheit, and a minimum which marks freezing point. The salubrity of the capital itself is unquestionable, being about as low in death rate as Paris and Berlin. Santos is now quite healthy, and yellow fever may be said to have *entirely disappeared* from both cities. The greater part of the State of São Paulo, and southern Minas, and the higher parts of Rio Janeiro, as well as all the land still further south, is subject to frosts during some weeks of each year, but of course the days are delightfully fine and invigorating. The wet season is usually from December to April, but at the beginning and end of it, the rain frequently comes on after three or four p.m., and although it may pour in torrents all night, the morning is gloriously fine. Warning is generally given of the approach of a wet spell, by a week or two of oppressive heat during the day. At Villa Jaguaribe (São Paulo) the mean annual temperature during 1909 was about less than 60° Fahrenheit. There were

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65 days of frost, and the maximum winter temperature was 70° Fahrenheit, and the minimum 24° Fahrenheit. After a good storm, the air is crisp and invigorating, and one feels impelled to get out and up the hills. I should hardly imagine that there is a more agreeable climate than that of the mountain resorts during the winter (April to September). It is hardly possible to say there are more than two seasons, as flowers are blooming in profusion all the while, and one need never complain of either the heat or the cold. In 1907 there was an influx of new diplomats, and it was rather amusing to notice their complaints about the weather. They said they had not come to Brazil to be chilled to the backbone. To sum up, there is no doubt that in many towns of the interior, the mortality is not so great as in similar places in Europe; indeed in some cities, as Ponta Grossa, in Paraná, there are years without a single death. St. Hilaire, in speaking of this region, says, "There is no place in this world where a European might establish himself with greater advantage." The words of Wallace will prove a fitting termination to the unanimous chorus of appreciation: "In Brazil a man may, with six hours of labour, obtain more of the comforts and necessities of life, than by twelve hours' work in Europe." The adventurer has nothing to fear. The death rate of this vast country will bear comparison with any other. Medical science is undoubtedly as far advanced there as anywhere, and as far as sanitary hygiene is concerned, Brazil took first prize at the great International Congress recently held in Germany. Personally speaking, I would far rather be in the most despised Brazilian city in the interior, than in a provincial European town.

It may be a recommendation or not, but within the short space of time of three years in the mountains,

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I gained not less than two stone in weight, in spite of the most active life, passing at least half my time either in the depths of the virgin forests or attacking the most difficult peaks, sometimes marching 16 and 18 hours a day, and getting but six hours' sleep in the twenty-four.

A few extracts from the report of Mr. Milne Cheetham (First Secretary of the British Legation) for 1908 may not be out of place here, and they are the more noteworthy as being from a source entirely unprejudiced in favour of Brazil:—

"The climate of Rio de Janeiro is salubrious, and the yellow fever has to all appearance been practically stamped out, as it has at Pará since March, 1911. Sanitary measures, both in it and Santos, have been taken with beneficial results, the health of both cities having entirely changed during the last few years."

"Much of the mortality, even in the most infected districts of the upper Amazon, is due to bad food in sickness and improper care."

"The death-rate of many cities, moreover, is also raised by outside patients. The highlands of Brazil are extremely healthy."

"In the month of April last (Autumn) readings of the thermometer were as follows:—

Rio de Janeiro	..	70° to 80° Fahrenheit.
Pará	..	77° Fahrenheit.
Ceará ..	..	84° ,,
Pernambuco	..	82° ,,
Bahia ..	..	78° ,,
Espirito Santo	..	80° ,,
São Paulo (city)	..	67° ,,
Curityba (Paraná)	..	65° ,,
Florianopolis	..	64° ,,
Porto Alegre	..	64° ,,

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Average temperature (centigrade) in São Paulo city: Spring, 18·7; Summer, 21·4; Autumn, 18·7; Winter, 14·7.

At Taubaté, Campinas, the maximum is 26 and the minimum zero. At Santos, the winter maximum 17, minimum 12. At Poços de Caldas, summer average 19·1, winter 14.

At Rio de Janeiro, annual maximum 34·8 C., December; minimum 12·0 C., June.

On the Campos Geraes in Paraná (25° south latitude) there are often 3 degrees of frost in winter. At 28 degrees south, 8 to 12 degrees of frost (14 in 1901). Snow is common in Rio Grande do Sul, below 28° south, often reaching 2 feet in depth in exposed situations. The summer is, however, usually hot and dry.

The death-rate is 20 per thousand. The birth-rate is:—Rio de Janeiro, 25·18; Porto Alegre, 27·73; Florianopolis, 34·73; Curityba, 33·45; São Paulo, 35·63; Fortaleza (Ceará), 35·24. The births for the State of São Paulo in 1907 were 108,438, whilst the deaths were 50,000. The birth-rate for London is but 20 per thousand. There are in France 184 centenarians to 38,000,000, whilst in the city of Rio de Janeiro alone (population 811,000) there are 178.

The ratio of density of population in Rio is as follows:—

As compared with London, 20 times less.
,, ,, Berlin, 40 ,,
,, ,, Paris, 50 ,,

and it has more houses than the latter city, with a population of 2,700,000.

Fletcher and Kidder (*see* Bibliography) say, on page 268: "It would seem as if Providence had designed this land for the home of a great nation."

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Bigg-Wither (*Pioneering in S. Brazil*): "There is ample timber, water and pasture, and *air, than which none purer or more invigorating can be found in the whole world.*"

In conclusion, it may safely be stated that a constant influx of colonists from every part of Europe, and even from Asia (Syria), has largely increased the mortality in all the more accessible parts of Brazil. This has been due to the abominable conditions under which the greater number of these people travel to Brazil, and also owing to the too frequent incapacity of the ships' doctors. It is notorious that the steamship companies pay usually a nominal wage to such medical men, who are either without means to establish a practice of their own, or prefer such service for the sake of their own health. Frequently there are more than 2,000 persons crowded together within a limited space, with one physician to attend to their needs. Many of the poor emigrants either embark with the germs of disease within their systems, or contract it on board, owing to the bad diet and want of exercise. This is more especially true as regards the little ones, but a great deal has been done of late by most of the better class lines in the provision of new steamers, fitted with 2, 4, and 6-berth cabins for families.

A great part of the mortality in the Brazilian cities is due to the newcomers who live under the worst possible conditions. Their habits are difficult to eradicate and the exceedingly backward state of public and private hygiene in Spain, Portugal, Italy, Russia and Poland is reflected in the annual returns of the Demographical Department. The death rate is, of course, greatest among the children.

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Mortality. Rio de Janeiro.

	1903.		1911.
Yellow Fever .	584	..	2 (brought in from another port,
Small Pox . .	1,000	..	8
Malaria . . .	1,036	..	368
Beriberi . . .	120	..	12

Compare the mortality from malaria with that in Russia, the Balkans, and Algeria. In this latter country there were 250,000 cases in 1904, 10,000 proving fatal. The statements of many foreign medical men are often entirely at variance with the true facts. The fall in the death rate has been rapid of recent years, especially when one studies the parallel increase in population, and the great influx of European settlers, naturally more liable to infection than the natives, and it must also be emphatically asserted that a great percentage of the new-comers are especially liable to disease, owing to their enfeebled physical condition after a long voyage under deplorable conditions, both as regard sleeping accommodation and diet.

Death rate from Consumption.

Rio	1·27	Tokio	3·00
London	1·60	Dublin	3·60
Rome	1·80	St. Petersburg . .	3·30
New York . . .	2·20	Lisbon	3·60[1]
Paris	3·90		

Rio, 1903. Population, 700,000. 3,321 deaths from tuberculosis.

Rio, 1911. Population, 850,000. 3,566 deaths from tuberculosis.

[1] Principal immigration from Portugal to Rio.

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The present conditions in the large cities in Brazil, especially Rio de Janeiro, are such, that no country can point the finger of scorn. The population of the capital is spread over an area greater than New York and double that of Paris or Berlin. Rio Janeiro to-day may be truly called a garden city. In 1872 the death rate from consumption was 6·46 per 1,000; in 1880, 4·95; in 1890, 4·23, and in 1906, 3·87 per 1,000.

These figures are eloquent enough, and when one comes to examine the Immigration statistics presented in another chapter, it will be readily understood that the Port Sanitary Authorities of Rio and Santos, and those of the Colonization Department, in the same cities, and in S. Paulo and elsewhere, have a great deal to do with some forty different nationalities.

It must also be fully understood that the Negro and the lower class Mulatto between them account for some seventy-five per cent. of the mortality in Brazil.

When Dr. Oswaldo Cruz first took in hand the campaign against the mosquito, he met with great opposition, especially when house to house visitation was determined on. Attempts were made (even in Congress) to stifle his energies under the plea that citizens' liberties were endangered. Fortunately Dr. Rodrigues Alves, President of the Republic, was on his side, and a most vigorous and highly successful warfare was carried on. Seventy-two doctors and a host of students set to work, and every house in the Federal District was thoroughly disinfected. Not a single open tank, gutter, fish pond, puddle or other deposit of stagnant water was left at the mercy of the larvæ of the noxious insect. Nearly 1½ million reservoirs, tanks, etc., etc., were cleaned in 1906.

A brigade 1,500 strong of *Mata mosquitos*, as the sanitary inspectors and their men are termed, is still engaged in the good work. The sewers are visited daily,

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and kept continually purified by means of Clayton's pumping apparatus, and the same means is employed in disinfecting ships lying at anchor in the bay. Every public elementary school has large coloured pictures illustrating the life history of the mosquito, and demonstrating the means of preventing its propagation, and giving instructions in the use of quinine, etc.

If we strike a fair balance, we shall find that this country is assuredly one of the healthiest in the world, and that no other tropical or semi-tropical region of the same area can possibly rival it, even as far as salubrity is concerned.

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JAVAHES GOYAZ UNCOVERED IN RESPECT TO THE BRAZILIAN FLAG.
Their Encampment in the background.



Photo] [R. KRONE.

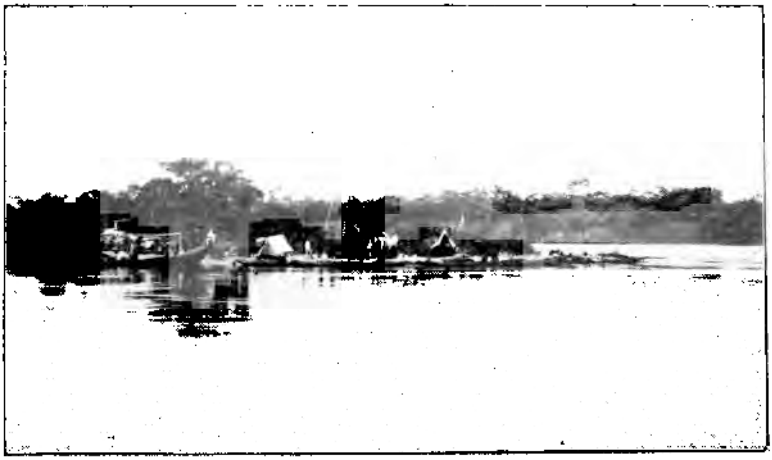
GUARANY INDIANS, MATTO GROSSO.

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CAMP AT RIBEIRÃO DOS PATOS.

In the foreground is a great tree with a crow's nest as observation post, from which the interpreters of the Indian Department call the wild Indians to parley with them.



FIRST ENCOUNTER WITH THE JAVAHES IN GOYAZ. THESE INDIANS ARE ENTIRELY NUDE. BANANAL ISLAND, RIVER ARAGUAYA.

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CHAPTER III

ANTHROPOLOGY AND ETHNOGRAPHY

ACCEPTING the hypothesis of Dr. Lund, the Danish scientist who spent most of his life in Brazil, that the country was the first part of America to be thrust up out of the sea, the theory of the settlement of South America by immigrants from Yucatan, or the Pacific, loses its value. W. Foster (*Prehistoric Races*, Chicago, 1873) said that all America was peopled by autochthonous wanderers from the Brazilian Highlands. Cerneau (*Histoire du Canada*, Quebec, 1859), expressed his belief that all the American languages had a common origin.

Keane divides the aboriginal Brazilians into four great groups, or families, namely, Cariban, Arawakan, Gesan, and Tupi-Guaranian. The physical features of the country closely connect themselves with the inhabitants, but there is no correspondence between the configuration of the interior and its political divisions. Both the racial constituents from which the American type was developed appeared in Brazil. The later neolithic Mongolian immigrant, who came by way of Behring Strait, represented advancing peoples probably more numerous than their pleistocene predecessors, and also possessing a much higher development. Survivals of the type would, therefore, seem as if they should be more widely scattered, and distinctly marked, when

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compared with the ruder, fewer, or less formidable men. There is, however, no doubt about these Brazilian Proto-Mongols. As Burton remarks, this strain demonstrates itself in big, round Calmuck skulls, flat faces, with broad, prominent cheek bones, oblique oriental eyes, rather brown than black. They have also dark, thick eyebrows and thin moustaches fringing large mouths, with pointed teeth, and sparse beards, hardly covering the long, pointed chin. Variation, through vast ages of wandering, produced another sub-race. It came to the southern continent when the climates of the far north were much milder, and there were no spaces of open sea between Scandinavia and Greenland. These (the first arrivals in all probability) were scattered widely over the country, principally due to the pressure exerted by the hordes of invading Asiatics. They seem to have become more or less concentrated in Minas Geraes, and it is supposed that this state is the centre whence subsequent migrations took place.

In the new world these stout, dark men, with narrow skulls, receding foreheads, flat crowned incisor teeth, and projecting jaws, form a separate group that was exterminated, absorbed, or driven into remote and isolated regions. Keane supposes them to have held their own for some time against the invaders, but according to the scientific dogma of Von Virchow, prognathism is not compatible with normal intelligence, and, therefore, this stand could not have been of long duration.

Tribal catalogues and philological analyses will go but a very little way towards bringing these groups into view as they are. Information contributive towards this end is very unequal with respect to different families, while for all of them the constant intercrossing, wandering, regrouping, and decay, have done their work in the way of modification and destruction. Whole popula-

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tions have vanished, leaving hardly a trace behind. In others they have been so broken up, that their very tribal names and original languages have been entirely lost. The mode of their life, in very small communities, continually subdivided by the slightest dispute or difficulty, was a very potent factor in their disappearance. Mirhanas, for example, is an arbitrary title for a multitude of indistinguishable ethnic fragments, including about half of the Indians in the valley of the Amazon.

Carayas is a term similarly applied to those in the basin of the Tingú and Araguaya Rivers. Those Indians called Coroados are so termed, because of their tonsures. Botucudo means one who wears a botogue or labret (an ornament of shell or bone inserted into the lip).

Tapuyo, originally signifying stranger or barbarian, is now synonymous with a savage well disposed towards foreigners. Caribs cannot be traced beyond Central Brazil, where they appear to have originated. Although these latter had a reputation as warriors, the fugitive slaves, fighting by their side, far excelled them.

Carijones, with Witotos, on the Amazon, are also affiliated to this group, as are likewise some scattered bands of Pimentaires roaming the borders of Pernambuco and Piauhy. The manners and customs of these tribes were (and are) so dissimilar that it is easy to understand how it is they never formed a real nation, and even to-day do not advance a single step towards civilization, unless taken in hand by the white man. It is supposed that the flat heads found in certain regions of the plateau are derived from unions between the conquering Europeans and the Caribs. The Arawaks of Guiana call themselves Loconos (or natives). They are widely distributed in Brazil, but their origin is impossible to discover. Like many other groups, the

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tribes are hardly more than large families, each under its own elder. They are, contrary to the Caribs, very cleanly in their habits. They have adopted many European articles, whilst the latter live in filth, and reject all foreign improvements. There is, however, an offshoot of the Arawak group (Warrans) possessed of much ability in canoe construction, and having the virtue of thrift, but indescribably dirty in their ways. The Carib distorts his limbs by ligatures, uses the labret, arrays himself in feathers, skins, and hand-made fabrics, whilst the Warran seems to be entirely destitute of personal vanity, is more stolid than his neighbours, and not being so well developed physically, hard work soon exhausts him. Both these loosely connected hordes build temporary huts of branches of trees, and wherever the Warrans are permanently established, they construct pile dwellings.

All of these races living in the wide river basins are in the habit of proceeding to the most extravagant excesses. These orgies are, of course, succeeded by periods of morose, surly depression, culminating in destructive impulses. Primary traits having a true value for classification purposes, are more marked amongst the Gessan than in any of the other families inhabiting Brazil. They had this name from Von Martius, who took the common terminal of tribal names for a collective designation. This individuality (Botucudo, as Keane calls it), in large measure, escaped the process of evolution, which created a distinct American type out of entirely different elements coming from opposite quarters of the globe. They preserve those characteristics which distinguished their paleolithic European progenitors. When taken *en bloc* the mental inequality shown by divergent branches of other stocks is here scarcely recognizable in varying degrees of

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aptitude, more or less skill or ingenuity, and an unequal response towards incitements that initiate progress. Gessan tribes have hardly become modified, they remain undeveloped, and no group of this family is otherwise than completely savage.

Caribs, Arawaks, and Tupis are sometimes indistinguishable. Structural survivals cut Aimores or Botucudos off from these, and closely unite them with proto-Europeans. Kayapos, Akuas, Cholengs, Kames, and several minor hordes represent a single group, extending from Amazonia to La Plata. These are true aborigines, fragments of a mass broken up by Tupi-Guarani invaders, and the nearest representatives, and probably the direct descendants of that primitive race whose osseous remains have been found in the Lagoa Santa caves, and Santa Catharina shell mounds.

Botucudos, Tapuyos, Capayos, etc., in eastern Brazil, have not even reached the stone age, but although on the great Solimões one may travel for weeks without seeing a fragment which might be worked, every tribe within this latter region has contrived to remedy the deficiency. Botucudos use wood almost exclusively, and until lately were without hammocks, and lived entirely on such poor provision that badly equipped hunters could supply; their diet consisting of every kind of insect or reptile that might by any stretch of the imagination be termed edible.

Tupi-Guarani tribes are distributed by Deniker, over the plains of the Amazon and Orinoco, and in Guiana, and on the table-lands of eastern and southern Brazil. This is a composite group, as indicated by its name, although the difference is largely geographical. Their ethnical constituents are, in fact, similar, but the Guarani branch are presumed to have come from Paraguay. It may be remarked in this connexion

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that this country is full of the Guaranis to-day, the bulk of the menial service being performed by these Indians, so much so that it is frequently necessary for employers to learn Guarani in order to make themselves understood, even in the capital. Early missionary priests constructed a sort of lingua franca, which by degrees came to be known as Tupi, although the real language of the Tupis had originally a great range, covering about one-fourth of South America. Piso, a Dutch physician, says that amongst the Brazilian Indians, the husbands go to bed when a child is born, and eat the most nourishing food they can get in order to recover their lost strength.

Tupi communities, purer in blood, and far more powerful than now, or at any rate much more numerous, were established on the Amazon itself, and all its branches. At present each has dwindled, and, except along the Solimões, it is impossible to find an unamalgamated population.

These groups, in common with most others, crossed in all directions, have mingled foreign strains amongst themselves, until by far the greater proportion are now Mamelucos (descendants of aborigines and white men); Mulattos, Cafuzos (crossed between Negroes and Indians); Curibocos, who combine Cafuzo with Indian blood, and Xibaros, the progeny of Cafuzos and Negroes.

Bates uses the term Tapuza for what he calls semi-civilized Tupis. Properly speaking none have reached this degree of social development, although in some instances there has been a greater or lesser adoption of civilized appliances. At certain places aborigines, or at least barbarians, masquerade as cultivated Christians, but this is all outside show. The savage remains at bottom.

When Cabral reached Brazil he found Guaranis estab-

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lished from Paraguay to Uruguay, in southern Brazil, and already united to Tupis. They were without clothing of any kind, although they used some personal decorations, which have since been abandoned. Nadaillac reports them as living in commercial settlements, usually consisting of four long houses built in a square.

Tattooing and scarification is still common, and they paint themselves with red and black designs, and use the labret.

This country exhibits every kind of stone implement, from the rudest paleolithic wedge, to finely-shaped arrow-heads of rock crystal, and the polished neolithic axe. There is no possibility of explaining why Botucudos use wooden arrow tips when plenty of shells, stone, and metal are at hand, or why Caribs, Arawaks, and Tupis often prefer stone to iron.

The Gessan tribes advanced less than any others, and accomplished nothing representing the lowest degree of human life in communities. An average Botucudo hut is a rude bamboo erection, about 7 feet high and 9 feet wide. The openings are barely large enough to crawl through, and the interior is black with soot. Bugre settlements consist of a few of such structures standing in partial clearances in the forest.

These Indians are not more than 5 feet 4 inches in height on an average, and their lower limbs have generally grown crooked. They cut off their coarse, black hair in front, and ornament it with toucan feathers, stuck on with wax. Every Bugre pulls out his eyebrows and eyelashes, and pulls down his under lip with a huge appendage, besides ornamenting himself (if fortune be kind) with a necklace, composed of rows of teeth; their bows and arrows are very inferior, and a kind of snare made of creepers is more effectual against big game. They still carry stone axes, counterparts of

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those used in prehistoric times in Europe. Attempts to civilize these wretched beings have generally proved entirely in vain, and of 27 taken prisoners by Mr. Bigg-Wither, all except one boy died of a mysterious complaint, in spite of washing, clothing, and proper feeding; or, in all probability, because of these improvements in their condition and appearance.

Near the coast, the Lingua Franca (or Geral) predominated amongst the tribes who had made their way thither from the central plains. Those Indians who have come into enforced and continual contact with the white man are generally docile, but taken as a whole it is very difficult to inculcate habits of order and cleanliness in them.

A peculiar characteristic of the whole of the Indian races is a deeply seated superstition. They believe in lunar phantoms and beings of light, who are spirits of good. They are afraid of certain dark shadowy forms, powers of ill, vengeful, and awful, whom it is necessary to propitiate. These are supposed to be the souls of their ancestors. They call God Tupa, and say that dead men's souls are converted into demons. They also believe in a water sprite or syren (Mãe d'Agua), and are afraid of bathing in the dark, except in company, as traditions are current that many had been dragged down into the lakes and rivers, and never returned. A little reflection would have taught them the real, tangible cause of the loss of their fellows, as alligators are naturally very common in many parts of the country. In common with other primitive races, their natural powers of observation are very highly developed. Many of the tribes are capable of producing artistic ceramic ware, and they have some ability for wood-carving, and making grotesque masks. Some of them plant maize and mandioca, weave baskets, and construct large canoes, of

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SCELIDOTHERIUM LEPTOCEPHALUM, OWEN. GIGANTIC FOSSIL SLOTH, NATIONAL MUSEUM, RIO JANEIRO.
By the kindness of Dr. Carlos Moreira.

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INDIAN HUT AT RIBEIRÃO DOS PATOS, S. PAULO. THE CHIEF RERIM IN THE CENTRE.

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course, by the hollowing out process, aided by fire. Amongst the River Indians harpoons are used, which are fitted with heads that become detached on entering the fish, or manatee, the shaft acting as a float. The tradition of a flood is current amongst them. It is related that the Chief Tamandaré, on the rising of the waters, took his wife in his arms, and climbed up into the crown of a palm tree; there he remained for three days and nights, until the flood began to recede. The palm, which had become uprooted, had floated into the middle of a plain, where it stopped, and Tamandaré descended, and saw that all other human beings had perished. He remained on the spot with his wife, and originated the great Guarani race, like himself, mighty hunters. Very few traces of the early inhabitants of Brazil exist, Dr. Lund being the pioneer of ethnographic discoveries.

There are many legends circulating amongst the Indians, and they are in the habit of sitting round their camp fires to listen to a tale-teller, sometimes the whole night through. The dominating note in these stories, and indeed in the whole character of the race, is melancholy. They were (and are) a very musical people, and it is remarkable to notice how Brazilians to-day are devoted to melody. Hardly a town of the slightest pretensions is without its band of music, in spite of the great cost of instruments (all, of course, imported). Many of these orchestras are quite good, and we find *free* schools of music established in the most unlikely places. Undoubtedly the aboriginal character is preserved amongst the white people now inhabiting Brazil. Traces are found of its influence in the mode of celebrating the carnival, in the very character of the national music, in its literature, and sometimes its art. The Negro, on the contrary, has not made himself felt to any

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great extent, of course, owing to his thraldom, as well as to his natural characteristics. The evolution of the Brazilian type is proceeding slowly, but surely, and out of the Sclavo-Teutons, Ibero-Tuscan-Romanos, Franco-Iberians, Syrians, and remaining aboriginal elements, is being constructed a composite, but none the less virile race, destined to play a great part in the future history of the world. The predominance of the white is assured. Colonization is the predominant question of the day, and although such experiments as the introduction of Asiatic settlers (Japanese) are somewhat dangerous ones, there is no doubt as to the final result. Envy and ignorance may work hard to stay the progress of Brazil, but her advance to the position of a great nation is sure, and even now she demands and obtains a prominent place in the world's councils. Who knows what the future holds in store for the " Colossus of the South," as she may fitly be termed.

The greatest problem is, not the civilization of the Brazilians, but that of the nations who send forth their multitudes across the seas, to the smiling valleys of the great Republic. If the right sort of colonists are sent to Brazil, the country will soon prove her fitness to take a place in the forefront of nations.

It seems very apropos of the subject of ethnography, to consider two diametrically opposed points of view, as far as the introduction of Anglo-Saxon colonists are concerned. The British Government warns its subjects that Brazil is not a desirable field for emigration, and as a retaliation, Brazilians frequently say—The Englishman is not suited to Brazil.

Which side does the truth lie ? As far as the second hypothesis is concerned, it is easily demolished, for no one with an open mind will deny that the English yeoman represents the highest type of agriculturist,

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especially as far as his standard of education and living is concerned. Is not then the best more suitable than the inferior? The first dogma is not so easy to destroy but I have done my best in this book to show the varied resources of Brazil, and those who think they are fitted to make a better living there than in England, must take the necessary steps to proceed thither. As far as Americans are concerned, no doubt there will soon be a steady stream of settlers with some capital to ensure success, and what is wanted is men who are not likely to prove a burden to the country, such as farmers and stock breeders, and specialists in all branches of agriculture.

Dr. Lund, the celebrated Danish scientist, was the first to discover the remains of cave-dwellers in Brazil, near Sête Lagoas, in Minas Geraes, where he spent many years in researches. The great cave is entered through a fissure in a vertical wall of limestone, forming part of a series of similar formations in this part of the valley of the Rio das Velhas. Ripple marks are plainly visible on the rocks some 70 feet above the plain, and other indications show that the whole of the country was an immense inland sea at some remote period in the world's history. The fossil human bones were found in connexion with those of a vast number of extinct animals. The remains are estimated to be at least 3,000 years old, and have been entirely transformed into limestone, having an outward appearance like bronzed metal (*see* illustration No. 1). A large number of caverns were examined by Dr. Krone in the valley of the Ribera river, São Paulo, in 1908, but traces of human life were almost non-existent. A skull from the cavern of Babylonia, Minas Geraes, of Botucudo type has a large capacity and an extremely brutal outline (No. 2). On the island of Maracá, north of the Amazon, an immense number of

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funeral urns have been found containing remains of a race far superior to existing types. Two skeletons were carefully examined, and the principal characteristics of the craniums are—Broad fronts, prominent sinuses and long faces, with an angle of 70°, as compared with 62° to 67° in the skulls from Marajó Island. The cranium from Ceará (No. 3) differs widely from those of Lágôa Santa, these latter showing marked dolicocephalic formation with an index of 69·72°. No. 3 is of a more recent type with a frontal inclination so pronounced that the forehead disappears entirely. The



No. 1.—Lágôa Santa Skull.

Described by Drs. Lacerda and Peixoto, *Archives of the National Museum* Vol. I. (1876).

funeral urn (No. 4) from Maracá Island is one of a large and very varied group found a number of years ago. In many cases plants had found their way into the vessels and the roots forced their way out below through the pottery, twisting and twining amidst the human remains. Here, and at Pacoval, a small island on a lake in the great island of Marajó, the idols and ornaments, and funeral urns buried in the mound dwellings, represent every type of human physiognomy, as if the ancient inhabitants had studied all races of mankind. The

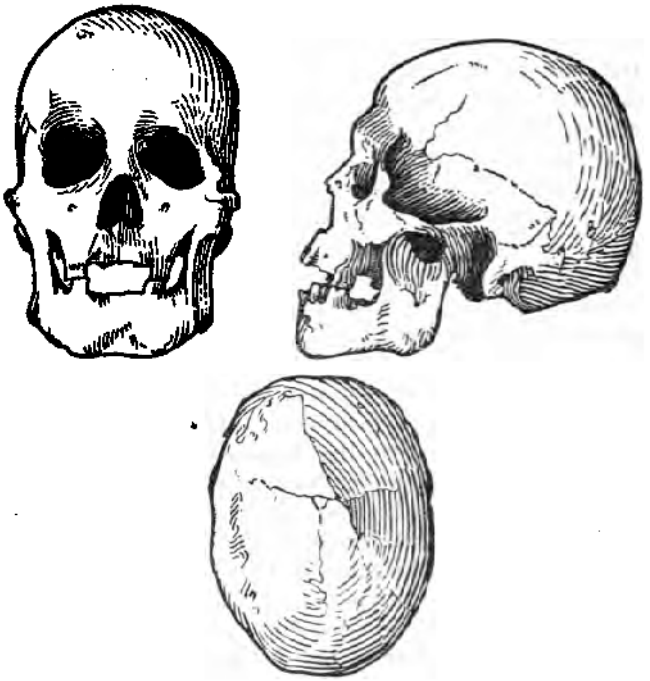
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figures have in many cases the same characteristics as those in the Aztec monuments in Mexico. Amongst the most finished and artistic specimens of ceramic art, one finds cheek by jowl, rudely executed designs on coarse unglazed pottery. The funeral mounds of Pacoval were evidently raised when the level of the lake was high, and were largely constructed of mud, etc., extracted from the lake, mixed with vegetable matter and mould from the surrounding plains. The bodies had apparently been buried temporarily elsewhere, and when the bones were quite destitute of flesh, they were placed in one of the Igaçabas or funeral urns in their proper position as in life, with the skull resting on the top; and a cover being placed on the urn, it was deposited in the mound in a vertical niche. The mound builders evidently believed that the departed had no necessity for a fleshy covering to the bones, and curiously enough, broke up all the cooking and other vessels of the defunct individual. An extraordinary thing with regard to the decorations on the Igaçabas is, that although a uniform scheme prevails, no two pieces are alike, and not a single leaf, flower, or fruit is represented on the funeral urns or other ceramic ware of the district.

Amongst other curiosities are rattles containing pebbles, labrets, or lip ornaments (Tembetás) in beryl and rock crystal, taking a lifetime to shape and pierce, basalt, syenite, amazon stone (No. 5), fossil resin and bone. Cornelian is only found in Rio Grande do Sul. Those made of crystal and harder substances were (and are) only used by chiefs. Jadeite and Nephrite was also in use, but not a single trace of either of the two has been discovered in any part of Brazil in a rough state.

The source of these ornamental stones is unknown, even in Mexico itself, from which those found in Brazil (Pará southwards) are presumed to have come, perhaps

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No. 2.—Botucudo Skull, Minas Geraes.



No. 3.—Skull from Ceara.

Described by Drs. Lacerda and Peixoto, *Archives of the National Museum, Rio*, Vol. I (1876).

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by way of the Rio Negro and the Magdalena. The Tembetá was used as an amulet to ward off danger, and the Indians of Espirito Santo use at the present time large discs of wood. Soapstone has also been worked up into various ornaments, a curious instance of which is seen in No. 7. Beads of glass supposed to be of Phœ-



No. 4.—Funeral Urn from Maracá Island off North of River Amazon.

Described by Dr. Ladisláu Netto, *Archives of the National Museum*, Vol. VI (1885)

nician origin, and various tools and weapons fashioned out of oligist, porphyry, fibrolite, agate and serpentine, etc., have been found in the Sambaquis (kitchen middens), or shell mounds in the south of Brazil. These curious conical-shape hillocks are found all along the coast from Pará southwards, but yield very little indication of the

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degree of civilization of the extinct Indians, that is in the way of human remains. The ornament illustrated in No. 8 is a Tanga reduced from the natural size of $14\frac{1}{2} \times 11\frac{1}{2}$ centimetres. The greatest thickness is 4 C. These were used by women to cover their *partes pudentes*, especially when on the march and in crossing streams. The male members of the tribe encased the virile member in a finely plaited bag, closely fitting, for the sake of protection. The Tanga was always made of the finest glazed ware, and suspended from the waist by a



No. 5.—Tembetá, or Labret of Amazon Stone, National Museum, Rio de Janeiro.



No. 5A.—Syenite Labret, or Tembetá.

From the Archives of the National Museum, Rio, Vol. 6, 1885.

cord of vegetable fibre by means of the holes near each end of the top.

The Rio Doce Indians (Espirito Santo) use a cloth Tanga, but the females often go entirely nude. Both sexes on the Panca river dispense with clothing, but paint their bodies with the red dye of the Urucum (Annato). The full page plate represents a mummy from Rio Novo (Minas), naturally preserved. Very few cave-dwellers exist in Brazil, but quite recently the discovery has been made that some of the Bugres of Paraná live

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BORORÓ INDIANS, MATTO GROSSO.

From Prof. Von den Steinen's *Unter den Naturvolkern Central Brasiliens*. (Dietrich Reimer, Berlin.)

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COLONY GAVIÃO PEIXOTO, TOBACCO PLANTATION, S. PAULO.



APPLES, ITATIAIÁ.

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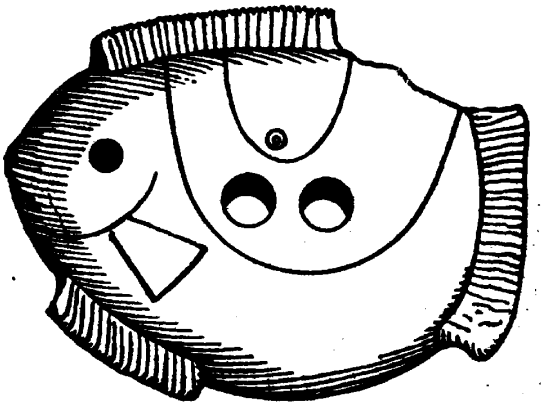
No. 6.—Vessel of Ceramic Ware. Marajó Island (Pará).

By the courtesy of Dr. C. Moreira, National Museum, Rio de Janeiro.

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in burrows scooped out in the earth in the Campos Geraes.

The volume referred to above contains a valuable series of comparisons of picture writing amongst several races in different parts of the world. The Mundurucus of the River Tapajos eat almost anything, and their



No. 7.—Soapstone Fetish found in the River Trombetas. This Mascot was hung round the Neck of a Fisherman for Good Luck.

Archives of the National Museum, Rio (1885).

women are veritable better halves, as they make nearly everything in use. Amongst these people the widow usually marries her brother-in-law. No one may marry who has not been tatooed. During pregnancy the husbands take care not to kill any animal in case they should injure their future offspring. Each tribe has its own medicine man, and they take care to bury their dead within their Malocas (huts), and if they die at a distance

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the head at least is brought home. These Indians fattened up their prisoners, and gave them wives during the time they remained in captivity, previous to being eaten. They also made a pretence of carrying off their brides by force. The Mahués of the Rio Negro differ from most Indians in not using the labret, and the nomads of Espirito Santo are the only ones in the south



No. 8.—TANGA, IN FINE GLAZED POTTERY, FROM MARAJÓ ISLAND, PARA. IN NATIONAL MUSEUM, RIO DE JANEIRO.

who use poisoned arrows. These savages play a bamboo flute with the nose, repeating continually a series of doleful notes ranging from B to F natural. Bamboo tubes are also used to convey water on journeys. In the north, in Pará, etc., consumptives are segregated in camps usually on the opposite side of a river, and looked after by old women, the young and healthy members

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of the tribe being forbidden to go near. The traces of picture writing seen by Bates and other travellers on the upper Xingú, in Amazonas, are now found to extend on one side into Columbia, and southwards through Maranhão, Ceará and Parahyba, almost always executed in inaccessible situations on the face of high rocks in a cañon. This record of the Odyssies of a lost race has not yet been read. Almost all the records existing show the Indians as possessing low foreheads, a configuration of skull characteristic of the primitive American races from Canada to Tierra del Fuego.

Dr. Lacerda (Director National Museum, Rio de Janeiro) in his brochure, *Sur Les Métis de Brésil*, states his opinion that in another century not only these but all the other coloured people in Brazil will have disappeared. The same eminent writer deals with the question of the descendants of the slaves, of whom the Portuguese introduced no fewer than 2,000,000: These Negros died *en masse*. The national character to-day reflects the result of the too intimate relations between the black and the white races. The creole is weaker physically than either, but more intelligent and has attained to the highest positions, especially in political life. In colonial days the favourite slaves were admitted to their master's table, accompanied his children everywhere, admitted them to their secret rites and saturnalia, and even degraded the noble Portuguese language with a host of Negro words. Too often the white settlers from Portugal were of the lowest order, and the marvel is, not that the slave states are still somewhat backward, but that they have attained such a high degree of civilization and prosperity. The female creole is often beautiful in face and form, with expressive brown eyes. She is usually of an ardent disposition, gentle and docile and essentially feminine, but frequently an easy prey to con-

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sumption and kindred scourges. In German Brazil the Negro and the Mulatto are looked upon as inferior beings and made to feel their social ostracism.

As in North America, the first intercourse between the white man and the red man in Brazil was marked by diabolical atrocities on both sides. In 1537 a Royal Decree from Lisbon made legal the slavery of the Caethé tribe, and the aborigines were gradually brought under subjection until the Marquez de Pombal designed more human laws in 1605 and 1607. In spite of these, persecutions and massacres still took place until quite recent times. Padre Vieira says in 1615 that in the province of Maranhão alone there were no fewer than 500 Indian villages, some of which could supply 4,000 to 5,000 warriors, but in less than 30 years not more than 800 armed savages could be united, more than 2,000,000 Indians having died of sickness or succumbed to the brutalities to which they were subjected by the white man. In the eighteenth century the Jesuit fathers had already done a great work, and they were ably backed up by Pope Benedict XIV, who issued a Bull excommunicating *latae sententiae* any who enslaved the red man. In 1808, however, a Royal Decree of May 13 ordered the Governor of Minas Geraes to make war on the Botucudos, and regulations of November 5 of the same year, and April 1 of 1809, promulgated the same inhuman ideas. In 1823 José Bonifacio de Andrade e Silva, deputy, and the patriarch of independence, presented a memoir with regard to the civilization of the Indians, and the department for the Protection of the Aborigines, created in 1910, has based its charter on the noble and practical ideas emitted by the great statesman. In 1842 the Indian was considered as a minor and subjected to the disabilities of an orphan, as a ward in chancery. In 1845 the provinces were split up into sections, each in charge of a director, and the church was given full powers.

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None of these measures, however, produced any practical effects, and on June 20, 1910, the President of the Republic, Dr. Nilo Peçanha, and the Minister of Agriculture, Dr. Rudolpho Miranda, signed a decree creating the present service of Protection of the Indians, the exposition of motives of the latter, demonstrating the necessity of, according to the Constitution of the Republic, substituting the word Protection for that of Catechism, as the Church being permanently separated from the State, the Government could not make any efforts to convert the Indians to this or that creed, but could lend them all the assistance in its power in an endeavour to establish peace, confidence and friendly relations, associating the aborigine with the people as fellow-citizens, but by keeping them as far as possible in separate settlements to so work as to gradually modify their habits and institutions. With regard to missionary work, the functionaries of the service are enjoined to aid in every possible way the civilizing efforts of each and every religious body that cared to send workers into the wilds. At the present moment excellent results are being produced by Franciscan Sisters at Itambacury in Minas Geraes, some six leagues from Theophile Ottoni. There are some 1,200 Indians, counting nomads and semi-civilized tribes, in this district. Here, in the schools the nuns teach spinning and weaving, and artificial flower-making, and find the Indian girls most apt pupils.

In Matto Grosso the Salesian Fathers are engaged in the work of reclamation, and the Capuchins find ample scope for their labours in Minas. The present Decree divides the Indian territory into 10 districts, each in charge of an inspector, obliged to present an annual report to the Director-General, Colonel of Engineers, Rondon.

It is proposed to settle the Indians in their own dis-

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tricts as far as possible, these being often unsuited to European colonists.

The aborigines will be granted the same advantages as the immigrant from over seas, and the inviolability of their allotments will be guaranteed. With regard to their peculiar tribal customs, and internal organization, the Department proposes to proceed with the utmost care, enlisting the aid of their Caciques (chiefs), and endeavouring that the red man shall reform himself as far as possible, but at the same time taking care to protect him from the rapacity of his fellows, as well as from that of the white man, either Brazilian or alien.

In order to legalize the possession of lands over which they have hunted, or in their effective power in any other manner, the State Governments are being appealed to, to assist in the demarcation of limits, and prevent encroachments. The Federal Government will also open free schools, and administer professional instruction, always voluntary, and wherever necessary create model colonies for the instalment of tribes unable to subsist in the districts they formerly inhabited.

Agricultural stations will also be established in each State, equipped with day and evening schools, workshops, experimental farms, etc., etc., and principally for the use of Indians who are already pacified.

In short, every inducement will be given to the native to adopt a civilized existence, and to make him a source of profit to the nation, as well as to improve his own position, both moral and physical.

In the State of Matto Grosso, the Director himself had already laboured hard whilst engaged in superintending the construction of telegraph lines in the extreme west of Brazil. Coming in contact with the terrible Nhambiquares, he has succeeded little by little in obtaining the friendship of several groups of this tribe, once

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even when attacked by surprise, retaliating by giving presents and whenever possible by means of an interpreter sending forth a message of good-will and fraternal feeling. The above tribes are quite savage, have no contact with civilization and nourish an inborn sentiment of hostility to the white man, yet in less than two years they have been pacified so far that instead of destroying the work of the telegraph department, they have been won over not only to protect it, but frequently to aid in the heavy service of opening out a path through the virgin forest. The Borôros, Parexis, Iranches, Apeacás, etc., have also been pacified without any loss of life, and in Goyaz the Javahés of Bananal island on the Araguaya were for the first time brought into contact with civilization. Besides this numerous tribe the Inspector has entered into relations with several others.

The ordinary difficulties of the service have been greatly increased in Amazonas, owing to the necessity of restoring confidence lost through the atrocious treatment received at the hands of many of the landowners in the rubber district, who, emboldened by impunity, had reduced all the Indians they could lay their hands on to a condition of slavery.

Amongst the tribes dealt with more or less successfully in their region are the Jauperys and Maués, and the Tembés, etc., in Pará. In São Paulo, the so-called intractable Kaingangs, after a year's patient and persistent labour were induced to come in contact with the officials of the department, with highly satisfactory results. Observation posts were erected in the virgin forests, in the branches of a tall tree, and from this coign of vantage an interpreter would call his savage brethren and expound to them the theory of the department and the earnest wish of the Government for their welfare. The services of the gramophone were enlisted, and a liberal

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distribution of useful presents made on every available opportunity. To aid in approaching the hitherto secluded tribe, a road was cut for many miles into the heart of the woods and the camp of the officials pitched in a locality where they were more or less at the mercy of the savages. In Paraná, the river Tibagy supports some 1,100 Indians, and these have been dealt with, as well as the Aymores in Espirito Santo, several tribes in Bahia, Maranhão, Minas and Rio Grande do Sul, and Santa Catharina, where the white settlers formerly drove the Indians inland, and compelled them to substitute hunting for fishing.

Indian settlements are in course of construction in various States, and an agricultural station at Sabino Vieira, in Bahia.

Altogether, the result of some two years has been highly gratifying, and the department has fully justified its creation.

It may be appropriate to mention in connexion with this subject the conditions subject to which the Government granted a substantial subsidy to Mr. Savage Landor, to assist him to carry out his expedition in 1911, across the eleventh parallel, from the Araguaya to the Mamoré river. He was explicitly told that the journey being through a country entirely without resourses, the Government could not be held liable for any loss or injury caused to himself, or to any member of the expedition, and he was especially charged to avoid any difficulties with the Indians, and to treat them with every possible kindness and forbearance; and was to present a minute report to the Minister of Agriculture, with regard to the language, manners and customs of all the tribes with whom he came into contact.

I write this in order to remove any misconception from the mind of any of the audience at the recent lecture of the explorer in London.

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CHAPTER IV

HISTORY—DISCOVERY AND FIRST SETTLEMENT

At the beginning of the sixteenth century, Portugal was in the throes of transition from the middle ages to the modern era. The Church had lost many of its powers, and was obliged to relinquish a number of its pretensions. Its political force was a thing of the past, except through the astuteness of the prelates. The power of the Throne had greatly increased. The desire for expansion, stimulated by the triumphs of Bartholomew Diaz (1486), and Vasco da Gama (1498), had turned men's eyes in the direction of the new world. The time was ripe for further discoveries, and the rivalry between Portugal and Spain served as a greater stimulus. Times were hard, and laws severe ; death was the penalty for such crimes as robbery of a mark. Moreover, the King was the absolute lord of his people. He could make war, and force the people to provide for themselves whilst fighting his battles. The animals, carriages and vessels of his subjects were all his ; the roads, rivers, ports and port dues, minerals and fisheries, all belonged to him. Small wonder then, when Brazil offered opportunities of greater riches and freedom, that the Portuguese flocked thither.

The geographical position of Portugal destined her

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people to a maritime life. Arabian traditions speak of the Mogharriun adventurers from Lisbon. The expedition against Ceuta, in 1415, consisted already of several hundreds of vessels. The first European who can be said to have cast eyes on the southern half of the new world was Vicente Yanez Pinzon, a Spaniard of Palos (Murcia), and one of the companions of Columbus. He sighted Cape Augustine (as it is now called), some twenty miles to the south of Pernambuco, on January 26, 1500. Before Pinzon reached the limit of his voyage (the mouth of the Amazon), Portugal had despatched Pedro Alvarez Cabral, and in spite of his intention of following up Vasco da Gama, he was forced by calms and contrary winds so much out of his course that, on April 25, he sighted Brazil in about the 10th degree of latitude, close to where Alagoas is to-day.

The entire squadron (13 vessels) dropped anchor on Good Friday in a harbour, which was given the name of Porto Seguro, and is four leagues north of the place actually called so. Cabral established friendly relations with the Indians, and after sending home a small caravel to convey the news of his discoveries, set sail again en route to India on May 2.

When the tidings reached Portugal, the King, Don Manuel, immediately fitted out three ships, and invited the Italian, Amerigo Vespucci, from Seville, to take charge of the expedition. The little fleet left in the middle of May, 1501, and reached land in latitude 5° south, and sent two of their party on shore to negotiate with a group of natives they saw congregated on a hill. Several days passed without the return of the sailors, and another was sent. Women came forward when the messenger reached the shore, he was surrounded by the Indians, who seized and examined him with evident curiosity and wonder. Suddenly another

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woman came behind him with a stake and dealt him a blow which brought him to the ground. Immediately he was dragged away, and the men amongst the party rushed down to the beach and discharged a cloud of arrows at the sailors remaining in their boats. Several guns were fired at the savages, who then fled to the woods. The barbarous Indians cut the poor youth's body in pieces, and boiled it within sight of his enraged comrades, who would have landed to revenge their three fellows if they had been permitted. Disheartened at the non-success he met with, Amerigo returned to Lisbon in 1502, but set out again with six ships the ensuing year. Four of the caravels were cast away owing to the incompetence of their commander, but the other two reached All Saints Bay (Bahia), where they remained five months on friendly terms with the natives, and then returned home laden with parrots, monkeys and Brazil wood, leaving behind them twenty-four men who had been saved from the wreck of the flagship (at Fernando do Noronha Island). Thus was formed the first settlement in Brazil.

The Brazil wood had become so noted in Europe, that the name which Cabral had given to the country (Vera Cruz) became lost in the denomination which it universally received of the Brazils, or the Brazil wood country, finally becoming Brazil simply. The harmony which marked most of the first intercourse between the aborigines and the discoverers did not continue for very long. The former found little reason to be satisfied with their neighbours, and, like most savages, passed from the one extreme of attachment and veneration, to that of hatred and fear, and their minds were soon filled with the idea of taking revenge for some provocations which they had sustained. Warfare of the most sanguinary sort succeeded, and the Portuguese were

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frequently defeated, and suffered such tortures that cannot be related. A temporary end was thus put to voluntary emigration to Brazil. At this crisis the Government adopted the plan (borrowed by the English at a later period) of making the country a penal settlement, banishment thence taking the place of capital punishment. Owing to the character of the new colonists, the Indians naturally lost all awe for those whom they at first regarded as vastly superior beings to themselves. Hardened by crime, and rendered desperate by their circumstances, the new-comers were well fitted to contend with the difficulties that awaited them. In the sanguinary battles that ensued, atrocities were committed not unsurpassed in enormity by those which attended the conquests of Peru and Mexico. It was said to be their practice on storming a village, to massacre all the old men and children, and carry the rest off as slaves. During this time, Amerigo Vespucci had returned to the service of the Castilian King, and undoubtedly counselled the latter to take possession of the territories which he (Vespucci) had discovered. The Spanish sovereign sent out Don Juan de Solis in 1509, with Vicente Yanez Pinzon as pilot. The King of Portugal did not act tardily in remonstrating with the Castilian on this proceeding, and on the return of Solis and Pinzon the idea was abandoned.

Seven years later, De Solis, coasting along the Brazils, came to the harbour of Rio de Janeiro. From thence he proceeded southward until he reached what he presumed to be a strait communicating with the Indian Ocean, but which turned out to be the mouth of the great River Plate. With this important discovery, the career of the great navigator terminated, for in attempting to make a descent on the coast, he and several of his crew were slain in sight of the ships. Discouraged

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by the loss of their commander, the survivors set sail for Europe, without attempting any further discovery. The King of Portugal claimed their cargoes, and remonstrated so effectually against the interference of Spain that Magalhaes, when reaching the coast three years afterwards (1518), purchased nothing but necessary provisions from the inhabitants. Meanwhile the French had formed settlements on the northern coast of Brazil, and when Christovão Jacques, a Portuguese commander, entered All Saints Bay, he found two Gallic vessels laden with Brazil wood. These he attacked and succeeded in destroying, after a gallant defence. The first settler in Bahia was Diogo Alvarez, a native of Vianna do Castello. He was wrecked upon shoals on the north of the bar. Part of the crew were drowned, others were slain and devoured by the Indians, and Diogo himself only saved his life by making himself useful to the savages. By design he secreted a musket and barrel of powder, and when an opportunity offered to astonish his masters, he promptly brought down a bird with a shot. He was in a moment translated from a slave to a great personage. The Indians gave him the title of Caramurú (man of fire). He became a chief, led his followers against the Tapuyas, and the fame of his terrible engine of war having preceded him, his tribe gained a bloodless victory. He fixed his abode upon the spot where Villa Velha was afterwards founded, and living as one of the patriarchs of old, soon saw a numerous progeny rising round him. It is undoubtedly true that the best Bahian families owe their origin to him.

At length a French vessel entered the bay, and Diogo Alvarez resolved to take the opportunity of once more seeing his native land. He loaded the ship with wood, and embarked with his favourite wife Paraguassú:

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They were received with great honour at the French Court. His wife was baptized by the name of the Queen of Portugal (Catharina), and the King and Queen were her sponsors, and her marriage was then celebrated. Diogo would have proceeded home, but the French would not permit him. By means, however, of a young compatriot (Fernandez Sardinha), he sent the information to Lisbon, that he was not permitted to carry personally, and exhorted the Portuguese monarch (João III) to colonize the province in which his own lot had been so strangely cast. After some time, however, he bargained with a wealthy merchant to take him back, and leave him the artillery and ammunition of two ships, together with a large store of useful goods for trading. In return for this he undertook to fill the vessel with Brazil wood. The arrangement was faithfully performed on both sides, and Diogo fortified his little capital. The Portuguese Government had continued to neglect their Transatlantic possessions, and for more than thirty years the attempts to colonize it had been of the feeblest description. Finding, however, that the French were profiting by their apathy, and that the Spanish were forming settlements on the bank of the Paraguay River, the Portuguese Court took alarm, and a plan was formed for the division of the country into Capitanias (captaincies), each containing about fifty leagues of coast, which were bestowed by João III upon such grandees as had distinguished themselves by their services to the Crown, and were able and willing to embark on such an adventure. They were either to go in person, or send colonists at their own expense, and in return they were invested with complete powers, both civil and militant, over their respective jurisdictions. We thus see that the policy of the Portuguese King and Cortes was the same as that

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of the Spanish, i.e., to colonize and enrich the nation at the expense of the people, not of the royal treasury.

Before proceeding with the next chapter in Brazilian history, the parcelling of the coast into a series of semi-independent communities, we will glance at the actual state of the country at this time. The first arrivals found no difficulties in procuring wives amongst the Indians, as the latter had a peculiar ambition to possess children by a race of men whom they at first deemed a sort of demi-gods, when they saw them apparently call down the thunder and lightning at the pointing of a sort of wand. Besides, according to their ideas, the only side of parentage worth anything was the male. They were further seduced by the store of trinkets, such as looking-glasses, scissors, knives, rings, etc., which were profusely displayed by the mariners. On the other hand, of course, the new-comers brought no women with them on their first voyages, and so it is easy to understand that a large number of mestizos soon sprang up wherever the Portuguese were settling. Some of these became quite as savage as their mothers, and forgot their partial white origin in the primeval instincts of the Indian. Others assisted in the brutal massacres of their relatives, and were even more ferocious than their fathers. An intermediate type is presented in Diogo Alvarez, and being the first, as well as one of the best of colonists, it is small wonder that the little port he founded soon rose to be the capital of all Brazil. From the time of his shipwreck (1510) to 1557, when he died, progress was slow but never failing.

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OURO PRETO, MINAS GERAES.

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PLACE TIRADENTES, OURO PRETO.

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CHAPTER V

THE CAPITANIAS, AND STRUGGLES WITH THE FRENCH, BRITISH, SPANISH AND DUTCH INVADERS

THE first person to take possession of a Capitania was Martim Affonso de Souza, who, with his brother's aid, fitted out a considerable expedition. He first began to survey the coast near Rio de Janeiro, and gave the place its name, being discovered on the first day of the year, and thought to be the mouth of a river. The allotment was situated near São Vicente. Pedro Lopez, his brother, had two sections, one part, São Amaro, immediately to the south of São Vicente; the second considerably to the north, not far from where is now Pernambuco. João de Barros, the celebrated historian, obtained Maranhão, and Pernambuco became the portion of Duarte Coelho Pereira. The territory adjacent to the Southern Parahyba River was conceded to Pedro de Goes. The country between the River São Francisco and Bahia was allotted to Francisco Pereira Coutinho. The next portion of territory southward was known as the Captaincy of Ilheos, it was granted to Jorge Figueiredo Correá. Cabral's Porto Seguro was included in the range of coast which formed the Capitania of the same name, and came under the control of Pedro Campo Tourinha. Espirito Santo was the appel-

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lation given to the next in rotation, and fell to Vasco Fernandez Coutinho.

Few of the settlements were founded immediately by the Crown, and the lords proprietors enjoyed feudal privileges and most regal rights, except issuing a coinage. They made their own laws and imposed taxes. This system of Government was, as might have been expected, attended by serious evils. An authority so absolute, and so uncontrolled, was inevitably abused by the adventurers to whom its administration was entrusted. Complaints of their brutal and arbitrary conduct became at length so frequent that it afforded the Crown a fair pretext for revoking the powers which had been so hastily conferred on the proprietors, and *de facto*, the settlements had been entirely alienated from the Government.

A Governor-General was appointed with plenipotentiary attributions, and the only thing left the adventurers was possession of their lands, as fiefs.

Thomé de Souza, a fidalgo (or noble), was appointed to this high office, and he was given instructions to build and fortify a city, which was to be called São Salvador. He arrived at Bahia in April, 1549, accompanied by six Jesuits, the first who had set foot in the new world. It should be noted that the introduction of slaves had already taken place, most of them brought from the West Coast of Africa, and were principally of Bantu Race. They came especially for the purpose of agriculture, but were made use of in the extraction of the precious metal, and as we shall afterwards see, entered into the whole life of the country at a later period.

Amongst the Jesuits was Father Nobrega, a contemporary of St. Francis Xavier, and his rival in disinterested exertions for the good of his fellows. He has

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been truly called the Apostle of Brazil. Of noble birth, he had been disappointed in some position looked for, and renounced the world in disgust, little thinking that his future was destined to be far greater than as a simple and useless aristocrat. His memory deserves to be held by the Brazilians in everlasting honour.

Some have ascribed the appointment of Thomé de Souza to other causes than that of the misdeeds of the feudal lords. Many Jews had found their way to Brazil, being banished thither by the Inquisition, after having been stripped of all their possessions. Here they founded a colony, imported sugar-cane from Madeira, and soon were so flourishing that the Crown became imbued with the idea of forming a new city in Brazil, and making it the seat of Government. The Jews had hardly been a year exiled when the new Governor arrived, so it can hardly be said that they were the cause of his appointment.

On De Souza's arrival at Bahia he found old Caramurú settled there. This man was of great assistance to the Portuguese, in promoting a friendly understanding between them and the Indians, and the latter helped them to build the city. Within four months a hundred houses were erected, a cathedral was begun, batteries were made, commanding both sea and land, and a mud wall was built to defend the place against any sudden attack from the natives. Supplies of all kinds were received next year from Portugal, and the year following, several young orphans of noble families were sent out by the Queen as wives for the officers, with large dowries in cows, mares, and slaves.

This was the very first royal settlement, and its prosperity was attended by advantages to all the Captaincies. De Souza did not, however, bring a sufficient force to cope with the disorders and repress the insub-

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ordination which began to prevail. By building São Salvador he gave a central government to the colony, but the honour of settling and extending it, and of making it really useful to the Mother Country, was reserved for the Jesuits.

These men, by their arts of insinuation and address, have been surpassed by none, and they dispersed themselves amongst the savages, and seemingly inspired by peace and charity, succeeded in obtaining their attachment and confidence. The obstacles which they had to encounter were most formidable, but their fiery zeal and assiduity rose with the difficulties met with, and the most salutary effects resulted from their exertions. They began by instructing the native children in the Portuguese language, and thus whilst fitting the Indians to become interpreters, they acquired their tongue, and, as we have seen, formed a Lingoa Geral. Nobrega had a school near the city, and the children were taught the elements of reading, writing, and arithmetic, to assist at mass, to sing the church service, and were frequently led in procession through the town. Great pains were taken to substitute the folklore of the Indians by legends from holy writ, and as to these poor people it was only a case of exchanging one set of stories by another, they did not lose by the substitution. Unfortunately for posterity, through this policy most of the Indian lore had been entirely lost.

The greatest obstacle in the path of the missionaries was the cannibal propensities of the Indians. Their very pride and beliefs were implicated in these horrid orgies. In spite of their curing the savages of drunkenness, of polygamy, and of the custom of the vendetta, they still possessed the propensity to delight in human flesh. Southey (*History of Brazil*) relates a story of a Jesuit, who, having administered extreme unction to a

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very old Indian woman, desired to know whether he could get her anything to eat. Said the old convert: "My stomach rebels against everything, but if you could only get me the little hand of a tender Tapuyo boy, I think I could pick the little bones; but woe is me, there is nobody to go out and shoot one for me." The priests, who were already established in the country, were in continual opposition to the Jesuits. Their interests were at stake; for what the missionaries did gratuitously, they demanded payment, for the priest maintained that slavery was lawful, because the Indians were beasts, although their own habits were not less dissolute than those of the savages, and they hated the Jesuits, who sought to humanize the natives. The first settlement consisted of an array of officials, directly responsible to the Governor-General, and who were deputed to visit the Capitanias to transact the business of the Crown; four hundred soldiers, six hundred exiles, and many mechanics, and others.

Hardly had the place taken the aspect of a permanent settlement when the first Bishop (Don Pedro Fernandez Sardinha) arrived in 1552. The following year Thomé de Souza, having been four years in Brazil, asked for and received his recall, and was succeeded by Duarte de Costa, who came, accompanied by Father Anchieta and six other Jesuits, who soon after established a college in the Plains of Piratininga (now São Paulo) on the Tieté River, in a secluded and beautiful spot. Southey, on visiting it, complained of the tremendous ascents, and the thinness of the air, although its elevation is not more than about 2,500 feet above sea level.

Difficulties arising between the new Governor and the Prelate, the former embarked for Lisbon, with the intention of stating his grievances to the King, but was

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wrecked, and, together with a hundred Europeans, was murdered by the Cahete tribe of Indians. In revenge for this the Portuguese hunted them until they were almost all exterminated, the remainder being condemned to perpetual slavery.

Da Costa was replaced, in 1558, by Mem de Sa, a man of enlightenment and humanity. On his arrival he immediately set to work to reclaim the natives, and to make them fully understand that they might expect justice in the future, he issued an order that all who had been wrongfully enslaved should be set at liberty. He also took vigorous measures to enforce the laws against cannibalism, pursuing and chastising such tribes as were found to continue the abominable practice. He soon had to turn his attention to a foreign enemy. Durand de Villegaignon, a native of Provence, and Knight of Malta, a man high in the French naval service, had taken possession of one of the islands in the bay of Rio de Janeiro, for the avowed purpose of founding an asylum there for the persecuted French Huguenots. For this project he had obtained the patronage of Admiral de Coligny himself, and by this means had succeeded in inducing a number of respectable colonists to make their way to Brazil. The French Court was inclined to view the scheme with entire satisfaction, as it afforded a means of forming colonies after the fashion of their Iberian neighbours. Villegaignon having landed, he began to build a fort, calling it after the name of his protector, Coligny, and although the whole territory was hardly a mile in circumference the continent was already honoured with the name of Antarctic France. On the return of his ships to Europe for another cargo of Protestants, a considerable zeal was kindled by the establishment of the reformed religion in these remote regions, and the Church of Geneva took such interest

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in the expedition that two clerics and fourteen students from that city determined to brave all the hardships of a new climate and mode of life.

Repairing to the seat of Admiral Coligny, they soon found their numbers swelled, and new recruits being continually enrolled as they made their way towards the sea. Their departure was hastened by a disagreeable adventure. At Harfleur the Catholic inhabitants, instigated by the priests, rose in arms against them, and one of their best officers was killed. On their passage they met with very bad weather, and on arriving off the Coast of Espirito Santo they had a slight brush with the Portuguese. Finally they reached the settlement of their countrymen at Rio de Janeiro, where they were received at first with great apparent cordiality. But Villegaignon was a scoundrel, he soon threw off the mask, and those who had come so far to enjoy liberty of conscience found themselves brought under a worse yoke than that which they had previously suffered from. They, therefore, demanded permission to leave Brazil, and he gave written permission to the captain of a ship to convey them to France. When they got on board, however, the vessel was found to be in such a state, that five of the party returned on shore, rather than put to sea in her. Jean de Lery was one of the others who thought death better than the cruelty of the traitor Villegaignon, and they pursued their voyage, and after having endured the utmost miseries of famine they reached Hennebonne. They had been forced to devour the leather coverings of their trunks, and hunted the rats and mice until none remained. Several died of hunger, and the frightful thought came to them that they would have to draw lots and devour each other. Villegaignon had given them a box of letters wrapped in cloth, and amongst them was one addressed to the

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chief magistrates of whatever port they might arrive at, in which this worthy servant of the Guises denounced the men whom he had invited to Brazil to enjoy the peaceable exercise of the reformed faith. His devilish malignity was, however, frustrated, and his treachery exposed, as the authorities at Hennebonne happened to favour the Protestants. Of the five who had trusted to his tender mercies, three were executed. Others fled to the Portuguese, and were compelled to profess a religion which they despised as much as they hated.

The attention of the Portuguese Government was soon directed towards this fine port, and the nephew of Mem da Sa was sent to Bahia for such assistance as might enable him to extirpate the French and take possession of the place. An expedition was fitted out accordingly, of two ships of war, and several merchantmen, and the Governor himself took command, and was accompanied by the Jesuit Nobrega. Early in January, 1560, they reached Rio de Janeiro. The intention of the Governor was to enter in the dead of the night, and effect a landing by surprise. They were, however, seen by the sentinels, and in consequence obliged to anchor off the bar. The French retired to their forts with a company of eight hundred native archers.

Mem da Sa now saw that he needed small craft, and sent to São Vicente for aid, and for men who had some knowledge of the harbour. When reinforcements arrived the Portuguese won a landing, but they vainly battered the solid rock fortifications for two days and nights, and uselessly spent all their ammunition, besides having many of their men wounded. There was no lack of courage amongst them, though they had evinced little skill, and in a desperate assault they won the largest of the outworks, then stormed the rock which

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NEW OPERA HOUSE, S. PAULO.

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PETROPOLIS, SHOWING TOWN HALL.

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hid the magazine. This so intimidated the French that they abandoned the other works in the ensuing night, and fled, some to their ships, and others to the mainland. As this action took place on January 20 (St. Sebastian's Day) Mem da Sa called the place São Sebastião, in honour as well of the young King of Portugal, who bore that name. Here the city was founded, and the whole of the work of construction was performed by the Indians, under the control of the Jesuits, without any expense to the State. The troubles of the Governor were not at an end, however, for he had now to contend with the most formidable and savage of the Indian races, the Botucudos, who were continually attacking the outlying settlements in Bahia, and even threatened the capital itself.

English adventurers were at this time making endeavours to settle in the country, and they fixed themselves in some considerable numbers at Parahyba do Sul. Allying themselves with the natives, they might have succeeded in becoming a serious menace to the Portuguese, had not Mem da Sa attacked and exterminated them. This successful administrator had been in control of the colony for an unusually long period, when Dom Luiz de Vasconcellos was appointed to succeed him, and brought out a new concourse of Jesuits, headed by F. Ignacio de Azeredo. Nearing the Azores they met with several French and English vessels. The new Governor was killed in action, and the Jesuits made to walk the plank by a French pirate, named Jacques Sore. Only one escaped in a lay habit. Nobrega had spent his last breath before, prematurely worn out, and thus was spared hearing the sad fate of his brethren. Luiz de Almeida being appointed Governor, he reached Bahia, and was welcomed by Mem da Sa, before the latter's death (1572). Later, when Luiz de Brito took

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the place of De Almeida, the growth of the colony had been so rapid that it was found necessary to divide it into two distinct parts, each with its own head. These were, however, re-united in 1578, under D. Diogo Lourenzo da Veiga. This coincided with the passing of Portugal and Brazil under the Spanish dominion for sixty years, owing to the death of the Portuguese King and his chief nobility in a memorable expedition against the Moors. The colony was offered to the Duke of Braganza, with the title of King, provided he forfeited all claim to the Portuguese crown. Neither Philip of Spain, in making the offer, nor Braganza, when he refused it, had any conception of the importance of the country and its destiny. Little either dreamed that the then insignificant colony was fated to eclipse Portugal itself, and to furnish an asylum to the Court in two hundred years' time. In spite of the search for gold and precious stones that had been going on for twenty years, very little intimation of the real riches of the interior could have been given then, or probably the fate of Brazil would have been quite different.

Bahia, Pernambuco, and Rio de Janeiro were in a most flourishing condition at this time, and would doubtless have made far greater progress had it not been for the temporary placing of the power in Spanish hands. Philip had too many affairs to consider at this time to bestow proper attention to Brazil, and his subjects were filled with dreams of the better known El Dorado on the western coast. This was also undoubtedly the reason why the attempts of the Earl of Cumberland, under whom Raleigh served, and Cavendish, and Sir James Lancaster were fated to produce no lasting results, although their filibustering expeditions were temporarily crowned with success. At this time Roberto Diaz, a colonist said to have discovered a great mine

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of silver, and who lived in such magnificence that everything used at the table or the toilet was of the precious metal, offered to disclose the secret to King Philip, on condition he was made a marquis. The crafty Castilian was not willing to comply with this suggestion, but sent out emissaries with instructions to discover the mine. In spite of his offers to show as much silver as there was iron in the mines of Biscay it was not forthcoming. The Governor-General set out with some miners for the Serra Itabayana (Bahia), but could discover nothing, and only the timely death of Diaz saved him from the vengeance of the King. The probability is that he had, in common with many of the old colonists, amassed his fortune through other means. The exploitation of the Indians was a vast source of riches. In two years no fewer than 80,000 arrived on the coast, in the neighbourhood of the capital, to be employed in the sugar mills, etc. Almost the whole of these died in a very brief space of time, and were replaced by Negroes. Astounding stories are still current as to the means employed by the first settlers to enrich themselves at the expense of the natives, and when these failed, by traffic in black ivory.

In 1611 the French renewed their efforts to form a settlement, and established themselves until 1620 in the Island of Maranhão. The Dutch now turned their eyes in the direction of Brazil, and in 1624 the West India Company fitted out a considerable armament under Jacob Willekins and Peter Heyne. Their instructions to attack the capital were completely carried out, and Bahia was taken almost without a struggle. The Hollanders soon set to work to strengthen the place, and prepared to renew hostilities, which were conducted with the greatest barbarity on both sides. The Portuguese Bishop, Marcos Teixeira, hoisted the crucifix for

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his standard, and commenced guerilla warfare with such success that São Salvador was soon blockaded. He died shortly after, in consequence of the hardships he had undergone, but his successors carried out the campaign. The Dutch were weakened by the return of Willekins to Europe, and the departure of Heyne, as well as by the loss of their General, Hans Vandort, who was killed in ambush. In 1626 the Spanish King sent forty ships and 8,000 soldiers to retake the place, under the leadership of Fabrique de Toledo, and the Dutch capitulated on condition of being permitted to return to Holland with their personal belongings and arms. New attempts were made by the Dutch West India Company, but the enormous expense delayed an expedition. They, however, harassed the Spanish and Portuguese merchant fleets on their homeward voyages, and in thirteen years took 546 vessels, the proceeds of which amounted to £7,500,000.

Early in 1630 Admiral Hendrick Lonck appeared off Pernambuco, and took the place after a feeble resistance on the part of Albuquerque, the Governor. A predatory warfare, with the aid of the Indians, was carried on by the vanquished, but in three short months they had to accept defeat, and were transported to the Dutch Indies. Disaster overwhelmed every fleet sent out by the Portuguese to recover the lost city, and in 1636 the Dutch had made themselves masters of the Provinces of Pernambuco, Parahyba, and Rio Grande do Norte, in reality the whole of Brazil lying northward of the São Francisco River.

These successes inspired the Dutch with the hope that they might, by a great effort, complete the conquest of Brazil, and Count Maurice of Nassau arrived at Pernambuco with fresh troops, and made himself Master of Sergipe and Ceará. His entire force at this time

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amounted to 6,180 European soldiers, and about 1,000 Indians. His efforts to reduce the capital were unavailing, and in 1639 Spain dispatched 46 ships of war, and 5,000 troops under Mascarenhas. Half the fleet was lost, and the rest arrived at São Salvador in a melancholy condition. Mascarenhas was, however, enabled to raise a total force of 12,000 men, and proceeded against Pernambuco. The result of an engagement lasting three days was the total defeat of the Portuguese, and of that mighty armament, but six ships returned to Europe. Negotiations took place, and hostilities were suspended for some time.

In 1640 Portugal regained her independence, and in 1641 an alliance was concluded between the Dutch and the Portuguese, marking the limits of the territory of each in Brazil.

The West India Company now recalled Mount Maurice, and a large number of the troops, and the commissioners appointed were foolhardy enough to sell to the Portuguese vast stores of ammunition. Their conduct became besides so intolerable that peace was not possible for any length of time, and it was left to the colonists themselves to finally expel the invaders in January, 1654. The Portuguese Crown received its Empire of Brazil from the hands of the patriot, Fernandez Vieira, and although desultory attempts were made by the Dutch to regain a footing in Brazil, they were speedily obliged to relinquish all pretensions to dominion.

The 10th of August, 1661, a treaty was signed, by which the whole of the country was finally ceded to Portugal, on payment of 8,000,000 florins in sixteen instalments, and free commerce being allowed Holland in all commodities, except Brazil wood. The Portuguese now appreciated fully the value of their possession,

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and João IV conferred on his heir apparent the title of Prince of Brazil.

In 1710 a French squadron, under M. du Clerc, arrived off Rio de Janeiro, and an attack on the city was made. After a short but desperate struggle the Portuguese were victorious, and massacred all who fell into their hands. Du Clerc, himself taken prisoner, was murdered in his bed. Next year France sent her great Admiral Duguay-Trouin to inflict vengeance on the Brazilians, and he led his fleet daringly between the lines of batteries which defended the city, and carried it by storm, holding it until a heavy ransom was paid. This ended the last attempt to wrest Brazil from the hands of her discoverers. During the two hundred years that had elapsed since the first settlement, the opening up of the Sertão (as the interior was called) proceeded slowly. Most of the settlements were due to the discovery of gold and precious stones, and the convenient course of the rivers provided a highway easily accessible. The State of São Paulo (as it is now) was prominent in the work of pioneering. Groups of adventurers (bandeirantes) forced their way over the serras, in search of slaves. They marched under a chief who was completely equipped with the fullest power over his subordinates, and a priest was an obligatory member of the band. Montaya speaks of these wolves in sheep's clothing whose office was to Christianize the natives, whilst the others despoiled them. Making use of the poor Indians for all the purposes of beasts of burden, and for every kind of labour, by this means the bandeirantes made their way into Minas, Goyaz and Matto Grosso, and linked up the great plateau with the Amazon. Those of the sixteenth century devastated the whole basin of the Tieté, and the districts to the south and south-west. By 1610 the Jesuits established in Paraguay had extended their

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work by the Uruguay, Paraná, and Iguassú Rivers to the Paranápánema (Paraná). In spite of the unspeakable barbarities perpetrated by these bandeirantes, it is undoubtedly true that credit is due to them for opening up the country. Many of the Paulistas never made their way southward again, remaining in certain favourable spots, and forming the beginning of future prosperous cities.

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CHAPTER VI

CROWN COLONY AND EMPIRE

In 1699 the first great discovery of gold took place, and was followed thirty years later by that of diamonds. Amongst the other charges made against the Jesuits was that they had found the precious metal in many places, and were working it by slave labour, without giving the Government its share. The missionaries at first were of serious, earnest character, and entirely devoted to good works, but little by little they became contaminated by the greed of their lay neighbours, and were gradually losing their influence, and being hated by the people. On Sebastião Joseph de Carvalho e Mello becoming Prime Minister he determined to remove them. They were the only persons whom he feared, and the great multitude of clericals, and the continual conflicts between them, gave him an excuse to expel those whom he considered the propagators of intolerance, ignorance and superstition. The priests were let alone, as they were good servants to the Crown. One of his most legitimate ambitions was to lessen the influence of Rome. The future Marquez de Pombal was 50 years of age when he entered into his ministry. He found the country in a state of decay, largely due to the pernicious influence of the clerics over the Court and the people, and he resolved to purge Portugal of as

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JARDIM DA LUZ, SÃO PAULO.

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Iguassú Falls, Paraná, 2½ Miles Across.

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many of its most undesirable elements as possible. It was said of him by his enemies that he acted first and thought afterwards, and persisted in his plans whether they were right or wrong. It is possible that he had not at first conceived the thought of extinguishing the Jesuits, but when events arose which seemed to render such a measure necessary, he pursued this scheme with characteristic perseverance. His brother, Xavier de Mendonça, Furtado, was appointed Captain-General of Maranhão and Pará. He used all his influence to deprive the missionaries of their authority, and finally, in 1760, they were expelled from Brazil. Their colleges, churches and other property were confiscated. They were sent home under inhuman conditions, by which many died, and others were cast into prison, to remain there for eighteen years, until, on the disgrace of Pombal, they were set free.

Brazil suffered many injuries at the hands of this tyrant. He granted licences to a number of exclusive companies, and ordained that their stock should bear a certain price, and in order to enforce this regulation, decreed that the script should become legal payment. In 1762 the Spanish Governor of Buenos Aires seized on Colonia, a port on the opposite side of the River Plate, and it never fell into the power of the Portuguese again. The following year the Conde da Cunha, on being appointed Viceroy of Brazil, was instructed to take up his residence at Rio de Janeiro, which being more convenient to the mines, and to the River Plate, had become of much greater importance than Bahia, and presented a more secure and more easily defended port. From this period down to the emigration of the Royal Family from Lisbon, the development of the country was uninterrupted, in spite of the exactions of the Crown. In 1704, the Brazilians got the better of the

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Portuguese in the municipal elections, and in 1708, 1710 and 1720, revolts occurred in São Paulo, Pernambuco, and Minas Geraes (as the mining province was now called). The conduct of the home Government was little calculated to soothe the Brazilians. The colonists were taxed for the benefit of Portugal as heavily as they could be. The Brazilian capital was filled with a tribe of functionaries and other Portuguese, who found life much more agreeable in Rio than in Lisbon. The appearance of a printing press was the signal for an order from the Court for its destruction, and every means was taken to prevent the fostering of a national spirit. In 1755 and 1758 laws were passed forbidding the enslavement of the Indians, and by others in 1761, 1767 and 1776, the introduction of Negro slaves into Portugal, including Madeira (which formed part of the Reino, or Kingdom) as well as the Azores, was prohibited. No mention was made of Brazil, where the number increased rapidly. After the establishment of the capital in Rio de Janeiro, when the population of the city exceeded 30,000, the coffee berry was introduced into the country, and many other kinds of industries were stimulated, all of them, however, depending for their profits on the supply of forced labour, which was increased by every means in the power of the colonists.

The revenues obtained by Portugal from Brazil at this time were very great, one fifth of the production of the gold and diamond mines going to the Crown. From 1728 to 1734 this amounted to an average of nearly £500,000 yearly, and, with the many other iniquitous taxes, reached an annual sum of not less than £2,000,000. All goods imported from the Mother Country paid 12 per cent. duty. Salt and iron were taxed 100 per cent., and most of the impositions were farmed out to the highest bidder. Every article introduced

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into the mining districts was surcharged *2d.* per lb. In passing ferries, goods paid not according to their value, but their weight. No trade of any kind was allowed between the natives and the British, although the latter often found means to evade the vigilance of the fiscal agents, who, on their side, frequently found it worth their while to turn their backs when any contraband trade was going on. Under such circumstances the development of the country was retarded, and the aspirations of the Brazilians for freedom could not be realized, owing to the sparsity of the population and difficult communications. At the beginning of the nineteenth century, Brazil is said to have contained 12 cities, 66 towns, and 430,000 inhabitants of pure blood, as well as some 1,500,000 Negroes and 700,000 Indians. These figures are as near as can be obtained from various sources, but, of course, are quite liable to be somewhat erroneous. The colonies were, however, outstripping the Mother Country, and the exports had reached £2,500,000, and the imports £2,100,000. Twenty thousand slaves were being annually imported, and 5,000 were sold in the market at Rio de Janeiro. Many of these poor wretches were the property of the Crown, 10,000 being employed in the diamond fields. Others were attached to convents, the Benedictines having 1,000 on the plantations. Social life at this time was of the most degraded kind. The habits of the lower orders were filthy, and those of the rich abominably vicious. The monks swarmed in every street, and were at once sluggards and libertines. For the sum of two dollars any coward could hire a bravo to waylay and stab his enemy. The Negro population were employed in every description of labour, both agricultural and domestic.

It was the custom of a man who had 20, 50 or 100 slaves, to turn them loose in the morning without a

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crust, and compel them to produce a sum of money at night. Any surplus they might keep for themselves. Builders used to impose a further condition that each Negro should bring back with him a large stone suitable for construction. If one hired a mechanic for any trifling work about the house, he would bring a slave with him to carry his tools. In my lady's chamber would be found a group of females ready to perform her slightest behest. Events had been hastening to a crisis in Portugal since the beginning of 1807, and on November 29 the Prince (João VI), who was Regent, hastily embarked on board the squadron of Sir Sidney Smith, with his retinue and all the valuables that could be got together. He reached Bahia on January 25, 1808, and was joyfully welcomed by the people. He was persuaded to stop there, but with praiseworthy firmness he adhered to the resolution he had taken, and after spending a month in the city, sailed to Rio de Janeiro, where he arrived on March 7.

The great Marquez de Pombal had foreseen the future necessity of transferring the seat of the Monarchy to Brazil. The first beneficial consequence of the arrival of the Royal Family was the opening of the ports to international commerce, and the centenary of this was celebrated by a great national exhibition (August to November, 1908) at Rio de Janeiro. In the very first year 90 foreign ships entered the new port, and many visited Maranhão, Pernambuco, and Bahia. In 1810 a treaty was concluded with England, which gave a preference to British goods, these paying 15 per cent. duty, whilst commodities of other origin were taxed to the extent of 24 per cent. Gold and silver, however, still continued to be prohibited. Santa Catharina Island was declared a free port, and privileges were granted to employ the splendid woods of the Brazils for the

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purpose of constructing British men-of-war. Before 1814 a number of English merchants took up their residence at Rio, and the place soon became a great commercial centre, and later the seat of a British plenipotentiary ranking higher than his colleagues elsewhere in South America.

The abrogation of the colonial laws, which took place soon after the arrival of the Regent, the introduction of the vine, and the encouragements given to improvements in horticulture, the adoption of vaccination, and better sanitary laws, and some reform in the courts of judicature may be enumerated among the benefits for which Brazil is indebted to the residence of the Court. The most vital stimulus in promoting improvement, and in forming a national character and feeling, arose out of the decree which gave to the country equal rights and privileges to those enjoyed by Portugal herself. The important declaration of this measure was fixed for the Queen's birthday, in December, 1815. The new title of the King's possessions was the United Kingdom of Portugal, Brazil, and the Algarve. When the merchants of Rio met to congratulate their Sovereign, they subscribed a large sum of money to form a fund for general education. Schools multiplied, and even the slaves were sent to learn to read and write. The classical languages began to be taught, and public libraries were established at Rio, and Bahia, and printing offices throughout Brazil. A botanical garden was opened at Pernambuco, a medical college at Bahia, a museum, a school for engineers, and a naval college started at Rio. In 1821 the Cortes invited the Regent (now King) to return home. The invitation was couched in such language as might have been considered minatory, but it was coupled with the information, or pretext, that the English were about to take possession

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of the country. The truth was that they were jealous of the rising influence of Brazil, and to mark their displeasure, ordered the schools and other institutions in that country to be closed, and the central Government at Rio to be dissolved. A manifesto issued by order of the Cortes bore the significant phrase: "Commerce and industry seemed entirely destroyed by the unlimited licence granted to foreign vessels in all the Brazilian ports, and by the fatal treaty of commerce with England." On February 18, 1821, the King nominated a commission to consider the Constitution, the clauses of which had been promulgated in the Mother Country.

Shortly afterwards the Prince Dom Pedro read to the people of Rio a royal proclamation, securing to them the Constitution, such as it should be framed by the Cortes at Lisbon, and ended by taking the oath to observe it. His example was followed by the Governors of Pernambuco, Bahia, etc., and the King confirmed all that had taken place. Having resolved to return, João VI embarked on April 24. As soon as he arrived in Europe, he found himself in the hands of his Cortes, and found it necessary to lend his authority to a Constitution which treated the Brazilians as mere colonists. A rupture between the two countries became inevitable. Measures taken by the Government at Lisbon to compel the abasement of Brazil, and the recall of the Prince, hastened a crisis. The decrees reached Rio on December 10, and, listening to the entreaties of his subjects, the Prince decided to disobey the obnoxious laws and remain. Independence was finally proclaimed September 7, 1822, and the Prince was proclaimed Emperor Pedro I. The first assembly was opened in 1823, and the Parliament was inaugurated in 1826. The reign of the first Emperor was, however, unfortunate. The

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southernmost part of the Empire was lost for ever, and now became the Uruguay Republic, acting as a convenient buffer state between Brazil and Argentina. Revolts succeeded each other, and Pedro abdicated in favour of his son on April 7, 1831. He then embarked for Portugal to take the Government of that country into his hands. After a number of insurrections, the Regency was placed in the hands of Father Diogo Feijo, who exercised a wise control until 1840. He was succeeded by Araujo Lima, and the young Emperor came into his own at the age of fourteen on July 23, 1843. Disturbances had now become chronic, and pacification was a long way off. For five years the reign of Pedro II was marked by revolt and insurrection. In 1851 the slave trade was abolished, and was entirely achieved by Constitutional means. The fact of the Royal Family emphatically refusing any compensation to the practically ruined planters, turned against them a great majority of the agricultural class of Brazil, who were almost entirely dependent on this enforced labour.

Now begins an heroic page of Brazilian history. In 1851 war was declared against the Argentine Dictator, Rosas, in defence of the Republic of Uruguay, and, although not very sanguinary, lasted three years. The second was an affair of quite a different kind. It cost Brazil £63,000,000, and many thousands of lives. She was engaged in a petty struggle (1864) with Uruguay, when Lopez, the Paraguayan Dictator, invaded Brazil and Argentina. This led to an alliance between the two countries attacked, and Uruguay, and in 1865 operations were commenced. At first the allies were under the command of the Argentine President, General Bartolome Mitre. In the battle of the Riachuelo the Brazilian Navy, under Admiral Barroso, destroyed the Paraguayan ships engaged, but the operations on land

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were not so decisive. A victory was won at Uruguayana (1866), but Lopez preserved intact the whole of Paraguay. The allied forces were now placed under the Marshal Duque de Caxias, and Paraguay was invaded. General Osorio was already there, and the Brazilian battleships forced the passages of Curupaito, 1867, and Humaytá, 1868. The latter was a feat worthy to rank with the most famed in history, as the Paraná was lined with heavy batteries, and the gallant Brazilian commander forced a passage, after several failures, by disobeying the commands of his chief. The army was now able to push its way into the interior of the country, repulsing the Paraguayans at Itoróró, Avahy, and Valentinas (1868), and forcing Lopez to take refuge in the inaccessible parts of the country to recruit fresh forces. The last campaign, 1869–70, was conducted by Conde d'Eu, son-in-law of the Emperor, who defeated the enemy at Campo Grande, and so ended the war. Lopez, in attempting to escape, was surprised by General Camara, and killed. This war secured for Brazil the free navigation of the Paraguay, placing Matto Grosso in fluvial communication with the capital. It was almost the financial ruin of the country, however, and the results were so disastrous to Paraguay that she has never recovered. Almost depopulated, there were very few men of mature age left in the country. The movement for the complete abolition of slavery had been growing for a long time, but the war with Paraguay had occupied the entire attention of the country for years, and in consequence the advocates for manumission had no opportunity of appealing to the country on this momentous question. Visconde Silva Paranhas do Rio Branco, the great statesman (father of the late Foreign Minister), succeeded in obtaining Parliamentary sanction to a bill providing that every child born of a

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slave should be free. The Emperor at this time was in Europe, and the Regent, Princess Isabel, signed the law, Baron Cotegipe remarking to her that in redeeming a race she was destroying the Empire. The franchise was voted on January 9, 1881; proposals were soon made for completing the good work already commenced, but were not successful until May, 1888, when a clear sweep of the whole system of slavery was made, by a law promulgated by both chambers, signed by the Princess, Regent for the second time, owing to the ill health of the Emperor, and received by great demonstrations of approval on the part of the populace. There is no doubt whatever that the act was premature. Sage reflections showed that the supply of free labour was entirely inadequate, and that the Negro was, through centuries of dependence on his master, quite unfitted to suddenly find his relations with the latter entirely changed. In place of security of tenure and in many cases great licence, which he had under the old régime, he found himself looked upon as a creature with no right to a living, and was all too frequently an outcast. The time was not ripe for such a *coup d'état*, much less to place the franchise in the hands of such a class as the ex-slaves were. Chaos resulted, hundreds of plantations were abandoned or only half-cultivated, and in the State of Rio de Janeiro to-day, within fifty miles of the capital, one may see the melancholy result of what was intended to be an act of humanity.

The coffee-producing states, and especially São Paulo and Rio de Janeiro, were the fertile soil in which was sown the seeds of revolution, and certainly the Republic, impossible to delay much longer, was precipitated by that law which gave freedom to the many, and penury to the few. The death-knell of the Empire was tolled. The Emperor had alienated the sympathies of the lead-

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ing statesmen during the last few years, and his voyage to Europe was doubtless a most injudicious act. Isabel was disliked, both with regard to her ultra-religious principles, and owing to her partisanship of the slaves. At this time the doctrines of Comte had found many disciples in Brazil, and Masonry had become a force to reckon with. Many circumstances were responsible for the debacle, but the most important have been stated. The leading spirits amongst the planters formed a Republican Party. It had, however, been organized on a small scale in 1870, by Saldanha Marinho, in São Paulo. The Church itself became an enemy to the Crown, throwing its weight (as always) into the side of the balance that appeared heavier. The demagogues hated the Emperor for his assumption of so much power. Benjamin Constant became the apostle of a movement that in one day gained a bloodless and stupendous victory. Changing, with the declaration of Marshal Deodoro da Fonseca, an Empire to a Republic, surely never had the militant arm achieved its aims by such means. Dom Pedro found himself without a single powerful friend when the crisis came. He bent his venerable head to the blow, and one of the most intellectual and patriotic rulers the world has ever known passed out of history. A proposal made to erect a monument to his memory has now borne fruit, and a fine bronze statue in one of the beautiful public gardens of Petropolis perpetuates his memory. This was inaugurated in February (1911), in the presence of a distinguished assembly, and it is hoped that the proposal made in Parliament, to have his remains brought back to Brazil, will bear fruit. Surely Republicans are more noble-spirited than Monarchists. What would the British House of Lords say to the idea of spending money in order to honour Oliver Cromwell, a man who deserved

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far more of posterity than a pitiable and despicable return to the principles of hereditary Monarchy?

At the time of the Empire, the cities of Brazil were in a very parlous state indeed. The streets of the capital were narrow, unpaved and sparsely illuminated with fish oil. Sewers and waterworks were not in existence, and the necessities of the people in this direction were confided to private enterprise. Most of the houses were one-storied, and those more elevated generally possessed a store on the ground floor. The few mechanics were careless and improvident, and scarcely any of the smaller master men had their own materials to choose from. Take the case of carpentry work. Friends had to be found who would travel into the country to buy the timber. None would work whilst possessed of money. Ladies scarcely ever went out, and when obliged by the necessity of attending mass, were carried in a sort of sedan chair, surrounded by a group of attendant Negresses. In the house, they usually sat, without stockings or slippers, in a very bare sort of deshabille indeed, listening to all the small talk and scandal collected by their favourite body-woman. They occupied themselves by lace or sweet making. (The Brazilian ladies are great adepts even to-day at concocting all kinds of delicious preserves and similar dainties.) At 18 they were quite women, and too frequently began to age before the age of 25. The men occupied themselves in gambling, frequenting cafés and discussing politics. A shop was a convenient place of assignation, and apparently the last business transacted there was to sell the commodities exposed. Lucock and Burton relate many amusing stories of the apathy and indifference of the tradesmen, as well as of their profound ignorance of the arts of which they called themselves masters. There was no social life, because there was no society,

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properly speaking, apart from the aristocratic and bureaucratic element. The home life of the planter was of the simplest and most unpretentious description, and there were no hotels or inns deserving of the name. Somewhat previous to the declaration of independence, it was a pleasant custom of the Prince to ride round with his entourage and point out a house he fancied. The door was accordingly marked "P.R." (Principe Real), and the owner compelled to dispose of it at an arbitrary figure, or too frequently make a gift of it to his august master. In 1826 the Imperial carriage was accompanied by an escort armed with whips, and woe betide the unfortunate wight who remained covered. Brazilians were expected to alight from their horses and carriages whilst the cortège passed. Small wonder, with the exactions of the Royal Family and the nobility, the people sought to avoid display, or anything which brought them under the notice of their rulers. These customs die hard. I know a tradesman, rich, even from an English point of view, yet he sleeps in a dirty little hovel, dresses in the most ordinary of clothes, and eats at the poorest kind of chop-house. His manners are as uncouth as his habits, and he represents a type still common amongst the Lusobrasileiros of the present age. You may meet with them in the steerage of homeward bound steamers, and little dream that they could in all probability make you feel small, from a financial point of view. In spite of the encouragement given under the Empire to education, yet at least 50 per cent. of the population were quite illiterate. Lindley said that when he was there, the ignorance evinced on most ordinary subjects was startling. During the height of a sanguinary campaign, many never knew that the country was at war, and if they were aware, didn't care a rap. One or another casual reader of a European book might speak of the

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possibility of future liberty. The proletariat had no interest in social and concrete questions, and were more inquisitive in parochial affairs than in national ones. Out of this people has sprung, in spite of their natural indolence of character, a race imbued with life and vigour. It seems as if the nation slept and required gigantic efforts to be awakened. If it has done nothing else, the Republic has breathed the breath of life into Brazil. The whole country is astir, and if the early travellers, who found so much to decry, were enabled to step from their graves and revisit it, their amazement would be great, and they would admit that they themselves were quite out of date.

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CHAPTER VII

THE REPUBLIC

THE 15th of November, 1889, saw the advent of the Republic.

The military dictatorship of Marshal da Fonseca was brief, but remarkable for the formulation of the new constitution, which took place in February, 1891 ; the same year Parliament was dissolved, and he was obliged to resign, and place the reins of Government in the hands of another soldier, but an abler man, Marshal Floriano Peixóto. The crisis caused by the sudden emancipation of the slaves now came to a head, and the country was plunged, in addition, to a state of disorder and civil war.

In 1892 a revolution broke out which lasted nearly three years in Rio Grande do Sul. The Federal Government was called in by the State to restore order, but soon afterwards the revolters were joined by nearly the whole of the fleet (September, 1893). A monarchical character was given to the affair, in spite of the efforts of one of the admirals. This was one of the most severe crises through which Brazil passed, and, contrary to the general rule, the army was the saviour of the country. Marshal Peixóto played a great part in the struggle, and on one occasion the bombardment of Rio de Janeiro was commenced, and only stopped through the intervention of the foreign war vessels at that time in port.

In 1894 Peixóto was succeeded by the first civil

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President, Dr. Prudente de Moraes, who concluded the civil war, and started the work of reconstruction, so well followed by his successors. An attempt was made on his life by a fanatic, but the political disturbances were becoming fewer, and the state of the country improving, in spite of the terrible financial depression. During this period the first efforts of the Methodists to make active propaganda met with but little success, owing to the attitude of the priests, especially in Bahia, where Bibles were publicly burned in the squares, without the slightest attempt on the part of the authorities to keep order. This can hardly be wondered at, considering the origin, and want of discretion, tact, and tolerance, on the part of the Protestant colporteurs.

The majority of these men were drawn from a class ill-fitted to do pioneer work in such a country. I remember a case where one occupied rooms in the same house as a Catholic father. He used to enter the apartment of the latter and place testaments on his bed, and lost no opportunity of insulting the faith and character of his religious enemies. Another fellow, ex-Bible agent, blossomed out into a reverend after a couple of years in the country. Another took in paying guests, contrary to the expressed rule of the society.

American girls' schools are springing up in many cities, but their Methodist propaganda is not at all judicious at times, and they lose many pupils through obliging daughters of Catholics to submit to their particular brand of Protestantism. The great colleges of the nuns are carried on with much more liberality, Jews, Positivists or Mohammedans being equally free to practise their own creeds. For the credit of the Anglo-Saxon race, it is quite time there were a few schools run on non-religious lines.

During the administration of Dr. Moraes, the limits between Argentina and Brazil were fixed in favour of

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the latter, after a dispute of more than a hundred years' standing. This was owing to the good offices of the United States as arbitrator.

Dr. Campos Salles became President in 1898, and the rehabilitation of Brazil proceeded rapidly. The boundary between French Guiana and Pará was fixed (Treaty of Berne).

Dr. Salles was a Paulista, and had the mortification of seeing the country, and his own state in particular, in very bad financial straits. His chief task was to re-establish the national credit, and to do this it was necessary to take serious measures. Specie payments were suspended for some time, and paper money, in large quantities, withdrawn and burnt. Another President from S. Paulo (Rodrigues Alves) came on the scene in 1902, and found things on a much better footing all round. During his term of office railway construction was pushed on rapidly, and the City of Rio de Janeiro in great part pulled down and rebuilt on magnificent lines. 1904 saw a great triumph at the St. Louis Exhibition, and the wonderful white palace in which were housed myriads of splendid examples of Brazilian products, was transferred to Rio de Janeiro, and rebuilt in a *few weeks* on a site in front of the bay, surrounded by gardens and fine promenades. In honour of the Monroe doctrine, it was called by the name of the American President who was responsible for that much-discussed definite exposition of United States political views.

The Monroe Palace is constructed of marble and granite, and is a distinctive landmark. Its first noteworthy use was a meeting place for the third Pan-American Congress, attended by 80 representatives of 20 nations.

The Brazilian Government installed in the building

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ITAMARATY CASCADE, PETROPOLIS.



WESTPHALIA, PETROPOLIS.

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ORGAN MOUNTAINS (STATE OF RIO) WITH THE DEDO DE DEUS (FINGER OF GOD) ON THE RIGHT.

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a complete telegraph, telephone, and postal service, entirely free to the delegates. It also maintained translators, typists, and clerks, and nothing in connexion with the comfort or convenience of the delegates was left undone. The conference was opened by Baron Rio Branco (Foreign Minister); and a few words from his address are perhaps permissible:—

"As young nations still, we should not forget what we owe to those who have furnished the capital with which we have entered into the world of competition. The very immensity of our territories, in a great part unpopulated and unexplored, and the certainty that we have ample resources for a population twenty times larger, would suggest to us the advisability of strengthening our friendly relations, and trying to develop the commercial interests which we have in common. From Europe we came; Europe has been our teacher, from her we receive continual support and example, the light of science and art, the commodities of her industry, and the most profitable lessons of progress. What in exchange we can give for this, by our growth and prosperity, will certainly constitute a more important field for the employment of her commercial and industrial activity."

Another success was that of the Sanitary Department at the Berlin Congress, where Brazil took first prize.

In 1906 Dr. Affonso Penna became President, but did not live to end his term of office, as he died after a very short illness on June 14, 1909.

The Presidential Election that came to an end early in 1910 was a remarkable one from several points of view. For one thing, it was the first in which two such redoubtable candidates found themselves in opposition, and in which a struggle was assured right up to the polling stage. The President-elect, Marshal Hermes

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da Fonseca, is the nephew of the head of the Provisional Government from November 15, 1889, to January, 1891, (the fiery Deodoro da Fonseca), the dictator, whilst his adversary, Dr. Ruy Barbosa, was Minister of Finance, and actually (although not in name) Vice-President during the same administration. The Marshal is a grandson, son and nephew of soldiers, and has served his country in every grade of military capacity, being Minister of War during the Presidency of Dr. Affonso Penna. He has for his programme the development of railways, public works, agriculture, and the general economical expansion of Brazil, and a settled policy of peace.

The Vice-President is Dr. Wenceslao Braz, born 1868, who relinquished the Presidency of the State of Minas Geraes to take up the work of propaganda for a higher position. Dedicated to politics from his youth, he has been in succession State and Federal Deputy, and Minister of the Interior of his native State.

The late lamented Baron do Rio Branco was Foreign Minister until his death (February 10, 1912), and was succeeded by Dr. Lauro Severiano Muller, who was born in Santa Catharina in 1864.

Of Teutonic extraction, he has the capacity of the Germanic race for administration. He was Minister of Public Works from 1902 to 1906.

Dr. Pedro de Toledo is Minister of Agriculture, Commerce and Industry, and has shown great energy and initiative.

The War Minister is General Vespasiano de Albuquerque; that of Marine, Admiral Belfort Vieira; Justice and the Interior, Dr. Rivadavia Corrêia; Finance, Dr. Francisco Salles; and Public Works, Dr. José Barbosa Gonçalves.

Amongst the most important measures of the past

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year, one may note the decrees for the protection of the rubber industry, the sea and river fisheries, the encouragement of the co-operative movement in Minas, etc., etc., as well as the forestry law, the stimulation of live stock breeding, including the importation of pedigree cattle, etc., all of which are due to the present enlightened Minister of Agriculture, and are more fully dealt with under their proper heading.

ARMY AND NAVY

The Navy

The official programme, commenced in 1908, will be completed next year, 1913, but the Liga Maritima (Navy League), 40,000 strong, is working might and main to add two more battleships to the fleet.

One, the *Riachuelo*, is almost a certainty, as a great deal of money is already subscribed.

The three super-Dreadnoughts already constructed were the first to have two tiers of 12-inch guns.

The personnel consists of some 6,000 seamen, and 1,500 firemen, and 5,000 boys, who will serve six years after they join the colours, as well as some 600 marines.

The largest and finest of the first-class ships is the *Rio de Janeiro*. She is 27,500 tons displacement, and has a speed of 22 knots. Her armament consists of fourteen 12-inch guns, all of which may be fired on one broadside, twenty 6-inch, and ten 3-inch, and a number of quick-firers, besides three 21-inch torpedo tubes.

This ship is driven by four screws, and the latest type of turbine engines. Her total cost was about £3,000,000.

The other ships are—

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	Tonnage.	Speed.	Metres.	Armament.
The São Paulo *Minas Geraes.*	21,000	21·4	159 long 25·6 wide 7·5 draught	12 12-in. guns in six towers 22 4·7-in. guns Broadside of 10 guns
Coast Guard.				
Deodoro *Floriano*	3,162	15	—	16 guns
School Ships.				
Barroso	3,450	21	—	28 guns
Benjamin Constant	2,820	14	—	16 guns
Scouts.				
Bahia *Rio Grande do Sul.*	3,500	27–28	—	10 of 120-mm. 8 of 47-mm. 2 torpedo tubes
Torpedo Cruisers.				
Tupy *Tymbira* *Tamooy*	1,190	22	—	10 guns
Gunboats.				
Republica	1,300	16	—	10 guns
Tiradentes	900	14·7	—	10 guns
Destroyers.				
Pará, Piauhy *Amazonas, Alagoas* *Matto Grosso, Paraná* *Santa Catharina* *Rio Grande do Norte* *Parahyba* *Espirito Santo*	700	27–28	—	6 guns 2 torpedo tubes
Gustavo Sampaio and 3 others	500	18	—	6 guns
Two Torpedo Boats	190	—	—	2 of 47 mm. 2 torpedo tubes

Five Submarines (type of Holland), some other small vessels of different types, and two Auxiliaries.

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The *Riachuelo*, and the fifth ship proposed, will doubtless be bigger and more powerful.

Some very fast river gunboats (heavily armed) have been recently ordered in England.

The Army

It is not intended to largely increase the military forces of the Republic, but to put them on a much better footing. The Government has lent its aid to the National Rifle Association, founded in 1906, and this has branches in every state. It must also be remembered that the police are semi-military in character, and instructors have been contracted with from France, to drill the São Paulo force, which has a total strength of 5,000 men. In Rio de Janeiro lectures are given, and military evolutions are shown by the aid of the kinematograph.

The War Department has its own smokeless powder factory, and with the very satisfactory increase in the number of volunteers, it is certain that the Brazilian military forces are in a very good condition to-day. By the law of 1907, every citizen is liable to serve from 21 to 44 years of age; two years on active service and seven in the First Reserve.

Present peace footing of the Army. Fifteen line regiments of three battalions each, thirteen companies of sharpshooters, twenty-five sections of maxims. Nine regiments of cavalry of four squadrons each, five regiments of mounted infantry of two squadrons each, five companies of mounted scouts for the infantry brigades, and seven companies of mounted scouts for other services.

There are also forty-five batteries of four pieces of horse artillery, five batteries of howitzers, nine batteries

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of light guns, six batteries of mountain guns, thirty-six batteries of field artillery, etc., etc., etc.

There is also a balloon and aeroplane section.

Total military strength (1912), 32,000 men, with 20,000 of the First Reserve called up annually for manœuvres.

Brazil is divided into thirteen military districts, and every municipality has a National Guard, and most cities rifle clubs (with uniform and military training). The States of São Paulo and Rio Grande do Sul have their own special organization.

ARMY ESTIMATES.

1912—£5,315,700
1911—£8,444,151

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CHAPTER VIII

AREA, DISTRIBUTION OF POPULATION AND COLONIZATION

State.	Area in Kilometres.	Population, 1908.	Capital.
Alagôas	58,491	785,000	Maceió
Amazonas . . .	1,894,724	379,000	Manáos
Bahia.	426,427	2,287,000	Bahia
Ceará	104,250	886,000	Fartaleza
Espirito Santo . .	44,839	297,000	Victoria
Federal District .	1,116	1,000,000 (1912)	Rio de Janeiro
Goyaz	747,311	280,000	Goyaz
Maranhão . . .	459,884	562,000	São Luiz
Matto Grosso . .	1,378,783	142,000	Cuyabá
Minas Geraes . .	574,885	3,960,000	Bello Horizonte
Pará	1,149,712	568,000	Belem
Parahyba . . .	74,731	520,000	Parahyba
Paraná	251,940	406,000	Curityba
Pernambuco . .	128,395	1,310,000	Recife
Piauhy	301,797	400,000	Therezina
Rio Grande do Norte	57,485	279,000	Natal
Rio Grande do Sul .	236,553	1,400,000	Porto Alegre
Rio de Janeiro . .	58,982	968,000	Nictheray
Santa Catharina .	43,535	353,000	Florianopolis
São Paulo . . .	290,876	3,397,000	São Paulo
Sergipe	39,090	413,000	Aracajú
Territory of the Acre	191,000	100,000	Rio Branco
Total Area . .	8,524,776 sq. kilometres (1908)		

Population, except the Federal Capital, is calculated on the basis of the 1900 census.

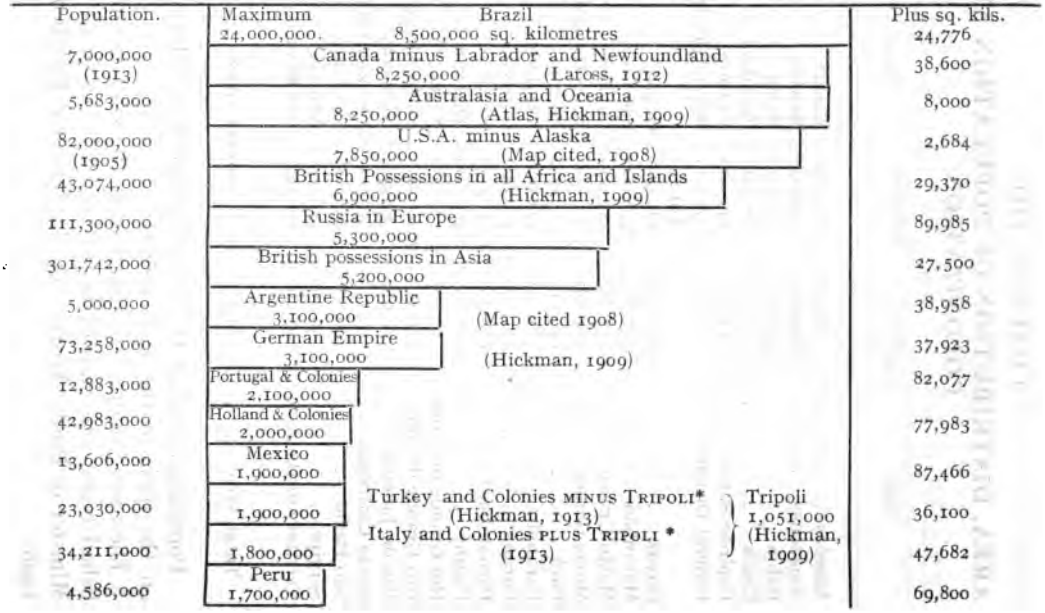
The above figures are taken from the statistics published below the map of Brazil issued by order of the Minister of Public Works, for the National Exhibition, 1908.

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COMPARATIVE AREA OF BRAZIL

Round Figures.

Scale: 2 centimetres to 1,000,000 sq. kils.



Population of Tripoli, 1909, 1,000,000 (Hickman).

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YPIRANGA MONUMENT, STATE MUSEUM (SÃO PAULO).

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S. Paulo Railway Station, São Paulo.

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The estimated total population in 1913 is 24,000,000, including less than 500,000 Indians. The population of the various cities is given in an appendix. The most curious thing about the country is the absolute disparity between the area of the States and the density of population. Compare the State of Rio de Janeiro (including the Federal Capital) and Minas Geraes, even allowing for the difference in area, the comparison is interesting. But although Minas has no city of any size, and has no great industries, sea ports, or outlet except through the States of São Paulo, Rio, Espirito Santo and Bahia, yet the *relative* density of population is very high. This is largely due to the effects of the influx of settlers in the palmy days of the gold and diamond mining. Adventurers poured in from north, east and south, and finding the climate good and the soil fertile, remained as farmers after the mines had been exhausted.

São Paulo will in all probability have the largest population of any Brazilian State ere long, as it is the only one to conduct an independent Colonization Department, and one which is highly successful. The capital of that State is without doubt the second city in Brazil, and a special note will be devoted to it at the end of the book. Bahia, Pernambuco, Pará (Belem), Manáos, and Porto Alegre are all destined to be great cities. The parent State of Rio is reviving from the disastrous effects of the yellow fever, lasting up to 1900, and in a few years the whole of the alluvials lying round the bay to the north will be drained and become the source of fortunes in the supply of market garden produce. Things cannot change entirely in a couple of years, and many parts of the State of Rio have a less population now than fifty years ago. With regard to the Constitutional law, which fixes the capital of the Republic at a selected site in Goyaz, a syndicate offers to build the Government

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offices and the President's palace, to complete the railways necessary, establish power and light, sewage, trains, and water supply; in short, to create a model city, free, if the surplus lands and concessions for public services be granted to it for a term of 90 years, and that it shall be free of taxes for 20 years.

In the south of Brazil the sexes are pretty well equally divided, but in such states as receive the greater number of immigrants, Rio de Janeiro, São Paulo, Paranã, and Minas Geraes, the male sex largely predominates. The present density of population is about 2·40 per square kilometre. The most densely populated state is Rio de Janeiro, and the second is Alágoas, whilst Pará, Amazonas, Goyaz, and Matto Grosso have considerably less than one person to the square kilometre. I have already dealt with the average mortality in the demographic statistics shown under the heading of Climate and Diseases. In all probability the next ten years will show a great alteration in these figures, as the interior states have their communications with the seaboard improved, and without a doubt Goyaz will be one of the divisions of the Republic to profit most.

The first attempt at colonization, other than by Portuguese, was by John VI, in 1818–19. He started two German villages in Bahia, and a Swiss one at Novo Friburgo (State of Rio). In 1851 the Emperor, Dom Pedro, invited over a number of Germans, and the cólony of Blumenau, and that of Joinville, were soon founded, to be shortly followed by that at Petropolis. In 1859 the Prussian Government passed a law prohibiting emigration of its subjects to Brazil, followed long after by the French, and later by the Italian restrictive measures. It cannot be wondered at that emigration has fallen off since 1891, the year which reached the high-water mark.

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In 1867 a large number of Americans from the southern states reached Brazil, and were settled in Paraná, São Paulo, Minas, Rio, Espirito Santo, etc., and about the same time the British immigration was not inconsiderable.

The grand total of 1891 was 275,808, of whom more than 116,000 were Italians. This influx was doubtless due in part to the crisis in the Argentine Republic (1890–92), as at no period since have the arrivals totalled half that number in one year. Since 1895 the figures have demonstrated the necessity of measures for encouraging the flow of colonists into the country, and the first of the states to show the way was São Paulo. In 1896, 1899 and 1905, the State of Minas Geraes created laws dealing with this problem, and Paraná, Bahia, Matto Grosso, etc., followed suit. On April 19, 1907, the Federal Government issued a national decree regarding immigration and colonization, the text of the principal articles of which is herewith appended. The *raison d'être* of this decree lies in the position of irresponsibility of the several states before the Federal Government, and, in consequence, as regards propaganda in Europe. This has been the cause of the obnoxious laws passed by most of the European Governments, as regards Brazil, and the most important result, of an immediate nature, achieved by the new Government department is the practical revoking of these measures.

The fact that from many parts of the United States repeated requests for concessions are coming in, shows that the conditions of life in Brazil are not such as certain Europeans imagine. A society, numbering 1,600, desires to come all the way from San Francisco, California, to São Paulo, and the great interest taken in Brazil generally in the United States shows that the shrewd farmers of that vast Republic know a good thing

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when they see it. The Japanese societies of emigration have also succeeded in inducing some 5,000 Nipponese to leave their native land. 787 arrived at Santos on June 18 last year (1908), and to crown all, came in a Japanese steamer, the *Kasato Maru*, which made the passage from Yokohama in less than six weeks. It is, however, doubtful whether the introduction of these Coolies will prove an unmixed blessing, and the yellow press is now engaged in warning the nation of the "Asiatic Peril," as the German question is by this time, and deservedly so, a thing of the past. Referring to the Teutonic colonies in Santa Catharina and Rio Grande do Sul, it is a curious fact that coloured servants are often obliged to learn German, instead of the alien learning the language of the country. Some towns are entirely Teuton; mayor, councillors, police, national guards, etc., but they are none the less good Brazilian citizens, and would prove good soldiers in defence of their adopted Faderland. The fact of their adhering to their own language, and to their old forms of Sangerbunds and Vereins, is an instance of their strength rather than their weakness. The Englishmen who have lost their mother tongue (as many have in Brazil) are less virile than those who retain their idiom as well as their national attributes.

The quality of the immigrants is said by the Director of Colonization in his report for last year, to be much improved. With regard to the arrangements for the reception and dispersal of colonists, I have received the highest possible praise from Englishmen who have passed through the hands of the officials of the department. In 1910 there were in preparation and course of settlement no fewer than 37 colonies.

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Immigration in 1910	88,564
1911	
Portuguese	46,754
Spanish	27,007
Germans	4,223
Austrians	3,327
Russians	13,898
Syrians	6,223
Others	32,184
Total	133,616

Read, mark, learn and inwardly digest, and treat with the contemptuous scorn it merits any attempt to discredit such a country as Brazil.

Again, he who is afraid of the security of his earnings need have no care. His wages are the very first call on an estate. If he hires himself out through the medium of the Government, the latter will see that the contract is entirely in order, and enforce its provisions. I speak, however, more to the man who will plough his own furrow, he who wishes a stake in the country, and I say with St. Hilaire, if ever there is a place that could do without the rest of the world, it is Minas Geraes, and I go further, and add to Minas at least one-half of the *whole* of Brazil, from the Amazon to the Paraná. There is room for all, and the only condition necessary is ability to work, and the leading of moral lives. There are no religious disabilities of any kind, and one may find members of almost any faith, scattered over the Republic, including Mohammedans, Jews, Evangelicals, Positivists, as well as the majority, who are Roman Catholics. There are, as we have stated in another place, Methodist churches in plenty, especially in the State of Minas Geraes.

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Surveys have been made by the engineers of the new department of colonization, in all of the states which have responded to the appeal of the Federal Government, and this year will, without a doubt, show remarkable activity, and a great increase in the number of immigrants. Bahia has also established a department of colonization, and issued literature in various European languages. The only state to offer free rural lots at present is Matto Grosso, but the cost of land in all the others is quite low, and payments are spread over a number of years. The special inducements offered also quite justify a normal price for the lots, as they are surveyed and selected by the Government, and the colonists are transported thither at the expense of the department.

The most interesting of the colonial centres is that of Itatiaiá, consisting of seven estates, having a total area of 48,000 hectares, in two states. The cost of the land amounted to £25,000, apart from any outlay in connexion with surveying or administration expenses and assistance given to colonists. The altitude of the colony ranges from 2 to 8,000 feet, and the average annual temperature of the highest part of the estates is 54° Fahrenheit, and the lowest 68° Fahrenheit. The colony is laid out for some 500 families as a preliminary essay. The Central Railway (São Paulo branch) has two stations (Campobello and Itatiaiá) convenient to the colony. The cost per lot of 50 hectares will be £63 to the first comers. The Visconde de Mauá colony in the same state is situated 1,050 metres above sea level. The annual mean temperature is 64° Fahrenheit. That of Vera Guarany (Paraná), 2,400 feet altitude, has a mean temperature of only 59° Fahrenheit. Colonists in the State of Rio are mostly Swiss and German; in Paraná, Austrian Poles and Russians. The São Paulo

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Government has established many liberal measures for the benefit of colonists, those having passed through the hands of the Immigration Department in the State capital being enabled to send for their families and relatives at Government expense, and are entitled to free legal advice with regard to contracts with employers, etc. Both the Federal and São Paulo Governments are prepared to enter into contracts with responsible firms, for the introduction of agricultural workers and their families.

The National Congress has under consideration a proposal to concede free grants of land to suitable immigrants in groups of families, definite title deeds being given after proof that reasonable improvements have been carried out, and the land properly cultivated. The State of Pará has organized a new system of settlement, and the price for 100 hectares is 100 milreis, the price *increasing* by 200 reis the hectare for each 1,000 hectares or fraction. The cost of land for mining and quarrying purposes will be double the above.

Urban lots will cost from 50 to 100 reis the square metre. Estates covered with the Brazil nut palm will be sold at the same rate as mining lots. All State lands must be paid for by three instalments, one on completion of purchase, and the third at the end of the second year.

GUIDE TO THE IMMIGRANT IN BRAZIL

Reception and Lodging of Immigrants in the Port of Rio de Janeiro

Steamers from foreign ports, anchoring in the port of Rio, are visited by uniformed interpreters, who speak most of the principal European languages, and offer, in the name of the Brazilian Government, to all healthy persons of good character free disembarkation and pro-

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visional board and lodging in the home in the Ilha das Flores.

This island is situated in the bay, some fifty minutes' distance from the city.

The immigrants are conducted thither, and after declaring their names, ages, nationalities, professions, and place of origin and destiny, if any, are permitted to remain from three to eight days. The immigrants may go in parties to the city to perform any necessary business, and will, if required, be accompanied by interpreters.

In the city will be found a bureau of immigration where every information will be furnished, as well as free passages to any part of the Republic in the case of agriculturists recently arrived.

Aid to Agriculturists with Families

The above will be given transport to the lot selected, together with their families and all their belongings.

The lots vary in price from 200 milreis to 750 milreis for 25 hectares, without a house, and may be paid for in instalments extending over seven or ten years, without interest. Houses vary in cost from 500$000 to 2,000$000.

The colonist will be given some tools, and in the case of being without means, can obtain work in road construction, etc., for the first six months. The immigrant arriving without his family, must pay cash for any lot. Owing to the vast increase in the number of immigrants, it is advisable for those who intend to go out to choose their domicile after arrival, in consultation with the authorities in Rio de Janeiro.

Free passage is now offered to any able-bodied Portuguese willing to work on the land. This measure has been decreed in order to relieve Spain from the burden

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AVENIDA CENTRAL, RIO.



RUBBER TRANSPORT, RIVER XINGÚ, PARÁ.

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PLACE CARIOCA AND RUA URUGUAYANA, RIO.



AVENIDA CENTRAL, RIO.

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of so many poverty-stricken Portuguese Royalist refugees.

To those who have been misled by malicious and interested statements, I would recommend the perusal of any of the books mentioned in the appendix at the end of this work. Hear what Wallace has to say, laugh with the incomparable Burton, and study Fletcher and Kidder, Bates, Scully, Mawe, etc., etc. The overwhelming testimony of the greatest scientists, the most practical business men, and ordinary tourists during the last 100 years, is that Brazil is a country eminently fitted for the European.

Extracts from FEDERAL DECREE, No. 6,455, April 19, 1907.

REGULATIONS REGARDING IMMIGRATION AND COLONIZATION IN BRAZIL

Art. I. The peopling of the soil will be promoted by the Union in agreement with the State Governments, railway and river navigation companies, other companies or associations, and with private individuals, provided that the sureties and rules hereby guaranteed and laid down are duly observed.

Art. II. There shall be counted as immigrants all foreigners of less than sixty years of age who are not suffering from contagious diseases, nor plying illicit trades, and who are not criminals, rogues, beggars, vagabonds, lunatics, or invalids, who arrive at Brazilian ports, travelling third class. Persons over sixty years of age, or unfitted for work, will only be admitted when accompanied by their families, or when coming to join them, provided that there is in the family at least one or two against the member who is over sixty years of age.

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Art. III. To immigrants who establish themselves in any part of the country, and devote themselves to any branch of agriculture, industry or trade, or to any useful craft or profession, the following guarantees will be granted: complete liberty of action and freedom to engage in any trade, provided that the same does not endanger public safety, health or morals; complete liberty of religious belief; and finally, civic rights, as enjoyed under the Constitution and laws by Brazilians themselves.

Art. IV. The Union, without interfering with the liberty of similar action on the part of the states, will enter into an accord with them to direct and facilitate placing the immigrants who desire to settle as owners of their own land, and will protect and advise such spontaneous immigrants as need material aid for their first instalment.

Art. V. The colonies shall be of sufficient extent to admit of development, easy and convenient means of transport, on land chosen as fertile, where conditions are healthy, and there is abundance of drinking water.

Art VII.

(5) The State will provide the immigrants with tools and seeds free of charge, on first being installed, whilst the Union (Federal Government) may grant them these, and other favours for the same.

Art. VIII. The State may give any assistance to the immigrants, independent of that given by the Union.

Art. XIII. Localities will be chosen which conform to the conditions in Art. V, as well as the following:

(1) Convenient altitude and soil fitted for all kinds of cultivation.

(2) A position on or near railways, or navigable rivers, or close to populous centres, where the holders of the lots will find a ready market.

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(3) A constant and ample supply of water, both for domestic and drinking purposes, and for agricultural and industrial purposes.

(4) Topographical configuration, and other conditions permitting the use of agricultural machinery.

(5) Forests which will afford a sure and cheap supply of timber for building and other works.

(6) A large enough area to permit of the increase of the nucleus, so that relatives or descendants of the first immigrants may be invited to come and form new households, and hold lots in the same vicinity.

Art. XIV. When the locality has been chosen, the lots will be marked, and all necessary work put in hand, and the place prepared for occupation by the colonists.

Art. XVIII. If the position and importance of the nucleus demand the establishment of head-quarters, a site will be reserved, and the necessary buildings erected.

Art. XIX. In each nucleus, ground will be set apart for the erection of schools, and for experiments in agriculture, for instruction farms, and for industrial purposes.

Art. XX. The lots will be classified as rural and urban.

(1) Rural lots will be devoted to agriculture and cattle breeding, and will be of sufficient extent for the colonists who own them.

(2) As a general rule, rural lots will not exceed 25 hectares (about 62 acres) when situated along or near a railway, or river navigated by steamers, but otherwise they may be up to 50 hectares.

(3) Urban lots will be those situated at the head-quarters, and will ultimately form the township, and all their fronts will be on streets and squares.

(4) No urban lot may exceed 3,000 square metres, unless set apart for some special purpose.

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Art. XXI. As a general rule, a good and sanitary house will be built on each urban lot to be occupied by the immigrant and his family, whilst the ground will be prepared for the first cultivation, to be made by the person who acquires it.

(1) Immigrants who desire to erect houses at their own expense and according to their own taste, will have lots without houses reserved for them.

(2) Under the conditions of the preceding, the immigrant and his family, who acquire the lot, will be afforded temporary quarters, until they have built the house, which must be within the space of one year.

Art. XXII. Rural lots will be sold either for cash or for payments in instalments. In the former case a definite title will be handed over immediately, and in the latter a provisional title, which will be substituted by a definite one as soon as all payments have been made.

(1) Any one purchasing a lot on the instalment system, may pay off the debt in full, or in part, before the due date, at any time, in order to shorten the period for receiving the definite title.

(2) Under the conditions of the preceding paragraph, the purchaser will enjoy the privileges of paragraph 2, Art. XL.

Art. XXIII. Urban lots will only be sold for cash.

Art. XXIV. Lots will be sold at a moderate price, which shall be previously fixed, according to their size and position.

Art. XXV. Where there is a house on the lot, the cost price of the same will be added to the debit.

Art. XXVII. *Immigrants not accompanied by their families may only purchase rural lots for cash.*

Art. XXVIII. Immigrants accompanied by their families may acquire a new lot after obtaining a definite title to the first. When the family consists of more than

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five workers, or when the immigrant has improved the first lot, he will be allowed the preference for the purchase of a second, near the first.

Art. XXIX. The foreign immigrant (agriculturist) who has been less than two years in Brazil, who marries a Brazilian woman, or the daughter of a Brazilian born in the country, or the Brazilian who marries an alien woman, who has been in the country less than two years as an immigrant, will be given a lot with a provisional title, without the couple having to pay anything, provided that they have lived in harmony for a year, and have improved the said lot.

Art. XXX. If such immigrant desires to obtain a lot with a definite title immediately after his marriage, the same will be sold to him for half the stipulated price.

Art. XXXI. On the provisional title shall be written the full price of the lot, and the conditions to be observed for the obtaining of a definite title.

Art. XXXIV. Immigrants will be transported to the colonial nucleus free of charge.

Art. XXXV. Immigrants will be given (free of charge at first) seeds, hoes, spades, picks, axes, and scythes.

Art. XXXVI. During the first six months, from the date of their arrival at the nucleus, and until the harvest and sale of their produce, immigrants coming from abroad, and settled as owners of lots shall, when necessary, be granted means for the maintenance of their families.

Art. XXXVII. For the space of one year, under the conditions of the preceding article, all immigrants will receive medical attendance and medicines free of charge. This period may be prolonged at the discretion of the administrator of the nucleus.

Art. XXXVIII. Stores, where provisions and other

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articles of prime necessity will be sold at moderate prices, will be established in the colonies, to guarantee supplies to the inhabitants, who, however, will be entirely free to purchase where they like.

Art. XXXIX. During the first year after his instalment (or for a longer period if the Government so decrees), aid may be given to such immigrants as desire it, for the purchase, or hiring, of agricultural implements and machinery, live stock and vehicles necessary for the cultivation of the lots, and the preparation and transport of the produce.

Art. XL. The price of the lots, with or without a house, when the same are purchased on the instalment system, as well as any aid granted, except for work done, or classed as gratuitous, shall be written in a book and handed to the debtor, in the form of a current account, and shall constitute the debt of the immigrant, for which the head of the family is responsible. He shall begin amortization by yearly instalments, not later than at the end of the second year after his establishment. After this date, if no payment has been made, interest will be charged at the rate of three per cent. per annum on the instalments due.

(1) When the colony is situated on or near railways, or rivers navigated by steamers, the period for amortization shall be five years, counting from the first day of the third year of the instalment of the immigrant. In other cases, or when the Government deems it advisable, the period will be eight years, under the same conditions.

(2) The immigrant who pays his debt in advance will have a right to rebate at the rate of 12 per cent. per annum on instalments that are outstanding.

(3) The immigrant who pays the full value of the lot will immediately receive a definite title to the

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same, even though he has still other debts outstanding, contracted with the administration of the nucleus.

Art. XLI. In the event of the decease of the head of the family, in whose name the provisional or definite title had been drawn up, the lot will pass to his heirs, or legal representatives, on the same conditions on which he himself held it.

If the nucleus has not yet been emancipated, the transfer will be made by an official order of the administration without any legal intervention.

Art. XLII. Any debt which the deceased head of the family had contracted with the nucleus will be considered extinct if he leaves a widow and orphans, save that arising from the purchase of the lot on the instalment system.

Art. XLIII. If the lot was purchased by instalments, and three had been already paid by the deceased, the remainder will be remitted in favour of the widow and (or) orphans, and a definite title granted.

Art. XLIV. Government will maintain primary schools free, and will organize agricultural shows if deemed expedient.

Art. XLV. Prizes will be offered to producers who most distinguish themselves at such exhibitions.

Art. XLVI. Where the nucleus is intended for aliens, not more than 10 per cent. of the lots may be sold to Brazilians; but where the former exceed a certain number, a special area near the lots will be set aside for Brazilians if deemed advisable.

Colonies Due to the Enterprise of Railway Companies

Art. LXIII. The choice of the localities will depend on careful study of all the circumstances essential to the development of the colony.

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Art. LXIV. The choice must be examined and approved by the Federal Government.

Art. LXV. In addition to the foregoing, the plans, roads, divisions of lots, types of houses, etc., must be approved by the Government.

Art. LXX. The Government may authorize, or promote at its own expense, the introduction of immigrants from Europe to these colonies.

Art. LXXI. The service of settling the immigrants shall be at the expense of the company, which shall furnish the new-comers with tools and seeds, and when possible give them paid work on the railway or near the lots, and shall supply them, whenever necessary, with advances of food or money until harvest time.

Art. LXXIII. The price of lots, and houses, and conditions of payment depends on the approval of the Government, which reserves to itself the right to fiscalize anything in the colonists' interests.

Art. LXXIV. The company binds itself to grant a rebate of 50 per cent. on the ordinary tariffs, on colonial produce for five years, dating from the instalment of the first family on a lot.

Art. LXXV. The company will render every aid in its power, and will stimulate the formation and increase of small industries. It will create free primary schools, and build churches for the immigrants, regardless of denomination.

Reception of Immigrants

Art. XCVII.

(2) At ports properly equipped for the reception of immigrants, disembarkation, lodging, food, etc., until the destination is chosen, and transport there with all belongings; and transport will be gratuitous.

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Art. C. Immigrants' baggage, including tools, will be admitted duty free.

Art. CXVII. The service of reception and distribution of immigrants will be carried out at the expense of the Union at the port of Rio Janeiro.

Art. CXVIII. In State ports (as Bahia, Santos, etc.) the service will be at the expense of the State interested, aided by mutual arrangement by the Union.

Repatriation

Art. CXXVII. Government will repatriate such agricultural immigrants who may have been brought in at their own expense, if they have resided less than two years in Brazil and are incapacitated from earning their living, and have none of their family to support them.

Regulations of the State of São Paulo, December 27, 1906

Every immigrant intending to settle in the State, and who gives notice to the official of the department before leaving the ship at Santos, will be conveyed, with his luggage and other belongings, free of charge, to S. Paulo. The families of such immigrants are received into the home at S. Paulo, and the head of the family is franked as far as the colony he intends to settle in, and back again to S. Paulo. On arrival at the lot selected the colonists are sustained there for fifteen days, and receive tools, and seeds necessary for the first crops, without any charge.

Of the colonies under Government protection, it may be said that they are situated along the railway lines. The annual payments vary from £6 5s. to £18 15s. Recent arrivals, without resources, are given three days' work weekly if required, in order to maintain themselves and their families until the harvest is in.

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Immigrants are considered to be persons under sixty years of age, either in families or single men, who, as agriculturists, enter the country with the intention of remaining, and come third class or steerage from Europe. In the case of those over sixty, they must be accompanied by a family of two or more male adults, in order that their support may be assured. The price of land ranges from 5*s*. to 35*s*. per acre, according to its quality and situation. Free schools are established in each colony, and there are always physicians and ministers of religion at hand. Family lists (to be procured from any of the Government agents) should be filled in and returned before sailing.

The State will pay a subsidy of 10 contos of reis paper to any Colonization Syndicate settling fifty families on the land under approved conditions.

The Colonization Department has in the hostel in S. Paulo a very complete service of information, post and telegraph office, hospital, crêche, pharmacy, steam laundry, bank and exchange office, and a table d'hôte restaurant at a special tariff.

Every facility is given the head of the family to visit the district in which he proposes to settle, at no cost to himself.

During 1911 51,000 immigrants entered the port of Santos, including 17,849 Italians, 13,796 Portuguese, and 11,276 Spaniards.

The principal colonies in the State of S. Paulo are—

Nova Europa (German, Russian, Spanish, etc.).—Price per lot of 25 hectares, 2½ to 3 contos. Population about 1,500. Polyculture, like all the other colonies in this State.

Nova Odessa, founded principally by Russians.—25 hectares cost 1½ contos.

Jorge Tibiriça (Russian, Italian, etc.),—20 cost 1½

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contos. There are many others, but the above are representative.

In Minas Geraes there are flourishing colonies at—

Rodrigo Silva (Barbacena) on the Central Railway, principally devoted to silk culture, with saw mills, ice factory and other industries. A journal is published (*O Sericultor*), and the population of 1,500, mostly Italians, is thriving and increasing.

Carlos Prates, near Bello Horizonte, has a stocking factory, and grows a large quantity of fruit.

The colony of João Pinheiro, near Sete Lagôas, is also very prosperous, the average net profit per family in 1911 being £100. Population 442.

Some half-dozen of other centres are in full activity, and the State possesses five model farms in different districts.

In Paraná, most of the recent arrivals are Poles, and some of the centres have over 3,000 population. Their situation is excellent on the high campos of the interior, at altitudes varying from 700 to 1,200 metres. Cereals are largely grown in this State.

Santa Catharina has a large number of Austrians and Italians settled in the newer colonies, mainly devoted to cultivating the vine, but the older districts are German, especially round Blumenau and Joinville, and Itajahy, first settled by immigrants from the Rhenish and Baltic provinces.

The municipality of Nova Baden was started by Baron Schnebourg in 1860 with Bavarians.

The colonies in Rio Grande do Sul are principally in the hills and forests, not in the campos or prairies.

The soil is derived from eruptive rocks, and is much richer than that further north, which is largely composed of the elements of disintegrated gneiss and granitic rocks.

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Most cereals are grown, and wheat is becoming one of the staple crops. A great many of the German, Italian, Russian, Swiss and other settlers go in for bee culture on a large scale.

The average cost of land is 1 real per square metre. Five years is allowed in which to pay for the lot, but cultivation must be commenced within six months.

The Leopoldina Railway has deposited in the Federal treasury the sum of £125,000 for the purpose of colonization in the zone served by its lines, principally for centres (neuclii) in the State of Minas Geraes.

In the State of S. Paulo a family of six, of whom five are able to work, should earn the following in one year.

	£	s.	d.
Excess of production of live stock . .	30	0	0
Coffee harvesting (per head, £16) . .	80	0	0
Daily labour on estate, £6 . . .	30	0	0
Net minimum savings	£140	0	0

The above estimate relates to a family of agricultural workers of average capacity and behaviour, and does not apply either to quite inexperienced persons, nor yet to good or bad years.

State lands in Bahia vary in price from 3 to 10 $ per hectare. In Espirito Santo 2 to 10 hectares are given free.

The influx of colonists during the last four years has been so great, that only in very exceptional cases (*see* note *re* Portuguese) will the Federal Government grant free passages.

It is the policy of the State at present not to use any means of inducing any persons to emigrate from the United Kingdom to Brazil.

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This is in accordance with the strongly expressed views of the British Government on this subject.

It is, of course, well known that the latter does not wish its subjects to settle anywhere, except under the flag.

The President of the Republic has asked Congress to facilitate the settlement of the land, by granting free lots to colonists who have cultivated them satisfactorily for two years.

Average temperature of the entire zone at present being colonized = 15° to 25° Fahr., according to latitude and topographical position Altitude varies from 300 to 1,000 metres above sea level. Density of population : maximum, 10 per sq. kilometre ; minimum, 1 per sq. kilometre.

Italians in São Paulo

In a long list of Italian colonists averaging some twenty years in the State, and most of them turning over £400 yearly or more, four are mentioned with an income of £1,000 annually, one with £1,100, one with £1,200, four with £1,400, five with £1,600, one with £2,000, three with over £2,300, one with £3,200, another with £3,600, and finally a man who has now three factories, half a million coffee trees and an annual income of £6,600. Nearly all these colonists came to Brazil with hardly a cent in their pockets.

The Land Question

Brazil *versus* British Colonies

Without attempting to disparage any country whatever, it seems necessary to me to point out that when the price conditions of tenure and accessibility of available farm lands are considered, Canada and Australia must

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take a back seat. No land, it may be said, on any of the Federal or State colonies in Brazil is sold at more than £2 per acre, and taking the whole area into consideration, a fair average would be 15*s*. Can lots *worth having* be obtained *for any such prices* in any part of the British Empire?

I have before me as I write the Sydney, New South Wales, *Farmer and Settler* of July 30, 1912, and will make a few quotations from it, and leave the reader to draw his own conclusions.

1. Land in the hands of speculators (*impossible in Brazil*). A great deal of it without water supply.

Wheat farms.—No railway, per acre, £4 to £6 for lots of 400 to 650 acres. Another, 25*s*. an acre. Another, 50*s*. per acre. Another, 160 acres, £325. Survey fees, and 5 per cent. interest charged until account is paid. No interest is charged in Brazil on lands sold on the instalment plan.

Grazing Land.—259 acres, £6 6*s*. per acre. Twenty acres, near Sydney, cottage, etc., stock, £800.

Fruit growing land, £4 10*s*. Others from £4 to £6 per acre.

None of this land is certified as worth the money, after examination by official valuers. This is *always* done in Brazil. No Colonizing Company can fix *their own price* in the Republic unless approved by the Ministry of Agriculture.

2. Balloting for Crown Lands.—Barmedman: 3 blocks, 225 applicants. Wyalong, 1 block, 35 applicants.

Prices of Crown Lands.

16 acres odd, £72; covered with timber.
12 acres, £120; 10 acres, £78; 5 miles from railway.
100 acres, £300. No natural water supply.

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A farmer writes.—I get 3*s*. a bushel for wheat. We are at the mercy of the speculator.

Irrigation lots. Water charge, 5*s*. per acre foot. Rent paid half yearly in advance.

Any alien becoming the holder of a farm must be naturalized within three years, or he will lose *all interest in such farm, together with every improvement he has made on it.*

Not a single lot is offered in any part of Brazil where irrigation is necessary, and no pressure *whatever* is placed upon any foreigner to change his nationality, and he has an absolute right to his farm and all thereon.

The plain truth is, that in Australia, etc., all the best lands have been squatted on long since, and what is left is either offered as more or less unsuitable, or sold at high prices. Land companies have evidently got a good grip down under, as well as in British North America, and the incautious immigrant usually becomes a victim of their machinations. At present these gentry have not put their foot in Brazil, and will not be able to take advantage of the greenhorn, if they do land there, as long as the Government remains as honest and wide awake to the interests of the proletariat as it is to-day. The great Railways, possessing rights (*and duties*) of colonization, are well looked after, and there is no parallel to the well-known case of a similar concern, that is busy advertising its *rich* lands in another part of the world.

The Brazil Railway Company has already surveyed over 2,000,000 acres for colonization purposes. These lands are situated in the valley of the Rio Peixe, on the Itararé-Rio Uruguay Line, and up the Iguassú Valley. São Francisco, Rio-Parana Line. These estates are situated in Paraná and Santa Catharina, and lots of 50 acres have been sold at an average of 21*s*. per acre.

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Other plots in São Paulo State have fetched 42*s.* per acre.

The value of the land may be judged by the fact that the first settlers came from Rio Grande do Sul to Santa Catharina, having disposed of their farms in the former state. Altogether, the above Company has 6,000,000 acres available for colonization purposes.

There are also great areas of virgin lands available in the Central and Northern States of the Republic, but these are more suitable for plantations on a large scale, or for exploitation in other ways by wealthy syndicates.

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THE MUSSURAMA SNAKE ATTACKING A JARARACÁ (HIGHLY POISONOUS).



THE MUSSURAMA GORGING HIS VICTIM.

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GENERAL VIEW OF THE MODEL FARM OF THE LEOPOLDINA R'Y AT MACUCO, STATE OF RIO.

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CHAPTER IX

NATURALIZATION, CONSTITUTIONAL AND COMMERCIAL LAWS, AND EDUCATION

United States of Brazil (*Estados Unidos do Brazil*)

FEDERAL Republic of twenty states, one national territory, and one Federal district.

Flag, green, charged with a yellow diamond extending almost from end to end and top to bottom. On this latter is placed a blue sphere, transversed obliquely by a white band bearing the device ORDEM E PROGRESSO. Above the band is a solitary white star, and below twenty others, representing the States. National colours are green and yellow.

The arms are—A five-pointed star, each ray half green, half yellow vertically. On the left a spray of coffee, and on the right one of tobacco. Within the star a double circle in blue, the outer of which contains twenty stars, and the inner five, to form the southern cross. In the centre below the circle a vertical sword. The label at foot contains in the centre—Estados Unidos do Brazil, and underneath—15 de Novembro, de 1889.

Synopsis of Naturalization Law of May 14, 1908

Art. I. The following persons are considered to be Brazilian citizens:—

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(1) Those who are born in Brazil, although the father be a foreigner, provided he is not employed in the service of the nation to which he belongs.

(2) The children of Brazilian fathers, and illegitimate children of Brazilian mothers, born in foreign countries, if domiciled in Brazil.

(3) The children of Brazilian fathers employed in the service of the Republic in foreign countries, although not domiciled in Brazil.

(4) Foreigners who resided in Brazil on November 15, 1889, and who had not up to August 24, 1891, declared their intention of retaining their original nationality.

(5) Foreigners owning real estate in Brazil, married to Brazilian women, or having Brazilian issue, provided they are resident in Brazil, and have not declared their intention to adhere to their original nationality.

(6) Foreigners who apply for naturalization under the present law.

Art. II. Naturalized foreigners shall enjoy all civil and political rights, and may hold *any* public office, except that of President or Vice-President of the Republic. The office of Senator may be held after six years' citizenship, and that of Deputy after four years'.

Art. IV. Foreigners who desire Brazilian citizenship must apply to the President of the Republic, through the Ministry of Justice. Applications must be signed and authenticated by a notary public, and must state nationality, parentage, domicile, profession, condition, and legitimate issue must also be mentioned.

Applications must be accompanied by certificate of personal identity, legal age, residence of not less than two years in Brazil, good moral and civil conduct, and proof that applicants have not been indicted in Brazil or elsewhere for the offences enumerated in Art. IX.

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Art. V. Necessity of actual residence shall not be obligatory in the cases of foreigners married to Brazilian women, those with real estate in Brazil, those interested in some industrial undertaking, or who are inventors or introducers of some industry useful to the country, and those recommended by their talents or literary attainments, or by their professional skill, and finally, sons of naturalized foreigners born abroad before their fathers' naturalization.

Art. VI. Certificates from public departments, or given by judicial, municipal, or police authorities of Brazil, are sufficient proof of identity. Certification of signatures by notaries, or in case of application through the latter, power of attorney is sufficient, and birth or baptism certificates, or passports, or other admitted documents, will be proof of legal majority, and certificates from the authorities of his place of domicile, from his consul or diplomatic representative, will be accepted as proof that he has not been convicted of the crimes mentioned in Art. IX.

Art. VIII. *Papers relating to naturalization are exempt from all costs, stamps or fees.*

Art. IX. Foreigners who have been convicted of homicide, theft, bankruptcy, perjury, smuggling, forgery, counterfeiting, or immorality, will not be permitted to naturalize.

Art. XVI. The titles of naturalization must be claimed within six months by persons living in the Federal Capital.

Art. XVII. Persons residing in the states must claim their titles within one year.

Notes on the Constitution (February 24, 1891), and Form of Government of Brazil

The Republic consists of the United States of Brazil,

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and the internal affairs of each state may not be interfered with by the Union, unless to repel foreign invasion, or in the case of civil war between two states, or to reestablish order within the territory of any state, by request of its authorities.

Each state must provide for its own necessities, unless in the case of public calamity. It is the exclusive prerogative of the Union to decree duties and taxes on imports and port dues, stamp duties, and postal and telegraph charges, to maintain banks, and create custom houses, and the laws of the Union shall be executed by its officials, but they may be entrusted to State Governments by consent. Interstate duties are prohibited, but states may create export duties, taxes on real estate, and charges of a state nature in relation to postal and telegraph services.

Interference with, or aid of religion, is prohibited. Coasting traffic must be carried on in national bottoms (i.e., under the Brazilian flag).

Legislative powers are vested in the National Congress, with the sanction of the President. The elections for Senators shall be carried out simultaneously throughout the country. Legislature shall last for three years. There shall not be less than four Deputies for each state. The Senate shall be composed of citizens over thirty-five years of age, and include three from each state, and three for the Federal District of Rio de Janeiro.

The President and Vice-President of the Republic shall be elected by direct suffrage of the nation, and the mandate of a Senator shall last for nine years. The Senate alone shall have the power to try and sentence the President of the Republic, and the other members of the Government. The President must be a Brazilian born, and be over thirty-five years of age. He may

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choose and dismiss at will all Cabinet Ministers, and declare peace and make war.

Adult suffrage is the law, with certain exceptions. The Cabinet consists of the Ministers of the Exterior (foreign affairs), Interior and Justice, Finance, Marine, War, and Public Works and since 1907, Agriculture, Industry and Commerce.

The judicial power consists of a supreme court of fifteen justices, who hold office during life, and ordinary Federal Courts scattered through the country.

The Senate consists of sixty-three members, three for each state, and three for the Federal district.

The Chamber of Deputies comprises 212 members (one for each 70,000 inhabitants), elected for three years.

Brazil forms part of the Postal Union, and is a party to the international agreements with regard to telegraphs, submarine cables, marine signals, and protection of industrial property.

Foreigners enjoy the same civil rights as Brazilians, including trade marks and patents privileges. The army consisted of forty battalions of infantry, six of siege artillery, six regiments of field artillery, and fourteen regiments of cavalry, but since 1902 has been reorganized and increased. Conscription has also been adopted. No aliens are admitted into the army or navy. The navy has been entirely reformed, and will be quite the most powerful of the South American marines. Ninth, and perhaps eighth place in the world's navies will be reached by 1913.

With regard to marriages, the civil ceremony is obligatory, and the religious services are not officially recognized. Both are the rule, however, amongst Brazilians of all classes. The laws for the protection of single women are very severe, and in case of rape every possible

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attempt is made to compel immediate marriage, thus avoiding heavy punishment. Registration of births is compulsory, but the law is frequently evaded, as is also the new vaccination decree, although schools are obliged to publish a notice refusing to take pupils who have not been subjected to the operation.

Education is free, but not obligatory in all the states. Elementary schools are of two grades. In the first, pupils remain from seven to thirteen, and in the second until fifteen years of age. Besides the ordinary subjects, moral and civil instruction is given, and the elements of French, and elementary algebra and trigonometry, and commercial natural history. Elementary principles of law and political economy are also taught. Secondary schools may be entered with a certificate from the primary ones. The capital has two schools of this class. There are others in all of the states, and faculties of law at Pernambuco and São Paulo, as well as medical schools; the polytechnic at Rio, and the school of fine arts, and the mining school at Ouro Petro, shortly to be removed to Bello Horizonte. Any school or college can institute courses of medicine, law or engineering, but if in receipt of a subvention from Congress, it is subject to the Federal Government's rules and regulations with regard to the length of the course, and the order of the studies; and the Professors must be nominated by the State.

Formerly, besides the great colleges, there were many schools all over the country that were able to give their students a degree, and invest them with the coveted cap and gown. A great reform was made in 1911, and no longer callow cubs are respectfully titled "*Sen Doutor.*" The graduate receives only a diploma, as a certificate that he has completed his course as a doctor of law or medicine, chemist, dentist or engineer. Every

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school properly equipped and staffed is on an equal basis before the law, subject to its students being obliged to submit to entrance examinations as well as periodical ones. The result of this revolutionary process is already manifest in the opening of a number of preparatory schools, as well as professional coaches. Formerly the gilded youth sought the title of Bacherel, as an aid in his social life, like one still finds in England men who claim status, by reason of a bare pass, after having crammed at one of the 'Varsities.

The great evils perpetuated under the extinct system bore fruit in abuses of all sorts, especially in connexion with official employment. In many cases, men with real practical ablity were left behind in the race for promotion by those whose greatest claim to consideration was their title. To-day this is all changed, and a new era has arrived, in secondary and higher education, as in many other ramifications of daily life. Whereas not 20 per cent. of the students exercised their professions, or continued their studies, conscious that their future was assured, now it is very difficult to get employment in the Government service without passing a competitive exam., or to make progress, unless able to demonstrate their proficiency in whatever branch of the public work they are connected with.

There are fine public libraries all over Brazil. The National Library in Rio possesses more than 400,000 printed books and manuscripts. There is also a National Museum, and Academy of Fine Arts, and a splendid, world-famous Botanical Gardens. The Brazilian Academy of Letters has forty members.

In São Paulo there is a very fine modern museum, (Ypiranga) on a site said to commemorate the declaration of independence. There is also there the McKenzie College, under Presbyterian control, with nearly 600

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students. The pupils are mostly Brazilians, but there are representatives of nearly all the nationalities to be found in Brazil. The states of São Paulo and of Minas Geraes are probably the best equipped with elementary schools in the Union. The former has also a fine agricultural college.

Holidays

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
National	1	24	—	21	3	—	14	—	7	12	2/15	—
City of Rio	20	—	—	—	—	—	—	—	10	—	—	—
STATES.												
Alagoas	—	—	—	—	—	11	—	—	16	—	—	—
Amazonas	—	—	—	—	—	10	1	17	5	—	21	—
Geará	—	—	25	—	—	—	12	—	—	—	16/24	—
Espirito Santo	—	—	—	—	2/23	12	—	—	2	—	—	26
Goyaz	—	—	—	—	—	1	—	—	—	—	—	16
Maranhão	—	—	—	—	—	—	28	—	—	—	18	—
Matto Grosso	22	—	—	—	—	13	—	15	—	—	—	9
Minas Geraes	—	—	—	—	—	15	—	—	—	—	—	—
Pará	—	—	—	—	—	—	—	15	—	—	16	—
Parahyba	—	—	—	—	—	—	20	5	—	—	—	—
Paraná	—	—	—	7	—	—	—	—	—	—	—	19
Pernambuco	27	—	6	—	—	17	24	—	—	—	10	—
Piauhy	24	—	—	—	—	13	—	—	—	—	16	—
Rio Grande do Norte	—	—	19	7	—	12	—	—	—	—	—	—
Rio Grande do Sul	—	—	—	—	—	—	—	—	20	—	—	—
Rio de Janeiro	—	—	—	9	—	—	—	—	18	—	—	—
Santa Catharina	—	—	—	—	—	11	—	—	—	—	17	—
São Paulo	25	—	—	—	—	—	8	—	—	—	—	15
Sergipe	—	—	—	—	18	—	—	—	—	1	1/24	—
Saints' Days	6	2	25	—	—	24/29	—	15	8	—	1	8/25

Besides the ordinary movable feasts.

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LAPA, RIO DE JANEIRO.

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PIRACICABA FALLS, SÃO PAULO.

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Law Sittings

Criminal Courts open all the year. Civil Courts are closed from February 1 to March 31, and during Holy Week.

Patent Law

1. The invention must be described fully, and all plans, drawings, samples, etc., etc., be presented in duplicate to the first section of the *chief office of the Ministry of Agriculture* (Department of Industry.)

2. All details must be in the vernacular (Portuguese) without any corrections or erasures, initialled on each sheet, and signed by the inventor or his representative.

3. Weights and measures must be according to the metrical system.

Temperature by centigrade thermometer, and density according to specific gravity.

4. Plans to be on white paper without folds or joins, and in black indelible ink. Sheets to be 33 centimetres in height by 21, 42 or 63 breadth, enclosed in a single lined frame, with an all-round margin of 2 centimetres.

6. A receipt may be had for the plans (free of charge) if desired.

7. After deposit of plans and specification, petition must be made to the Minister of Industry for a patent. This must be distinct for each invention, and must contain name, nationality, profession and residence of inventor, and the purport of the invention.

8. The petition must contain also a list of the documents, etc., and in case of being presented by an agent, a power of attorney (procuração), and the original patent, if it is a case of an invention already protected abroad.

9. The President of the Republic will sign all patents, and then publication of the Presidential dispatch will

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be made in the *Diario Official* and the inventor invited to personally demand the titles, pay the fees and dues, and witness the opening the envelopes containing the documents, on a day and hour fixed within one month.

10. In case of Provisional titles, no duplicates are required. Such a title may be given, up to a period of three years, without formalities, but if the invention is worked industrially during this period, the inventor shall lose the right of priority. Stamp duties on Provisional titles are 5$500.

11. In case of an invention of a dangerous or dubious nature, or one dealing with food, chemicals or materia medica, *a secret examination is made by the Government.*

There are in Rio de Janeiro now several patent agents, and it is better to entrust the conduct of negotiations to one of these.

Trade Marks Regulations

1. Trade marks showing designs of medals, prizes, or diplomas must be authenticated by presentation of said medals, etc., etc.

2. All other signs, arms, blazons, names, etc., must be authorized.

3. Words, signs or pictures offending decency are prohibited.

4. National (Brazilian) arms are not to be used as a trade mark.

5. Registration lasts 15 years (cost 10$000), and at the end of that period may be renewed.

Depositing of trade mark 4$000.

To obtain Registration

Three copies of the trade mark must be sent in containing:

1. Description and characteristics.

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2. Reproduction, with all accessories, including sample of ink to be used.

3. A declaration of the business for which to be used, and the profession and domicile of the petitioner.

4. The petitioner may declare that said mark may vary as to size, colours and their arrangement.

Petitions and copies of mark must be on strong paper 33 centimetres high, and 22 centimetres wide, with a margin for binding, and no folds or joins, all to be stamped, dated, and signed. The secretary of the Commercial Board (Junta Commercial), or the official appointed, shall certify the day and hour of presentation of models, etc., and register same, and as soon as registration is granted, the secretary of said Junta, or officer of Department of Commercial Inspection, shall certify same on each copy of mark, and cause the petition to be filed together with one of the copies, numbering it, and also the remaining copies, which shall be returned to the petitioner. Publication shall be made within 30 days in the *Diario Official*, or in the official organ of any state, together with a full description of the trade mark, and as soon as the preliminaries are concluded the *Diario Official* shall publish a certificate of registration.

Appeals for annulling registration must be made within 5 days, or in case of non-residence of the appellant 30 days. *As in the case of patents it is advisable to employ a local agent.*

Bankruptcy Law

This law came into force in December, 1908. It contains 15 chapters, and the principal items are:

In case of debtors offering 60 per cent. of amounts due, any agreement between creditors must be approved by 60 per cent. of the claims. Bankrupts offering 40 per cent., at least two-thirds of the creditors must be in

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accord and represent 75 per cent. of the debt. If less than 40 per cent. is offered, the composition should be approved by three-fourths of the claimants owning not less than 80 per cent. of debits. No agreement or composition will be considered valid unless at least 20 per cent. is offered by the debtor.

Consumption Tax

All articles subject to this impost must be plainly labelled, or branded on the case or other receptacle, as well as on every piece of cloth or packet. In the case of boots and shoes, on the soles.

House Duty (Federal District)

Twelve per cent. on rental. Outer Zone, 6 per cent.

Stamp Duty on Bills and Posters on Hoardings

Thirty reis each.

Official Burial Charges (including Certificate, Coffin and Hearse)

1st class, 591 milreis; 3rd, 241$; 5th, 106$; 8th, 20 milreis; others proportionally. Tombstone, 250 milreis. (Santa Casa da Misericordia Rio de Janeiro).

Law Relating to Commercial Travellers

Commercial agents are not required to take out any special licence, or to have passports or certificates, but owing to the new regulation providing for deportation of undesirable aliens, it is advisable for such travellers to register. Without this precaution they cannot bring a suit to enforce payment of a debt, and persons buying off an unregistered agent can refuse to pay for the goods if they choose. Most firms who send out representatives establish relations with some local house, and the col-

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lections are taken over by the latter. In this way it may be possible to avoid paying taxes in the larger cities. Some states require a licence. The states and municipalities have the power to fix fees, which are apt to change. Samples are subject to duty, and the latter is not refunded, but such samples are not liable to a special duty of 10 per cent. (vide No. 560 of Customs Regulation). All merchandise must be accompanied by a consular invoice, except in case of small samples not exceeding £10 in value. A rebate has been granted of 25 per cent. on the tickets of commercial travellers on the Central Railroad, on production of a voucher from the Commercial Association of Rio, that the bearer is a *bona fide* commercial traveller. Agents' trunks must pay duty, but it is intended to remedy that abuse, as also the taxes on samples in each port. In the future a certificate of charges will be obtained from the first custom house entered.

Food Laws of Brazil

Article 40, Law 428 (December 10, 1896), prescribes as follows:

Wines, lard, and all other food substances condemned by the National Laboratory shall be destroyed, and the importers fined 500$000.

There shall be condemned as injurious to health, *all* food products containing boric or salicylic acid, inferior alcohol, free mineral acids (sulphuric, sulphurous, azotic, chlorohydric), sulphide, alum fluorates, and alkaline fluosilicates, saccharine, compounds of strontium, and other minerals in the proportion of 15·4324 grains (2 grams) per litre (or 1·0567 quarts) of wine. Hop substitutes in beer, as quassia, absinthe, aloes, etc. Also any essentials prepared with ethereal oils, colouring

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matter prepared from coal tar, and of a lead base; mercury, copper, arsenic, antimony, or *any other substance* which science has recognized as injurious to health. The importation of artificial wines is prohibited under *all* circumstances. Wines with more than 20 per cent. of alcohol may have four grammes of sulphate of potassium per litre.

In 1898 and 1905, additions were made to the list of prohibitions, including adulteration, purposely so made, of wines and spirits, and also naturally generated noxious properties, *due to chemical reaction on hops in transit, etc.*

Immense quantities of beverages of *all kinds* have been condemned, owing to their containing salicylic acid, excess of sulphates, colouring matters (aniline), and free sulphurous acid.

Among other products destroyed have been meats, (*particularly hams*), preserved vegetables, sweets, and fruit preserves, butter (containing boric acid).

Analysis (fee 25*s.*) is obligatory of every kind of food or beverage sold within the country. The fee is liable to be increased, in case of extraordinary circumstances.

Subsidies, etc.

The President of the Republic is authorized to grant a subsidy, at the rate of £250 per kilometre (0·62 mile), to companies or private individuals building roads, and organizing automobile services for passengers or goods between two states, or across one only. The roads shall be made in accordance with Government regulations, and the subsidy shall be paid when 120 kilometres have been completed, inspected, and approved.

A bill has been introduced in Congress, to grant 4 per cent. interest to the first five ironworks employing national materials, to be increased to 6 per cent. if Brazilian coal or other combustible is used. In con-

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nexion with this it must be noticed that very encouraging experiments have been carried on by Dr. Arthur Barbosa, with an electric furnace, at Ouro Preto. The expenses of installation (amounting to £4,370) were authorized by the late Minister of Industry.

Subsidies have also been granted by the State of Rio Janeiro to a firm commencing the manufacture of paper from the piri-piri (papyrus), a reed growing all over the swampy lands at the edge of the Bay of Rio (north and west), also to producers of silk, cotton, etc.

Favours conceded to those engaged in stimulating the wheat, rubber, silk and other industries, will be dealt with under their proper headings.

Extradition

The extradition of Brazilians and foreigners is permitted.

Brazilians, whether born in the country or naturalized prior to commission, cannot be extradited except reciprocity is guaranteed by the soliciting country.

No extradition can be permitted when Brazilian law does not impose the penalty of a year or more imprisonment for the misdemeanour, or where the criminal has been tried by a Brazilian jury for the same offence.

Offences against religion, or military offences, or libels, or purely political crimes are not extraditable offences.

In case of the death penalty, the criminal will not be given up unless the sentence is commuted to penal servitude.

Extradition must be solicited by diplomatic means, and the Supreme Tribunal will decide as to the legality of the case.

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Copyright

Full protection is now given to foreign authors, artists, and musical composers (1912) in case of reciprocation only.

Power of Attorney

Any person of adult age, and in possession of civil rights, may sign a power of Attorney (Procuração). This must be written in Portuguese, according to established formula, and signed and stamped with a 1$000 federal stamp, and must bear also the signature of a witness of local standing.

Guarantee of Rent

Any person wishing to guarantee the payment of house rent should specify (in the vernacular) that the landlord may deliver to Mr. So and So the keys of the house situated at No. . . ., Rua . . . Cidade . . . (or Villa, etc.) . . . The undersigned being responsible for the monthly (or yearly) payment of Reis . . . $ . . ., as guarantor, until the keys are returned to the owner of the house. The document must be signed across a stamp of the necessary percentage on a year's rental, and witnessed by a person of repute.

It is, however, a frequent custom in Brazil to demand one to three years' rent in advance from persons having no previous legal domicile in the Republic.

State and Municipal Loans

1. The Federal Union will not be responsible for loans contracted by states or municipalities, either in Brazil or abroad, unless these have been arranged after authorization by the National Congress.

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NATIVE HORSE.



BULL, "PINDAHYBA," NATIVE STOCK.

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SELECTED STOCK, S. PAULO.

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2. Bonds, etc., representative of such debts, may not be offered for sale on the Brazilian Stock Exchanges unless approved by the Federal Legislative Power.

3. In case foreign creditors endeavour to exert pressure on states or municipalities with regard to repayment of such loans, the Federal Government will intervene to maintain the integrity of national territory, and the form of the federated republic, according to the Constitution.

Civil Marriage

Requirements

1. Either birth certificates, or other proofs of adult age. If minors, the consent of parents or guardians must be obtained.

2. Two witnesses to the condition of contracting parties, with proof of the absence of impediment, and in the case of a former marriage, either the death certificate or that of annulation of marriage.

(There is no divorce law in Brazil at present.)

Particulars for Registration of Birth

Day, month, year, and place of birth, sex, if a twin or not, legitimate or otherwise. Name, nationality and residence of the parents and grandparents, and godfathers and godmothers, if any.

Particulars for Registration of Death

Day, month, year and place of death, name, sex, age, condition, profession and nationality, and domicile of the deceased person. If married, the name of the surviving partner, if legitimate, or not.

Name, business and residence of the parents. If a

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will was made, or not, if children living, how many. Mode of death, and the place where burial will take place.

Emission and Circulation of Cheques

By decree of August 7 (1912), the President of the Republic sanctioned the following law :—

ART. 1.

Any person possessing funds in banks or other financial establishments may draw cheques payable at sight or otherwise.

Cheques should bear the date and place of emission, the signature of the drawer, and the same of the person to whom payable.

ART. 4.

It should be presented within five days if payable in the city where it is drawn, or within eight days if in another city.

ART. 6.

Any drawer of a cheque omitting the date, or putting in a false one, is subject to a fine of 10 per cent. of the amount.

ART. 7.

Any person drawing cheques without sufficient credit to meet them is also subject to the same penalty.

ART. 14.

Cheques are exempt from stamps, but the cheque books are subject to the tax established by law.

Clearing houses may not function without authorization of the Federal Government.

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Consular Factures

Consular factures must be presented in three copies to the Consular Agent, or Consul of Brazil, abroad, who, having authenticated them, will proceed in the following manner.

(1) Send one copy together with the ship's papers to the Customs Department of the port to which the vessel is bound. The second to the Direction of Commercial Statistics in Rio de Janeiro. The third will remain in the archives of the Consulate.

(2) The first copy (written in indelible ink by hand or machine) must be stamped before receiving the vise of the Consul. The other copies may be made by any process, and are exempt from stamps.

The value of the goods will be regulated by the first copy, which is sent to the Customs Authorities.

(3)* Any difference between the goods and the facture will make the owner or consignee liable to double duty.

(4)* The declaration of the gross weight in the facture, when the goods are liable to payment of duties on the net weight, or vice versa, will subject the owner or consignee to the above-mentioned penalty.

* The Minister of Finance is studying the question of emending these clauses owing to unanimous disapproval by the importing houses.

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CHAPTER X

FINANCE AND COMMERCIAL NOTES

THE postal rates from Brazil to England are now reduced in accordance with the Postal Convention of 1907, i.e. 200 reis ($3\frac{1}{8}d.$) per 30 grammes. At present there is no stamp in use in Brazil of the value of $2\frac{1}{2}d.$, so the tax works out at a little more than the International rates. The old tax was 300 reis for 15 grammes, or about $\frac{1}{2}$ oz.

Shipping Goods

Weight of both goods and cases (or other covering) should be given separately. Catalogues should be accompanied (whenever possible) by fair samples.

No tenders can be accepted from any European or other firm not having an agent in the Republic, and not being officially authorized to do business in Brazil.

In the future the only vessels permitted privileges of mail boats will be those fitted with refrigerators suitable for fruit carrying.

No new railways will be given concessions, and no old ones renewed, unless the companies possess and employ cold storage wagons.

In order to do business successfully in Brazil, several things are necessary. First, the goods sold must be of a high grade, and before exporting a visit should, if

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possible, be made to the country, or the consular reports (both British and North American) carefully studied. Catalogues *must* be in Portuguese, and a clerk employed who writes and translates that language correctly.

Representation on the spot, by a good traveller knowing the country, is essential, and the short-sighted meanness of the common exporting houses is strongly condemned. First-class German houses pay their men equal to £60 monthly, with commission and travelling expenses, *as incurred*. This may amount to £2 or £3 daily. Hotel charges are not less than 12*s*. 6*d*., and porters and baggage charges are proportionately high. Every pound of luggage put in the brake van pays. Credit is also necessary for at least three months. Packing requires the greatest care and attention, and, as suggested by the results of experiments made in the sewing machine and phonograph trade, a stock may be advantageously carried at a central depôt (Rio de Janeiro), and goods sold on monthly payments. Singers' charge 5$000 a week (6*s*. 3*d*.) for hire of machines. Almost any goods can be sold in this way, such as musical instruments, furniture, ornaments, etc. A common way of doing business locally, is to form a club of 60, 80, or 100 members, and draw weekly chances for clothing, jewellery, etc. Probably the best way of doing a large and profitable trade in Brazil is to open locally with the latest novelties, and employ Brazilian salesmen, under European supervision. If travellers are sent from England they must be good men, tactful, sympathetic, well read, gentlemanly above all, and possessed of tenacity and patience, and should be *well paid*, properly supported, and able to speak Portuguese.

Floating Dock

Tenders were invited in Europe for the construction of

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a floating dock to accommodate vessels of the very largest size, and also for a docking plant. Tenders opened in October, 1909, were all rejected owing to too high estimates. One, however, was accepted in 1910, and the dock is now in operation in Rio, having successfully dealt with the Minas Geraes and the São Paulo.

The Federal Government has neutralized a zone in the State of São Paulo, and coffee *ex* Minas Geraes will be allowed to pass through to Santos without paying any duty to the former state.

Paper Mills

Two or three only in Rio and São Paulo, making coarse wrapping paper and cardboard from refuse of sugar cane, grasses, reeds, etc., the most useful plant being the pirí-pirí, or *Papyrus brasiliensis*.

The State of Paraná, with its pine forests, offers an unequalled opening for the above.

India-rubber Goods

Fifteen per cent. export duty is charged on raw rubber, and at least 50 or 60 per cent. on manufactured goods entering the country, of which a very large quantity indeed are used.

There are openings for biscuit, fancy soap, starch and chemical works, box makers, canneries, steam laundries and saw mills.

There are no steam fishing boats, no piano manufactories, or factories where jams, jellies and marmalade are made on English lines, although the consumption of the best European brands is large and increasing.

There are, in fact, openings for all kinds of factories, works and mills, and inducements are offered by various municipalities, such as free sites, lighting, and power for

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a period, and exemption from local taxes. A nominal duty is charged on machinery for manufactories, and in many cases it is admitted entirely free.

Interpreters

The Secretary of the British Legation in Brazil suggests the employment of interpreters to commercial travellers. This is not at all a practical idea, first because of the difficulty of getting a suitable man, and secondly because of the great expense entailed. Again I *insist* on the *necessity* of the traveller knowing Portuguese *himself*.

Budget (1912)

Receipts.	Expenses.
92,195,610 Gold.	56,456,044 Gold.
312,627,500 Paper.	404,021,451 Paper.

Weights and Measures

The metric system is in general use, but some of the old Portuguese measures, etc., are still in use, as:—

Weights:	Oitava	3·586 grammes.
	Onça	2·1961 ,,
	Libra	·4595 kilogrammes.
	Arroba	14·6896 ,,
	4 arrobas	1 quintal.
	13½ quintals	1 tonelada.
Long Measure:	Pollegada	·0275 metres.
	Palmo	·22 ,,
	Pé (foot)	·33 ,,
	Jarda (yard)	·91 ,,
	Passo (pace)	1·65 ,,
	Tolsa (6 pés)	1·98 ,,
	Vara	1·1110 ,,

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Braça (10 palmos) .	2·2219 metres.
Estadio . . .	262·7484 ,,
Milha. . . .	1,955·3127 ,,
Legua (geographical) .	5,555·5 ,,
,, (kilometrical) .	6 kilometres.
Land Measure: Braça quadrada (square) . . .	·0484 acres.
Prato de tierra. . .	10·89 ,,
Geira (400 braças) . .	19·36 ,,
Quarta de tierra . .	37·12 ,,
Alqueire (S. Paulo) . .	174·24 ,,
,, (Rio) . . .	348·48 ,,
Cubic Measure: 1 braça cubica	10·648 cubic metres.
1 palmo cubica . .	·9106 ,, ,,
Liquid Measure: Tonel, 2 pipas (pipes)	958·32 litres.
Pipa (15 almudes) . .	479·16 ,,
,, (commercial) . .	480 ,,
Almude (12 medidas). .	31·944 ,,
Medida (4 garrafas) . .	2·662 ,,
Garraffa (bottle). . .	·666 ,,
Dry Measure: Alqueire (Bahia). .	36·27 litres.
,, (Rio) . .	39·9970 ,,
Quarta	9·07 ,,
Canáda (Rio) . . .	2·7715 ,,
Selamin	2·27 ,,
Sacca (sack) 3 alqueires .	109 kilos.
,, ,, 2 alqueires .	73 ,,
,, ,, sugar . .	50 ,,
,, ,, ,, (Pernambuco) for Rio, Santos and Paraná	60 ,,
for other ports and export.	75 ,,
,, coffee	60 ,,
1 barrica (barrel) sugar .	105 ,,
½ ,, ,, ,, .	88 ,,
¼ ,, ,, ,, .	58 ,,

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⅛ barrica (barrel) sugar .	38	kilos.
⅛ ,, ,, ,, (refined)	52	,,
1 barrica flour . . .	88·95	,,
1 sacca ,, . . .	88·95	,,
1 barrica cement (net) .	50	,,
1 sacca cotton . . .	80	,,
1 bale cotton . . .	180	,,

Coinage, etc.

Unit . . 1 real (plural reis).

Bronze, 20, 40 reis (100 reis = 1⅛*d.* and a fraction over).
Nickel, 100, 200, 400 reis . . (400 reis = 6½*d.*).
Silver, 500, 1,000, 2,000 reis.

1,000 reis is expressed 1 $000, and is called 2 milreis = 1*s.* 4⅛*d.* Paper, 1 and 2 milreis (being withdrawn), 5, 10, 20, 50, 100, 200, 500, 1,000 milreis.

1,000 $000 is called a conto of reis, worth actually £67 3*s.* 9*d.*, thus £1 is worth almost 15 $000.

Notes Recalled.

5 milreis.	10 milreis.	200 milreis.
8th, 9th and 10th series.	8th and 9th series.	10th series.

Also 20, 50, 100, 200 and 500 milreis printed in England. Also the above suffer a gradual diminution in their value each year, until worthless.

Legal Tender

Silver up to 29 milreis.
Nickel up to 1 milreis.
Bronze up to 200 reis.

Weight

20 milreis (gold)	$17\frac{93}{100}$	grammes.
10 ,, ,, ...	$8\frac{965}{1000}$	,,
5 ,, ,, ...	$4\frac{482}{1000}$	,,

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Silver Coin: 2 milreis piece should weigh 20 grammes; 1 milreis, 10 grammes; 500 reis, 5 grammes.

Movement of Currency

MILREIS

1900	$9\frac{23}{64}$ pence.		1906	$16\frac{1}{32}$ pence.	
1901	$11\frac{17}{64}$	,,	1907	15	,,
1902	$11\frac{53}{64}$	,,	1908	15	,,
1903	$11\frac{41}{64}$	,,	1909	15	,,
1904	$12\frac{8}{64}$	,,	1910 (Jan.)	15	,,
1905	$15\frac{50}{64}$	,,	1910 (Dec.)	16	,,

1911–12. Nearly stationary at $16\frac{1}{32}d.$

Funding Loan Quotations.

December, 1910 — $103\frac{1}{2}$ – 104
,, 1911 — 104 – $104\frac{1}{2}$

Conversion Bank.

Cash in hand (December, 1911): £23,943,059.
Notes in circulation: 378,483,010 $100.
Emission of paper money: 612,519,626 $000.
Total Emissions: Conversion Bank and National Bank, 991,002,636 $100.

Taxes and Stamp Duties.

All receipts for amounts over 25 milreis must bear a 300 reis stamp, as well as cheques, petitions (each page), memorials, letters of exchange, and all other documents.

Commercial houses with a capital of over 5 contos must have their books registered and stamped in the Junta Commercial. A tax of 44 reis is due for each page.

The following articles are subject to Stamp Duty: All beverages, manufactured tobacco, matches, perfumery, salt, candles, boots and shoes, vinegar, drugs,

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umbrellas, hats, textile fabrics, etc. Everything must bear the necessary stamp before being exposed for sale. Heavy fines are exacted for non-compliance.

All industries and businesses are taxed, and brokers, auctioneers and lottery agents are subject to heavy monetary guarantees.

No income tax is imposed anywhere in the Republic.

Percentage of—

	Exports	Imports
São Paulo	42·487	19·2
Amazonas	15·108	5·2
Pará	13·153	8·3
Rio Janeiro	11·227	37·6
Bahia	6·439	4·9
Rio Grande do Sul	2·269	8·5
Pernambuco	1·853	7·1
Rest of Brazil	7·464	11·72
Total	100·1	100

Exports (1911)

Eight Principal Articles.		Value in Paper Money
Cotton (kilos)	146,460,909 =	14,704,146 $000
Sugar	36,208,301 =	6,132,210 $000
Rubber	35,549,127 =	226,395,419 $000
Cacão	34,994,087 =	24,668,017 $000
Coffee (sacks)	11,257,802 =	606,528,949 $000
Hides (kilos)	31,931,698 =	27,014,675 $000
Skins	2,797,909 =	9,729,956 $000
Maté	61,034,446 =	29,785,020 $000

Total Exports, £68,000,000.

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National Debt.

1910—£116,414,507.

Debt per head of the population, £5.

Foreign Debt (1911), £83,439,677.

Fresh capital invested in Brazil, 1910 — £32,787,143.

In 1911, 35 new companies were started with a capital of 44,270 contos.

British capital in Brazil (1911)=£140,246,278, of which £22,000,000 is in railways.

Banks

Banco do Brazil

1911—First half-year dividend, 9 per cent; second half-year, 10 per cent.

Foreign Banks.

Banco Allemão Trans-atlantico. Capital, 30,000,000 marks.

London and River Plate Bank. Capital, £3,000,000; dividend (1911), 20 per cent.

London and Brazilian Bank. Capital, £2,500,000; dividend (1911), 17 per cent.

British Bank of South America. Capital, £2,000,000.

Brasilianische Bank für Deutschland. Capital, £500,000.

Banco Commerciale Italo-Brasiliano. Capital, £300,000.

Banque Française et Italienne. Capital, £1,000,000.

A Pan-American Bank, backed up by American financiers, will start operations shortly.

The Central Agricultural Bank (estab. 1908) at Rio has a capital of 300,000,000$000 in 150,000 shares of 200 milreis each. The principal object of the bank is loans on approved security to agricultural societies and corporations.

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There are 600,000 Portuguese in Brazil, and they send home some £3,600,000 annually. The Italians number nearly 1½ millions, and their savings which find their way to Italy amount to 200,000,000 liras, or about £7,500,000. If we consider the vast sums which pass from other sources to Germany, Spain, Syria, Holland, the United States, Austria, England, etc., we shall understand a little what a great factor Brazil is to-day in the financial world.

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CHAPTER XI

POSTS, TELEGRAPHS AND TRANSPORTATION

Posts

THE organization of the postal service in Brazil dates from 1829, and the first postage stamps were issued in 1848.

Stamps are issued of the following values: 10, 20, 50, 100, 200, 300, 400, 500, 600, 700 reis, and 1, 2, 5 and 10 milreis.

Official stamps (green and orange) from 10 reis to 10 milreis.

POSTAL RATES IN THE INTERIOR

Letters	100 reis per 15 grammes.
Post Cards	50 ,, each.
Reply Post Cards	100 ,, ,,
Printed matter	20 ,, per 50 grammes.
Newspapers, etc.	10 ,, ,, 100 ,,
Manuscripts	100 ,, ,, 50 ,,
Parcels	
Registration Fee	200 reis
Advice of reception	100 ,,

Samples: 50 gr., 120 r.; 100 gr., 160 r.; 200 gr., 320 r.; 250 gr., 400 r.; 350 gr., 500 r.

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Money orders up to 25 milreis, tax 300 reis.
" " " 50 " " 600 reis.
" " " 100 " " 1,000 reis.
" " " 150 " " 1$500.
" " " 200 " " 2$000

And 500 reis for each fraction of 200 milreis beyond.

Money orders can be sent to most foreign countries, but only in francs.

Parcels post conventions have now been signed with Great Britain, U.S.A., Austria, Italy, etc.

Postal rates have already been given. Mails leave Southampton and Liverpool alternate weeks, Fridays and Thursdays respectively, and *via* Bordeaux same days as *via* Liverpool. Mails leave Rio de Janeiro weekly by Royal Mail steamer on alternate Wednesdays, and by other steamers according to arrival. Mails leave New York by Lamport and Holt, or Brazilian Lloyd steamers about four times a month. Passage from 13 to 18 days.

Telegraphs

The electric telegraph was first introduced into Brazil in 1852. Present extension of lines over 32,000 kilometres, 658 stations.

Telegraphic communication is established between all parts of the Republic at the following rates :—

Capital Federal, 20 words, 500 reis.
1 State, 100 reis a word.
2 or 3 States, 200 reis a word.
4 or more States, 300 reis a word.

Besides a fixed tax of 600 reis for each telegram.

75 per cent. abatement for press telegrams.

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FOREIGN RATES.

Per Western, or German Cable (via Monrovia)

From	per word. fr.	c.
Rio Janeiro to England	3	25
France, Germany, Holland, Belgium	3	63
Russia	3	95
Canada	4	45
Cape Town	5	75
Cuba	4	60
Texas	4	25
Louisiana	same rate	
Other States (U.S.A.)	4	45
Uruguay	1	25
Argentina	1	75
Chile	2	55
Paraguay	2	05
Peru	3	80
Colombia	5	55
Equador	4	55

Urgent wires, triple tax. Copies 500 reis for 30 words.

Telegrams in plain language at half above rates. (The franc is reckoned at 600 reis (paper)).

Telegrams are dispatched by pneumatic tube in the urban district of Rio, as well as letters bearing express fee. During 1910 2½ million dispatches were transmitted.

Radio Telegraphy

Wireless telegraphy is now used on all the Brazilian war ships and most of the passenger steamers. There are (1912) six stations in the State of Rio, that at Cabo de S. Thomé being one of the most powerful on the South American coast. Other stations are working at Fernando Noronha island (1,000 miles effective range),

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THE SEMINARY GARDEN, S. PAULO.

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A Forest Path, S. Paulo.

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Olinda, Bahia, Rio de Janeiro, Santos, Santa Catharina, and Rio Grande do Sul. As well as Pará, Santarem, Manáos, and others at Porto Velho, Rio Branco, Senna Madureira and S. Antonio, in Amazonas, and the Acre Territory.

MAXIMUM DELAY AFTER LEAVING PORT, WITHIN WHICH A WIRELESS TELEGRAM MAY BE DISPATCHED

To or from Rio de Janeiro—	Fastest Steamer. Hours.	Slowest Steamer. Hours.
Via Fernando Noronha . . .	80 ..	100
Via Olinda (Pernambuco). . .	60 ..	80
Via Bahia	30 ..	40
To Steamers (via Rio Janeiro) . .	7 ..	10

MARCONI COMPANY'S RATES.

Ship's Tax.—From or to a German or Dutch ship: 1*s.* 4*d.* a word, with a minimum of 3*s.* 4*d.*

From or to a Spanish ship: 3*d.* a word; minimum, 2*s.* 6*d.*

From or to British and other ships: 4*d.* a word, no minimum.

Brazilian Coast Tax.—Sixty centimes a word, with a minimum of 6 francs.

Telephones.

Rio Janeiro, São Paulo and Bahia have well organized services, as well as Rio Grande do Sul. Lines are in operation between Rio, Petropolis, Theresopolis, Nictheroy, The Federal Government has its own lines in Rio. There are in all some forty installations in the Republic.

In 1910 the Postal Department organized a savings bank, with deposits from 100 reis to one conto, 4 per cent. interest being given. When the limit is reached, savings may be invested in public funds.

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Shipping

Transatlantic

Royal Mail Steamers, fares, first class, £33; second class, £22; third class, £8. Leave Southampton Fridays, sometimes weekly, otherwise fortnightly, calling at Lisbon Monday, and Madeira Wednesday, and reaching Pernambuco as a rule on the 13th day, and Bahia on the 14th, and Rio on the 16th (night) or 17th (morning). Their newest boats have a tonnage of 10,000 to 12,000, and are up-to-date in every particular, the *Arlanza* being the best. Pacific line from Liverpool alternate Thursdays, calling at Lisbon on the Tuesday, and making Rio in nineteen or twenty days. The Hamburg American and Hamburg South American lines run fine steamers also, calling at Dover or Southampton and Lisbon, and taking about the same time as the other boats. The Holland Lloyd (from Dover) with new fine steamers and low rates.

The North German Lloyd, Bremen and Antwerp to North, Central, and South Brazil.

This Company has put on four fine new steamers (*Sierra Nevada*, etc.) running a fortnightly service from Bremen to Rio Janeiro, *via* Boulogne, Lisbon, and Madeira. First sailing January, 1913.

The Hamburg American (Dover), and Hamburg South American (Hamburg) (mail) to North, Central, and South Brazil. The latter Company put the *Cap Finisterre* on the Brazilian service in September, 1911. This fine ship of 16,000 tons steams 17 knots, and carries four classes of passengers.

The Transports Maritimes, Marseilles to Pernambuco, Bahia, Rio and Santos.

Austrian Lloyd from Trieste to Almeria, Las Palmas, Lisbon, Rio, etc.

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Dykman's line. Antwerp to Havre, Lisbon, etc., etc.

Rederie Aktiebolaget. Malmo, Stockholm, Gothenburg, Christiana, Newcastle, Hull and Rio.

La Veloce, Lloyd Italiana, Lloyd Sabaudo, La Ligure Brasiliana, from Naples to Genoa, Barcelona, Las Palmas, Rio, etc.

Lamport and Holt to Barbadoes and New York from Rio Janeiro and Santos and *vice versa*, 17 days.

Booth line to North Brazil *via* Liverpool, Havre and Lisbon.

New Zealand and Shaw Savill steamers from Montevideo and Rio Janeiro to Teneriffe, Plymouth and London, about every month.

Compagnie Sud Atlantique. Bordeaux to Lisbon, Dakar, Rio, etc., every four days.

Nelson line from London to Rio Janeiro weekly.

The Russian Volunteer Fleet will shortly commence a service from Odessa to Brazil.

Prince line. From Rio to New York or New Orleans, at frequent intervals.

Lamport and Holt. Passenger and Cargo steamers from Liverpool, London, or Southampton, to Rio and Santos.

Booth line from Liverpool to Maranhão, Ceará and Parnahyba monthly.

Same Company from the River Plate to North Brazil ports, and from New York to North Brazil *via* Barbados. Fare from Manáos to Barbados 60 dollars, New York 100 dollars. From Pará, 40 and 80 dollars respectively; to Manáos 100 milreis. From Pará to Iquitos £23, Manáos £16, all single fares; and from Liverpool right through to Iquitos (Peru) *via* Madeira, Pará and Manáos monthly.

The Linea Transatlantica (Spanish line) from Barcelona to Cadiz, Las Palmas and Santos frequently.

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FASTEST STEAMERS FROM EUROPE TO RIO DE JANEIRO

	Days. From Lisbon.
Direct.—Hamburg American Line. s.s. *Cap Finisterre*, 16,400 tons	11
Direct.—Hamburg American Line. s.s. *Arcona, Vilano, Ortegal*, etc., 8,000 to 9,000 tons	12
Direct.—Compagnie Sud Atlantique. s.s. *Burdigala* (1912)	11
Direct.—Compagnie Sud Atlantique. s.s. *Gallia*, etc. (1913), very large	11
Direct.—Lamport and Holt. s.s. *Vauban, Vestris, Vandyck*, 11,000	13
Companies calling at various Ports—Royal Mail, Pacific Company, Steamers 10,000–14,000 tons	14–15
In 1913. The Royal Holland Lloyd will have the *Gelria* and *Tubantia* (14,500 tons) on this service	Probably 11 days
	From Barcelona.
Direct.—Royal Austrian Lloyd. s.s. *Kaiser, Franz Joseph*, 16,500 tons	11
s.s. *Martha, Washington*, 14,500 tons	12
Direct.—Royal-Italian Lloyd. s.s. *Principessa, Mafalda*, 10,000 tons	11
Navigazione Generale Italiana	12–13
Lloyd Sabaudo Steamers	12–13

COASTING

The Brazilian Lloyd has seventy-two ships totalling 140,000 tons. It receives a bounty of £187,000.

Services: North (mail), every alternate Thursday

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to Bahia, Maceió, Pernambuco, Ceará, Maranhão, Pará, and Manáos.

North (weekly) Saturdays to Victoria, Cabedello, Fortaleza, Tutoya, Obidos, Santarem, Itacoatiára, as well as all the ports mentioned above.

Monthly to Caravellas (Bahia), calling at Victoria, S. Matheus and Cannavieiras, and some minor ports.

Sergipe (15th and 30th of month) *via* Victoria, Caravellas, Bahia, Aracajú, etc.

Rio Grande do Sul (Thursdays) by Santos, Paranaguá, and Florianopolis.

To Buenos Aires (alternate Saturdays) *via* Santos, Paranaguá, S. Francisco, Rio Grande, and Montevideo, etc., etc.

To Florianopolis, calling at all ports (first and third Saturdays).

From Florianopolis two voyages weekly, north to Paranaguá, south to Laguna.

Montevideo to Corumbá (Matto Grosso), by Rosario, Paraná, Corrientes, Assumption, etc. (every other week).

Corumbá to Cuyabá, etc. Total extension of lines 6,013 miles.

Other Companies

Lage Irmãos, 15 ships (13,000 tons); 2 lines, North to South.

Esperança, Maritima, 6 ships (largest 1,200 tons); 2 lines, North and South.

Companhia Commercio e Navegação, 12 steamers, (22,000 tons), cargo only.

Companhia Pernambucana, 8 vessels (7,000 tons); North to Fernando do Noronha, South to Brazil.

Amazon River Steam Navigation Company, subsidized by decree, dated August 7, 1912. Head Office, Pará. To run regular services of steamers to all parts of the

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Amazon, Rio Negro, Solimões, Javary, Madeira, Purús, Oyapock, Japurá, Juruá, etc., etc.

Steamers to have all modern improvements, cold storage, electric light and fans, and mosquito netting, etc. Minimum speed 8 knots, maximum 10, according to contract. Total subsidy, 873,948 $200.

There are also many lines of small steamers on the coast, and on the rivers Tocantins, São, Francisco, etc.

The São Paulo Government has guaranteed interest of 6 per cent. to a company with a capital of 5,000 contos, making three journeys monthly from Santos to Manáos, two to Corumbá, one to Parto Alegre, and a service to Rio, etc.

There is also a line of boats making twelve voyages yearly on the Iguapé (S. Paulo).

Local Fares

Rio Janeiro to Montevideo	150$
Montevideo to Corumbá	180$
Bahia to Cannavieiras	34$
Bahia to Caravellas	60$
Joazeiro to Bom Jardim (S. Francisco River)	56$
Joazeiro to Januaria	97$
Joazeiro to Pirapóra	125$
Pará to Manáos	130$
Pará to Iquitos (Peru)	317$

Shipping Entered

1908—20,093 ships of 18,673,898 tons.

1910 (partial returns)—

British	2,302	= 6,704,241
German	989	= 2,806,455
French	401	= 1,331,488
Italian	335	= 1,044,084

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Brazilian Ports

Geographical miles and distances from Rio de Janeiro. Northwards—Victoria, 270; Bahia, 735; Aracajú, 904; Maceió, 1,015; Recife, 1,125; Parahyba, 1,195; Natal, 1,273; Fortaleza (Ceará), 1533; Amaração (Piauhy), 1,739; São Luiz (Maranhão), 1,915; Belem do Pará, 2,280; Manáos, 3,204.

Southwards—Santos, 199; Paranaguá, 364; Florianopolis, 523; Rio Grande, 875; Porto Alegre, 1,008; Montevideo, 1,180; Corumbá, 2,803; Cuyabá, 3,242.

Distances—From Rio to New York, 4,748 miles; time 17–19 days, *via* Barbadoes (Lamport and Holt Line). Rio to Genoa, 5,040 miles, 13½–15 days. Trieste, 5,838 miles; Bordeaux, 4,894; Southampton, 5,034; Bremen, 5,507; Hamburg, 5,519; Antwerp, 5,244; Odessa, 6,341; Libau, 5,900; Valparaiso (*via* Magellan's Straits), 4,241 miles. Time *from* Wellington (New Zealand), 23 days to Rio de Janeiro. From Rio de Janeiro *to* Montevideo, 4 days. By coasting steamer up to 15–16 days. Rio to Paris, *via* Barcelona, 13 days; *via* Cherbourg, 16 days, or Lisbon, 16 days. Rio to Santiago or Valparaiso, *via* Buenos Aires, and the Pacific Railway, 7 days. By the same route (and steamer) to Callao, 17 days. From Cuyabá to Manáos by sea, not less than six weeks are required at present, changing steamer at Rio de Janeiro (Brazilian Lloyd).

The New Quays, Rio de Janeiro

The total extension of the new quays is 19,100 metres, and the depth of water 10 metres, or nearly 33 feet.

They have been leased to a Franco-Brazilian Company until the end of 1921.

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Exemption from Taxes

Boats, launches and other small craft engaged in the transport of passengers and baggage, and belonging to ships loading or discharging at the quays.

Mails, specie, belonging to the Government or to the States, passengers' baggage, goods belonging to foreign legations, immigrants and their belongings, and embarcations of war vessels, are to be considered free of the port taxes and other dues.

Port works are in course of construction at Manãos, Pará, Maranhão, Fortaleza, Natal, Cabedello, Pernambuco, Bahia, Rio, Paranágua, Florianopolis, Rio Grande do Sul and Corumbá.

A contract has been signed for a French and Spanish International Railway and Steamship line *via* Tangier to Dakar (3,000 kilometres). From the latter port steamers will run in five days to Pernambuco, and in a few years the railway will be completed to Rio Janeiro.

Railways

The first line opened in Brazil was the Mauá line, which, leaving the little port of the same name, made its way across the low lands to the foot of the Estrella Range. This was inaugurated in 1854, and was soon climbing the Serra to Petropolis, and running down the valley of the little Piabanha towards Entre Rios.

The first section of the Central Railway (then called Dom Pedro II) was opened in May, 1858, from Rio to Queimados.

This (Government) line has now instituted a system of carnets kilometricas, or 1,000 kilometres tickets. The rates are: 1,000 kilometres, 51 milreis; 2, 84 milreis; 3, 118 milreis; 4, 152 milreis; 5, 195 milreis; 6, 230 milreis.

The Goyaz Railway will now pass through Cataláo,

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THRASHING RICE, SÃO PAULO.

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TRANSPORTING MATTE, PARANÁ.



LUIZ DE QUEIROZ, AGRICULTURAL COLLEGE, PIRACICABA, SÃO PAULO.

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the second city of this state, and have two branches, one to Uberaba, and the other to near Araguary, thus serving the northern boundary of São Paulo–Minas Geraes.

The Central Railway reached, in 1909 (December), its present terminal point, "Pirapóra," on the São Francisco river, 26 hours' run. There will also be a loop from the Victoria-Diamantina Railway to Curvello on the Central Railway; a new line from São Paulo, Mogy Mirim to Santos; an extension of the Leopoldina Railway to Cabo Frio (north of Rio), and the doubling of this Company's lines and acceleration of its service to Petropolis, this trip taking only 1½ hours instead of 1¾, and ten trains being proposed daily as a minimum (instead of eight), and the reduction of freights on this line, and a direct service between Rio de Janeiro and Victoria (Espirito Santo). (Running since 1910.)

The Corcorado Railway is now operated by electricity, and the suburban service of the Central Railway will be worked by the same system. The cost of conversion is estimated at £350,000. Considerably over 20,000,000 passengers are carried on this service annually.

The railway is also open to Porto Alegre, a distance of 2,752 kilometres, taking 96 hours over the journey.

The line is also working from Porto Alegre to Montevideo (Uruguay). Leaving Porto Alegre on Tuesday at 6 a.m., Montevideo is reached in 48 hours.

The Central Railway has for the purpose of the heavy gradients on the Serra do Mar section from Rio to Belem three Mallet engines weighing 138 tons each, capable of drawing a load of 500 tons at the rate of 25 kilometres an hour. The line will be extended *via* Formosa and Palmas (Goyaz) to the Tocantins and Pará, a distance of 2,500 kilometres from the present terminal point, or a total distance of 3,650 kilometres from Rio, taking 3½ days.

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Surveys have commenced all along the route and the extension has already begun.

There are some 360 engines on the main line.

Briquettes, imported from Cardiff, cost from 23s. to 26s. a ton.

The Victoria-Minas Electric Railway will be worked from two power stations, to use 32,000 h.p. each. The ore exportation from this line is expected to reach three million tons annually.

This line is now open to kilometre 423 (January 1,1912.)

Surveys have been concluded for new lines from Theophile Ottoni to Arassuahy (160 kilometres), Serro to Peçanha (100 kils.) Peçanha-Theophile Ottoni (243 kils.), all in the State of Minas Geraes.

There will be a new trunk line from Angra dos Reis (State of Rio) to Catalão, "Goyaz" (1,000 kils.).

The Bahia-Minas line from Aymore to Theophile Ottoni will be converted into an electric one.

The Great Western Railway will also extend their Pernambuco trunk line to Bom Conselho, and 100 kilometres of new line will be constructed in the valley of the river Cahy in Rio Grande do Sul.

The Curralinho-Diamantina Railway has long since crossed the Rio das Velhas, wanting only 79 kilometres to its destination in January, 1912.

REVENUE PER KILOMETRE

Central Railway	16,767 $917
Paraná Railways	10,872 $900
Bahia-S. Francisco	7,905 $500
Great Western Railway . . .	6,601 $000
Rio Grande do Sul	5,121 $100

Paulista Railway (1911)—Revenue, 22,490,990 $129. Expenditure, 10,125,188 $768

Great Western Railway—Receipts, £644,888. Expenses, £440,429.

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PASSENGER RATES PER 100 KILOMETRES (FIRST, SINGLE)

São Paulo Railway, 6$500; Bahia, 5$000; N. Oeste do Brasil, 7$800; Mogyana, 7$800; Soracabana, 7$500; Great Western Railway, 6$500; Victoria-Diamantina, 10$000; Oeste de Minas, 8$500; Paulista, 6$750; S. Paulo-Rio Grande, 9$600; Paraná 9$000; Rio Grande do Sul, 7 to 10 milreis.

SOME RAILWAY EXCURSIONS AND FARES

From	To	Distance.	Line.	Fare—First, Return.
		Kils.		
Rio Janeiro	Juiz de Fóra .	276	Central Railway	34$500
Rio Janeiro	Barbacena . .	379	—	44$000
Rio Janeiro	Bello Horizonte	605	—	60$500
Rio Janeiro	Ouro Preto .	541	—	57$000
Rio Janeiro	São Paulo . .	498	—	54$500
Santos . .	São Paulo . .	74	São Paulo Ry.	12$900
Santos . .	Jundiahy . .	140	—	21$000
Rio Janeiro	Theresopolis .	60	Theresopolis	16$000 Sundays 12$000
Alagoinhas	Serrinha . .	110½	Bahia Rys.	12$880
Cachoeira .	Bandeira de Mello	254	Central Bahia	—
Alagoinhas	Queimados .	227½	—	21$660
Alagoinhas	Joazeiro . .	452½	—	29$100
Bahia . .	Alagoinhas .	—	—	11$000
Caravellas .	Theophile Ottoni	376	Bahia-Minas	33$000
Paranagua .	Curityba . .	110	Paraná	16$200
Paranagua .	Ponta Grossa .	301	—	37$200
Paranagua .	União da Victoria	264	—	21$700
São Paulo .	Itararé . . .	—	São Paulo-Paraná	26$900
Itararé . .	Ponta Grossa .	—	Paraná	21$000
Pernambuco	Nazareth . .	—	Gt. Western	9$100
Pernambuco	Pesqueira . .	—	—	16$500
Pará . .	Livramento .	—	Bragança	9$000
Jundiahy .	Campinas . .	44	Paulista	4$700 (Single)
Campinas .	Ribeirão Preto	317	Mogyana	41$300 (Return)
Campinas .	Uberaba . .	—	—	46$500 (Single)
São Paulo .	Soracabá . .	110	Soracabana	14$000
São Paulo .	Baurú . .	439	—	27$000
Baurié . .	Itapurá . .	445	N. O. do Brazil	32$000

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UNFINISHED

Itapurá-Corumbá (Matto Grosso), 962 kilometre. Total distance Rio de Janeiro to Corumbá, 2,341$\frac{6}{10}$ kilometres.

The Central Railway issues special tickets, available for 60 days, to the Thermal Springs of Lambary, Poços de Caldas, Caxambú, Cambuqueira and S. Lourenço.

In Rio Grande do Sul there are rail motors now running on the line Venancio Aires-Soledade.

TIME TABLE. CENTRAL RAILWAY.

Depart	*Arrive*
Rio, 6 a.m.	S. Paulo, 6.35 p.m.
,, 9.30 p.m.	,, 9.12 a.m.
S. Paulo, 6.50 a.m.	Rio, 6 p.m.
,, 9.15 p.m.	,, 8.15 a.m.
Rio, 6 a.m.	Bello Horizonte, 9 p.m.
,, 7 p.m.	,, 10 a.m.
Bello Horizonte, 4.10 p.m.	Rio, 7.30 a.m.
,, 6 a.m.	,, 9 p.m.

Southern Expresses

Rio Janeiro-Curityba. Leave Rio 6 a.m. Monday and Friday. S. Paulo (496 kils.).

Itararé, 5.30 a.m.; Ponta Grossa, 1.45 p.m.; Curityba, 8.6 p.m., Tuesday and Saturday. Leave Curityba 5.20 a.m. Monday and Friday, arrive Rio 9 p.m. Tuesday and Saturday.

Rio-Porto Alegre, *via* São Paulo, Ponta Grossa Santa Maria, etc., 2,652 kilometres in 96 hours. Thence to Montevideo. Rio-Uruguayana, 2,638 kilometres. (Junction with Argentine and Uruguay Railway.)

Rio Janeiro–Rio Grande do Sul, 2,868 kilometres.

Rio Pirapora, 1,009 kilometres.

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Leopoldina Railway Time Tables

Rio (Praia Formosa), Suburban line to Merity; frequent trains all day. Distance, 20 kilometres. 1st return, 500 reis. Monthly ticket, 12 milreis.

Rio Petropolis, 2 days, 4 milreis. Monthly ticket, 75 milreis; yearly, 750 milreis.

From Rio at 6, 7.30, 8.20 and 10.30 a.m., and 3.50, 4.20, 5.40 and 8 p.m.

From Petropolis at 6.5, 7.35, 8.35, 3, 4.20, 7.15 and 8.5 on Sundays.

Present length of journey, 1 hour 45 minutes. Will be reduced to 1 hour 30 minutes.

Rio, 6 a.m.; Entre Rios (18 $100), 10.30 a.m.; Uba (41 $900), 4.19 p.m.; Ponte Nova (56 $600), 9.5 p.m.; Saude (62 $900), 6.20 a.m.

Ponte Nova, dept. 5.20 a.m.; Rio, arr., 9 p.m.

Rio, depart 6 a.m.; Leopoldina, arrive 4.35 p.m. Fare, 37 $800. All return fares.

Rio (Caes Pharoux), 5.20 a.m., ferry to Nictheroy, thence tram to railway station.

Campos (36 $800), 1.30 p.m.; Campos, 9.50 p.m.; Rio, 7.25 a.m.

Rio, 8.10 p.m.; Victoria (Espirito Santo), 6.15 p.m., *via* Campos (7.20 a.m.). Mondays and Fridays only.

Victoria (Sundays and Thursdays), 10.15 a.m.; Rio, 7.25 a.m.

Rio, 6.10 a.m.; Novo Friburgo, 10.35 a.m. Fare, 16 $200; excursion, 9 $000.

Cantagallo, 1.54 p.m. Fare, 24 $100.

Cantagallo, 11.27 a.m.; Novo Friburgo, 3.5 p.m.; Rio, 6.35 p.m.

Kilometre tickets: 3,000 costs 200 $000; 6,000, 363 $000; 12,000, 653 $000.

The above Company has an interest in the Rio-

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Nictheroy ferries, the trams in the latter city, and the Victoria Port Company.

The ferries transported 5 million passengers in 1911, and the trams no fewer than 11½ millions.

Rio-Theresopolis Railway Company

Depart Rio (Caes Pharoux), 3.30 p.m., by steamer to Magé, thence by rail; arrive at Theresopolis at 6.30 p.m. Return from Theresopolis at 6.30 a.m., arrive Rio at 9.30 a.m.

Day ticket costs 10$000; 3 days, 12$000; 15 days, 16$000.

An Anglo-American concern, the "Brazil Railway Company," has obtained possession of most of the southern lines in Brazil, and is to-day the biggest company in the Republic. 3,128 miles of lines are in operation and 1,959 constructing.

In a few years it will be possible to travel by rail from Rio de Janeiro to *any* of the Brazilian States, or to Uruguay, Paraguay, Chili and Bolivia, and (if the proposed bridge is built across the River Plate) even to Buenos Aires. In Brazil, fortunately for the prosperity of the country, it is not the railways that have awaited population before adventuring into the interior. On the contrary they have (as is only natural in new countries) proved the pioneers of civilization everywhere throughout the Republic. Certainly they will be harbingers of peace, as well as progress, wherever their twin rails extend.

In the near future all the lines in Brazil will be linked up, and as far as possible a uniform system of freights arranged.

Electricity and Water Power

The numberless waterfalls in almost every state in the

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Union are destined to play a great part in the commercial development of the Republic. Already some of the greatest enterprises on the American Continent owe their success to this source. The Rio Light and Power Company has made use of a great dam at Ribeiro-das-Lages, 81 kilometres from Rio de Janeiro, with a capacity of 224 million cubic metres of water. With the electric force derived from the works it is possible to supply light and power to the whole of the capital, besides operating a very extensive system of tram cars. The same concern has a great power station in São Paulo, utilizing the Tieté river 33 kilometres from the city. On the Rio Grande, in the same state, the Urubupunga and Itapurá falls have a volume of water calculated to furnish a million horse power. A new station is in operation at Piabanha (Petropolis) giving some 15,000 horse power, and providing current for the illumination of Nictheroy and Petropolis itself. The tremendous falls of the Iguassú, Paraná and Paulo Affonso are as yet entirely unexploited, as well as many others larger by far than any European falls.

Pará has electric light, and 55 kilometres of tramways, and Manáos is said by Paul Walle to be the best illuminated city in Brazil. Maranhão, Bahia, Campos, Friburgo, Bello Horizonte, Curityba, Porto Alegre, *en fin*, most Brazilian cities of any importance use electricity both for power and lighting. Even such out of the way places as Diamantina are indebted to this wonderful force as yet in its infancy. Brazilian towns in general are so situated that it is only necessary to make use of the water power close at hand. Here then is a great opportunity for the electrical engineer to call into being forces that are still lying dormant in every part of Brazil.

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RAILWAYS, DECEMBER 31, 1911

Name of Railway.	Constructed.	In Construction.	Surveyed and Approved.
	Kils. Mets.	Kils. Mets.	Kils. Mets.
A. *Government lines administered by the State.*			
Central do Brazil	1,938.552	39.094	286.756
Rio do Ouro	126.705	—	—
Oeste de Minas	1,205.728	348.000	10.500
B. *Leased for a term of years.*			
Madeira-Mamoré (concluded April, 1912)	292,000	25.000	47.500
S. Luiz-Caixas	—	142,280	251.446
Baturité, etc.	523.628	72.150	58.000
Sobral, etc.	305.083	30.917	119.513
Central Rio Grande do Norte	100.854	130.557	—
Great Western	1,361.731	66.954	—
Viacão Ferrea da Bahia	996.180	229.000	539.738
Paraná Rys	416.382	—	—
Compagnie Auxiliare	2,170.424	(Rio Grande do Sul, etc.)	—
Itaquy-S. Borgia	—	123.870	—
Itapura-Corumbá	25.944	939.842	—
Gogaz	203.551	95.318	1,265.430
Rêde Sul Mineira	1,048.240	227.012	1,275.252
C. *Concessions with interest guaranteed.*			
Victoria-Minas Geraes (Itabira)	423.000	21.565	257.707
Curralinho-Diamantina	68.100	79.496	—
Leopoldina (1 Metre gauge)	186.723	—	42.000
São Paulo-Rio Grande	979.287	143.115	340.767
Noroeste do Brazil	436.320	—	—
Mogyana (S. Paulo)	281.104	—	—
Soracabana-Itauna	467.973	—	75.280
Quarahim-Itaquy	175.597	—	—
D. *Without guarantee of interest.*			
Caixas-Araguaya	—	—	182.720
Recife-Limoeiro-Timbauba-Leopoldina Railway	141,055	—	—
Minas-Rio-Espirito Santo	977.313	103.613	—
Maricá extension	—	64.186	—
Rezende-Bocaina	38.810	—	—

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COFFEE WAREHOUSE AT SANTOS.



GIGANTIC ARROWROOT AT SÃO PAULO.

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INSTALLATION OF A COLONIST ONE YEAR AFTER HIS ARRIVAL AT SÃO PAULO.



THE FAMOUS CORREIÁS FIG TREE, NEAR PETROPOLIS.

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Name of Railway.	Constructed.	In Construction.	Surveyed and Approved.
	Kils. Mets.	Kils. Mets.	Kils. Mets.
Paulista (S. Paulo) . .	308.616	—	40.000
Magyana (S. Paulo) . .	268.362	—	313.850
Funilense extension . . .	13.000	31.000	—
Soracabana-Itauna extension to Santos	—	—	183.000
S. Paulo Railway . . .	139.466	—	—
Minas de S. Jeronymo .	15.440	—	375.000
Estradas de Ferro Federaes (to Lavras)	—	—	92.492
E. *State Concessions.*			
Bragança (Pará) . . .	316.000	—	—
Short branches . . .	57.000	—	—
Pernambuco system . .	93.851	—	—
Bahia	478.384	124.500	44.700
Leopoldina Ry. (State of Rio)	932.838	—	54.160
Theresopolis	33.520	—	—
Agricola de Quissamá . .	34.000	—	—
Leopoldina Ry. (Minas) .	480.961	90.930	160.346
Bahia-Minas	233.870	—	—
Short lines	91.741	34.360	—
Paulista (S. Paulo, 1.60 metre gauge)	842.260	—	—
Mogyana (S. Paulo) . .	962.649	111.000	—
Soracabana-Itauna . . .	842.193	33.000	—
S. Paulo Ry.	51.548	25.000	—
S. Paulo-Goyaz . . .	30.642	120.000	—
S. Paulo-Minas	126.000	11.000	—
Itatibense	20.097	—	—
Araraquara (S. Paulo) . .	212.136	81.000	—
Dourado	206.000	42.000	—
Ramal Campineiro . . .	41.444	—	—
Funilense	52.263	—	—
Santos-Santo Antonio .	—	158.000	—
Minor lines in S. Paulo .	88.172	11.000	—
Perús-Pirapora	—	23.000	—
State of Paraná . . .	44.476	—	—
Blumenau-Hansa (Santa Catharina)	69.648	—	—
Porto Alegre-Tristeza (Rio Grande do Sul)	11.250	—	—
Total, December 31, 1911.	22,286.905	3,840.707	5,073.405

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CHAPTER XII

NATURAL HISTORY—FAUNA

Fishes

In this chapter I have followed the order in the section (" Animal Kingdom ") of the great work in Portuguese, *O Brazil*, and commence by studying the ichthyology of the country. It is necessary at this juncture to refer the reader to the wonderful researches made by Agassiz (*see* appendix).

The food fish of greatest value in Brazil is the pirarucú, inhabiting the rivers and great lakes of the Amazon region. It measures some seven feet in length, and weighs up to 220 lb. in rare cases, the average being about 120 to 140 lb. It has an elongated snout covered with large bony plates or scales, the body being cylindrical, with a somewhat flat form laterally. The tongue is large and osseous. This valuable animal takes the place of meat to a great extent, and is eaten dried very frequently, and is seen now and then in the markets of the far south of Brazil. It is caught with a harpoon, in clear water, usually in September and October, and is then salted. The price per kilogramme locally, dried, is from 1*s.* to 2*s.*, according to the district. When visible in Rio, it fetches as much as 3*s.* 6*d.* a kilogramme. The tongue of this fish is bony and can be used as a file, and its scales as a substitute for emery paper.

The tainha (a kind of tench) is found in many parts of Brazil, both north and south, and is caught in vast numbers by means of nets.

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The capital (Rio Janeiro) is the principal market for fish, and the greatest variety are offered for sale; sometimes, however, the quantity is exceedingly small, as the vessels engaged in the trade from Cabo Frio, St. João da Barra, Angra dos Reis, and Paraty, are so tiny that they are unable to go out in rough weather, or to remain at sea for any length of time.

The principal fishes of the Rio market are robalos, a variety of sturgeon, from 6*s.* to 18*s.* each; dourados (up to 50 kilogrammes), garoupas, 3*s.* 6*d.* to 6*s.* a kilogramme; corvinas, linguadas (soles), sardines, badejos (cod), bijupirás, meros, 3*s.* 6*d.* to 6*s.* a kilogramme; mullet, pescadas (whiting), xernes, 2*s.* 6*d.* to 5*s.* a kilogramme. Besides these there are multitudes of lesser value, and prawns, lobsters (several sorts), various kinds of crabs, oysters, clams, mussels, etc., etc. On the rivers one also finds the surubim, up to six feet long. This is sold dried as a rule, and the price varies from 1*s.* 6*d.* to 3*s.* a kilogramme. There are also bagres, piranhas, trahiras, jundiás, piabas, and to quote Agassiz, thousands of finny creatures entirely unknown in Europe. This savant calculated that there were more classes of fish in the Amazon alone than in the whole of the Atlantic Ocean. The method of taking fresh-water fish in Brazil is not regulated in any way by the appointment of fishery commissioners or other officers. The splendid natural preserves for trout are entirely without inhabitants. Most of the mountain streams are quite fishless, or inhabited by such kinds as lurk in the more sluggish and muddier parts. Where there are good fishing stations, the stocks are decimated by means of dynamite bombs, or several Brazilian substitutes for *Cocculus indicus*, or fishers' berries. By this latter means sometimes the whole of a stretch of river is poisoned.

It is certain that judicious stocking of many of the

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mountain streams with such hardy varieties of the *Salmonidae* as the rainbow trout would pay very well, especially if care were taken to avoid contamination by sewage, and to protect the fisheries from poachers. The variety named can support a temperature of 25 Centigrade, and this is higher than that of the water at any time of the year. As far as food for the adult fish is concerned, there should be no difficulty about that, as many kinds of fly are found, and fresh-water insects, but the main difficulty would be the alimentation of the small fry during the first few months of their existence.

Dr. Moreira, of the National Museum, has (partly through my efforts, I am glad to say) sent for 10,000 brown trout ova, and I shall watch the experiment with great interest.

Carp do very well indeed, some imported fry put into a reservoir in São Paulo growing from 1½ to 19 inches in eighteen months, and having to depend entirely on the natural food found in the water.

In the great rivers of the south there are many huge fresh-water fishes, the jahú weighing as much as 200 lb., and the dourado and other kinds up to 100. There are in most of the Brazilian rivers numerous small fishes that devour a vast number of mosquito larvæ, and the Ministry of Agriculture has resolved to breed these for the purpose of keeping down the insects that infest malaria-haunted districts.

In spite of the abundant supply close at hand, a great deal of dried cod (*ex* Nova Scotia) is still consumed, and to it may in all probability be traced many of the disorders of the stomach prevalent amongst the lower classes in Brazil.

The piranha (quite a small fish) is extremely voracious and swarms in the flooded savannahs of the States of Pará and Amazonas. The live stock suffer considerably

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from its attacks, according to Paul Walle in his *Au Pays de l'Or Noir*, where he states that the largest animals are frequently entirely consumed by its multitudes, attracted by the blood flowing from a single bite.

Many kinds of fish are very easily caught by rod and line, and it is a frequent occurrence to find one's capture seized when half-way to the bank, and bitten right off the hook by some cannibal fellow of a larger species.

The Federal Government has now promulgated excellent laws for the protection of the fisheries, both sea and river. Aquariums will be organized, and three marine biological stations opened in the current year (1912), with several to follow in the near future. A year book will also be published in English and Portuguese.

Approved fishing companies will be granted concessions of land, for the purpose of installing their warehouses, and for quays, etc. Trawlers may be manned with half European crews for the first five years. Steam trawling will be prohibited within the 5 miles radius, and the mesh of the nets must be at least 7 centimetres from knot to knot. The State of Paraná has long since forestalled the national Government in respect to fisheries protection, and instruction is given in the elementary schools.

The cost of landing a ton of fish at Rio de Janeiro is at the present time only 400 reis.

Game, other Animals and Birds

The supplies of the capital, in the way of game, come from the Serras of Tinguá, Estrella and the Organ Range principally, as well as from Barra Mansa, Merity, and as far as Novo Friburgo. Besides rabbits, hares, 2*s.* 6*d.* to 2*s.* 9*d.* each, deer, pigeons, pacas, agoutis, otters, peccarys and wild boars are occasionally seen.

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Amongst the quadrupeds not mentioned, especially noteworthy is the tapir, living in the reedy lakes on the top of the coast and other ranges. Sometimes he is hidden in a dense forest of grasses 7 or 8 feet high, and growing in tufts with deep holes between. This unwieldy animal is found within four or five hours of Petropolis, or two of Theresopolis, and a couple or leash of good dogs are necessary to make him move out of his retreat. His hide makes excellent harness. When pursued by a jaguar, he rushes with tremendous force through the undergrowth, and in many cases where the great cat has succeeded in lodging on his back, the shock of the encounter with saplings and cane brakes has not only torn the attacker from his hold, but smashed his skull.

The great and little ant-eater are pursued for their skin, as are also the numerous family of felines, comprising felis onça, felis onça nigra, felis concolor (puma), the ocelot, wild cat, etc. The greater jaguar is hunted in the most courageous manner in Brazil. The native hunter, armed only with a long knife and a stout wooden fork with two prongs, approaches the jaguar, always looking straight at his eyes. When the animal springs at him he catches it on the fork and immediately stabs it in the heart. Amongst other quadrupeds we may notice the guará, wolf, fox, marten, otter, ratão (beaver), producing hair worth 40 to 70 milreis a kilogramme; the kinkajou, gambá, sloth, and irara or honey-eater (*Tayra barbara*). In 1905 about eight tons of prepared skins of various sorts, including those of some half-dozen species of monkeys, were exported, of a total value of £11,000. The simians, by the way, are well represented in Brazil, but none of them are comparable to those of Africa as far as size is concerned. Of the domestic animals it is not necessary to treat here, except to say that races of bovines accustomed to hilly districts do

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well in Brazil, as also goats. Horses are of a small wiry breed, but mules prove best adapted to the northern and central states. Pigs do well in the south, and in Minas, etc., whilst sheep are only suited to some parts of São Paulo, Paraná, Santa Catharina, and Rio Grande do Sul. Domestic poultry, including guinea fowl and Indian game fowls, thrive in most places. The guinea fowls are stated to be very useful to keep down the reptiles.

Of the ophidians, the cascavel (rattlesnake), coral, python, boa-constrictor, jararaca, and surucucú are the better known. The latter serpent attains 7½ feet in length and its bite is almost always fatal. The sucury is a water snake that sometimes reaches 45 feet in length. It pursues and devours the manatee, and the largest fishes.

The mussurama (*Rhacidelus brazilii*) is an entirely harmless reptile that subsists exclusively on other serpents, and the poisonous ones for preference. It has a very flexible blackish-grey body, covered with iridescent scales, and may attain the length of 7½ feet. An individual measuring 1 metre 70 centimetres, kept in the Instituto Serumtherapico of Butatan (S. Paulo), devoured a poisonous snake 1 metre 40 centimetres in length. (See illustrations.)

This institution is engaged in breeding the above mentioned reptile, in order to distribute it to planters. It also prepares anticrotalic and antibothropic serum, for the bites of rattlesnakes and jararacas.

Amongst other snakes are the urutú, sometimes 1 metre 40 centimetres in length. It has a thick brownish body, with whitish patches, and a design of V-shaped convex curves, with their points directed to the centre of the body, and a Y-shaped design on its head. It is, like the *Surucucú tapete* (carpet snake), very venomous. This latter reaches over 2 metres in length, its head is

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perfectly triangular, the body black above, marked with oblique yellow lines. The belly is yellow with black patches.

The mortality per annum from snake bites has been considerably reduced, and is principally amongst the bare-legged field workers and small farmers, most of whom are extremely reckless. There are some 180 varieties of snakes in Brazil, of which not 10 per cent. are venomous.

Insects are, of course, common, but the dreaded *Stegomyia fasciata*, the recognized propagator of yellow fever, has been absolutely exterminated in Rio and several other cities. The female is the dangerous sex. The anopheles, another of the mosquitoes, is the species responsible for malaria, and yet another, *Culex fatigans*, introduces the terrible disease known as Filiarisis. Needless to say, the sanitary corps in all parts of Brazil are fully alive to the necessity for waging constant war against the whole tribe of mosquitos.

Hairy caterpillars are common in some parts of Brazil in the spring and early summer. They are known locally as tataranas, a word signifying in Tupi false fire, in allusion to the fact that the slightest touch causes severe burning pains that extend all over the side of the body affected, and lasting for a number of hours. Relief may be had at once by instantly pressing a dahlia leaf firmly over the place of contact.

In the old and badly built huts in Minas Geraes a species of beetle is met with that is known locally as the barbeiro. It lives during the day in crannies in the wall or under the floor, sallying forth at night in considerable numbers, and biting animals or human beings in the room. The mark is hardly noticed and the pain insignificant, but the effects, especially on young children, serious in the extreme. It is said by Dr. Chagas (Manguinhos

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Institute, Rio) to cause anæmia, partial paralysis, and many other dangerous diseases.

There are also some fifty varieties of ticks (*Ixodides*), called carapatos, two or three of which attach themselves to man, and the rest to almost every description of animal, even the boa-constrictor, tortoise and armadillo being subject to these plagues. They vary in size from a minute speck to that of a large bug. They are usually found amongst brushwood or where cattle frequent. The chigoe (*Bicho de Pé*) is met with in parts of Minas, São Paulo, Bahia, etc., etc., and sundry other insect plagues may be encountered, but careful attention to the clothing and footgear, and avoidance of sleeping without mosquito netting, will usually be sufficient to protect the traveller. Of course a small medicine chest is a necessary part of the equipment.

Spiders abound, but are not usually venomous. A most extraordinary variety is *Mygale avicularia*, the bird-eating spider, found in the Abrolhos, where it catches lizards, and even young chickens. A specimen caught on the Madeira-Mamoré Railway in 1911 measured 6⅜ by 8⅜ inches, and weighed 18 oz. (*Vide* Bulletin of the Pan-American Union, Washington, U.S.A., May, 1912.)

Turtles are not so common on the Amazon as fifty years ago, owing to the wanton destruction in taking them, and thinning out their eggs for the purpose of extracting oil. The turtle is largely used for food, and in Pará at the present time the meat costs from 6*s*. to 25*s*. a kilogramme, according to season. There are also six kinds of tortoises which form important additions to the diet of this region. The municipalities of the State of Pará obtain large sums from the taxes imposed on those engaged in the above trade. Oil is extracted from various kinds of lizards, tapirs, and capivarys, but the principal fount of this product is the whale.

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Whaling

Whale fishing is carried on along the coast-line of the State of Bahia. The animal caught is a roqual (*Balænoptera musculus*). It contains some 360 pieces of the so-called whalebone, but their shortness (32 inches) renders them of little commercial value. The animal is from 30 to 70 feet long, and yields up to 5,000 quarts of oil. The season lasts from May to December, commencing in the south of Caravellas. There are thirteen whaling stations, eight of which are near Bahia city itself, five of which are on the island of Itaparica in the bay. The others (with the exception of Caravellas) are more to the north. The boats are about 30 feet in length, very strongly built, with ribs not bent but hewn to the shape required. On each side of the bows is a sort of cleat of natural bent wood. There is a single mast, steeped a little forward, with a huge mainsail, square in shape. Each boat has eight to twelve harpoons with 10 fathoms of 1-inch manilla line. There are also several spear-pointed lances mounted on long poles, with 6 fathoms of ¾-inch rope attached to them.

On each bow of the boat there are coils of 2-inch rope nearly 100 fathoms long, and down aft two more coils of 70 fathoms for emergency use, as well as oars, stores and cooking utensils. Each boat has a crew of ten; all under the orders of the harpooner. The whalers go out each morning at sunrise, and return at nightfall. The method of approaching, striking and killing the animal does not differ much from that employed elsewhere, but after it is killed one of the crew must dive under it and pass a rope round its mouth to secure the latter with, otherwise the animal would fill with water and sink. The whale is towed to the beach and cut up there, and the flesh is frequently sold and eaten. There are no

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modern appliances for trying out or refining the oil, and no means of utilizing the refuse as manure. The average catch per season is 300 to 400. Salaries are small, but for each whale caught the harpooner gets £6 10*s.*, the boat steerer £3 5*s.*, and each of the others 12*s.* 6*d.* The total number of men engaged is about 900, and there are some 50 boats engaged in the trade, those from Caravellas being of about 15 tons burden each. The proceeds in 1903 were £30,000.

Fish Glue

The silurus (catfish) is the one which supplies most of the above, and the price obtained for it in the market at Pará is 3*s.* per kilogramme, in comparison with 1*s.* 6*d.* from other sources.

The exportation of fish glue from Pará and other places in 1905 was 72,429 kilogrammes, worth £15,508. Export tax 7½ per cent., plus 50 reis per kilo municipal tax. Freight to Liverpool, 45*s.* per ton; Havre, 50 francs.

Feathers, Scales, etc.

The following are the principal birds furnishing feathers for export:—

Emu, parrot, macaw, toucans, humming bird. The most valuable are those from the garça (white heron), and are taken from the head of the male; they are known in England as ospreys, and are worth one conto of reis per kilogramme locally. Most of these feathers (few in number in each bird) come from the northern states. In 1905 158 kilogrammes 627 grammes were exported. Export tax 600 reis per gramme. Tax in Pará 37½ per cent. In 1910 this state exported 12,400 ounces of aigrettes, of a value equal to 5,691$300

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paper. In the previous year three times the value was exported.

The feathers of the emu are from 3 to 8 inches long, and the best are used in the manufacture of boas. Exportation (1905), 1,983 kilogrammes, value £1,600. Of the feathers from the immense variety of multi-coloured birds (exportation 25 kilogrammes, worth £65 only), a great many are used in the country, made up into ornaments, flowers, etc. The scales exported are from the sturgeon, gropers, etc. These are nearly all made up in Santa Catharina and Parahyba do Norte. Flowers are also made of shells, leather, etc. In Rio de Janeiro there are two or three houses making a speciality of ornamental work of all kinds, including butterflies' wings, beetles' wing sheaths, etc., made up into an infinite variety of designs, and costing absurd prices, considering the mite given to the countryman who brings them in. Profits of 200 to 300 per cent. are very frequently made in this sort of business.

Animals for Collections

The bulk of the stuffed, or simply dissected birds, such as toucans and humming birds, seem, according to official data, to be exported to the United States and Argentina, at least as far as those are concerned which are not set up and mounted. There are always better prices obtainable locally for natural history specimens, but the demand is very small for the more expensive kinds.

For export: stuffed and prepared. Alligators 2 feet 6 inches fetch up to £1 10*s.*, lizards same length £1 5*s.*, monkeys of various sorts £1 to £1 10*s.*, serpents (3 feet and longer) £1 5*s.* to £2, falcons £1 2*s.* 6*d.*, water hens, woodpeckers, humming birds (assorted kinds) £1 2*s.* 6*d*, to £1 5*s.* a dozen, penelopes (jacús) £1 10*s.*,

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crabs and lobsters, mounted and varnished, £1 16*s.* a pair. Armadillo coverings or shells made into work baskets, etc., etc., up to £2 10*s.* Myriads of beetles and butterflies and other curious insects are also caught, of which the semiramis, up to £7 and £10 for a single specimen, is most noteworthy.

More ordinary coleoptera and lepidoptera cost 12*s.* 6*d.* to £15, according to the number in a case, and their relative rarity. Amongst the better class of butterflies one may mention numbers of the argante, morphos (four kinds), caligos, heliconidae, danaedae, papilionidae, T. agrippina, darius, codomanus, etc., etc. A class of ants (tanajuras) from S. Paulo are also exported; these are dressed in various costumes and put up in little boxes with a landscape painted in the background. Thus arranged, they sell for 12*s.* 6*d.* to £1 a box. These same ants are cooked and sold in large quantities in the interior of the state, and are considered a great delicacy. There are also various bizarre-tinted fishes, varnished and exported, or sold locally at high prices. Apropos of this, a man came into a shop in Rio in my presence and sold a toucan for 200 reis. I asked the owner of the store (a personal friend) how much he would sell the bird for when stuffed and prepared? The answer was—10 $000. *Verb. sap.*

There is yet room in the capital for a clever naturalist, who is at the same time a linguist (French and German being essential). The proprietors of the small businesses already existing have very little scientific knowledge, and their abilities as taxidermists are rather mediocre.

Birds

According to Dr. Goeldii (*As Aves do Brasil*), there are at least 1,680 species of birds in the Republic, a

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number superior to that of any other country in the world. There are, however, few songsters of note, but many screamers. One variety of sabiá (*Mimus lividus*), worth in the Rio market up to £7, is greatly esteemed. The sabiá-una (*Turdus flavipes*), bicudo (*Fringillidae*), worth £2, and encontro (*Icteridae*) are amongst other birds with pleasing notes. Dealing in the most brief manner with the subject, one may note amongst the *Vulturides* the corvo branco, or urubú-rei (*Sarcorhamphus papa*). This magnificent bird measures over a metre in length, including its tail. The exterior of its wings is black, the breast white, the interior of the wings whitish red, the neck and the head yellow, orange, and red, and the throat grey. The common urubú is protected by the State as a useful scavenger, but Dr. Paschoal de Moraes, of Rio, denounces this variety as a propagator of carbuncle amongst cattle. Of the *Falconidae*, the caracará (*Polyborus brasiliensis*) is about the size of the European bustard. Its predominating colour is white, with transverse black bands on the breast and on the neck and upper part of the back. The place of the crow in the European pastures is taken in Brazil by a small hawk (caracará branco) which renders good service to the cattle in removing from them a variety of ticks, especially the carapato. The gavião real, or uraçu (harpy) (*Morphus harpyia*), is a truly formidable bird over a yard long and with claws and beak more powerful than those of any other of the predatory species. Fortunately it is relatively rare in populated centres, preferring forests near the margin of rivers. On the Xingá and Araguaya it is frequently kept in captivity by the Indians, as well as a large variety of other birds, commonly toucans and parrots. The whole of the tribe of the *Falconidae* are *inveterate* enemies of the monkey, and I have seen two animals of a size apparently large enough to protect themselves from

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most enemies shrink chattering and terror-stricken into the remotest corner of their cage when a distant speck appeared in the sky, so small that the human eye could not distinguish any resemblance to a bird. The fish hawk is common all along the coast and on the banks of the larger rivers. Owls are well represented, and the jacurutú (*Bubo crassirostris*) is the most notable, the female in order to feed her young not fearing to attack pacas or agoutis. A whole chapter could be easily written on the parrots and macaws alone, but I must limit myself to describing the following. *Sittace coccinea* (macão), a metre in length frequently, with a scarlet vermilion body and tail, and part of the wings bright blue with orange-yellow feathers in the middle. Another macaw (*Sittace chloroptera*) reaches 33 inches, and has plumage of a darker red. The hyacinth macaw is much rarer, and grows larger than any other. It is of a cobalt blue colour, with a huge black beak, and, contrary to the habit of the *Conurides* in general, is not usually met with in bands. The largest green macaw is the *S. militaris*, attaining 30 inches. These birds are exceedingly long lived. Dr. Goeldii (op. cit.) relates the story of Humboldt, who in the Maypures found a parrot speaking the language of the Atures, an extinct tribe. The paroquets are common all over Brazil, extending as far south as the river Paraná.

The true parrots also appear in hundreds, especially in the tropical zone, and the *Androglossa farinosa* is doubtless the largest in South America, being frequently over half a yard long. Green in general, speckled in front, with the abdomen clear yellow, having a red border to the wings, this papagaio has a regal aspect, but cannot compare for beauty with *Deroptus accipitrinus* (anacã). The neck feathers are brownish-red with wide blue borders, the back green and the breast red. This parrot

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does not exceed 30 inches in length. Most of the Brazilian parrots and some of the macaws have great capacities for learning songs, and imitating other animals of every kind. Dr. Goeldii became acquainted with a feathered philosopher who used to scream out "Viva" in a fervent manner whenever rockets were fired, but immediately afterwards, in an undertone to those near by, he would remark, "Tolo! tolo!" (foolish! foolish!), thus expressing his contempt at the ridiculous custom of letting off fireworks on every saint's day, or other appropriate or inauspicious occasion. The toucans are fitly represented by *Rhamphastus toco* (tucanuçu) sometimes almost 2 feet long. The enormous beak is orange, and the colour of the body blood red, and whitish on the upper breast. It is rare in the State of Rio, unlike several other and smaller kinds, which are most destructive in the plantations, as they are (like the parrots) gregarious, and are said not only to rob other birds of their eggs, but to destroy the young. They are noisy, quarrelsome creatures, and were they not shot for food, would become a plague in some districts. Their beaks are commonly used as powder horns by the inhabitants of Minas, etc.

Woodpeckers form a numerous family, no less than 65 varieties being catalogued. Allied to the cuckoo are the anús, small sombre-plumaged birds, especially common in the north of Brazil. The taquara (*Momotus levaillantii*) is a splendid creature, some 19 inches in length, with the body and wings olive and the abdomen rusty-orange red; it is somewhat rare. Trogons cannot compare with the variety well known in Guatemala, but *Pharomacrus pavoninus*, of the Amazon and Rio Negro, is the most resplendent Brazilian representative. It is dark golden green on the back, and in front purple vermilion, with the base of the beak rose vermilion.

Martins and swallows are well distributed both north

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MONTSERRAT ITATIAIÁ COLONY, STATE OF RIO.



COLONY VISCONDE DE MAUÁ, STATE OF RIO.

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and south. The humming birds vary in size from topaza pella, the largest known variety, over 8 inches in length, with golden green throat, violet head, back and abdomen red, with patches of garnet hue; to tiny fragile creatures that would easily go into a large thimble. Some are like flashes of electric metallic blue; others evanescent gems of every imaginable combination of hues. One and all, however, are most courageous, attacking everything that comes in their way, and pursuing with the greatest ferocity the large moths that venture forth in daylight from the dark shades of the forest into the open glades. Contrary to the general opinion, the principal aliment of these tiny living jewels consist of minute, almost microscopic insects, found within the calixes of many flowers, or snatched from spider's webs. Curiously enough, the equatorial region is comparatively poor in the *Trochilides*.

We have already spoken of two kinds of sabias, but *Turdus rufiventris* (sabia larangeira) must be noted by reason of its brilliant iron-red plumage, and because it is perhaps the most common variety.

Troglodytes inhabit the tropical zone principally. Corvos and tanagras are hardly worthy of notice, but one of the *Cassicines* (guaxes), called japú, is curious by reason of the contrast afforded between the black plumage of the body and the yellow tail. The araponga is well known by its harsh metallic voice, and it may be termed the blacksmith, because of the perpetual ringing note, like a hammer striking an anvil.

João da Barra (*Furnarius*) has a disagreeable habit of building its clay nest on the top of telegraph poles, covering the insulators and wires, and often intercepting the electric current. It is said that this bird is a good Catholic, as he never works on Sundays.

The perna lavada is a fine game bird, but only 10 inches in length.

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Pigeons are a plague in many parts of the interior, and although hosts are slaughtered every year, their numbers do not appear to diminish.

Amongst the *Gallinacae* the mutum is one of the finest and largest, sometimes exceeding a yard in length. The plumage of the male bird is of a brilliant metallic dark blue. The jacú (penelope) is somewhat smaller, with dark brown body, and greenish lustre on the legs. The macùco (*Tinamus solitarius*) is common on the sea coast amongst the woods, and resembles a plump hen in size. Its colour is dark brown, with a front of a contrasting lighter shade. The *Rhynochotus* (perdiz) lives only on the campos of the interior in flocks. It is a shy and wary bird.

The capoeira (*Odontophorus*) weighs up to 13 lb., and measures over 42 inches in length. Amongst the waders are the water hen, curlews, gulls, storks, herons, including the garça real, over 1 metre in height, the blue heron, egret, spoonbills, scarlet ibis, flamingos, in bands of hundreds and thousands even, and purely aquatic birds like the pelican, wild duck, goose, black-necked swan, with blood-red beak (the largest and most handsome of its species), peculiar to South Brazil; the white swan, stormy petrel, frigate bird, and four kinds of divers.

This very incomplete list must be closed by the emu and rhea, represented also by several types of fossils from the limestone caverns of the Rio das Velhas (Minas Geraes).

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CHAPTER XIII

FLORA

Rubber-producing Plants, etc.

ACCORDING to the great text-book, *Flora Brasilensis* of Martius, there are ten species of hevea, besides a similar plant, *Micranda siphonides*; and in Minas, *Micranda etata*, and in Bahia, *Micranda bracteosa*.

In Amazonas exists also the tapurú, the *Castilloa elastica*, and the *Hancornia speciosa*, of some six kinds.

The heveas are true forest trees, reaching at times nearly 100 feet high, with a diameter of 15 to 39 inches. They are without branches for three-fourths of their altitude. Most of the varieties producing the best and most abundant supplies of rubber are found growing in a humid situation, very frequently in alluvial soil periodically covered by the floods. They are, with the latter mentioned plants, found over an area of a million square miles. Some of them are capable of economic production up to an altitude of 950 feet. The rubber gatherers are hardly in the habit of discriminating between the various sorts, mixing the produce of many trees together, regardless of the quality of the gum. The riches of the valley of the Amazon are scarcely touched. It is sufficient to journey a few miles from the river banks to find virgin forests, and this over a distance of at least 1,000 leagues.

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It is estimated that there are fifty-two companies in operation, with a total capital of £2,000,000. These have been organized in the two years, 1906–7. A French traveller, Auguste Plane, who made serious studies of the Amazon basin, says that the production of rubber can be doubled whenever necessary, and as soon as the cost of living is decreased, prices of even 1*s.* 3*d.* or 1*s.* 6*d.* a lb. for rubber will prove sufficiently remunerative.

The tax on exported rubber in Pará varies from 15 to 26 per cent., according to the quality, including in the latter case 22 per cent. on the official value, 2½ per cent. additional, 1 per cent. municipal tax and ⅜ per cent. Stock Exchange tax. The freights are proportionally high for river transport, never being less than 7½*d.* a kilogramme. Freights in 1911 were: to Liverpool, 50*s.*; Havre, 67 fr. 50 cent. per ton; and New York, 0·34 cents. per cubic foot plus 15 per cent. In Manáos the various local taxes amount to 28 per cent. of the value when put on board, in addition to the Pará tax. Undoubtedly the result of such abominable fiscal measures is to encourage all kinds of abuses and attempts at evasion. As the author of the "Monograph" in *O Brasil* says, such a state of affairs must not, and cannot, continue. It means ruination to an exceedingly profitable and great industry. Referring to the other rubber-producing plants, we find the tapurú, reaching 80 feet, and having an average diameter of 3 feet, with a feathery palm-like top. The *Castilloa elastica* is a much smaller tree, not exceeding 65 feet high and 2 feet in diameter. The varieties of hancornia are relatively diminutive, about 10 feet high, and 2 to 3 feet in circumference. In São Paulo the plantations or forests are worked on the share system, the employé receiving usually a third part. The system employed is destructive, as both owner and

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worker concur in taking from the plant its entire store, not economizing the sap in any way.

In Ceará, Piauhy, and somewhat to the north and south, another variety is found, known as maniçoba. Contrary to the habit of the heveas, it is a native of the higher lands of the interior. The leaves are used to feed cattle. Tapioca is extracted from the roots, and the seeds are in the form of almonds, and either in their natural state, or after the oil has been extracted, are a valuable food for cattle, pigs and fowls. This tree is found as high as 1,000 metres above sea level, but its usual habitat is from 200 to 300 feet in altitude.

Many other entirely different classes of plants are rubber producing, including the wild fig, Plumeria, sorveira, *Lucuma laurifolia*, *Platonia insignis*, *Symphonia globuluris*, and massaranduba (*Mimusops elata*), a gigantic forest tree, whose timber is very valuable for constructive purposes. Rubber-producing plants grow in every state except the most southern or below 24° S. latitude.

Exploitation of Rubber

The concessionary, or owner of the seringaes (rubber forests, or collection of trees producing rubber), is called the master seringueiro, or aviado. At the most convenient point he establishes a store (*barracão*), where may be found every necessity and even luxury that man may require. We must presume that this aviado is a capitalist on a somewhat large scale. He may employ 200, 300, or even 500 men. Each man will be transported at the expense of the aviado to the forest, and will be advanced £40 to £70 worth of different goods, including provisions, arms and munitions, medicines, and clothing. The aviado is in his turn exploited by the wholesale merchants (*aviadores*) of Manáos or Pará.

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Sometimes these latter give credit up to as much as £40,000. These latter are furnished with funds and goods by Yankee speculators, who receive payment in rubber at the end of the season. Each year 20,000 collectors are employed, mainly from the States of Ceará or Bahia, and the rest are semi-civilized Indians, or natives of the rubber-producing states themselves Proceeding up the river in a launch, on arriving at the selected points, each family lands, and whilst some of its members set up their encampment, others proceed to blaze with a cutlass a line (or road) of rubber plants, up to 150 or 200 in number. This number of trees may cover a length of three or four miles, and no more can be properly tapped. Each line is made in a zigzag fashion in such a manner that the whole forms an oval, and the entrance and exit come together just where the seringueiro has established his smoking place.

His tools comprise: (1) A machette of soft iron to make the incisions (which are made obliquely), a rifle, fishing tackle, and half a dozen pots and pans.

(2) Balde, or pail, a vessel which will hold ten litres of latex.

(3) 700 to 800 tigelinhas (little basins) with a tube at one end to insert in the incision.

(4) A form round which the rubber is moulded.

(5) Boulhão, or iron chimney, through whose orifice passes the smoke to coagulate the rubber.

(6) The bacia, or basin, which contains the latex.

The incisions are made early in the morning, about 4 to 6 inches apart round the trunk, and the tigelinhas placed in each. Not more than 1½ minutes is taken up at each tree. As soon as the whole of the trees are tapped he (or another) proceeds with the balde to draw off the contents of the basins (*tigelinhas*). Each line or set of trees generally yields from eight to ten litres

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of fluid (*latex*) daily, producing four to five kilos of pure dry rubber. The maximum amount given is about 15 to 18 litres. Care is (or should be) taken not to make too many incisions in a tree, and wise collectors stop up the incisions when the latex is all collected, in order to protect the tree from insects. The cuts are made some 5 feet from the ground.

The latex in the bacia is subjected to a temperature of 35° to 45° Centigrade (95° to 113° Fahr.) to purify. Afterwards a fire is lit with the nuts of the urucury palm (*Attalea excelsa*) which grows in the vicinity, or with others similar mixed with resinous woods. When a dense smoke is emitted the chimney is put over, and with the aid of a calabash (*cuia*) the collector places a quantity of latex on the mould. The handle of this is rested on the knees and a rotary motion is given to it whilst over the smoke.

The bolacha (biscuit) of rubber may weigh from 5 to 100 lb., and is formed by continually adding fresh coats as soon as one is dry. The average daily production of rubber is 12 to 25 lb. and up to 40 lb.

The collector, or seringueiro, commences work at 5 or 6 a.m., and is generally finished by noon. At the time of writing the rubber is worth 6*s*. a lb.

According to a general rule, the contractor fixes the price, and the gatherer is frequently never out of debt. This is in the first season of course, and in the second he may clear something for himself.

Prices on the lower Purus in November, 1911, were 4 milreis a kilogramme, and in Manáos 11 to 12 milreis at the same time (*Almanack Garnier*, 1912). The late Euclydes da Cunha wrote a few years ago—The passage of the gatherer from Ceará to Pará is 35 $000, with advances of 950 $000 for necessaries, tools, quinine and food for three months. Transport and other items

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bring up the bill to over 2 contos of reis. If he should fall ill, he is charged 10$000 daily. Should he be a single man, and manage to extract 350 kilos of fine rubber, and 100 kilos of ordinary (sernamby), at the rate of 5 milreis and 2½ milreis respectively, he has nothing to spare. Under favourable conditions he may, however, prepare as much as 700 or 800 kilos. In this case he makes a clear saving of £100 to £130 for the season.

Presuming the seringueiro owes the aviado £80, and he is paid at the rate of 4*s.* to 5*s.* a kilogramme for the rubber collected, some idea of his saving may be obtained. It is true that he pays nearly three times as much for his provisions as they cost the aviado, but the latter has to put up with every risk, including the dishonesty, or perhaps the death of the collector. The transport of one family to the Juruá will run into £10 even under the most favourable circumstances. Some gatherers save £200 in six months. The usual outfit comprises carne secca (dried salt meat), rice, beans, mandioca meal, salt and flour, butter, sugar and matches, with sometimes condensed milk and tinned meats and sardines.

According to many authorities, if the price of Pará rubber should fall permanently, even to 2*s.* 6*d.* per lb., so much demand would be made for it that all the areas under cultivation would still be well employed.

A Commercial Congress was held at Manáos from February 22 to 27 (1910), when most of the rubber-producing countries were represented, and an exhibition held, and prizes offered for various essays on the subject of rubber cultivation, collection and preparation.

In Matto Grosso the manner of collecting is on somewhat similar lines to Amazonas, but the aviado is here called abonado, and he sends out his men in groups

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AVENIDA KOELER, PETROPOLIS.



MANDIOCA PLANTATION, S. PAULO.

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CATTLE, S. PAULO.



RIO NEGRO, AMAZONAS.

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under a foreman, and the forests are reached as a rule in about two weeks, the journey being made on foot in daily marches of 18 or 20 miles. Each man bears with him a small figure of his patron saint, for luck, and woe betide the fetish if Dame Fortune does not smile on the bearer. The poor saint is either burnt, hung or chopped up, and another protector chosen. A strange superstition exists that a stolen mascot brings great luck to the stealer, and misfortune to the former owner.

In this state the rubber (*latex*) is treated with a solution of alum, boiling hot, and as soon as it is coagulated the mass is subjected to great pressure; and the rubber resulting is in the form of cakes, 30 inches long by 6 inches wide, and weighing up to 50–55 lb. Best quality is worth some 10*s.* a kilogramme; 2nd, 7*s.* 6*d.*; and mangabeira, 4*s.* 6*d.* to 6*s.* a kilogramme.

Favours conceded by the State of Pará

Concession up to 20,000 hectares of public lands for rubber cultivation.

Reduction of 50 per cent. on export taxes for 10 years, and 30 per cent. up to the 20th year.

Reduction of 30 per cent. on the Bragança railway rates, and reduction in the freights of steamers subsidized by the State for 20 years. Free transport by rail of rolling stock and other effects especially relating to colonization.

Five per cent. interest will be guaranteed up to half of the company's share capital, up to £400,000.

The company or companies must plant not less than 20,000 trees a year, maintain elementary schools, and all necessaries for the housing of at least twenty foundlings, cultivate other products, use the most modern machinery, and present a complete annual report to the State.

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Use the registered mark of the Commercial Junta on all packages exported.

The concession will be for 99 years, at the end of which time the property as it stands will revert to the Government.

Premiums are also offered for general agriculture, and 250 milreis for each 500 cacão trees, properly planted.

Federal Decree for the Protection and Stimulation of the Rubber Industry

No. 9521 (APRIL 17, 1912)

Art. 2. Materials and utensils destined for the cultivation of rubber-bearing trees, or for the collection and refining of the rubber, are to be admitted into Brazil free of duty.

Chapter 2. Art. 5. To each person (1) planting rubber trees, or (2) replanting native trees, a subsidy will be granted per group of 12 hectares. For (1) 2½ contos for seringueiras, or 1½ contos for caucho or maniçoba, or 900 milreis for mangabeiras. For (2) 25 hectares replanted with seringueiras, 2 contos; with caucho or maniçoba, 1 conto; with mangabeiras, 720 milreis. Subject to the following conditions:—

Plans to be submitted to the Minister of Agriculture with indication of area, navigable rivers, routes, ports, railway stations, and a report as to the production of the plantation and the salubrity of the locality.

Art. 6. The minimum number of trees per hectare for new plantations must be 250 for seringueiras, or 400 for maniçoba, etç., and in the case of replanting a distance of 6 metres and 5 metres respectively between the plants.

Art. 7. Planters who cultivate food crops on an

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area not less than one-third part of that devoted to rubber, will receive an addition of 5 per cent. to the subsidy, paid annually, until the first crop of rubber is gathered.

Experimental stations will be established in all the rubber-producing states, and will furnish information with regard to all matters connected with the industry,

Each station shall possess—

1. A laboratory of phytopathology, equipped for seed testing.

2. Laboratories of agricultural entomology and chemistry, and microbiology, etc., and the station will be obliged to distribute selected plants and seeds, analyse (gratuitously) any manures or fertilizers submitted, and publish a yearly bulletin dealing with the work of the station for free distribution. Besides the above, each station will contain a museum of agriculture and forestry, a permanent exhibition of machinery, and a meteorological observatory.

Title II

Art. 23. To the first rubber refinery treating seringa, established in Pará and Manâos, and dealing with maniçoba, etc., in Piauhy, Ceará, Rio Grande do Norte and any other rubber-producing state, as well as to the first manufactory of rubber goods which is established in Pará, Manáos, Recife (Pernambuco), Bahia, and Rio de Janeiro, will be conceded the following subsidies:—

A. Up to 400 contos for seringa refineries,

Up to 100 contos for maniçoba, etc., refineries,

Up to 500 contos for rubber manufactories,

subject to the following conditions:—

Presenting to the Department of Agriculture a full description of the proposed factories or refineries, with plans, etc., and proofs of the financial stability of the promoters and competence of the management.

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Premiums paid will not exceed 25 per cent. of the cost of first establishment.

Title III

Art. 26. Hospices will be established in Pará, Manáos and the Acre Territory, equipped with hospitals, pharmacies, and every necessity for the use of colonists in the rubber districts, who will be transported free of charge, together with their baggage, to any point in the above zone with which communication is maintained.

Title IV

Chapter I. Narrow gauge railways will be constructed on the rivers Xingú, Tapajos, and others in Pará and Matto Grosso, and on the Rio Negro, Rio Branco, etc., in Amazonas, and up the valleys watered by these rivers.

Branch lines from the Madeira-Mamoré Railway by Villa Rio Branco, and to the Peruvian frontier by the valley of the river Purús.

The rivers Negro, Branco, Purús and Acre will be deepened to enable steamers drawing 3 feet of water to navigate them the entire year.

Coal deposits will be established in every port where it is possible, and they will be floating so as to facilitate coaling in any desired part of the river. Oil reservoirs will be also installed where convenient. All such deposits and machinery in connection, as well as the river steamers, shall be exempt from petty administration charges and import duties.

To companies renting and cultivating the national estates on the Rio Acre, Amazonas (Rio Autaz), and in Pará, the following favours will be conceded :—

Exemption from duty on all machinery, building materials, seeds, fencing, live stock, etc. ; and—

Premiums of 30 contos per 1,000 hectares of pasture

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land planted, and 100 contos per 1,000 hectares cultivated with rice, beans, maize, and mandioca, and 10 contos per 500 tons of dairy produce or preserved meat produced within 5 years.

Any company devoting themselves to the fishing industry, with head office in Pará or Manáos, will have exemption from duty on all their necessary materials, and premiums of 10 contos annually for 5 years for an excess of 100 tons of dried fish annually.

In case of such contract, the property to revert to the Federal Government after 15 years.

Exhibitions.

Rubber exhibitions shall be held triennially in Rio de Janeiro, the first to be opened on May 13, 1913. They will comprise exhibits dealing with the cultivation, extraction and manufacture of rubber goods of every description. Bonuses will be offered for the best processes of extraction and for machinery and tools. Foreign products may be admitted, but cannot compete for prizes. They will, however, be admitted without customs duty, but if sold, this will be levied. Native products will be transported to Rio de Janeiro free of charge. National congresses will be held in connection with the exhibition, and samples of products will be chosen for the permanent exhibition at the Commercial Museum in Rio, and for those abroad.

Plants Producing Tannin

The following are the principal sources of extractives used for tannin purposes in Brazil :—

	Percentage of Tannin
Striphnodendron barbatimão . . .	25 to 48
Acacia angico (bark and fruit) . . .	40
Phyzophora mangle (bark and leaves) .	20 to 30

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	Percentage of Tannin.
Buranhem	30
Murici guassú	15 to 20
Quebracho vermelha (red)	4 to 16
Ingá sapida, edulis, vera, dulcis	10 to 15
Acacia jurema	8 to 15
Quebracho branco (white)	12
Carapa vermelha	4
Compared with oak (in Europe)	30 to 45

Many plants used in Europe do not possess more than 8 per cent. of tannin.

The barbatimão is the most generally used in Brazil, and furnishes also fine woods for the cabinet maker. In the States of Minas, São Paulo, and Rio Janeiro this bark is extensively employed; but in São Paulo, where there are more than fifty tanneries, the local supply is insufficient, owing to the devastation of the forest. This applies, more or less, to the other two states, but especially to Rio de Janeiro, where the extraordinary clearances have made a great difference in the wet seasons, the rainy weather coming on now quite out of the usual time, and in volume generally less than heretofore. Many tanneries have had to close down in different parts of Brazil owing to lack both of hides and tanning material. With improved methods, and great increase in stock of store cattle, this is not likely to occur in the future.

With the barbatimão, some 7 or 9 months' treatment are necessary. The usual price in the State of Minas Geraes is about 1*s.* 6*d.* per arroba (15 kilos), or about 32 lb. There are also five other species of stryphnodendron used in Brazil. Exportation has commenced of various barks to Europe (Germany and Portugal) from Paraná, Rio Grande do Sul, and São

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Paulo. The embaúba (*Cecropia palmata*), etc., whose tender leaves are the favourite food of the sloth, furnishes also a large percentage of tannin, as well as being very useful in the manufacture of cordage. The number of plants used in Brazil for this purpose is so great that it has been found impossible to quote more than the principal and most widely used ones.

Fibre-Producing Plants

Undoubtedly one of the greatest sources of wealth in the Republic, it is as yet, perhaps, the least exploited. Everywhere there are myriads of malvaceas, and, doubtless, Brazil is the country richest in the branches of this family.

In comparison with the canhamo (hemp) it is considered that the guaxima vermelha would rival the former, if properly prepared. Many of these latter plants have been used in making ship's cables in Brazil since colonial days. The urena and the triumpheta are used under the name of aramina.

These plants, in favourable situations, not too dry, produce fibres of 8 to 9 feet in length. In São Paulo some 12,500 acres are under cultivation, and produce about 800 tons of fibre annually. Nearly the whole is consumed by one factory in the capital of the state. The usual price paid is, rough, 2*d*. per lb., and prepared, 6*d*. to 8*d*. a lb. The cultivation is carried on near the coast, and some 60 quarts of seed are used to the hectare (2½ acres). The harvest commences in February, and ends in June or July. The principal use of the fibre is in the production of sacking for coffee, 60,000 to 70,000 bags being made monthly.

A group of the malvaceas, known as vassouras, is so persistent and universal in its growth that, if Brazil possessed a department similar to that in the Australian

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Colonies, they would become *proclaimed plants*. They are, however, very useful, the more delicate fibres making good paper, and the others furnishing material for brushes, ropes, and twines. This family is allied to that of the jute. The one kind that is likely to prove of most value is known as *Canhamo brasiliensis* (Brazilian hemp). Very similar to our own flax, it is now known locally by the name of linho *Perini*, from the name of its supposed discoverer. It grows in the valley of the river São Francisco principally, in some places in great profusion, and also in the States of Minas and São Paulo. It appears to be a variety of hibiscus. The stalk grows to the length of 10 to 13 feet, without branches. The strength of the fibre, as compared to hemp, is about four to three. Cultivation on a large scale has been commenced at Rodeio, in the State of Rio. Production of 1,000,000 square metres of land, three crops yearly, 380 tons of best quality, and 2,214 tons of second quality fibre. Prices offered in Europe, £40 and £12 respectively per ton. Can be sold at a profit of 1$200 and 600 reis a kilogramme respectively.

Some 2,500,000 square yards have been planted with the fibre. Each acre produces at present 3,194 lb. The earnings per acre run up to £60. Experiments have been made in growing elsewhere (Texas), but no information is forthcoming as to commercial results.

The family of bromeliaceas present also varieties of pineapples suitable for textile fibres. The north of the State of Rio, along the coast, is covered with this (*Bromolia lagenaria*) type for 60 square kilometres. The exploitation of this plant is purely local, in spite of the great opening in Europe for the fibre. A London house offered £30 a ton, and asked for an immediate lot of 4 tons for experimental purposes. Price offered at Hamburg was £15 a ton.

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THE PUBLIC GARDENS, PARÁ.

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THE PUBLIC GARDENS, PARÁ.

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In the family of amaryllidaceas we must note the *Fourcroya gigantea* and *Fourcroya cubensis* (pita).

Both these plants are common in Brazil, and may be found at all altitudes. Length of leaves, 10 to 12 feet.

Compared with sisal, the following figures demonstrate the value of this plant :—

Dimensions of leaf.	Weight.
Sisal, 4 to 6 ft. × 4 or 5 in.	1½ to 2 lb.
Piteira, 8 ft. × 7 to 9 in.	3 lb.
Weight, 1,000 leaves.	**Fibre, 1,000 leaves.**
Sisal, 1,500 to 2,000 lb.	50 lb.
Piteira, 2,500 lb.	50 lb.

The sisal lives 10 to 12 years, the piteira 12 to 16 years.

Pita requires 3 years to mature. The minimum yield per acre is 1,500 lb. of fibre, worth £13. An estate of 1,000 acres (400 hectares) would produce £13,000 after 3 years. Expenses calculated in planting 5,000 acres, machinery, freight, etc. . . £1,200

Wages, etc. (4 years) . . .	10,000
Instalment, etc.	1,800
Depreciation, etc.	1,000
Freight, etc.	6,000
	£20,000
Expenses, first 4 years . .	£20,000
Result (one crop)	60,000
Profit	£40,000

If we add £5,000 to expenses, and allow no crop in the fourth year, we have then—

Five years' expenses . . .	£27,500
One crop, result	60,000
Profit	£32,500

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Calculating £20 per ton, and a minimum crop of 3,000 tons per 5,000 acres.

Experts calculate the crop, after 3 years, at £13 per acre, thus 5,000 acres = £65,000.

An ample margin is thus shown, and land is not wanting for planting. If we reckon value of land at 5*s.* an acre it will be an outside estimate.

In 1904 the price of pita (Mauritius hemp) was from £25 to £35 a ton (London). An estate of 25 alqueires in Minas will produce 75 tons of leaves, worth at least £1,800.

The exportation of cocoa fibre, etc., is very far from being equal to the demand, the total amount in vegetable fibre in 1905, coming to 7,377 kilos (less than 7½ tons), valued at about £300.

Kapok (paina) is another vegetable substance which is produced in Brazil, from the fruit of the various families of paineras. The best quality paina branca (white) is capable, when used in life-belts, of supporting thirty to thirty-one times its weight, as compared with the kapok from Java twenty-six to twenty-eight times its weight. The painera is abundant in the States of Espirito Santo, Rio de Janeiro, Minas, São Paulo, etc. In spite of the excellence of the production of this class of tree, the exportation is infinitesimal. Most of the paina is used in Brazil in stuffing mattresses, pillows, cushions, etc.

The price in Rio de Janeiro varies from 1 to 2 milreis a kilo, according to quality.

Lyrio do Brejo (*Hidichium coronarium*)

This wild lily is very common in marshy lands near the coast, often choking watercourses. The fibre is tough and strong, the roots produce starch, and the flowers are suitable for the manufacture of perfume.

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Tucum (*Bactris setosa*)

Another plant yielding a soft silky fibre; common in the forests.

Aramina

This fibre is used by the Sack Manufacturing Company in São Paulo, which has a monopoly, and uses some 350,000 kilogrammes of fibre annually, making some 800,000 sacks.

Ramie Fibre

Up to the present this is not cultivated, but the Government has resolved to plant it wherever possible in the new colonies.

One hectare should yield four crops yearly of 40 tons each of this fibre = 160 tons in all (at 16*s.* to 20*s.* a ton).

Piassava Fibre

Piassava (*Attalea fumifera*), yielding the fibre from which brooms, brushes, etc., are made (as well as the coquilho nut), is found growing wild in Bahia, mostly along the coast, and in the south. It is a kind of palm, with just a cluster of tall leaves, growing in a sandy soil. Forests contain to an acre, as a rule, about 75 trees, which produce generally from 10 to 20 lb. of fibre each annually. Several estates are very large, and one company has 450,000 acres under operation containing 6,000,000 palms. A large quantity of the fibre is from State territory, exploited under Government concessions, the price usually payable per arroba (15 kilogrammes) extracted being fixed by the State. An export duty of 21 per cent. is levied, and from July to December, 1908, this tax brought in some 300$000 per ton. In this year 1,318 tons were exported. Land is worth from 4*s.* to 8*s.* an acre, and labour costs 2 to 3 milreis

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per arroba. The British Company owning the above large estate north of Bahia uses modern machinery, but the native companies do all the work by hand.

Freight from Pará to Liverpool 40s. per ton, to Havre 45 francs. Plus 15 per cent.

RELATIVE STRENGTH OF FIBRES

m/m=millimetres.	Diameter of Cord (Dry).			Diameter of Cord (Wet).		
	1·5 m/m	2·5 m/m	3·5 m/m	1·5 m/m	2·5 m/m	3·5 m/m
Aramina (*Urena lobata*) .	14·0	24·0	—	—	—	—
Canhamo Perini (*Hibiscus unidens*) (prepared by Dr. Perini)	10·2	20·5	—	11·7	22·5	—
Prepared by the Agricultural Institute . . .	9·5	18·2	—	15·7	22·7	—
Sisal (Pernambuco) (*Agave vivipara*)	14·5	22·5	25·0	—	—	—
(Manilla) Canhamo (*Cannabis indica*).	7·0	15·5	31·5	22·5	27·0	68·5
(Madagascar) Raffia . .	12·5	24·0	27·5	17·0	27·0	34·0

Banana

Unexploited in Brazil for the purpose of textile fibres. São Paulo could produce not less than 80,000 tons of these fibres per annum.

The above are only a few of the plants which occur in profusion all over the Republic, and offer a hundred different kinds of utilities to the world of commerce. The thing which is most astounding is not the extraordinary richness of the vegetable kingdom in Brazil, but the meagre way in which these sources of wealth

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are utilized. Fortune awaits any capitalist who will venture to take up the study of any one of a thousand different kinds of cultivation, or even the commercial exploitation of those multitudinous species growing wild in every state, from one end of the Republic to the other. The very cursory glance given in the previous pages to this subject is entirely inadequate to give the reader any idea of the wealth nature has so bounteously bestowed upon this fair land, only now beginning to take its proper place amongst the productive countries of the world.

The Bromeliaceas are very common in Brazil, and the Gravatá de Rede (*Bromelia lagenaria*), the wild pine-apple (*Anana sylvestre*) and the corvatá grow in abundance in the sandy wastes near the coast.

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CHAPTER XIV

TIMBER, ETC.

BRAZIL is undoubtedly the country possessing the richest store of valuable woods. The majority are so hard that furniture made from them resists the worm. Many possess perfumes as aromatic as any invented by modern science. In spite of the wonderful exuberance of nature, especially in the north, and the unequalled fluvial system of those most favoured states, the melancholy fact must be confessed that it does not pay to export any but the finest timber. Not only this, but as yet an enormous quantity of pine is introduced into the country for the purpose of box and case making, general carpentry work and building construction. This is the case even at Belem (Pará), where the forest is at the gate of the city. The explanation of this lies in the fact that freights are prohibitive, a cargo sent to Liverpool hardly paying cost of transit, and that the more beautiful forest trees are growing isolated. One finds, in a great wood, a hundred different kinds of huge and stately trunks, hardly two alike in proximity. The all-pervading quest of rubber renders labour unavailable, and again some of the timber is so hard that it resembles iron rather than wood. The future of such trees as the massarandubá is in the hands of the railway constructor, the enduring qualities of the wood making it

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very useful indeed for sleepers. The so-called cedar of Brazil (*Cedrela odorata*) is found throughout the Amazon region, and is principally used in cabinet work and internal fittings of houses. It grows plentifully from Bahia southwards.

The jacarandá (pallisander), mahogany and ebony are the woods most commonly used in local furniture and cabinet making. For exportation, the former, of the best quality from 18 to 25 inches in diameter, and from 12 to 14 feet in length, weighing over 800 kilogrammes, is worth in Havre 600 francs.

Peroba grows over 100 feet high, a single trunk weighing as much as 30 tons, and taking three men 4 days to fell it. It costs 7 milreis a ton on the spot (Rio State) and four times this price in the capital. At São João da Barra the cost is £1 per cubic metre. In São Paulo this tree is frequently 18 metres circumference.

The Imbuia is valued at over 100 milreis a metre in Rio, and Vinhatico, Ipé, Piuna, and many more trees with Indian names, conveying no idea whatever to the lay reader, are so fine that they fetch locally as much as £7 the cubic metre.

In Paraná there are 800 million Araucarias, spread over some 100,000 square kilometres. This wood (red or white) is 20 per cent. stronger than Swedish pine. The tree reaches nearly 200 feet in height, with a base diameter of 10 feet.

The only exportation from the north in 1906 was as follows:—From Manáos, £5,800, and from Pará, £9,900, this latter paying in exportation taxes £567, at a percentage of 8½. In 1910, timber to a total value of 213,557$166 paper was exported from Pará. The two woods predominating were the acapú and pau amarella (yellow wood), for flooring purposes, as the dark and light colours alternating are very pleasing to the eye.

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Many of the finest houses in Lisbon are floored with these woods.

In Paraná most of the owners of pine forests have entered into an accord to raise the price.

The monopoly created at the great European market (Hamburg) is considered to be one of the principal causes of the failure to develop the timber trade. It is stated that a closed ring of buyers fix the prices paid to the exporting firms, and then deal for whatever is needed amongst themselves. The greatest consumers of timber are the Brazilian railway companies and the sugar mills. Two lines in São Paulo alone burnt wood to the value (locally) of nearly £100,000 in the year 1904. This state consumes some 6,600,000 cubic metres of timber annually, devastating 228 square kilometres of forest. Some idea of the extraordinary state of affairs in Brazil may be gathered from the fact that in the capital of the Republic it is sometimes cheaper to buy coal imported from England than wood, which is to be found within a couple of leagues of the metropolis. In the vicinity of the city it has been found necessary, not only to prohibit the destruction of the forests, but also to form reserves, the Federal Government having, July, 1912, closed four zones in the Acre District.

Paraná has had its own laws since 1907.

In the State of São Paulo a veritable marvel of the vegetable kingdom has been discovered, in the shape of a tree with luminous foliage showing a magnificent spectacle of phosphorescence at night.

The Paulista Railway Company has been engaged for some time in experiments with eucalyptus, planting a large area with various varieties for use as sleepers, telegraph posts, fencing, piles, etc. According to the experience of this line, the above tree is eminently suitable for any of these purposes, yielding good material in less than 10 years.

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A plantation of 1,000 trees at Jundiahy cost as follows :—

Clearing the ground . . .	30 $000
Planting, etc.	83 $800
1,000 plants at 30 reis. . .	30 $000
Replanting dead slips . . .	5 $200
Cleaning (4 years' work) . .	100 $000
Pruning	10 $400
Total .	269 $400

(Working day, 8 hours.)

These plants produced in 20 years 5,121 $000 worth of timber. The tree, flowering as it does at an epoch when there are no other blossoms, is of the greatest utility to bees, and with a selection of ten or twelve varieties, a constant succession of flowers may be obtained.

The bark is richer in tannin than oak.

One ton of leaves will give 7 to 9 litres of essence.

The timber is most valuable for cabinet work, hardly ever being attacked by insects.

Paper Making in Brazil

Adapted from Le Brésil (article by M. Emile Lecocq.)

One hectare of forest in the south should furnish 1,500 stères of logs 1 metre × 10 to 15 centimetres, and after 2 months' drying the percentage of moisture is reduced to 37. Each stère will weigh 350 kilos on an average. Three tons of wood should easily yield 1 ton of cellulose, consequently each hectare will produce 150 tons of material. Manufacturing 6,000 tons of pulp annually, or 20 tons in each of 300 working days, in 20 years from 800 to 1,000 hectares of forests are denuded of their trees.

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The expenses of manufacturing a metric ton of wood pulp should not exceed :—

	fr.	cent.
3 metres 90 centimetres of wood at 3 francs the cubic metre	27	00
yielding—		
200 kilogrammes of sulphate of soda	20	00
9 metric tons of firewood	13	50
400 kilogrammes of lime at 15 francs per ton (manufactured)	6	00
Wages (at 4 fr. daily average), 150 hands	30	00
Repairs, upkeep, etc., etc.	23	00
Bleaching	20	00
Total	139	50
Cost of imported pulp per ton	300	00
Difference in favour	160	50

Profits if exported—

	fr.	cent.
Cost per ton as above	139	50
Freight, etc..	20	50
Total cost	160	00
Deduct bleaching	20	00
Total	140	00
Price per ton (unbleached) C.I.F. at a British port	157	50
	17	50

Thus per 1,000 tons exported = 17,500 fr. 00 cent., or roughly £700 profit.

The expenses of manufacturing a metric ton of wood pulp should not exceed :—

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	fr.	cent.
3 metres 90 centimetres of wood at 3 francs the cubic metre	27	00
yielding—		
200 kilogrammes of sulphate of soda	20	00
9 metric tons of firewood	13	50
400 kilogrammes of lime at 15 francs per ton (manufactured)	6	00
Wages (at 4 fr. daily average), 150 hands	30	00
Repairs, upkeep, etc., etc.	23	00
Bleaching	20	00
Total	139	50
Cost of imported pulp per ton	300	00
Difference in favour	161	50

Profits if exported—

	fr.	cent.
Cost per ton as above	139	50
Freight, etc.	20	50
Total cost	160	00
Deduct bleaching	20	00
Total	140	00
Price per ton (unbleached) C.I.F. at a British port	157	50
	17	50

Thus per 1,000 tons exported = 15,700 fr. 00 cent., or roughly £700 profit.

Piri-Piri (*Papyrus brasiliensis*)

Some attempt has been made to utilize this reed for

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the manufacture of coarse paper, but it is as a combustible that I propose treating of it in a later chapter.

The Brazil Railway Company has acquired 560,000 acres of pine forests in Paraná and Santa Catharina, and one mill which was put into operation in November, 1911, is expected to turn out from 4 to 5 million feet of timber per month, and another smaller one 450,000 feet monthly. Experiments have resulted in absolute success in kiln-drying the planks. At the beginning of 1913 lumber will be exported to Uruguay and Argentina by the Company's own railway as far as the frontiers. The first mentioned mill will be running 20 hours daily with two shifts of hands.

Nuts, Oils, Wax, etc.

The castor oil plant, although not indigenous to Brazil, has adapted itself locally with great success. In spite of the most rigorous methods taken to extirpate it, including fire, once introduced into a district it is never destroyed, and is considered as a plague. Largely used for many years as an illuminant, it is employed more and more as a machine oil, mixed with other oleos or alone. The Leopoldina Railway Company has established a factory for the purpose of extracting the oil as a lubricant. There are some twelve or thirteen more mills distributed over the different Brazilian States. Several other plants of the same family are common in the country. Each plant will produce from 2 to 3 kilos of seed, and an alquiere should yield 5 tons. The value of the seed in Pernambuco is 160 reis a kilo, and the oil 500 reis.

Exports in 1910, 150 tons.

Pea nuts (*Amendoim*). These kernels yield 50 per cent. of oil, and the shells contain 85·48 per cent. of cellulose. The residue of the crushed nuts forms an

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excellent feeding cake for cattle, containing more than 31 per cent. of albuminoids, 11 per cent. of oil, and 31 per cent. of starch and saccharine matter. The plant thrives only in a limestone district, or in soils where an abundance of calcareous matter has been added. It should be planted in rotation with tubers or maize. In favourable circumstances 2½ tons of nuts to the acre is not an out of the way crop.

Brazil nut oil, furnished by the Brazil nut of commerce, and kindred seeds. Contrary to many of the trees of the Amazonian region, the chestnut (as it is called in Brazil) grows best on high and dry lands, and forms extensive woods of lofty trees of great size, attaining the height of 150 feet, and having a girth of 12 to 20 feet at 50 feet up. The nuts are contained in a shell about the size of a cocoanut. Those called sapucaiás produce a fruit excelling the Brazil nut in quality and worth two or three times the former. The State of Pará has almost a monopoly in the exportation of the Brazil nut. The extraction of the oil is generally performed locally, for use in the country. The whole of the woods are uncultivated, and the collection of the nuts is fraught with great difficulty.

These are found in the silvas, or elevated plains, and each shell contains some 15 to 20 nuts arranged somewhat like the sections of an orange. The outer pod is so strong that a loaded cart could pass over it without cracking the shell. The trees are too high to climb, so only those pods which fall to the ground are collected.

The retail price of the new crop has advanced steadily during the last 10 years from 4*d*. to 6*d*. and 8*d*. per lb.

This nut contains some 17 per cent. of protein, and 66·8 of fat, and only 5·3 per cent. of water, comparing very favourably with other foods from an alimentary point of view.

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Exports in 1910 = 10,000 tons, valued at £350,000, nearly all sold by auction at Pará.

The sapucaiás are quoted now from 1*s.* 6*d.* to 2*s.* 6*d.* per lb. This class of nut is found in a pod, bearing a closely fitting lid, which, when the nuts are ripe, opens and lets fall the contents. Monkeys are unfortunately very fond of these, consequently the crop is small. One tree may produce as much as 3 tons of nuts in a season.

Exportation of Brazil nuts from Pará from January to June, 1912 (export tax Pará 20½ per cent.) :—

To Europe, 101,195 hectolitres; to U.S.A., 192,979 hectolitres.

Freight Liverpool, per ton 50*s.*; Havre, 60 francs; New York (per cwt.) 50 cents. Plus 15 per cent.

Copaifera officinalis (copaiba). There are twenty species of this family of leguminosas, of which some seven are found in Brazil. The oil is extracted from the trunks by means of an incision, and in Bahia a suction pump is employed. The limitation of the tree is about 20 quarts. The principal places of export are Bahia, Maranhão, Pará, and Manáos, and the largest importing countries are the United States, Great Britain and Germany.

Carnaubeira (*Copernica cerifera*) is found as far south as Bahia, and grows sparsely in the more temperate parts of Brazil, thriving best in hot dry zones, like Cera, where there are over 1,000,000 trees, and in Rio Grande do Norte, etc., in the river valleys.

Humboldt speaks of this palm as the tree of life, and its wonderful utility may well entitle it to lay claim to that designation. The roots are useful in skin diseases as depuratives, the leaves make excellent cordage and twine, and are commonly employed to stuff mattresses and pillows; the fruit is agreeable and nutritious, the timber makes fine furniture, taking a high polish, and

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resists putrefaction so well that it is in use in a hundred different ways in salt and fresh water. The young shoots are used as the palmito cabbage; the sap of the adult palm contains a very wholesome kind of tapioca, and makes a pleasant fermented drink, whilst even the stalks and other residues furnish food for cattle. The principal product of the tree is, however, the vegetable wax which is found in the young leaves. 100 leaves from one tree give about 4 lb. of wax on an average, but under good conditions as much as 13 lb. has been obtained. To collect the wax, the leaves are dried and beaten. The value, per kilogramme, is about 2*s*. (1905). The exportation of this wax, the same year, was valued at less than £200,000. Exports (1908), 2,592 tons.

It shoots up within 30 to 40 days after planting, just below the surface, in a moist soil. 2,000 plants is the maximum per hectare, and each hectare should yield 412 $000 in wax alone. Irrigation is necessary if a very dry season ensues. Fifty candles, made from 1 kilo of wax, are sold locally for 1½ to 2 milreis. The fibres are also used for hat-making, headgear woven from them being worth from 80 reis to 2 milreis a piece.

Cocoanut palm. In its green state the nut contains more than a pint of liquid. The substance, in a gelatinous state, is highly considered in Bahia, and should be much better known in Europe than it is. The nuts, which are so common and cheap in the English markets, are in comparison with the green ones not at all palatable. The production on the spot of cocoanut butter, fibre and oil seems to be needed, and the enormous quantity of plantations existing might find a ready market for their nuts. As it is, freights are so high, and consumption so small, that a cocoanut costs twice as much in Rio de Janeiro as it does in London. The

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value of each nut on the spot (Pernambuco or Bahia) is about 1¼*d.* There are about 100 million cocoanut palms in Brazil, principally along the coastal belt (central). Nuts from Cannavieiras yield 63 per cent. of oil. No copra is as yet exported. The Avoeira produces the palm oil of commerce. Quite unexploited.

Coquilho Nuts (Vegetable Ivory)

Produced by the piassava palm (see Fibres) and grow in a cluster of about 100 at its base. Each nut is about the size of a turkey's egg, and contains a large kernel, which produces a very fine lubricating oil. The nut itself is generally used for making beads, buttons, and other small articles. The Government levies an export duty of 8 per cent. on this product, working out at 100 $000 per ton. During 1908, 429 tons were exported.

Freight to Liverpool (Booth Line) 40s. per ton, plus 15 per cent.

MATTE (*Ilex paraguayiensis*)

Matte is to the Southern Republics, Chili, Paraguay, Brazil, Uruguay, and Argentina, what tea is to the European. It is even more drunk in many places than its rival, coffee. Here we find a plant which has its habitat exclusively in the temperate region, at an altitude of from 1;500 to 3,000 feet above sea level. Its Latin name is, of course, due to its being found, probably, in the first instance, in Paraguay, but the State of Paraná is the great seat of its exportation.

The tree, or rather bush, is some 12 to 20 feet in height, and it rarely reaches 30 feet. It belongs to the hollies, but is without spinous leaves. The area over which it is distributed in Paraná alone is some 140,000 square kilometres, but it is found in six other states, as well as

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VIEW OF THE PRAÇA DA REPUBLICA, SANTOS, SÃO PAULO.

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A River Scene near Manaos, Brazil.

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in a small part of Argentina and Uruguay, near the Brazilian frontier. The leaves are prepared in two distinct ways. (1) Ground up into powder to be used in the cuia (or gourd), and the decoction, made with boiling water, is sucked up through a perforated tube. (2) Prepared as a sort of tea in flakes, with some fine stalks, and taken in cups, like the Chinese or Japanese liquor. The infusion is of a green colour, and when brewed in a pot, a Brazilian custom is to put a piece of glowing charcoal into it. The effect is to turn the liquor into a dark brownish green, and undoubtedly much stronger. It improves also by boiling. Matte has one great advantage over tea, and that is, that two brewings may be made with the same handful of leaves, and sometimes the second is stronger than the first. Its greatest quality is in its effect on the human system. Take a good bowl with a crust of bread at 4 a.m., and you may work in the harvest field till noon. It has no aftermath, no injurious influence on the digestive organs, and its action is stomachic and laxative. During the war with Paraguay the soldiers marched and fought day after day without any food but matte.

I have noticed a remarkable fact with relation to its medicinal properties. In the Argentine cattle lands an enormous quantity of meat is consumed, indeed, the staple diet of the people is flesh. I have myself breakfasted on huge beefsteaks for months together, 7 days a week. The beef, however, goes together with the matte usually *a bombilla* (in the cuia or gourd). The bombilla is the tube, spoon-shaped at base, and commonly of silver, through which the matte is drawn.

The cowboys are great beef eaters, but rarely suffer from the effects of the diet. Certainly the matte is a blood purifier, at least taken in native fashion, and without sugar. This beneficent herb can be placed on

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the market here in England for 9*d.* a pound, and if imported direct in large quantities would cost no more than 6*d.*

Each bush produces some 200 lb. of leaf and fine stalk, which is reduced in the factory to about 90 lb. of herb. In its natural state the matte is found in company with the monarch of the temperate zone of Brazil, the majestic and graceful araucaria (the southern pine). The only cultivation the bush receives, under these circumstances, consists in clearing the obstructing growths from its vicinity. This is done every 2 or 3 years, under favourable circumstances. The harvest is collected from May until August. The branches measuring less than half-inch in diameter are nearly all cut down, and then the finer twigs and leaves separated from the mass. They are first rough dried over a fire in the open, and then cut up by a machine, and put into sacks, and transported perhaps 100 miles by road or river to the factory. The matte (maté), is now dried again in patent ovens (Brazilian invention), and then separated into different qualities by sieves. The powder (maté chimmarão) is usually exported to Rio Grande do Sul, the River Plate Republic, and Chile, to be consumed *a bombilla.* In the Paraná Campos the matte tree alternates with the araucaria. Its limit in this zone is from 500 to 1,000 metres above sea level.

There is ample scope for combining saw mills and matte factories.

Exportation during the last quarter of a century has increased at least 300 per cent. The most encouraging thing about this trade is its development without artificial aid, solely through the excellence of the article. The annual consumption in the State of Paraná per head of the population is about 10 lb. The exterior trade is carried on through fourteen ports, in six different states,

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but of the total, Paranáguá and Antonina between them account for more than one-half. It is calculated that the bush requires 3 years before being fit for harvest again, if the precaution is taken of leaving a few branches covered with leaves at the top, to protect the rest from the elements. The price of the tea put on board trans-atlantic steamers works out at about 3*d.* a lb., and some allowance must be made for trans-shipment, for the German liners calling at the Paraná ports do not touch at a British one *en route* to Hamburg. The price stated previously, 9*d.* a lb., will cover all costs of delivery (retail), as there is no customs duty on it in England.

To purify water, an infusion of matte is a most excellent thing, causing precipitation of lime rapidly, when the water is impregnated with calcareous matter.

To Replace Tea or Coffee

Two grammes of matte to one cup of water; or roughly speaking a handful of the herb serves for a quart. Costing 1*s.* a lb. each quart of matte would amount to $\frac{1}{10}$th of a penny.

A very good drink may be made from 2 grammes of matte and ½ a gramme of centaury tops to 1½ quarts of boiling water.

It would be possible to cover many pages with attestations from well-known physicians of the high therapeutic value of matte, but it is quite unnecessary. During 1910–11 the Spanish army made very beneficial use of it in their campaign against the Riffs, etc., in Morocco.

The *Journal d'Hygiene*, Paris (25th July, 1909) says—Apart from the value of matte as a beverage, it renders great service as a purifier of water.

The Société Française d'Hygiene (9th July, 1909)

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votes unanimously its expression of the necessity of the authorities employing matte as a beverage and water purifier, especially amongst *the troops* in Africa. A great chorus of physicians in every part of the world where matte has been scientifically tested acclaims its sovereign virtues, not only as a food beverage, but as a gentle stimulant and a corrective of many stomach, liver and kidney complaints.

Medicinal Plants, etc., etc.

Quinas, furnishing cinchona, or Peruvian bark. There are no less than fourteen or fifteen native kinds, and the true Peruvian cinchona has been introduced with great success. Angelica, quassia, gentian, centaury, rue, and many purely Brazilian species of bitter tonical plants abound in all the states.

Ipecacuanha is found very largely in the State of Matto Grosso. The collectors take up and dry the roots, observing that one is left to propagate wherever a plant is found. The price (in Brazil) is about £1 per kilogramme. Exports (1908), 24 tons = £13,500.

Tonic stimulants. The principal one (matte) has already been described. Bitter orange is commonly used.

Anticatarrhic = extracts of the sapucaiá nut are very beneficial.

Guarana (*Paulinia sorbilis*).

This exceedingly valuable plant is cultivated by the Maués Indians in Amazonas, but grows wild in many parts of this region. It can be grown to advantage in nearly any tropical or sub-tropical part of Brazil. Planted 6 metres apart, it flowers in the third year, and sometimes bears fruit as soon, or in the fourth or fifth

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season. The crop is picked in November. The plant is a climber, with a yellow fruit and a black seed, and is somewhat larger than a maize grain. It does best on a sandy, blackish soil, and should be pruned after harvest. The fruit is cleaned in water, and the seeds are roasted on the same day, to prevent fermentation. They are then crushed, and made into a moist paste, which is rolled into sticks and dried. Price locally, 6 to 8 milreis a kilo. The prepared paste is sold at 20 to 25 milreis a kilo in Matto Grosso. If carefully treated, each plant will produce 8 lbs. of seeds annually for 40 years. Total crops of the Maués district, the seat of its preparation, 20 to 25 tons yearly. A small piece of the chocolate-coloured cylinder is ground up into fine powder, and a spoonful is mixed with one of sugar and taken in a glass of cold water. The plant is now grown in the neighbourhood of Rio Janeiro, and used by a local chemist in the preparation of various specialities.

Export tax (Pará) 2$000 per kilo, plus 5 reis for the Stock Exchange. Freight to Liverpool, 45*s.* per ton, plus 15 per cent.

ANALYSIS (per 100 grammes).

Caffeine	4·288
Resin	7·800
Sapoine	·060
Starch, etc.	9·350
Essential Oil	2·950
Guaranic Acid	8·052
	32·500
Residues	67·500

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Exports from Pará in 1908, 30,051 kilos, valued at 344,549$500.

The output has decreased since, possibly owing to local consumption.

Other Medicinal Plants

We may mention capilaria (pectoral), colchicum, *Sagittaria dracaena* (dragon's blood), tamarind, sassafras, verbena, valerian, gentian, jalap, cochlearia, cashew, rue, digitalis, elaterium, *Strychnus toxifera* (nux vomica), and the well-known jaborandi, from which pilocarpine (the basis of hair tonics) is extracted. There are multitudes of others that space will not admit of mentioning.

Exports of medicinal plants in 1908, 259 tons, worth £25,000.

Poisonous Plants

The most noteworthy are the uirari (*Strychnos castelnæi*), and icu (*Anomospermum grandifolium*), from which the Amazonian Indians prepare the paralysing poison, curare. The victim dies of asphyxiation, and from 8 to 15 centigrammes are a fatal dose. The only remedy is artificial respiration, which, if persevered in, and commenced in time, saves the person who has been wounded by a poisoned arrow. Special receptacles are used for the points of the weapons, and the poison is carried in reserve in various shaped vessels.

Dr. J. B. de Lacerda, Director of the National Museum at Rio de Janeiro, has dealt very fully with these plants in a recent volume of the Archives of the Museum.

Canabi is a convulsive poison found in many parts of Brazil, and the *Solanum nigrum*, *Thevetia neriifolia*,

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Curassavica and *Vinca rosea* are venomous plants acting on the heart and as stupefacients, respectively. *Strichnos gardnerii* and *Bothryopsis platyphylla* poison by dilation of the vascular system. Many plants used in Materia Medica are extremely poisonous if an overdose is taken.

Depuratives.—Sarsaparilla is the best known and widest distributed, many rivers having their water impregnated with it. It grows all over Brazil.

Ornamental Plants

Orchids naturally take pride of place amongst the above, Brazil occupying the chief position in the world, with 1,059 varieties, most having large and beautiful flowers.

Of the cattleyas, Pernambuco exports *labiata, Leopoldii guttata* and *granulosa*. Other species of orchids from this state are the *Burlingtonia fragrans, Oncidium devaricatium, Oncidium gravesianium,* and the *Miltonia spectabilis moreliana.*

The *Cattleya labiata alba* is also found, with an exquisite white blossom, but it is extremely rare.

Plants with eight leaves are worth 4½*d.*, those with fifteen leaves 9*d.*, twenty to thirty leaves 1*s.* 4*d.*, and thirty to forty leaves 1*s.* 11*d.* each. An extraordinary plant was found recently and sold for £1. In the United States or Europe it should be worth £30 at least. When in full bloom it is expected to bear 500 flowers.

Buyers representing great growers take up their abode at a central spot, and give notice of their intention of buying. Every market day the people come in with some plants, good, bad, or indifferent. Pernambuco exported 15,000 of the *Cattleya labiata* last season. An export duty of 2 milreis per 100 plants is charged.

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Properly packed they will stand 30 to 40 days' voyage.

The cattleyas and lœlias are found principally from Bahia southwards, in the coastal ranges. The following orchids are found on Itatiaiá :—

	Altitude.	
Epidendrum	800 metres	(July)
Isochilus	1,000 ,,	,,
Pagonia	1,000 ,,	(March)
Physurus	900 ,,	,,
Habenaria	1,000 ,,	,,
Octomeria	1,000 ,,	(July)
Phymatidium	900 ,,	,,

Pará exports mostly the *C. eldorada, C. superba* and *Oncidium lanceanum.*

Bahia—*C. aclandii, C. ameythst oglobossa.*

Espirito Santo—*C. labiata, C. harrissonia, C. schofieldiana, C. schileriana, C. crispa, lœlia xantina, L. tenebrosa.*

Rio de Janeiro—*Lœlia perrinii, C. harrissonia, C. crispa, C. lobata, C. guttata* and *miltonias.*

Minas and São Paulo—The same classes.

Santa Catharina—*Lœlia purpurata, Lœlia elegans, C. intermedia, C. leopoldii.*

Espirito Santo and Santa Catharina boast of the rarest varieties of these beautiful plants, some, as the *Cattleya autumnalis alba,* being worth £50, or the *C. warnerii* £200. Amongst the other noteworthy plants are the begonias, cannas, almonds, cardamum lilies, hortensias, magnolias, verbenas, jasmines, lycopodiums, gloxinias, bougainvilleas, camellias, water-lily, heliconias, amaranths, and all flowers common to Europe, besides others without number. The plateaux at an altitude of some

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ALTO DA SERRA, NEAR PETROPOLIS.



RIVER ITAMARATY, PETROPOLIS.

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STATUE OF THE EMPEROR PEDRO I, PRAÇA TIRADENTES, RIO DE JANEIRO.



STATUE OF THE EMPEROR DOM PEDRO II, PETROPOLIS.

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6,000–7,000 feet, which are found in several places in the States of Minas and Rio de Janeiro, are remarkable for a flora of a distinct nature, amongst which bulbous plants predominate, growing very frequently with the roots almost entirely exposed. In these elevated regions the climate is truly temperate, and most of the flowers are found blooming in the spring or early summer. The fuchsia, which is a sort of climbing, semi-parasite in Southern Brazil, is not found much above 3,000 feet, but between 2,600 and 2,900 feet is abundant in most place. *Aristolochia gigantea* is another climbing plant that produces flowers 35 centimetres long and 30 centimetres wide. In tropical Brazil the splendid Victoria Regia flourishes. In the south the purple blossoms of the Melastomaceæ (Flor da Quaresma) are seen everywhere.

The Passion flower (Maracujá) grows all over Brazil, 100 varieties being found; one, *Passiflora Macrocarpa*, bearing a fruit weighing up to 4 kilos.

PRINCIPAL FLORA OF ITATIAIÁ

Flowers.	Altitude in Metres.	Bloom in
Amarylides	2,100–2,500	January and June
Anemones	1,500	May to July
Begonia	2,100–2,400	May
Bignonia	2,300	,,
Bromeliaceæ . . .	2,000–2,300	March to July
Cannas	1,000	July
Cassias	2,100	March
Clematis	1,750	May
Convolvulus	2,000	,,

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PRINCIPAL FLORA OF ITATIAIÁ—*continued.*

Flowers.	Altitude in Metres.	Bloom in
Dicksonia	2,000–2,200	—
Fuchsia	2,000–2,300	June and July
Trunk up to 1½ in. thick, grows up to 30 or 40 feet high.		
Geranium	2,200	March
Lobelias	1,900–2,400	December to March
Lupin.	200–2,000	February
Lycopodium	1,800–2,500	—
Mimosas	2,200–2,600	March and December
Nicotiana	2,200	December
Oxalis	,,	March
Passiflora	2,400	,,
Primula	2,000–2,300	May
Ranunculus	2,200	February
Saxifrage	2,000–2,800	February and July
Solanum	2,000–2,100	June and July
Urtricularia	2,300–2,500	March
Valerian	,,	April to June
Verbena	2,100–2,300	May
Viola	1,200–2,200	February

All wild, of course.

Floriculture

The cultivation of flowers offers a splendid result to those who will dedicate themselves to it. In February, March and April tubers and bulbs of all sorts should be put in, with the exception of dahlias, which require to be planted in August, September and October.

Gladioli, angelicas, scillas, amaryllides, etc., may be planted twice a year. In February and March pansies, anemones, vanilla, balsams, daisies, sweet peas, gloxinias, poppies, primaveras, phlox, ranunculi, petunias, violets, verbena, pinks, aquilegia, cinerarias, etc., may be sown.

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In the spring (August and September) begonias, pinks, fuchsias, calceolarias, gloxinias, petunias, lobelias, forget-me-nots, etc., etc.

Transplanting and thinning should take place in November and December.

Pyrethrum. This well-known plant, from which the so-called Persian powder (insecticide) is made, can be grown easily in South Brazil, where the soil is not too sandy, or the climate excessively dry.

Essences, Resins and Dyes, etc.

The *Quebracho colorado* of Argentina is replaced in Brazil by several trees of the Brazil wood type, some dozen or more producing a red dye, including three kinds of dragon's blood trees.

Two anils with fine blue colours, both creepers (*Cissus tinctarea* and *Cissus sicyoides*, also the indigo plant itself.

Some of the fuchsias give a black, and other trees, as the *Ludwigia saparosa* and various bromeliaceas, a brilliant yellow. Gum arabic is obtained from acacias, cashews, etc., and copal from hymenæas, especially the jatoba. Resins are produced from the *Amyris clemifera* and the *Hedwigia balsamifera*. Of the essences the vanilla plant is found nearly all over Brazil, especially in Minas Geraes. Cinnamon grows exceedingly well in Pará and Maranhão, and the famous Tonkin beans are common in the northern forests.

Annatto (Urucum) grows in most places in Brazil. The seeds are crushed, and the red dye precipitated in hot water. The deposit is then evaporated, rolled into cylinders, and sent to market. The States of São Paulo and Paraná have made attempts, under Government supervision, to produce vanilla on a commercial scale, and the latter state has published directions for its

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successful culture. It may safely be asserted that there are many plants producing extremely valuable essential oils and extracts, that would repay a hundredfold the man who took up their cultivation in a scientific way. It is just the things which are neglected that offer the best openings in Brazil. Undoubtedly the state most advanced in agronomical studies is São Paulo, possessing as it does at least two finely equipped and managed experimental stations. Here also meteorological phenomena are adequately registered, and the results profited by. The Paulistas term themselves, perhaps with some justice, the Yankees of Brazil.

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CHAPTER XV

AGRICULTURE—PART I

Coffee, Sugar, Cotton, Cacão, Tobacco

COFFEE

COFFEE is grown in Brazil, principally in São Paulo, Minas Geraes, Rio de Janeiro and Espirito Santo. The plants flower from September to December; earlier in the north, and later in the south. The crops are gathered from April to July or August, or during the dry season.

Although many parts of the more central states (coastal) are adapted by nature to the growth of this plant, the fazendas have been reduced to less than half their previous extent, owing to the state of the European market. The soil of the coffee-producing zone is of a red colour, and is presumed to be similar to the Devonian in England. Sember says that it is formed of decomposed lavas mixed with decayed vegetable growths. The element that seems lacking in most of the soil appears to be the oxide of cal. (or lime); this, however, does not appear to prejudice the coffee plant, as it requires but a fourth part of this chemical constituent as compared with wheat. Experiments carried out with samples of earth from Minas, Rio de Janeiro and São Paulo, demonstrate that the composition shown by

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analysis does not agree by any means with the result obtained by harvest; after all, the most exact method of proving the suitability of the soil. The data that one finds infallible in cold ground in Europe, are hopelessly at fault in the cultivated zones of Brazil. Whilst in England one finds a maximum depth of soil of some 24 inches in relation to efficacious agriculture, in São Paulo there is from three to five times as great a profundity. I have myself seen a solid wall of earth at least 150 feet high, and decomposition is said to have been effected in many localities to the depth of 1,000 feet. All scientific travellers in Brazil remark this extraordinary phenomena.

With regard to the selection of seeds for the propagation of coffee, the greatest care is taken nowadays. From 75 to 90 per cent. of those planted survive. The sites selected are generally cleared as soon as the summer rains have diminished, or ceased, at about the end of March. The fallen trunks and branches are left to dry until August, when the whole is set on fire. At the beginning of the wet season the young plants (previously brought up from seed) are selected and put in. The planting continues from November to February. The first crop is produced in the third year, and the system employed in São Paulo for the new plantations is sufficiently favourable to the colonist. By Decree No. 1,090 of January 9, 1903, the situation of the planter became more untenable, and the Valorization Scheme was proposed as a remedy. This, as we have seen, is superseded (1908). See *Brazil in 1909–10*. Generally speaking, the new arrival (immigrant) has a definite contract with his employer, and his salary or share of profits is the first charge on an estate. He finds a house built, and a lot for his own use already cleared. Between May and September he can earn 5*d*. to 7*d*. a half

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sack (or 1½ bushels) picking the berries, and in the case of a large family the earnings are quite substantial, many Italians being able to return home for 3 or 4 months of each year. The Colonization Department in São Paulo furnishes labourers to approved planters, under stamped contract. Conditions are usually as follows:—

Pay from 2 to 3 milreis daily with keep for workers engaged in drying and preparing for export. Families of pickers on piece work are given a properly built house and ground for growing kitchen stuff free. Three persons ought to gather and sack at least 16 alqueires daily. Price per alqueire (50 litres), 400 to 800 reis. Each 1,000 trees should produce 60 alqueires annually. Maximum yield (at Baurú), 130 alqueires per 1,000 plants. Another method is to pay for each 1,000 plants tended, or hoed round, from £1 to £1 5*s*. This operation is performed some five times in the year. Ample time is left to the colonist to cultivate his own lot, for which he pays no rent whatever, neither does he for the house. Some of the planters adopt a different system, paying a third of the production to the colonist, and advancing him means for his subsistence until after harvest. The cost of marketing 50 kilos of coffee works out at about the same number of francs, or with interest on capital and depreciation reaching 66 francs for a fair grade of berry. This amounts to 6*d*. per lb. in round figures. From 1890 to 1895 coffee reached the high-water mark of 97 francs, and once or twice even 130 francs. The lowest point touched (1900–5) was 40 francs. Whilst the present state of affairs continues the virgin lands in the State of São Paulo alone (some 2,500,000 acres) must be reserved for other kinds of cultivation. Various measures have been taken by the planters themselves, including the burning of immense stocks of coffee. One

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great grievance the planter has, is the fact that his best efforts to produce a high grade of berry bring profit, now and then, not to him, but to the European merchant, who buys at the lowest figure, and sells the Brazilian production at the price, and under the name of Mocha or finest Java. I asked recently the manager of a large wholesale house what stock of Brazilian coffee he carried, and the reply was—*none*. One can only judge that he didn't know what he was selling. The world's crop 1908–9 was 16,927,000 bags, Brazil alone producing 12,812,000 bags. That of 1906–7 was the greatest on record, totalling 15,392,000 bags from Santos alone, and 4,234,000 from Rio de Janeiro.

Exports from Minas Geraes (1911), 102,679,639 kilos. São Paulo (total production of state), 8,524,245 sacks.

All coffee passed until recently through the hands of brokers, or commission agents, in Santos or São Paulo. These houses were charged with classification of the grades.

When one compares the price received by the planters and that actually attained by the coffee in the retail market, one wonders where the difference comes in. A little study of the subject will be extremely enlightening.

The coffee broker in Santos is responsible for 3 per cent. to begin with, but he has four other sources of revenue.

1. 12 per cent. on current accounts.

2. 200 to 400 reis per sack, overcharge on the freight from the plantation.

3. Price of sacks, costing 11*d*., and being sold to the planters at 2*s*. 2*d*. each.

4. Profit made out of manipulation of the contents of the sacks.

The expenses per sack of coffee from Amparo to Santos (280 kilometres) are: freight, 3·500; sack, 1·700;

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SCENE IN THE STATE OF PARANÁ, BRAZIL

The iron mines in this region are reached by a Government railroad 258 miles in length.



By courtesy of] [*La Razon, Montevideo.*

THE RIO DO PEIXE, IN SANTA CATHARINA

The railway—São Paulo and Rio Grande—follows the Fish River, as the Portuguese name signifies in English, along the east and west watershed. The roadbed is good, the country picturesque, and the altitude is high enough to insure an agreeable climate. This region is heavily wooded, and there is practically no population.

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THE FAMOUS IRON-ORE PEAK OF ITABIRA DO CAMPO, STATE OF MINAS GERAES, BRAZIL.

In Minas Geraes iron ores do not form seams but actual mountains. They are very pure and nearly inexhaustible.



RIO GRANDE DO SUL, BRAZIL.

This city has a population of 25,000 inhabitants and lies near the southern border of the Republic. It is the gateway to an immense region exceedingly rich in natural resources. New port improvements are under way, which will be completed by the end of 1913. This will permit of a 35-foot channel, and will cost $10,000,000.

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export taxes, 5·659; commission, 0·720; stamps, etc., 1·800. Total, 13·379. Freight to Havre, 2 fr. 56 centimes. Total cost per sack (60 kilos) to Havre, 23 fr. 79 centimes = 19*s*.

Freight to Hamburg (1912), 45*s*. plus 5 per cent. per 1,000 kilos; London, 40*s*. to 45*s*. per 1,000 kilos; Liverpool, 35*s*. to 45*s*.; Amsterdam, 45*s*.; Antwerp, 45*s*.; Copenhagen, 47*s*. 6*d*.; Stockholm, 53*s*.; Christiania, 54*s*.; New York, 40 cents plus 5 per cent. per 60 kilos; New Orleans, 40 cents plus 5 per cent. per 60 kilos.

Wholesale Prices (1911)

London, per cwt., £3. New York, per lb., 14⅜ cents. Havre per 50 kilos, 80 fr. 75 cents. Hamburg, per ½ kilo. 67 pfennigs. A very welcome rise.

Since 1905 several companies have been formed to sell direct to the foreign buyer, and an English firm (Johnston & Co.) has formed a Warrants Company to unify charges, and put an end to this state of affairs, but the brokers have instituted a system of boycottage against it, resolving not to sell it any coffee.

A Propaganda Company was created in London (October, 1908) under the title of the San Paulo Pure Coffee Company. The São Paulo Government subsidized this concern to the extent of £50,000, payable in five yearly instalments. The coffee is put on the English market in half pound tins, hermetically sealed, the price being at first 1*s*. 4*d*. per lb., and now 1*s*. 10*d*. The roasting and packing of the coffee was put under the supervision of a delegate of the São Paulo Government.

In addition to the 3 francs surtax on each bag of coffee imposed for a period of 6 years by the Convention of Taubaté (São Paulo), signed by the Presidents

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of São Paulo, Minas, and Rio in 1906, the Government has organized a permanent service of propaganda in Europe. The State now purchases the coffee from the planters at 42 fr. 50 the 50 kilos. It is calculated that the whole of the loans contracted for this purpose will be redeemed in 1914, and a stock of at least 3 million sacks remain in its possession for sale; the proceeds are to be used for the purpose of stimulating the industry, and protecting the interests of the planters in Europe. In 1911 some 875,000 hectares were cultivated with coffee in São Paulo.

A fazenda, or coffee estate, of 50,000 trees in good condition is worth some £5,000. These 50,000 plants should produce 240,000 lb. of coffee.

Many different kinds of vegetable crops may be grown between the bushes. On the higher lands (up to 5,000 feet) protection from the cold winds is frequently required.

In the whole of Brazil there are 1,320,000,000 coffee trees, occupying nearly 4½ million acres. São Paulo alone has 688,845,410 coffee plants, representing 4 francs or 3*s.* 2*d.* per plant, and occupying over 2 million acres. Each 50 kilos requires some seventy plants. Thus to produce 1,000,000 sacks of 60 kilos each, a capital is necessary of no less than £13,430,000. The total sum invested in the business in this one state must amount to £100,000,000 at the present time. The probability is that São Paulo will follow the example presented in England by the hop-growing counties; indeed polyculture has been the care of the Agricultural Department for some years past, and the tendency is to supplant coffee with more profitable growths. A remarkable fact is presented to the student of economics. In spite of the high prices ruling in the nineties, Brazil was the only country to materially increase its production, rising from

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5 million sacks in 1880 to 8¾ million sacks in 1900, and 12 millions in 1905, whilst the total output of the rest of the world decreased from $4\frac{6}{10}$ millions to $3\frac{9}{10}$ millions, 1905. Prohibitive taxes now rule in São Paulo with regard to the laying out of fresh plantations. This measure undoubtedly has proved very beneficial to those planters farthest from the exporting centres, and it is a curious property of the business, that plantations recede further and further into the interior, being found over 460 miles from the sea, whilst formerly they were mostly situated near the coast.

The limit of cultivation south is Santa Catharina, but it does not flourish in the far north.

Coffee Substitutes

In 1905 there were in Italy twenty-three manufactories of coffee substitutes, and in Austria and Hungary at present exist no fewer than 412 making fig coffee, 142 using chicory, and fourteen barley. In Germany (Saxony Baden and Brunswick) there are 723 factories, and in France 166, whilst in Belgium 60,000 tons of imitation coffee are produced annually.

In England, Russia, Spain, Portugal, etc., chicory is the usual substitute, but the quantity used is not very great.

By Decree of July 22, 1911, the Government of Minas Geraes offers to Coffee Co-operative Societies, who instal up-to-date machinery for the preparation of the berries, a subsidy of 12½ contos to each of two societies, and 2½ per cent. of the value of the coffee sold abroad by any such society, and 1 $000 per arroba of roasted coffee sold abroad in cities indicated by the Government Agents on the European Continent, where there are no similar

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coffee-roasting establishments, dealing with Brazilian produce exclusively.

Cacão

The theobroma is native to Brazil, in the regions of the Amazon valley, but to-day it is cultivated as far south as São Paulo and Southern Matto Grosso; but the coast of South Bahia, and Northern Espirito Santo, and Rio de Janeiro is admirably adapted to its growth when the swamps are drained. At a distance of six or more kilometres from the sea it begins to produce well, and thrives until the colder elevated regions are reached, doing best at an average day temperature of some 80° Fahr. The soil most suitable is an alluvium, light and porous. In some parts of Espirito Santo the climate is so favourable to its growth, that it forsakes its usual habitat and climbs high up into the serras. Here it produces fruit in the second year, instead of the third. Contrary to cotton, cacão requires a somewhat humid climate. The number of acres under cultivation in Brazil is continually on the increase, and there are immense territories yet available. Shade is necessary for its best development, but the trees should not be planted too closely together—12 feet apart allows of some 300 to the acre. The second crop is larger than the first, and the yield increases until maturity at about 10 years. The tree continues in full bearing for 20 to 30 years at least. Frequently flowers and fruit are seen on the trees at the same time. The best quality is that from Maranhão, containing a larger percentage of fatty matter than any other kind. One variety in Bahia is a veritable giant in relation to its fellows, reaching nearly 35 feet in height, and with a trunk 9 inches in diameter. Frequently two crops are gathered in the year in Brazil,

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each fruit being cut from the trunk without injury to either. Expenses of planting are not more than 60 per cent. those of coffee. The most encouraging feature in this cultivation is the fact that the supply continues to be less than the demand. In 1907 the consumption was 156,000,000 kilos and the production 148,000,000, or a difference of some 7,600 tons. In 1906 the figures were somewhat less favourable, and in 1905 the balance was on the other side.

The cacão-producing zone extends from Amazonas to the north of Espirito Santo, doing best from the 10th to the 20th degrees south of the Equator. Each tree produces on an average 200 pods. One person can take charge of some 1,000 trees. In some plantations the yield is as much as 20 lb. of beans per tree, which, sold at 2 francs per kilogramme, or 1*s.* 7*d.*, would bring some £800 per 1,000 trees. Taking the lowest possible average yield of some 5 lb. per tree and *minimum* price of 2*s.* 6*d.* per 5 lb., we have for a plantation of 4,000 trees £500. One plantation in Bahia yields 13 lb. per tree, and the cacão fetches a much higher price than above. This state exported 27,000 tons in 1908–9.

Each plantation may be reckoned to cost 3$000, or 3*s.* 10*d.* per tree. In Bahia there are at present 8,000,000 trees, and the output is not half what it might be, in spite of the fact that this state furnishes 80 per cent. of the entire Brazilian crop. Some trees in the Belmonte district have produced no less than 32 lb. of *dried* beans in one year. The area of land suitable for the cultivation of cacão is unlimited (*vide* British Consul's last annual report).

The State Government would grant a concession for a suitable railway line to tap the richest districts, and give a substantial subsidy for each kilometre of railway

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completed. The Consul says that it is worth the serious attention of British capitalists.

Export tax Pará 8½ per cent. Municipal duty 20 reis per kilo. Freight to Liverpool, 30*s.* per ton; Havre, 35 francs; New York, per 100 lbs., 30 cents.

Sugar and By-Products

Another important industry which has suffered greatly from a number of causes is sugar planting.

The sugar cane was introduced into Brazil shortly after the discovery of the country, and cultivation was commenced simultaneously in Pernambuco and São Paulo. It is stated that the soil and climate of Brazil are better adapted to the production of sugar than that of any other country in the world. The principal seat of the cultivation is along the N.E. Coast and Rio and Matto Grosso States. Not profitable in the far south. The planters have (as is the custom of their kind everywhere) taken advantage of the fertility of the soil to such an extent, that, extracting its vital elements without replenishing them, the yield per acre is now only about 20 tons. Instances are not uncommon where the same lands have been under sugar cane for two centuries, and the methods employed in the majority of the mills obtain not more than 6 per cent. out of 15 per cent. of saccharine matter.

Owing to the system of milling, and the small yield, the cost of sugar per pound placed on the market is not less than 1*d.* Under such circumstances, Brazilian sugar cannot compete with that from Cuba, Demerara, etc., where the cost of labour is less, and the methods in vogue so superior. The principal sugar-producing states are Pernambuco, Ceará, Parahyba and Rio Grande do Norte. The cane grows well in most parts of the

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Republic, and a large industry has sprung up in the States of Rio de Janeiro and São Paulo. The quantity of sugar consumed locally in 1902 was about two-thirds of that exported, and a huge quantity of cachaça, or aguardente, is produced (806,497 gallons in 1904–5), a notable diminution from the yield in 1901–2. Alcohol for illuminating purposes is increasing in consumption, as is also that of treacle. A mill has been started at Campos to make paper out of the refuse of the cane, and artificial silk could doubtless be manufactured at a good profit.

If we take the figures presented by the State of São Paulo, we find that the percentage of sugar as compared with other countries is as follows :—

	Tons of Cane per hectare (2½ acres).	Proportion of Sugar per cent.
Egypt (with irrigation)	38·5	11 to 15
Argentina ,,	40	11 to 12
Java, intense culture	80	14 to 15·5
Sandwich Islands	82	15 to 15·5
Demerara	62	— —
Louisiana	50	11 to 13
Cuba	50	13 to 15
Queensland	46	— —
São Paulo	50	13 to 14·5
Campos (Rio de Janeiro)	50	14·5 to 15·5

The above calculations are sufficiently telling, and one can only marvel, and wonder what the result would be after the introduction of up-to-date methods. With sugar cane growing at its portals so to speak, the price of ordinary cubes works out at more than 6*d*. a lb. in Rio de Janeiro. In the north the cane ripens within 14 or 15 months, and in São Paulo in 18 or 20 months.

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One must insist here, as everywhere in this work, on the necessity, imperative and increasing, of scientific cultivation in Brazil. It is useless men embarking in enterprises in that country who are not prepared to work on the most approved lines; those who think they can reproduce in Brazil the rule of thumb methods by which they have impoverished their farms in Europe are prospective enemies to the Republic. On the other hand, bright, brainy farmers and planters, with sufficient capital, can reap rewards such as they never imagined in the old world. Sugar will pay in Brazil, and pay well if all is not taken out of the land and nothing put in, and if the by-products are properly disposed of.

The present annual output is 300,000 tons. Materials and equipment for sugar refineries are admitted into Brazil free from customs duty. Retail prices have risen nearly 100 per cent. (October, 1911), and a Conference held the last week in September in Campos with a view to valorization is likely to produce disagreeable results to the consumer, unless the State intervenes.

Sugar Exports in 1908 . .	31,577 tons	=	£305,597
1909 . .	70,208 ,,	=	£689,266
1910 . . .	59,000 ,,		

For 1911, see general statistics as regards total exportation. The state of Rio produced 31,232,317 kilos, and Minas Geraes 1,524,893 kilos.

Exportation of cane spirit, 1910, Rio de Janeiro, 6,411,455 litres.

São Paulo produced, 1910–1911 = 122,634,800 litres.

Cotton

During the American civil war the cotton industry was at its height in Brazil, and it is only the last two or

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three years that it is beginning to forge ahead again. In 1904, 165,000 bales were produced. The price in the Rio market in 1907 varied between 13*s.* and 14*s.* per 10 kilogrammes (22 lb.). Exportation duties are highest in Piauhy, 12 per cent. *ad valorem*. Freight is high, the Leopoldina Railway (south) and Great Western Railway (north) both having a scale which begins at something over £2 per ton for 150 miles. The lesser distances pay more in proportion, up to double, and the lowest rate is for distances exceeding 200 miles (Leopoldina Railway). Both these lines are English. The Natal and Ceará-Mirim Railway charges per kilometre, exceeding 300, 30 reis per ton; the Central Railway (national) charging something less. Ceará is one of the states most adapted to cotton owing to its dryness and peculiar climate, but the plant thrives in all Brazil. The most up-to-date states, as far as local industry is concerned, are Rio de Janeiro and São Paulo. In 1908 there were in Minas some forty-three spinning and combing mills (mostly small), in Rio de Janeiro twenty-nine, but with an output vastly greater than Minas, and in São Paulo eighteen. In this state in 1903 there were some 37,000,000 yards of cotton manufactured in calicoes, prints, etc., the largest mill, with 10,000 spindles and 600 hands, using up 2,000 tons of raw cotton.

In 1911, 6,598,411 kilos of raw cotton were produced locally, and 7,644,550 imported from North Brazil, to make up the amount necessary for the mills in this state.

The bulk of the cotton crop is produced in the N.-Eastern coastal states, and it cannot be satisfactorily grown below Paraná, or in the Amazon valley. Production of São Paulo, 1910–1911, 21,995,670 kilos.

In the vicinity of Rio city there are several very large mills, one at Petropolis (Cascatinha) employing about 1,500 persons all told. In 1910 the factories round

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Petropolis used 3,300 tons of cotton. In Rio State each alqueire yields 20 arrobas of cotton, worth 390 milreis, and 40 arrobas of seed, valued at 42 milreis; total per alqueire 432 milreis. Expenses, 100 milreis. The overseers of many of the Brazilian mills are English, or of English extraction. Without a question this is a flourishing business. Dividends are being paid of 20 and 30 per cent., and even 40 per cent. at times, and it may safely be stated that every mill is making a substantial profit. Every state has its cotton fields.

Average price per 10 kilos of Ceará cotton (1911), 15 milreis (£1), that from Pernambuco and Alagoas bein; worth 11 milreis. In Ceará the cost of land without a reservoir for irrigation is about 5$000 per hectare. Each hectare should produce cotton to the value of 824$000.

Subsidies are offered by the State of Minas for each 50,000 arrobas grown in a municipality, 5 to 15 contos for fine quality cotton grown from selected seed furnished free by the State, provided the best machinery is used and the area planted is not less than 400 hectares, producing a minimum of 12,000 arrobas. Also to the first cotton-seed oil factory producing a minimum of not less than 100,000 litres, a subsidy of from 5 to 15 contos will be paid.

These favours are especially designed for Co-operative Societies.

£12,000,000, one-third of the industrial capital of the country, is invested in cotton mills, and still Brazil uses £6,600,000 worth of imported cotton goods. In an appendix at the end of the book will be found details of the number of mills working, and the hands employed in this industry in 1909. At present the southern states consume most of their production. In the north the bulk is exported.

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Tea

A small quantity of tea is grown in Minas Geraes, and this culture might be widely extended.

Tea was first introduced in 1810, and the Premier (Linhares) brought over hundreds of coolies from Central China. Large plantations were laid out on the Ilhi do Governador, and in 1837 some 100 lb. were sent to London as a trial shipment. In 1824 Frei Leandro cultivated the plant in the Botanical Gardens, and for some time Brazilian tea only was drunk in Rio Janeiro. In 1834, 173 arrobas were produced in São Paulo. The principal plantations were at San Bernardo, between Santos and São Paulo, and were very productive. John Rudge, a British settler of São Paulo, sent a consignment to Rio market packed in Chinese canisters, and it was with some difficulty the customs authorities were convinced that it was a national product. An award of merit was obtained at Vienna Exhibition, but the industry languished till recently, when very good prices were fetched by samples from Pouso Alegre in Minas. This lot was considered equal to the best Ceylon. The remains of a small plantation still exist in Petropolis, and it is a common thing to see it growing in gardens.

July and August are the best months for transplanting, and some six crops yearly may be picked in Brazil. This culture is worthy of great attention, as the following prices will show, and it must be remembered that the consumption continually increases.

The duty is 3 $000 a kilo. Lipton's tea sells at 8 $000 a kilo, and fine qualities (usually Chinese) up to 20 $000 a kilo. In 1909 some 281 tons were imported into Rio Janeiro. Tea is grown on a small scale in many parts of Minas.

Another plant is, however, found in many localities

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in this state, and is known as Chá Mineiro. Its botanical name is *Eschniodorus macrophylus*. It is used as an infusion, and has the most beneficial effects in cases of rheumatism and skin diseases. The leaves are roasted, the same as those of matte, before being used.

Tobacco

The cultivation of tobacco in Brazil dates certainly to pre-discovery of the country, for the first voyagers observed the Indians using the fragrant weed. In 1500 the European conquerors commenced its planting, the first experience being in Bahia. In the latter part of the eighteenth century a large quantity was exported to the mother country (Portugal), and from thence until the year 1808 to Italy, Germany, Holland and England. In 1845 seeds were introduced from Maryland, through the Government, in order to improve the local culture. Bahia is to-day the great centre of the trade, and a great deal is manufactured there by the firms of Dannemann, Stender and others. The best known factory in the south is that of Messrs. Poock, in Rio Grande do Sul, some really excellent cigars being now on the market. The city of São Felix, a short distance from São Salvador (Bahia), is the principal manufacturing centre. One thousand plants produce in this state some 300 lb. of tobacco. The cultivation requires much labour and care, and it is especially sensible to changes in the temperature or modifications of the seasons. Adopting the system employed in Sumatra, 150,000 square metres (equal 179,400 square yards) requires an outlay of some £1,580. The crop should be 10,000 kilos, worth £2,120. This is the result of one year's working, but of course is considering the plant to be cultivated and dried by really practical men. In Minas Geraes 4 months old plants yield

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leaves fit for use. November is the best month for planting in this state. The local Government offers premiums of 5 to 15 contos for lots of 10,000 to 30,000 kilos exported in roll or leaf respectively, if of fine quality.

The tobacco trade, like a good many more, suffers from the existence of parasites, and traders up to all kinds of sharp practices. It is very common to find in Bahia that the plant is adulterated with various materials to add to its weight. In addition, many of the planters strip the leaves in a very careless manner, and send to market a product that is calculated to prejudice, not only their own interests, but those of the industry at large. Prices have been rising of late, owing to the improvements of the last few years in the growing and preparation of the leaf. In 1903 the municipality of Caravellas (south Bahia) instituted four annual premiums of £50, £37, £25 and £12 10s. (at current exchange) to the agriculturists who put in 50,000, 30,000 20,000 and 10,000 plants of the first class. From 1901 to 1907 the exports of tobacco were 199,645,784 kilos, of snuff 106,281 kilos, of cigars 12,095,936 kilos, and of cigarettes 33,482 kilos.

The smallest planters in Bahia employ all the members of their family in the work, and hire their neighbours by granting them lots on condition of one day's service per week, others working on salary, but as a rule, no one being amenable to discipline, or caring for their labour, the cultivation is very desultory. Here, as in other classes of agricultural work, the need of hands is severely felt. The native Brazilian usually despises such toil, especially for another's benefit. One great evil is the horde of speculators who advance money on the crops; exorbitant interest is charged, and all too frequently the price paid is fixed at the pleasure of the usurer. Hardly any of the planters are able to deal directly with

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the exporting houses, and moreover are cheated abominably in the weight of the packages they hand over to the middlemen. The consumption of cigars and cigarettes in Brazil itself is very heavy, and the well-to-do still smoke those from Havana, Turkey, etc.

The tobacco-producing states are Bahia, Minas, São Paulo, Santa Catharina, Goyaz, Pernambuco, Piauhy, Sergipe, Ceará, etc., but it may be said that a little is grown in every state in the Union.

The exports of tobacco from Bahia in 1908 were 14,509 metric tons, worth £512,959. All this was shipped to Hamburg and Bremen.

Exports from Pará were—

1908	200,000 kilos	worth	756,488$
1909	220,747 ,,	,,	916,246$
1910	260,999 ,,	,,	1,471,489$

Nearly all of this was sent to Amazonas, and a little to Rio de Janeiro. Acará is a very fine quality grown locally.

Exportation, 1911—

State of Rio de Janeiro, 784,818 kilos; Minas Geraes, 4,810,556 kilos; São Paulo (production), 1,951,770 kilos.

Export duty from this state 200 reis per kilo, plus 5 reis for the bourse.

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CHAPTER XVI

CEREALS

Wheat, Rice, Oats and Barley, Maize. Beans and Tubers

WHEAT

IN Colonial times wheat was grown in the States of Rio Grande do Sul, Santa Catharina, São Paulo, Minas Geraes, and Rio de Janeiro. The cultivation, however, decreased and was abandoned in the early part of the nineteenth century. The real cause of this cessation of planting in the south was various diseases, such as rust, carbuncle, and caries. In spite of the want of success hitherto, the Government offered premiums in 1857 to farmers who produced a certain quantity of wheat of their own growing. In the north, on the table-lands of Ceará and Parahyba, and in Minas Geraes, various attempts were made with more or less success, but with final result nil. To-day the great English flour mills (the largest in the southern hemisphere) at Rio de Janeiro are supplied almost entirely with Argentine wheat. It is considered that, with more modern methods, such states as São Paulo, Minas, Goyaz, Paraná, etc., might produce immense quantities of this cereal, and experiments now being made are decidedly encouraging. The quantity *imported* 1902–7 was 1,244,460,259 kilos, valued

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at over £8,000,000. The best kind of wheat for Brazil is Indian, and it should be planted from March to May, and September to October. Rio Grande do Sul.—The wheat crop from this state 1910–11 was 51,700 metric tons, from 53,323 hectares, and in 1912, 60,000 tons. The flour imported was worth nearly £9,000,000. Of this, the capital of the Republic received almost seven-twelfths, Santos nearly one-third, and Rio Grande do Sul the bulk of the rest, very little being directly imported by the other states, although, doubtless, a large quantity was reshipped in national bottoms. The importation of wheat from the United States had fallen to a value of some £10 in 1906, in spite of a preference customs tariff of 20 per cent. in return for the most favoured nation treatment which Brazil receives as regards her produce. The yield in Rio Grande do Sul was 13½ hectolitres per hectare in 1910. In Caçapava it is 50 fold, and at Rio Negro and Bagé 160–300 fold. Co-operation has done wonders already, and the State offers 15 contos premium for each estate of 200 hectares, managed by an expert. Bounties are also offered for flour mills grinding national wheat.

Flour imports in 1908 showed a great falling off, the grand total being 150,000 tons, whilst the local production increased from 172,779 tons in 1907 to 181,963 tons (1908). The Minister of Agriculture has received details of experiences made in wheat culture (1908–9) in various localities, and in Novo Friburgo in the State of Rio de Janeiro (some 3,000 feet above sea level) the results have been very satisfactory. The States of Paraná, South Minas Geraes, and São Paulo, and Santa Catharina have all produced fair crops. Anywhere in Brazil, provided the elevation is sufficient, and other conditions equal, wheat should grow well, once a suitable variety is selected.

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THE GENIUS OF THE AMAZON (RUBBER COVERED), AT THE RUBBER EXHIBITION, NEW YORK, 1912.

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AMAZONAS RUBBER (EXHIBITION AT NEW YORK, 1912).

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Flour Milling

The Legislature of the State of Rio de Janeiro has passed an act granting—to the first company establishing a flour mill—exemption from taxes on exporting wheat-flour *for ten years*, and a free concession of public lands for wheat cultivation.

Free entry for all machinery will be asked from the Federal Government.

A premium of 15 contos will also be paid for 5 years, if the mill has a capacity for over 11,000 bushels.

Rice

Brazilian farmers are not yet up-to-date in rice cultivation, and the recent arrival of Japanese coolies is presumed to be with the view to adopt more intense methods. As with the coffee, the forests are destroyed and burnt. No selection is made of the seed, and it is either dropped into holes, made with a pointed stick, or scattered by hand, and stamped in with the feet. In the north, planting is carried on between January and April, and preferably after a shower. Usually the rice is left to take its own course after planting. That sown in September generally produces two harvests, the grain of the first being cut away at the top of the stalk. At Iguapé (São Paulo) the cost of planting 2½ acres of land is as follows: Clearing, burning, and planting 50 quarts (litres) of rice, 55 milreis; cost of seed, 5 milreis; harvesting, 50 milreis; transport to farmhouse, 8 milreis; thrashing and winnowing, 12 milreis: a total of 130 $000, equal to £8 2*s.* 6*d.*, at fixed exchange of 1*s.* 3*d.* The harvest amounts to 2,000 litres, costing 3*s.* 2*d.* per 40 litres, thus 65 reis, or about 1*d.* a litre. Each 100 kilogrammes of rice, in husk, produces 60 kilos of grain and 30 kilos of bran, when treated by a proper cleaning machine, of

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which there are some thirty in the State of Rio de Janeiro alone. Excluding wild rice, found along the rivers of the north, there are some fifteen kinds known in Brazil, one of which is native, and is responsible, with crossing, for other varieties. The most common is a Carolina type, and the place mentioned above (Igaupé) gives its name to a kind grown principally in that district. Importation has fallen off considerably. In 1902 over 100 million kilos reached Rio, mostly from Burmah (50 to 60 days by steamer). In 1907 only 11½ million kilos arrived, and it is safe to say that the next decade will see the entire disappearance of this importation. The State of Rio Janeiro has become one of the most important productive zones, increasing its output tremendously the last 3 years, under the Presidency of Dr. Nilo Peçanha.

S. Paulo now (1912) exports over 10,000 tons annually, the total production of the state reaching 11,592 tons in 1910, and 104,982,700 litres in 1911. Each hectare yields 55½ hectolitres of grain in the husk, at a cost of 2$548 per unit. The present market price is from 8$000 upwards. 36,590 sacks planted give 963,130.

At S. Gabriel (Rio Grande do Sul) 240 hectares yielded (1909) 765 tons of rice.

The enemies of rice are numerous, and one of them is the little tico-tico, which answers to our sparrow. When planted near rivers, the capivary is an extremely destructive beast. As yet there is no foreign trade, but an English firm has ordered from a São Paulo planter (Senhor Carlos Lehfeld, of Taquaritangá) some 5 tons as a trial. Being a staple diet, the home consumption is very great. Hardly a Brazilian family that does not have rice served up at least once a day. This grain is grown everywhere, but the most productive states are Santa Catharina, Paraná, São Paulo, Minas Geraes, and Rio de Janeiro.

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The exportation of rice from Rio state amounted to 1,174,444 kilos in 1911, and that of Minas Geraes 11,835,930 litres.

Oats and Barley, etc.

The remarks, with regard to wheat, may be applied with some reservations as regards climate, to the above-mentioned cereals, which have every prospect of success in such localities as the central plateaux, extending from Amazonas to Matto Grosso. Very few attempts have been made as yet to cultivate these grains, but results have proved satisfactory wherever experiments have been made under reasonable conditions.

Maize

The maize was found growing in Brazil by the first navigators, and was known by the name of abatí or avatí by the Indians. The savages had discovered also its utility in the manufacture of fermented beverages as well as flour. The whole of the planting, harvesting and preparation of its products was performed by the women of the tribe. In Brazil it is considered that the soil, which is unfitted for any other growth, will serve perfectly for maize. It is the practice of planting this grain everywhere that is responsible for the production of so many varieties, usually, of course, the result being the survival of the unfit. The kind which is most generally known, however, is the common yellow maize, popular not only by reason of its abundant production, but also for its resistance to the disease called *calandra-granaria*.

No less than nineteen other kinds are found growing in the different zones, and no proper classification has yet been made, nor any determination of which species is best adapted to this or that climate, beyond the commonly

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known fact that white maize resists the drought better than any other kind. There is no scientific treatment of the subject of this culture as yet, and the result is, that the yield is entirely out of proportion to the fertility of the soil, and favourableness of the climate. The localities principally favoured by Brazilian farmers are those with a western aspect, avoiding the south and south-east. With the exception of cold clays, or sandy ground, the plant is suitable to most soils, especially admixtures of sand and clay, and the red earths derived from diabase (Devonian type). Sloping lands are deprived of their woods, and burnt after the timber is dry (July to September). Furrows are made with hoes, some 4 feet apart, and five or six grains are planted together. This work is done either from March to May, or August to October. As soon as the maize attains about 4 feet in height, the earth is worked up round it with the hoe. Sometimes this is done twice, at 3 and 4 feet high. Between the lines of maize it is customary to plant beans, pumpkins, melons, etc. Harvest takes place some 3 or 4 months after planting, and the cobs are taken one at a time, and carried in baskets to be spread out and dried. It is rare to find a planter who takes the trouble to manure the land in any way; they prefer to destroy the forests, and plant fresh fields. The cost of planting and harvesting an alqueire of land is reckoned as follows, in virgin forest zones:—

Clearing and preparing land	180 $000
40 litres of seed	4 $000
Planting and hoeing . .	119 $000
Harvesting	48 $000
	351 $000 = £21 18 9

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In second growth lands	£16 11 3	
Using modern agricultural implements	8 15 0	
		= $8\frac{6}{10}$ acres.

An alqueire is so-called, because it is just the area of land required to plant 40 litres of seed, and according to the metrical system, it equals in São Paulo and Paraná 2 hectares and 42 ares, or $4\frac{3}{10}$ acres. In Rio, Minas, and Espirito Santo, 4 hectares, 84 acres, or $8\frac{6}{10}$ acres. In Bahia the measure is tarefa—$2\frac{1}{2}$ tarefas equal 1 hectare, and further north the quadra-alqueire, or 100 braças square, is the land measure. Maize suffers from rust, and from various roedors, as the agouti and cavy, and also from the armadillo (tatú), and above everything else, from the all-devouring locust, and a variety of other enemies.

Pernambuco and Maranhão export large quantities to Pará and Amazonas, and to Peru and Bolivia. The state which produces the largest quantity of maize is São Paulo, and next in order of importance come Minas Geraes and Alagôas, little being cultivated in Rio Grande do Sul, Rio de Janeiro, etc.

S. Paulo is now producing over 10 million sacks per annum, the 1911 crop amounting to 955,675,000 litres, whilst Minas exported 31,075,349 kilos and Rio de Janeiro 35,241,720 kilos.

Beans

These legumes form, with rice and dry salted beef, the staple food of the majority of the lower classes in Brazil. The greater part cultivated are of a black colour (*Phaseolus niger*, *nanus*, etc.).

In a plantation made in September, using 42 litres of seed per hectare, in land previously manured, the result was 1,249 litres of beans. Many kinds of red and yellow

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beans are grown in addition to the above, and they are subject to the same attacks of rust as the other plants mentioned hitherto. The bean being a very gross feeder, it is necessary to enrich the soil before planting, except in rare cases, with the first crop. The harvest is over in 4 or 5 months after planting, at which time three seeds are placed in a small hole, at a distance of an inch apart. Very frequently beans are planted together with maize, permitting the former to utilize the stalk of its sturdier neighbour for climbing purposes.

In addition to beans, peas (of a variety whose pod is eaten) and lentils are planted, but on a very small scale, and obtaining high prices in the market. As with maize, beans are grown more in the central and southern states.

Exports (1911) Rio de Janeiro, 4,431,960 kilos; Minas Geraes, 24,784,881. Production (S. Paulo) 136,744,000 litres.

Tubers

MANDIOCA

The credit of the discovery and utilization of this root is entirely due to the aborigines, who also found out the secret of destroying its venomous properties. In Brazil it may well be asserted that it constitutes a veritable underground storehouse of food. The dish of beans, rice and fat pork is always thickened by a handful of the coarse flour meal, and it takes the place of bread in many places. Found as far as 30° South, it is peculiarly a tropical and semi-tropical plant. There are three principal varieties, two of which are somewhat bitter, and the third sweet. There are, however, many minor sorts (twenty or thirty). The most prized (called aypim) has a root which weighs about 2 lb., and is used for a variety of purposes, making many delicious preserves. The bitter sort (brava or venomous) is used only to

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manufacture flour. This kind sometimes weighs 15 to 20 lb., and is full grown in 8 to 10 months. Before this root is fit for consumption, it must be pressed well and washed, and the water and residue must be thrown away out of the reach of animals, as it is distinctly poisonous. The largest roots produce some 2 gallons of prepared meal. Some kinds contain 23 per cent. of starch. It is planted usually in August or September, in any part of the country, from the coast up to 3,000 feet above the sea level. The plant, crushed and well washed, is pressed into a dry mealy mass, and roasted on hot plates, being continually turned until done. A good hand can prepare two or more sacks per day.

Each hectare should give from 70 to 100 tons of roots, yielding 300–400 hectolitres of meal, and 60–130 hectolitres of tapioca. The principal seat of the manufacture of the latter is Santa Catharina. This plant cannot stand frosts.

The finest qualities are worth from 12*s.* 6*d.* to 15*s.* a sack, and the coarser up to 7*s.* 6*d.* One disadvantage is that the roasting must be done the same day as the plant is washed and crushed, otherwise it will turn sour. The water which has escaped from the mass in pressing contains a large quantity of very fine starch, and the deposit is washed several times and strained off. Tapioca is a product of the residue.

In Belgium the roots are used in the production of alcohol, in Holland as stock feed, and in England for making starch and dextrin. Dessicated mandioca is worth £12 per ton in Hamburg, and tapioca £22 10*s.* 625 kilos of roots produce 100 kilos of dried meal. Tapioca (when genuine) is a product of the root. Pure tapioca does not affect the taste of milk or soup, but imitations prepared from potato starch give a disagreeable flavour to any food.

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The Government of Minas Geraes is now offering premiums for co-operative factories manufacturing starch from mandioca and rice.

Exports of Mandioca flour in 1911 from Rio de Janeiro 3,589,960 kilos.

Arrowroot (*Araruta*)

This plant is native to Brazil, and gets its name from the fact that the Indians used it to cure the wounds made by poisoned arrows. To grow to the best advantage the root demands a porous, well drained, alluvial soil. Planting is done by means of small slips, and as soon as the new growth makes its appearance, it is earthed up in a similar way to celery. Planted in March, it comes to maturity in from 8 to 11 months. The smallest fragments of root will soon strike, and throw out leaves. The root must be well washed to get rid of its impurities; it is then crushed or ground, and mixed with plenty of clean water, and passed through a bolting-cloth, or sieve, to separate the fibrous parts from the powder. The latter is dried in the sun, on perforated tables, and is ready for packing in 4 days. The price, locally, ranges from 6*d.* to 1*s.* a lb. The production is not nearly sufficient for home consumption. The State which is best adapted to the cultivation of arrowroot is perhaps Rio Grande do Norte, where each hectare gives an average of 900 kilos of flour. Like mandioca, this plant is very susceptible to cold weather.

Mangarito (*Caledium sagittofolium*)

A plant of the family of araceas, little grown, but more nutritive, and easier to prepare, and pleasanter to the palate than any of the other tubers.

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RETIRO, "PETROPOLIS."

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GLORIA, NEAR PETROPOLIS.

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POTATOES

The sweet potato is the most common in Brazil, the English potato, as it is called, being largely imported. Such as are grown in Brazil at present usually represent the kind which is given to pigs in Ireland. The anomaly is seen in the maritime cities of the Republic, of large consignments of the tuber from England, and latterly from New Zealand, although those grown in Bolivia and Peru, at an altitude of 9,000 to 12,000 feet, are considered far superior to ours. In spite of the fact that the high lands, within a few hours of Rio de Janeiro, are admirably adapted to the cultivation of the English, or, as a Hibernian correspondent corrected me, the Irish kind, and that two crops may be gathered annually, the cultivation is very small, and no pains are taken to select the right sort of soil. Planted in March, the tubers are fit to be pulled up in June; and sown again in August, the harvest is ready in November.

With manuring by means of sulphate of potassium, superphosphates, and nitrates, a grower at Bara Mansa (Rio de Janeiro) obtained from 1 hectare 4 tons of potatoes. In Rio Grande do Sul, at Pelotas, 13¼ tons were obtained.

Another grower in Minas Geraes made a profit of 600 $000, or £50 clear, per hectare (2½ acres).

The yield of the sweet potato is, however, vastly superior, being twenty times the amount sowed. The latter thrives in a different location, preferring the lowlands and depressions between the hills. Some of the kinds are ripe in 3 or 4 months, and they frequently take a disagreeable taste if grown in manured lands. The red variety is most esteemed, and is the most suitable for the table, the white serving better for animals. To fatten pigs, the country custom is to let

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them loose in a sweet potato patch, thus saving the trouble of digging the land, and at the same time enriching it. The sweet potato is considered more nutritive than the European, as it contains more sugar.

Yam

The Brazilian valleys are covered with this plant, which is considered as a *dernier ressort*, when all other cultures fail. At ordinary times it serves the same purpose as the commoner kinds of sweet potato. In virgin and fertile soil it develops fully in from 6 to 12 months, the roots weighing from 15 to 22 lb. Boiled, it is an excellent food for pigs, fattening them extraordinarily.

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CHAPTER XVII

TROPICAL FRUITS, ETC.

BRAZIL possesses climates suitable for the growth of every kind of fruit known.

In what corresponds to the European winter in the southern states, all fruit-bearing plants common to the northern parts of the world flourish and give abundantly of their substance. Amongst the better known belonging to the tropical zone is the abacati, produced from California to Rio Grande do Sul. The part eaten is the inner pulp, surrounding the central mass of seeds. The fruit varies from the size of a pear to that of a very small melon. In Mexico a delicious salad is prepared from this pulp. Eaten alone, it requires sugar or lemon juice or both, as it has no acid or sub-acid flavour. It is planted by seed, hardly buried in the earth, but success has been obtained by experiments with shoots and seed lings. Fruiting only in the fourth or fifth year, it becomes ripe after January. No diseases are known, and it is a very profitable growth, being worth from 6*d*. up to 1*s*. 6*d*. each in the European markets.

Pineapple

The abacaxi is the Brazilian name for the finest quality of pineapple (ananaz). It is planted by shoots after September in the south, and from March to May in

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the north. It comes into flower in the spring (August to September) and ripens by January. Sometimes fine fruits are sold in Rio de Janeiro as low as 1½*d.* each (retail). Pernambuco is a great seat of the trade, mounds being piled up in the covered market, and at a hundred stores. The price asked to passengers in transit is usually 4*d.* to 8*d.*, according to size. In 1907, 270,572 kilos were exported, of a value of about £5,000.

On an alqueire of land (220 metres square) 80,000 pineapple plants may be cultivated, which at 40 reis each will bring in £200. The cost of cultivation may be calculated at not more than £40.

Abieiro (*Lucenna Caimito*)

A plant only found in the more tropical states, and never below Santos. The fruit is oval, of a clear yellow, and has two to four seeds; only recently placed on the market at Rio de Janeiro.

Pará Apricot

The tree grows to 30 feet high and over, and bears a spherical fruit the size of a large orange. It has one large seed only. Eaten raw or used in all kinds of tarts, etc. It has been reproduced hitherto by seed only, but it is considered that slips or cuttings would produce a fruit of much better quality.

Araça

Araça, a plant belonging to the myrtaceas, the fruit of which is used principally for making a kind of preserve.

Caju (*Cashew*)

There are several kinds of this tree, of the family of terebinthaceas, and all are indigenous to Brazil from

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north to south. It is found everywhere, high up on the table lands, or down in the forests or near the seashore. In the Brazilian cities the fruit is used to make a very refreshing drink (cajuada), or prepared as a preserve, similar in form to ginger. It is exceedingly agreeable in this latter manner, but the packing leaves much to be desired. The syrup makes a delicious wine, and the curiously formed nut (outside the fruit) is the portion which is well known in Europe. Curiously enough, this plant disdains fertile and rich soil, prospering in an arid waste. The fruits are ripe in November. One type of tree (found only in the woods) attains 50 feet, but the fruit is very small.

Cactus Fruit

Many kinds of cacti produce agreeable fruit in the warmer parts of the country. One of the best known is the Barbary fig, introduced from Mexico. It is more procured, however, for the purpose of cochineal, than for anything else, the fruit being insipid and somewhat acid. Another, the *Cereus triangularis*, bears a fruit equal in size to an orange. There is no exportation of these products, and they are little considered locally.

Bread-fruit

This tree is from 20 to 35 feet in height, and demands moist heat for its most perfect development. The colour of the leaves and fruit is of a light green, and the latter is usually of the size of a large orange. The part eaten is the central pulp, either roasted or boiled. Brazil possesses varieties entirely without seeds. The tree is only found along the coast-line, being entirely unknown in the higher lands of the interior. It flowers and bears fruit nearly the whole year round.

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Fructa de Conde (*Anona squamosa*)

The fruit is about the size of an apple, with a very rough scaly exterior. The interior is composed of a delicious soft mass, eaten with a spoon. The plant is reproduced from seeds, slips, etc., and requires a dry fertile soil. Like the bread-fruit tree, it is only found in warm places. It is very much esteemed in Brazil.

Bacuri (*Platonia insignis*)

Fruit found in a wild state in Amazonas. Usually sold preserved in syrup. Aromatic and sweet.

Cherimolia (*Anona cherimolia*)

Derived from Peru, the plant is relatively small (6 to 13 feet high). The fruit, equal to an orange in size, is scaly outside, and formed of a number of sections. The colour when ripe is of a dirty yellow. Sweet to the taste, it has a very agreeable perfume, and is considered the finest fruit of the anonaceas. It is known in Brazil by the name of condessa (countess), to distinguish it from the foregoing, conde (count).

Sour Sop (*O. Carossol*)

Brought originally from the West Indies. The fruit is equal in size to the citron. It is not esteemed much in Brazil, and requires a very hot climate to grow to advantage.

Jambeiro (*Eugenia jambas*)

This myrtacea is found on the sea level, and high up on the table-lands, and bears fruit at almost any altitude. The tree is small, hardly ever exceeding 20 feet. The flowers are beautiful, and are succeeded by fine fruit, the size of a plum, and of a rose colour. The perfume emitted by this plant is very sweet, reminding one of the

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queen of flowers itself, and thus it obtained its name of jambo-rosa. It is produced from seed, and the kernel is loose. The above is the most highly-prized variety of the jambas, but there are several others grown, some of which are more ornamental than useful.

Guava (*Goiabeira*)

Previously exclusive to tropical Brazil, it has spread all over the country, and is one of the plants most commercially exploited. In the vicinity of Campos (State of Rio de Janeiro) it grows in profusion in the woods, and at least 20 per cent. of the preserves manufactured in Brazil are derived from this fruit. The locality named produces some 600 tons annually of jelly, consuming in the factories 120 tons of the fruit. The average price, 1905–6, was 9*d.* per 32 lb. There are two crops yearly, January to March, and September to November. The preserve (named goiabada) is frequently badly made, but 1 or 2 marks are excellently turned out. In 1905 some 4,517 packages were sent from Campos district to Rio de Janeiro. Each packet represents 4·110 days' wages, and the total cost per package placed on the market works out at £5. Each tin (about a pound) is sold at from 1*s.* 4*d.* upwards. Attempts at exportation to Montevideo and Buenos Aires have not proved remunerative up to the present, in spite of the freights being less to the River Plate from Rio de Janeiro (1,200 miles) than from Campos to Rio, a distance of not more than one-seventh part at most. The exact rates are, per 100 kilos (roughly 2 cwt.), Campos to Rio, 5*s.* 7½*d.*; Rio to River Plate, 4*s.* 10½*d.*

Jaboticabeira (*Eugenia cauliflora*)

The handsome tree which produces the jaboticaba grows abundantly in the forests of Minas, Goyaz, São

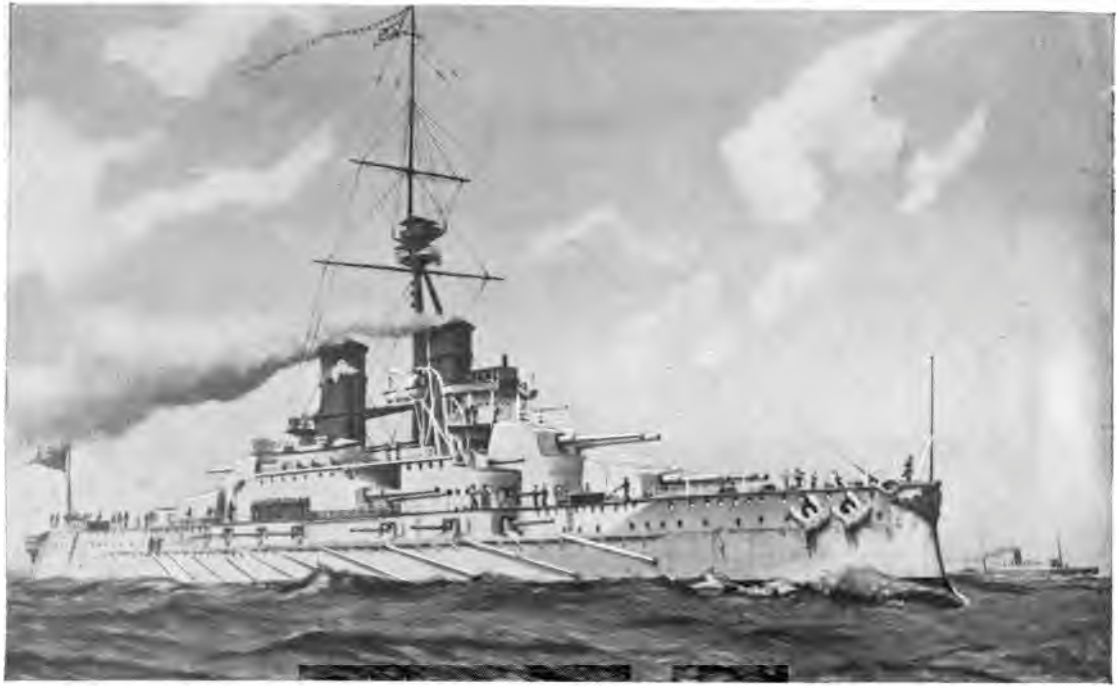
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Paulo and Matto Grosso, and is frequently found near the coast. The trunk is extremely smooth, and reaches a height of 30 to 40 feet at times, with an abundance of foliage. The flowers grow, not on the branches, but on the trunk itself, from the ground to the top of the tree. The fruit is about the size of a plum, but rounded, and contains delicious white pulp and one large seed. The skin contains a large amount of tannin, and much colouring matter. This fruit makes a fine wine, and may be eaten as dessert, or used as a preserve. The tree takes 6 to 8 years to come to maturity sufficient to produce crops, but has an exceedingly long life, and continues to bear till an advanced age. No attempts at improvement of the stock have been made, although it is considered that the fruit would be greatly increased by propagation through slips or grafting. Exportation of this fruit is very difficult, owing to the softness of the interior rendering it liable to smash.

The Orange, Lime and Lemon

The bitter orange is common in many parts of Brazil, and from it is supposed to be derived all the other varieties. Grafted, it produces the finest kinds of the sweet orange. The fruit of the first has a loose rind, and it is somewhat flattened at top and bottom. The outside rind is frequently of a much darker colour than that of its sweet relative. The leaves are used as an infusion for various purposes, and frequently take the place of tea. The rind is used for making preserves. The citrus aurantium is the better known, and the king of them all is the kind grown in Bahia, and called navel oranges in England. These grow up to 6 inches in diameter. This is the famous orange that has rendered the California groves noteworthy, although in its Pacific domicile the fruit has deteriorated. The first seeds were

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BRAZILIAN SUPER-DREADNOUGHT "SÃO PAULO."

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THE RIO NEGRO, NEAR MANAOS.

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sent to S. Francisco in 1873. Two plants survived only. As much as 5 dollars was given for the first cuttings. The Brazilian plants were grafted on native stock. In 1907 the exportation of oranges of the above type was some half a million, worth £2,000, a mere bagatelle when one considers the possibilities of this trade, and the annual consumption of England alone, amounting in 1904 to £2,500,000 for oranges and lemons. The mandarin or tangerine orange, brought from China, is much grown in Brazil, but the fruit is almost twice the size of that seen in the London market. A smaller one has a very delicate flavour. In 1907, 63⅓ tons were exported, worth £1,150.

The lime is grown in most of the states, and in favourable situations attains a large size. I have eaten some that were as large as the navel oranges, and were most delicious.

The Brazilian lemon is usually quite small, but very juicy when in perfection. Its rind is thick and of a beautiful dark green colour when it is usually plucked for market. There are two other kinds of lemons besides the citrus of commerce, one growing in a state of nature in the woods. The other is called the sweet lemon, and is obtained by grafting. Neither oranges, limes nor lemons are at all cheap in the more populous cities, if one considers the abundance produced. Like the quince in the Republic of Uruguay, the fruit is often left on the trees to spoil.

Citrus

Cidreira (*Citrus medica*), the largest of the citrus family, the tree being small, and its branches borne down to the ground by the weight of the great fruit, some of which are a foot or more long. It is cultivated largely for the purpose of making preserves, and requires a fertile soil, and is reproduced from either slips, seeds,

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or by grafting. In spite of its not being native to Brazil it is perfectly acclimatized, being found in all parts of the country, and in all sorts of climate, doing equally well to all appearance everywhere it is grown.

Mamoeiro (*Mamona*) (*Caricaceas mart.*)

(See Castor Oil Plant)

The mamoeiro is a plant of 10 to 40 feet in height, with a straight trunk. The fruit is large, oval, somewhat pointed, and of a dark yellow colour when ripe. It is much esteemed in Rio de Janeiro. In Pará it attains 4 kilos in weight.

The dried fruit contains some 75 per cent. of glucose, 6¾ per cent. of cellulose, besides oxalic acid. The tree bears fruit in less than a year, of a size varying from 1 to 6 or 7 lb., and examples have been shown weighing as much as 16 lb. Frosts are entirely prejudicial to its growth. An hectare of land will support 2,000 plants, and the result according to "O. Fazendeiro" of São Paulo, on the most pessimistic basis should be :—

Cost	
Manure, 30 tons	0,300 $000
Plants, 1,600 at 50 reis	0,100 $000
Labour	0,960 $000
Extras	0,140 $000
First year	1,500 $000
Second, third and fourth years	3,000 $000
In 5 years	4,500 $000
Revenue, 1,600 plants, average 50 reis each	9,600 $000
Profit per hectare	5,100 $000 = £332

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The flowers of the male plant may be employed in medicine as a specific against bronchitis, etc. The fruit is a gentle laxative, and is very well adapted for preserving, and the leaves can be used in the place of soap, and the toughest meat wrapped in them becomes quite tender when cooked. The mamona is an aid to digestion, and a plantation of this tree serves to keep away noxious insects. The useful life of the tree does not exceed 4 years as a rule.

The crude oil is used in Brazil for soap manufacture.

Mango

Grows luxuriantly in all the hotter parts of Brazil, especially in Bahia, Pernambuco, and all northern states.

Banana

Grows from Amazonas to Rio Grande do Sul, but is hardly found above 3,000 feet in the southern and central states. There are many kinds cultivated, and we may enumerate the following:—Pacova (in Pará), a very large kind, usually eaten fried or boiled. The outside is red. *Musa cavendishii* (anã) has a short trunk, dark leaves, and produces huge bunches of fruit of a long, curved and cylindrical form, light yellow coloured. *Musa sapientum*—trees high and rounded fruit. Exportation of bananas in 1907, 1,878,904 bunches, worth £6,000. Each bunch weighs on an average 45 lb., and the heaviest attain 125 lb., or up to 300 bananas. Freights from the plantations in São Paulo (near Santos) to Buenos Aires (Argentina) total about 12*s.* 6*d.* per dozen bunches. In Santos there are some 200 planters who only cultivate one class (the anã), most of them occupying the lands without any right of ownership, as they are State property, and have never been con-

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sidered worth selling. Each kilo of bananas exported pays 1 real of duty, i.e., 100 reis per cent. kilos.

In Cubatão (near Santos) one planter has 500 alqueires under bananas, and the whole of the district is devoted to this culture. The whole of the banana traffic is limited to the coast-line from Rio de Janeiro southwards. Pará and Pernambuco are so well situated, however, with regard to exportation to Europe, that doubtless when their port works are completed, they will prove the shipping centres of an immense trade. The best variety in Brazil is known as the Banana de São Thomé. This tree takes from 1 to 2 years to come to maturity.

A plantation of 500 trees, properly treated, yields ten dozen bunches a month, and a grove of the second year only will produce fifteen dozen bunches per 1,000 trees. Some plantations more than 30 years old are still producing, the only attention given being the clearance of extraneous matter from the vicinity of the plants, and the bunches average seventy bananas, even after such an extension of time. There are reckoned to be 2,000,000 trees within the district above mentioned. Labourers employed in cutting the bunches (still green) are paid at the rate of 4*s.* 6*d.* to 5*s.* daily.

Planting should be done in the spring, each shoot being put in 12 to 16 feet apart. The best situation is a low humid one, with a moist soil.

Exports are trifling at present except to the River Plate.

Other Tropical and Sub-Tropical Fruits

Mangostão. Better suited to the West Indies than to Brazil. It is stated that the State of Pará is the only one where this famous fruit can be grown.

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Maracuja. Principally used for the purpose of making refreshing drinks. It belongs to the passifloras, and is distinctly a tropical fruit.

Sapoti. The fruit is of an earthy colour, oval shaped and rather sweet.

Pitangueira. There are several of these, belonging to the myrtaceas, all bearing fruits of purple and yellow hues. They are common to Brazil.

Gabiroba (*Psidium cinereum*). Golden yellow in colour; resembles a gooseberry. The campos in Minas, etc., are covered with it during the summer.

Toranjeira (*Citrus decumana*). Used for the manufacture of preserves. Of less importance than it deserves, and has had no attention paid to it.

The above represent a few of the numerous fruits, which have so many forms, colours and tastes. Most of the purely Brazilian ones, it is safe to say, are entirely unknown in England, and it is very difficult to persuade a farmer to make any attempt to grow on a large scale, much less get him to run the risk of sending a consignment to Europe at his own cost. His system of business is exceedingly simple, i.e., to sell on the spot for cash, and chance losing half the profit. Again, apart from such staples as oranges, guavas, bananas and pineapples, there are hardly any merchants or exporters who trouble themselves about fruit. If they do, it is to supply the markets of Montevideo, Buenos Aires, Rosario, and perhaps Chili.

A good opportunity exists in this direction for smart firms to dedicate themselves to exporting to the European and North American markets.

Acclimatized Fruits

The European and Japanese plums have both been tried in Brazil, and the latter adapts itself perfectly. Of

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the varieties cultivated, and which produce magnificent crops, we may cite—

Plums. Abundance (Douglas Babcock), burbank, and yellow Japanese plums.

Damson. Like the oriental plum, this fruit does well in Minas, São Paulo, Paraná, etc.

Mulberry. Acclimatized perfectly, withstanding both heat and cold. Not cultivated for the fruit, but for feeding silkworms.

Cherry (bigarreau, etc.). Experimented with recently in the southern states.

Fig. Universal and highly successful.

At Correias, near Petropolis, there is a fig tree which will give shade at noon to 4,000 persons. It covers an area of 480 feet. (See photograph.)

Raspberry. Does very well in the south. There is also a wild fruit which grows everywhere on the mountains.

Apple. Produced to *perfection* in selected soils in the more temperate parts of Brazil. Some grown at Poços de Caldas (Minas Geraes) weighed nearly 1 lb. each.

Quince. Yields splendid crops. Is principally used for the manufacture of jelly. A large quantity of the preserve comes to Rio de Janeiro from the small towns, high up in the Organ and Estrella Ranges in the same state, Theresopolis, for example. No proper attention is given to the cultivation of this fruit.

Strawberry. Fruits perfectly from Rio de Janeiro south, but is quite inferior *at present* to the berry we know and appreciate so well in England.

Nespereira (*Photinia japonica*). This tree is improperly termed the yellow plum in Brazil. It is extremely common (or the Japanese variety is) in the south, but usually does not bear very well owing to want of proper cultivation.

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Peach. Of the fruits introduced from abroad, the peach has made itself more at home than any. Most of the European varieties are grown with some success, but the oriental fruit is not yet seen, except in the catalogue of a professional grower of Pelotas (Rio Grande do Sul).

Pear. Not so well adapted to Brazil, unless it is the sand or Chinese pear.

Tomato. Will grow perfectly and produce fine fruit, but like most things, it requires more attention than is usually given. Does best in the more temperate states. Very badly packed for market at present.

Olives. Now grown at Caixas, in Rio Grande do Sul.

MELON

Both the ordinary and the water melon grow freely throughout Brazil.

WALNUTS

At Jundiahy (São Paulo) walnuts have been grown this year equal to any imported.

Uncultivated Fruits

Blackberry, currant, gooseberry, loganberry, wine berry, barberry, dewberry, cranberry; the true medlar (*Mespilus germanica*), as well as cob-nuts and chestnuts, and the sweet almond. All worth trying in the south.

FRUIT

The Royal Mail and Messageries Maritimes Companies have entered into an accord with the Government to transport fruit at the following rates per cubic metre:—

Pineapples,	20	milreis	= 200 pines to cubic metre.
Bananas	8	,,	= 50 bunches ,,
Oranges	15	,,	= 3,000 oranges ,,

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All other fruit the same prices as oranges. Thus, if we reckon the outside value of a pineapple as 100 reis, or 1½*d.*, f.o.b. Rio, and freight to England 100 reis more, we have a total cost of 3*d.* each delivered London. If the planter exports a large quantity, 4½*d.* should be a good price for him, and 9*d.* a fair *retail* charge for such fruit as costs at present at least double. The Ministry of Agriculture has now offered the following premiums, i.e., to 5, 3 and 2 contos of reis for those growers who export the most fruit during 8 months. The quantity must not, however, be less than 50 tons.

APICULTURE

There are some twenty-one species of bees known as indigenous to Brazil, but none of these are domesticated, although several produce very fine honey, according to St. Hilaire superior to the European product. One variety is stingless, but most of these insects are very dangerous. The honey varies a great deal, and that produced by some kinds has drastic effects.

Apiculture is especially adapted to the south of Brazil, and most of the German and Italian colonists in Rio Grande do Sul have a number of hives. There is a special review published, called *Brasilianische Bienenpflege.*

Customs duties on bee appliances are: For farmers, 8 per cent. *ad valorem* ; for merchants, 20 per cent. *ad valorem.*

A bee farm at Campos consists of 160 primitive hives composed of boxes measuring 24 × 12 × 16 inches. The bees are of Italian origin, and are derived from some imported in 1904. São Paulo, Minas Geraes and Paraná also produce some amount of honey and wax for exportation. The most modern apparatus in Paraná yields 30 kilos of honey and 2 kilos of wax per hive as a

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maximum. In 1909 ten farmers in Rio Grande sold 54 tons of honey and 126 of wax. Local prices (1911) in Porto Alegre: Honey, per kilogramme, 600 reis; wax, 1$700.

Most of the honey sold in Brazil is in bottles, and frequently has the appearance and taste of treacle, owing to being largely adulterated with the latter (Melado). The south, and only that part with a definite winter, is alone suitable for bee-farming, as in two or three seasons the imported bees cease to store up honey where there is a constant supply of nectar, and in the sugar-refining districts even learn to abandon the flowers altogether.

Exports of wax bear no relation to the production, as huge quantities are used for church candles. No exact figures are available with regard to the foreign trade, mostly with Germany.

SERICULTURE

The above industry is still in its infancy, but there is a great future in store for it. As we have already seen, the mulberry thrives splendidly, and neither it nor the silkworm suffer in any degree worth noting from the diseases so common in Europe. One of the principal reasons for the non-development of sericulture has been the great cost of mounting factories capable of dealing with the raw silk. In Petropolis, however, there are two mills, one Italian and the other German. The climate of this delightful little city (justly termed for its beauty—A Rainha do Brasil) is so well suited to the growth of the mulberry tree, that cocoons produced locally prove superior to many foreign ones, not only in brilliant colour, but also in elasticity of thread. The two Petropolis mills consume 45 tons annually between them, but most of the

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thread is imported. In Nova-Trento (Santa Catharina) the whole municipality is inhabited by colonists from Trente, in Austrian-Italy, and most of the inhabitants are engaged in silkworm culture, the proceeds being used by two small factories belonging to a religious order (Brazilian), where the nuns themselves are the actual workpeople. The first factory was started in 1900, and the products obtained three gold medals at the St. Louis Exhibition. The annual output is now 3,000 yards of silk, 216 scarves, and over 100 pairs of stockings. The other factory is somewhat smaller, the production amounting to about £1,800 in value last year. Besides the above there are many hand looms scattered throughout the country. In Rio Grande do Sul the industry is further developed, two large and various small factories being established, and in Minas Geraes, Barbacena is the seat of this culture, already well advanced. The colony of Rodrigo Silva, in the above municipality, produced 5,158 kilos of cocoons in 1907, and distributed no less than 38,600 mulberry slips. The cocoons are generally collected from August to September, October, and November to December. 39 grammes of eggs produce an average of 36,000 caterpillars, which consume 800 to 850 kilogrammes of fresh mulberry leaves, to produce from 50 to 70 kilos of cocoons, the silk being of excellent quality, but somewhat coarse in thread. Barbacena is, it is worthy of note, some 3,400 feet above sea level, and slight frosts are not at all uncommon in the winter. Many other districts in this state are taking up silkworm culture with success. In São Paulo a factory has been started, and the silk produced took the first prize at St. Louis, three medals at Rome, and one at Milan, besides others at Campinas and São Paulo city. This state produced 22,400 cocoons in 1908. The following figures illustrate the profits to

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be obtained from this industry in Brazil, even under present conditions.

EXPENSES

30 grammes of eggs	9$500
Mulberry leaves	20$000
Labour, etc.	65$000

Result—say 60 kilos of cocoons, worth 240$000. (16 milreis equals £1.)

Profit, 145$500. This is the result of 30 days' work only, utilizing the services of women and children. From these figures one may easily calculate the profit to be obtained from an outlay of say £1,000. It must be remembered that the duty on imported manufactured material is enormous. Notes just to hand from Minas Geraes inform me that the Government of this state has decided to open the following credit for three prizes: (1) 10 contos of reis (£625), being 1*s.* 3*d.* per kilo, to those producing 10,000 kilogrammes of cocoons; (2) £312 10*s.* to the planter with at least 2,000 mulberry trees properly cultivated; and (3) 45 contos of reis, equals £2,722 10*s.*, to the two first factories possessing modern machinery, employed in the weaving of silk, produced from national cocoons. The Federal Government has also resolved to pay premiums on each plantation of 2,000 mulberry trees, on each kilo of cocoons, and to subsidize the first two silk factories using native material, and equipped with modern machinery.

By Federal Decree No. 9,671 of July 17, 1912, it has been resolved to establish experimental stations, with a 3 months' course for men, and one for women, where the culture of the mulberry and silkworm will be taught, and how to prepare the cocoons and silk for market.

Handbooks, pamphlets and bulletins will be published regularly.

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VITICULTURE

Grapes have been known in Brazil since early colonial days, and the kind mostly grown are white muscatel, lady's finger, and ferrar. Amongst others introduced more recently, the *Uva americana* or isabella dates back some 50 years.

In the States of Rio, S. Paulo, Paraná, etc., from October to April, the vine suffers from diseases engendered by the humidity, such as fungi. In spite of this, here are found the finest sorts. An expert grape cultivator (Dr. Fialho) near Petropolis has some hundreds of varieties growing, and exhibits the most magnificent bunches in the capital (3½ hours by rail and water). Even in the City of Belem (Pará) a vine exists which produces three crops annually; this is under adverse conditions, as it rains daily in that place.

In the valley of the river Sáo Francisco the climate is best adapted to grape culture, and particulars are given in a Government report by Dr. João Silviera in 1906 of the results obtained from 175 acres of alluvium. To a depth of nearly 20 feet the soil is composed of sand, mixed with clay and black earth, without stones or foreign matter of any kind. The low lands of this area are flooded from December to January for a distance of 1,300 yards. The climate is dry, with not more than twelve or fourteen heavy rains in the year (October to May). The highest summer temperature is about 100° F., but the nights are always agreeable. In the winter the highest point reached by the mercury is 85° to 90° F., and the lowest 45° to 50° F. Irrigation is carried out throughout the dry season. The area is divided into two parts. The first has 640 vines, remaining from 1,000 originally planted, and there are 150 varieties from the four continents. The most delicate and finest European

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sorts give three harvests annually, with a supply of 70 to 80 quarts of water daily, and the ground is well manured. The quantity of grapes produced under such conditions is enormous. In the city (Joazeiro) one vine of 3 years of age had 542 bunches. At the trial grounds, white muscatels have weighed over 4 lb. the bunch.

This experience has proved one of the most successful, and has encouraged the Department of Agriculture (Bahia) to further outlay. From this trial ground slips have been distributed all over the country (more than 34,000). The Agronomical Institute of Campinas (São Paulo) has also sent out some 30,000 to 40,000 per year. The state most occupied with the vine for wine making is Rio Grande do Sul. Between 27° and 34° south the climate is entirely suited to the vine, and corresponds with Southern Italy, except as far as the topography is concerned. In this Brazilian states the vine is not attacked by its terrible enemy, phylloxera. Already native wines have received high recognition (Milan Exhibition), in spite of the competition of European growers with long experience and great reputation. Most of the vineyards belong to Italian colonists, and the harvests are usually exceedingly good. The following are typical results :—(1) 2½ acres equal 7½ tons of grapes. (2) 2½ acres equal 17½ tons of grapes. (3) (Caxias) 18 tons per hectare (2½ acres), and Guaporé and Bento Conçalves 25 tons per 2½ acres, average 11,480 litres of wine. In Portugal the average yield is 1,870 litres ; France, 3,300 litres ; and Chili, 5,000 litres. In Nova Trento a vine exists 17 years old, from which has been taken 1½ tons of grapes, producing 792 litres of wine.

In Rio Grande do Norte two crops are produced yearly.

In Rio Grande do Sul grapes sometimes sell at 1½*d.* per 11 lb., and the wine is worth the same price for one-third

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dozen bottles, retailing in Rio de Janeiro for 7½*d.* to 1*s.* a bottle perhaps. In 1902 the entire export was 288,000 litres, and in 1906 it rose to 2,700,000 litres. It is stated that the production, including local consumption, totalled 10,000,000 litres the same year. The average percentage of alcohol in these national wines is 7 to 13, the proportion of acid 0·866 to 0·1050. Those of France are 0·28 per cent. to 0·39 per cent. The above figures relate only to wine made from the grape. As already mentioned, the pineapple, jaboticaba, cashew and other fruits are extensively used for the purpose of making wines.

BALANCE SHEET OF A VINEYARD (SOUTH BRAZIL)

Year.	Expenses. Items.	Total Amount. Milreis.	Produce per Hectare.	Value.
1	Labour, 120; Manure, 500; Planting, 200; Plants, 1,000; Stakes, 250; Administration, 360 . .	2,430	—	—
2	Fencing, 1,500; Labour, etc., 650	2,150	—	—
3	Total expenses	1,040	—	—
4	Including wine making .	2,000	5 pipes of wine of 480 litres each	1,000
5	,, ,, ,, .	1,000	10 pipes	2,000
6	,, ,, ,, .	1,000	20 ,,	4,000
7–10	,, ,, ,, .	4,000	80 ,,	16,000
	Total . . .	13,620	115 pipes	23,000

Net profit per hectare, £160.

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If table grapes are grown, the expenses will be about £1,050 and receipts £2,100 for the 10 years per hectare.

In spite of the increase in acreage of vineyards, the importation of wines is on the up grade in Brazil. In 1908 45,521 *tons* were received from Portugal, and 19,941 *tons* from Italy, Spain, France and Germany in the order named.

Of spirits, cognac is the most consumed, with whisky a good second.

Present prices of wine per pipe :—

Portuguese (red) . . .	325–340 $000
Rio Grande do Sul . .	125–130 $000
(8 per cent. alcohol.)	

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CHAPTER XVIII

THE PASTORAL INDUSTRY

Forage Plants, etc.

WITH regard to pastoral conditions, Brazil must be divided into three zones, i.e., tropical, semi-tropical, and temperate. The first is naturally the north; the second the central territory; and the third the whole of the south. Before dealing with the stock it will be necessary for the benefit of practical farmers to consider the grasses.

GRASSES (*Gramineas*)

Root grass. Not exceeding 10 to 12 inches in height, always green, and springing up as if by enchantment, after being cropped quite close by thousands of beasts. The local cowboys say that it contains sufficient salt, impelling the cattle to drink. This grass is found from Goyaz to the Araguaya and Tocantins.

Capim branco (white grass), considered to be *Andropogon glausens*. There are two or three kinds of this graminea, and they are found in patches amongst the first-named grass, but are not so resistent.

Mimoso. Grows along the central part of the São Francisco River.

Marmelade grass. A giant reaching 16 to 17 feet high, peculiar to the lower parts of the Araguaya.

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PLACE TIRADENTES, RIO.

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National Museum, Rio de Janeiro.



Ilha das Flores, Bay of Rio: Emigrants' Hostel.

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Rice grass. On the margin of the rivers generally.

Beach grass (*Panicum fistolarum*). The principal green food of stock in Matto Grosso.

Capim gordura (*Tristegis glutinosa*). The commonest in Brazil, growing wild everywhere.

Jaragua (*Andropogon rufus*). Grows in rich soil, more than a metre high. The young shoots are preferred by cattle. The campos are burned the end of August, and the plant springs up again in September or October.

Catingueiro (*Melinis minutiflora*). Thrives on poor lands, and is very free from insect plagues. Several other varieties are cultivated in São Paulo, most of which yield five to seven crops a year.

Dr. L. Glaziou collected, in a short time, no less than 155 *new* varieties of gramineas on the central plateaux of Brazil. It is impossible to enumerate the names of a tenth part of the plants suitable for forage, and, if it were, undoubtedly their names would be entirely unknown to the general reader. Suffice it to say that there is no lack anywhere, either of food or water, and the latter is abounding, and as pure as virgin snow.

Alfalfa

This leguminous plant is hardly cultivated at all in Brazil, to the great prejudice of the stock breeder. Some is imported from the River Plate in the form of hay. In the model farm at Gamelleira, various experiments have been made, demonstrating that ten crops may be had yearly, giving 173 kilogrammes from 100 square metres. Dr. Carvalho Britto on his farm at Pedro Leopoldo (Minas Geraes) planted in 1908 10 kilogrammes of alfalfa seed in 1,200 square metres, and on December 10 harvested 926 kilogrammes of green alfalfa and 300 kilogrammes of hay. The local (Rio de Janeiro) price would be about 150 reis per kilogramme. To achieve

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the best results, the soil should be of a good depth and fairly light and porous. To each hectare some 700 kilogrammes of lime. Some 40 kilogrammes of seed will suffice to the hectare.

Live Stock

In Rio Grande do Sul there are reckoned to be, at the time of writing, 5,000,000 oxen, besides 2,000,000 just over the boundary line in Uruguay, but belonging to Rio Grande stock raisers. In Ceará there are perhaps 1,500,000 and the bulk of the remainder in Piauhy, Matto Grosso, Goyaz and Minas Geraes. In São Paulo (1912) there are some 750,000 head of cattle.

Calculating the population of Brazil as 20,000,000, the consumption per annum should be about 12,000,000 bovines, and in live stock in all some 30,000,000. In Rio de Janeiro the average amount of beef eaten per inhabitant is 22 kilos annually. In the State of Minas there are more than 100 butter and cheese factories producing merchandise to the value of 6,000 contos, equal to £370,000. Exports in 1909 amounted to 2,279 tons of butter, 4,511 of cheese, and 7,003½ of milk. The exportation of butter from Santa Catharina, 1907, was 667⅞ tons. The Brazilian oxen, derived from the primitive and isolated herds, probably natural to the country, are quite small, weighing on an average not more than 400 lb. when dressed. These animals are noteworthy for their immense horns, one preserved having a capacity of 5 or 6 quarts. In Goyaz and adjoining states a variety of cows called mocha is much esteemed, and is considered, locally, equal or superior to any of the imported stock. The zebú has been introduced with great success, and in the north the Malabar is found widely spread. Recently, Durhams, Jerseys and Herefords have been brought over, as well as various specimens of

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the Simminthal (a Swiss type). Apart from Rio Grande do Sul and S. Paulo, the Brazilian states employ the most primitive methods of stock raising, the herdsmen limiting themselves to visiting the pastures now and then, and somewhat more frequently at breeding time, when the calves are immediately separated from the cows, and shut up in corrals, where they are allowed to feed twice daily, morning and evening, when the cows return voluntarily to the enclosures. The cowboys of the great plains of Goyaz, Matto Grosso, and other central states, are dressed entirely in leather from head to feet. They are usually paid by a fourth or fifth part of the production. Each stock-raising district of Brazil has its own dress and customs, and technical language.

In the north the oxen are either seized by the tail or lassoed. In Rio Grande the cowboys use the bolas. In the same state the Argentine-Uruguayan term of estancia is employed, instead of the Portuguese word fazenda, used in the other parts of Brazil. The animals are usually marked by cutting their ears in a distinctive form. Where it is necessary to give salt, this is done in January, May, and September, in the proportion of one sack to seventy oxen. The drover, who is accustomed to complain of travelling 10 or 15 miles with a few beasts over good roads in England, would, doubtless, open his mouth at the thought of a hard journey, varying from 450 to 600 or more miles, with hundreds of wild oxen, many of them laden with stores. From Matto Grosso to the south of Minas Geraes is 1,050 miles, and the whole of this distance is annually travelled by many indefatigable horsemen. It is not only the vast distances traversed that render the drover's life an onerous one. Sometimes at dead of night the cry of a panther in the woods will suffice to stampede a thousand head. The noise *en route* of the clashing horns of the beasts

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can be heard for leagues, and resembles a distant clap of thunder. As the only time possible to drive stock is the rainy season, the camping grounds become quagmires, with the animals breast-deep in mud. The average number of oxen in a drove is from one to two thousand, and this frequently represents the whole capital and credit of the herdsman.

Sometimes the owner loses the whole drove before reaching his destination. The animals are emaciated, living skeletons on arriving at the resting and fattening place, where they remain 8 to 12 months. From Barreto (Minas) they are sent to São Paulo on foot, or by water.

In Ceará cattle are brought from Piauhy to fatten during the autumn or wet season. In Matto Grosso an animal 2 years old is worth from £1 to £2, 4 years old, £2 10*s*. to £3. For a saddle or draught ox, from £3 to £5 10*s*. In Goyaz an ox, more than 5 years old, is valued at £2 to £6 5*s*., according to the number of heads available. In Piauhy the top price is £1 5*s*. The cost of a journey of some 2 or 3 months is about £1 per head. The most important cattle fairs are, Tres Corações (Rio Verde), Bemfica, near Juiz de Fóra (Minas), Sitio (Minas). Nearly the whole of the stock sold at these fairs is destined for the municipal slaughter house of Rio de Janeiro, at Santa Cruz, where, in spite of the immense population it has to supply, not more than 400 beasts are killed daily. The reason of this is the entire want of cold storage. This will soon be remedied, as a contract has been signed with a company that will entirely modernize the whole affair. In Rio Grande do Sul there are twenty-one factories for the preparation of xarque (charque) or jerked beef, known in Brazilian shops as carne secca (dried beef). Brazil consumes 80 per cent. of the world's production of this meat. Fortunately the importation is decreasing,

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and no doubt the consumption of this frequently unpalatable article will be gradually reduced to a very low amount. Each ox gives 75 kilos of meat, worth 380 reis a kilo, 25 to 30 kilos of hide at 660 reis a kilo, 22 kilos of fat at 300 reis. 40 quarts of salt are used in the preparation of each lot of flesh. In Matto Grosso there is a large extract of meat factory, owned by a Belgian company, and 60,000 oxen are slaughtered annually. In Rio Grande there are also several small preserved meat factories, and one large cannery, which is also the most important biscuit factory in Brazil (Leal Santos & Co.).

The Devon probably represents the best all-round type for breeding, and in Brazil puts on more weight in flesh than the Durham or Hereford ox. Texas fever must, however, be guarded against. Farmers in Minas Geraes who wish to import stock, deposit the value of the animal, and the State defrays all transportation expenses. The Leopoldina Railway has a model farm at Bemfica (near Rio), where a complete course in any particular subject costs £4 a month, including board and lodging. The total number of cattle in the Republic (1911) cannot be less than 25 millions, one-fifth being in Rio Grande do Sul.

A syndicate has been formed in London, with a capital of £1,000,000, for the purpose of stock raising in South Brazil, and an American company has obtained a large concession of lands in Piauhy for the same end.

Quoting from the report of the Brazil Railway Company published this year, 1912, there are *vast* expanses of pasturage available in Brazil for cattle raising, and a large and growing business is bound to develop in the Republic. This concern has purchased some 7,000,000 acres of grazing land, and its investigation proves that the area is quite as suitable for the purpose as the best

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North American prairies, and that there is a sufficient supply of native stock to ensure the rapid development of a prosperous industry on a very extensive scale. The Company has already 150,000 head of cattle, and this number will be increased by local purchases, and by the importation of thoroughbreds from abroad.

Exportation of hides from Pará, 1911, value 308,719$715.

Balance sheet of a shipment of hides from Pará (1910) :—

96 hides (stretched), 780 kilos @ 12½ mil. = 1,200$000.

Duty.

17 per cent. = 106.080
2½ per cent. = 2.650
65 reis the kilo = 50.700
} = 159$430.

Expenses.

Packing and transport	28.800
Warehousing	19.200
Stamp duty	2.200
Minor expenses	5.500

= @ 15½*d.* the milreis, £91 11*s.* 4*d.*

Freight from Pará—

Wet hides to Liverpool, 35*s.* per ton; Havre, 40 francs. Dry hides to Liverpool, 70*s.* per ton; Havre, 90 francs. Plus, 15 per cent.

Horses

The principal credit for scientific study of the pastoral industry belongs certainly to São Paulo. This state has now taken in hand the improvement of the national race of horses (which is undoubtedly Arab, or a degenerated variety of this famous breed). In

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some parts there are Russians and Anglo-Normans, some worth £62 10s., when broken in. In Minas there exists a good stock, derived from Arab stallions and national mares. In the northern pastoral zones there is a race of horses capable of covering 60 miles daily. The Brazilian horses are not, as a rule, large, but they are very wiry. By the initiative of the present Minister of War, the Brazilian cavalry is being remounted with national equines, the regulation demanding 1 metre 48 centimetres in height (about 14½ hands), and no difficulty is experienced in getting animals over this size.

The Compte Le Hon offers some very pertinent observations in the Paris Journal, *Le Brésil*, with regard to the horse.

He is of opinion that the native race requires crossing with the pure bred Arab at first, and that the result of this union should be united to the Anglo-Arab, in order to produce size and power sufficient for remounts. The sires should be obtained from stallions that are accustomed to run wild or semi-wild in the vast campos in the interior of Minas and Goyaz, etc., and animals selected that are not much taller than the average in order to prevent the breeding of ungainly and disproportionate stock.

A large trade is done between Goyaz and Bolivia, horses and mules being transported by road to the Paraguay River (sometimes 1,800 kilometres), and thence by water to their destination. Rio Grande do Sul contains over 1 million horses.

Mules and Asses

The bulk of the carrying trade in Brazil rests on the backs of the former of those two useful animals, and no others have been so despised and ill-cared for. They are

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sometimes distorted in the legs, and this is attributed by the breeders to the insufficiency of lime in the pastures. The only states that have devoted any attention to the raising of this kind of stock are Rio Grande do Sul, Paraná, São Paulo, Minas Geraes, Goyaz, and Bahia. The greater proportion of the animals in use in the Republic, are, however, imported from the Argentine Republic. Whatever progress has been made in recent years is principally due, not to the breeders themselves, but to the efforts made by the Governments of such up-to-date states as São Paulo, Paraná, Minas Geraes, etc.

Sheep

We must turn again to the Paulistas, if we wish to see what has been accomplished in the way of sheep breeding. Amongst these enlightened farmers one may come across splendid specimens of the Oxford, Southdown, Hampshire, and Rambouillet sheep. In Rio Grande, the Southdown, known locally as black face (cara negra), is preferred, and the wool produced is abundant and fine. The Romney Marsh breed is suitable for most parts of Brazil. Rams should be imported, not ewes. Not only the south, but as an illustrious Brazilian, Dr. Assis Brasil, says, the plateaux of Paraná, and Santa Catharina, and Rio Grande, with an average of 2,000 feet elevation, are well suited to the sheep, more perhaps than even Argentina or Australia. How much more, then, central Brazil, with 3,300 to 4,000 feet of altitude, and the most delicious climate in the world. In Goyaz experiments have proved that the sheep is entirely adapted to this zone.

In Rio Grande do Sul there are 1,852,300 sheep at the present moment, but geographically speaking, the greater part of this state forms a continuation of the

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Photo by] [PAPE, *Petropolis.*

PLANT OF CATTLEYA ALBA (ORCHID).
Grown by Miss Spangenberg (Petropolis).

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CORREIAS, NEAR PETROPOLIS.

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River Plate alluvial basin, and cannot be considered beside the greater part of Brazil, as far as climate and soil is concerned.

Goats

Here we find the beast who (as in Europe) will get a living where any other will starve. Where the Cearense has to emigrate sometimes, owing to the drought, his goat finds ample subsistence, and this state (Ceará) exported in 1906 more than 400 tons of skins, worth 1,500 contos of reis. In Piauhy a splendid milch goat is found, of a remarkable size, and all over the northern hills, from Maranhão to Bahia, hardly a family exists without possessing a herd. The cost of their keep is less than that of any other kind of stock, and the pecuniary results are almost immediate. One may say that this animal is found everywhere in Brazil, especially where others cannot be profitably raised, amongst a vegetation composed of cacti and agaves of every kind, the most spinous sorts naturally predominating. It is said that the goat can pass months without needing water, and furnishing milk all the time.

Swine

Introduced soon after the discovery of Brazil, the Portuguese types still preserve their distinguishing marks. One kind is an enormous beast, nearly 6 feet in length, thick skinned, short legged and snouted. It is known by the name canastrão (big basket). Most English pigs are now found, as the Yorkshire, Berkshire, Hampshire, Tamworth and Leicester, as well as others from Italy, Poland, etc. The food given to these animals, all over Brazil, consists of maize, mandioca, pumpkins, skimmed milk, etc., and as our hogs are let

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loose in the woods to eat the acorns, so their Brazilian brothers fatten on the fruit of the native pine (*Araucaria brasiliensis*). The State of Rio Grande do Sul is the centre of the lard trade, having eleven factories, supplied with some 8,500 tons of fat. Minas, Santa Catharina, Goyaz and Rio Janeiro are other pig-breeding states. Bacon, such as Englishmen know, is not cured, and a Portuguese once asked me what was that meat, with a piece of lean and a piece of fat alternately, that they gave him for breakfast on the Royal Mail steamer. Brazilian bacon (toucinho) is nothing but a great mass of fat, 3 or 4 inches thick, with quite an unappetizing look. São Paulo has now (1912) 1,282,000 hogs, and the number is constantly increasing, and there are some 600,000 in Rio Grande do Sul.

To sum up, Amazonas is suited to oxen, but not to goats or pigs. Pará is, more or less, in the same conditions, and all the other states are well adapted to the introduction of almost any stock. Rio produced, in 1906, no less than 3,707 *tons* of milk, and 61 tons of cheese; Petropolis district being one of the richest, making 6,984 kilogrammes of butter, and 18,012 of cream cheese in 1907. Santa Catharina, in 1905, already made 419 tons of butter, and Minas Geraes exported (principally to Rio), in 1907, 5,100 tons of milk, 4,635 tons of cheese, and 1,420 tons of butter, nearly all of this passing over one line of rails (The Central). All the milk was used in the Capital of the Republic. The total value of products of the pastoral industry in this state amounted to £2,891,599 in 1904, and has, undoubtedly, very much increased since then.

Exports of butter (Minas), 1911, = 3,059,686 kilos. Milk, 11,833,485 litres. From Rio de Janeiro (milk only), 5,141.488 litres. Cheese (Minas), 6,079,515 kilos.

A great feature of Rio now is the dairies, where one

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may sit (as in a café), and drink milk, hot or cold, at about 1½*d.* a glass.

Poultry

There is very little to say about this subject except that undoubtedly it is a branch of farming which would be most lucrative, more especially because up to now very little care has been taken with either fowls, ducks, geese, or turkeys. Petropolis again is one of the most up-to-date centres, and a low estimate calculates the annual production of eggs (hens) as 10,000 dozen (1907).

There is a more or less plentiful supply of scraggy fowls, but it is a very rare thing to be able to buy plump birds in the ordinary way.

As there are now several poultry farms in Rio, São Paulo, etc., one or two of which are under British management, it is preferable to buy prize birds in Brazil, unless able to choose and accompany them yourself on the voyage. Plymouth Rocks and Leghorns do very well, but local advice is necessary before selection. Exportation of eggs (Rio State), 1911, 1,468,231.

The Leopoldina Railway Company has a model farm at Bemfica (Macuco), Rio State, where 6 months' courses in practical poultry, dairy and mixed farming, and bacon curing are given. Board and lodging is only charged 60 milreis a month, a very moderate fee indeed.

Trial sowings yielded—

40 litres of maize : 60 sacks of 80 litres
40 ,, beans : 18 ,, ,,
40 ,, rice : 50 ,, ,,

One alquiere of land produced 40 tons of sugar cane.

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Premiums for the Introduction of Animals for Breeding Purposes,

subject to conditions as follows :—

1. A presentation of certificate in payment of local taxes, or proof of registry as a breeder in the Agricultural Department.
2. Consular factures, etc.
3. Custom House (receipt for duties, etc.)
4. Photographs of animals in duplicate (birds excepted).
5. Pedigree of bull or stallion.
6. Veterinary certificate given in country of origin.
7. Certificate of inoculation for tuberculosis in case of bulls.
8. Receipt for steamer and railway freight.

The whole of the above must be in Portuguese, or translated.

PREMIUMS IN CURRENCY (PAPER)

Animal.	Europe to any port in Brazil.	From U.S.A.		From River Plate.	
		To North.	To South.	To North.	To South.
	$	$	$	$	$
Bull	500	300	500	400	250
Stallion	600	350	600	450	300
Jackass	400	250	400	250	200
Hog	150	100	156	120	80
Ram	120	80	120	90	60
Goat	120	80	120	90	60
Sheep-dog	100	70	100	80	40
Poultry	10	6	10	8	5

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The Government will also import stock, providing the cost of same and partial expenses of freight is deposited in the Treasury previously.

The Federal Government has a Zootechnic Station (Pinheiro, E. do Rio), where prize stock is kept for the benefit of breeders.

The State of Minas Geraes offers premiums to co-operative dairies producing at least 50 tons of butter or 100,000 cheese (5 to 15 contos). Also 10 to 30 contos for the first co-operative condensed milk factory, or one producing milk powder, or caseine, and using at least 1,000 kilos of milk daily.

Also 5 contos to the first salt refinery, producing salt chemically pure, fit for butter manufacture, and sold at equitable prices.

Also 20 contos of reis to the first manufactory of tins, producing at least 2 million butter, etc., tins annually.

Agricultural Inspection

The Federal Government has created a service of agricultural inspection throughout the Republic, which is divided into twelve districts, which are planned as follows :—

1. Amazonas and Pará.
2. Maranhão and Piauhy.
3. Ceará, Parahyba, and Rio Grande do Norte.
4. Pernambuco and Alagôas.
5. Bahia and Sergipe.
6. Rio de Janeiro and Espirito Santo.
7. Minas Greaes.
8. São Paulo.
9. Paraná and Santa Catharina.
10. Rio Grande do Sul.
11. Goyaz.
12. Matto Grosso.

As well as a special division in the Acre.

Each district will be under the control of a delegate of

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the Federal Government, who will present a most minute monthly report. He will be charged with lecturing, the organization of agricultural shows, and of demonstrations of the use of various machines; in short, his duties will be those of an agricultural expert and adviser, and he will be especially charged to initiate new cultures and improve existing ones of every kind. There is no doubt that this measure will be productive of great benefit, especially in those states without organized agronomical stations or agricultural colleges.

Several European and American travelling teachers are now at work.

Experimental Stations

To five or more syndicates combining to establish laboratories and experimental stations for the study of agricultural chemistry, etc., a bounty is offered of £1,250.

IMPORTS

	1910	1911	
Butter	16,256	12,963	cases
Flour	92,153	45,041	barrels
Rice	203,097	97,935	sacks
Potatoes	431,814	280,062	cases

The above are examples of how Brazil is tending to supply herself with articles of prime necessity.

Dry Farming and Irrigation

The only part of Brazil demanding the earnest attention of the Government from the above point of view is that situated in the north-eastern extremity of the Republic between 2 and 7 degrees south of the Equator, comprising parts of the States of Ceará, Rio Grande do

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Norte and Parahyba. The Director of the Geological Service of Brazil (Dr. Orville Derby) has detached a number of geologists and other naturalists, and engineers, and placed them at the disposal of the Ministry of Public Works, and they are now engaged on an exhaustive survey of the whole district. Reservoirs are in course of construction in several places, several finished, and others repaired, and the River Ceará-Mirim deepened, and a large number of artesian wells sunk. Emigration has been sporadic from Ceará since 1871, partly through droughts, and partly through the efforts of agents recruiting labour for the Amazonas rubber plantations. The Cearense is perhaps the nearest to the aboriginal type amongst civilized Brazilians.

Sources of Information for Settlers engaging in Agricultural Pursuits

Federal

1. The Ministry of Agriculture, Rio de Janeiro; Departments of Commerce and Industry, Divulgation, and Colonization; The Commercial Museum.

State

2. Colonization Department of the States of S. Paulo (São Paulo City), Paraná (Curityba) and Minas Geraes (Bello Horizonte).

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CHAPTER XIX

GEOLOGY AND PALÆONTOLOGY

Geology

If we glance at the map of Brazil we find the whole country cut up, as it were, by great rivers, their basins being divided by long ranges of mountains from 4,000 to 7,000 feet in altitude, and with a general trend north and south, except in what is known as the central plateau, where the serras run in all directions, having their meeting point where the head waters of the Paraná, and the great affluents of the Amazon, the Tocantins and Araguaya, and the São Francisco are not far distant from each other, as distance goes in Brazil. This latter river flows parallel with the coast for hundreds of leagues, forced into its course by the chains of mountains which form the eastern side of the central plateau, and as soon as it finds an outlet it descends abruptly through a wild gorge or cañon to a much lower level, having evidently forced its way through fractures or joints in the formation of gneiss and granite, and rushing over the rocks with incredible violence, especially immediately below the principal fall, where an elbow is formed by the cañon, whose cliffs are composed largely of purple syenite. In its middle course the bluffs, sometimes 20 to 30 miles distant from the stream, are mostly

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BOTAFOGO BAY, RIO DE JANEIRO, WITH THE SUGARLOAF.

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BOTAFOGO, RIO DE JANEIRO.

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limestone, characteristic of the Rio Paraguassú and Rio das Velhas. Above Piraporá and the mouth of the latter river the sandstone formation is again predominant, and, below the falls at Paulo Affonso, the same rock is found all the way to Penedo, near the mouth itself.

The coast from the Abrolhos to Bahia consists of low hills of cretaceous age, especially near Bahia and Sergipe, and then in almost an unbroken line to Parahyba do Nord. The strata forming this series are all inclined, whilst the tertiary rocks are horizontal. The latter (Miocene and Pliocene) form part of Amazonas, etc., and the lower part of the basin of the great river belongs to the Quartenary Formation, being principally diluvium.

The Acre Territory, Upper Amazonas, and most of Matto Grosso and parts of Goyaz have never been properly surveyed, but what work has been done tends to prove that the predominating rocks in the above states, as elsewhere, are of the most ancient type. Broad bands of Devonian extend southwards from the S. Francisco River to Santa Catharina, bearing southwest as a general rule.

The Guianas are entirely separated from the main ranges of the Brazilian highlands, whose mean elevation is some 3,000 feet. The culminating point, in the Serra da Itatiaiá, reaches nearly 10,000 feet. Itacolumi, near Ouro Preto, is 5,700 feet. The Pyreneus in Goyaz attain 4,450 feet, and Itabira about 5,000, whilst the offshoot from the Organ Mountains in the State of Rio (Itaiassú) is 7,260 feet above sea level, and the highest peak in the Organs themselves is some 6,500 feet high. The Serra do Mar, extending from Espirito Santo to Rio Grande do Sul, has many eminences over 5,000 feet. Itatiaiá, Tingua, near Rio de Janeiro, Cabo Frio and

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Pocos de Caldas in Minas, as well as the Island of Fernando Noronha, are mostly composed of phonolites and other nepheline rocks, and represent the only distinct traces of ancient volcanic action. In Minas there are many hot springs, especially in the Caldas region. The Serra da Mantiquera is separated from the coastal range by the Parahyba River, and at the head waters of the latter it forms part of the massif of Itatiaiá and the frontier of the States of Rio, Minas and São Paulo. North-west, the Espinhaço forms the watershed of many rivers, extending to the Jequitinhonha. The Serras do Mar and Mantiqueira belong to the Laurentian system, mainly composed of gneiss, estimated by Liais to exceed 20,000 in thickness in the Organ Mountains. The high lands of Minas, in the Espinhaço, Canastra and Matta da Corda ranges, are presumed to be Huronian, and contain most of the mineral deposits. The Campos Geraes, or plateaux, are traps which degenerate in sandstones, leaving fantastical and precipitous cliffs, as at Villa Velha, near Ponta Grossa, where the softer strata have been entirely removed by the erosive influence of alternate sun and rain.

The Paraná and Uruguay basins are flanked by ranges of mountains classified roughly as triassic. The Paraná itself, and the Tieté, one of its principal tributaries, afford evidence of the great upheavals to which the country has been subjected. The many cascades and the tremendous falls of the Iguassú and La Guayra are nearly all due to intrusive dykes of eruptives, over which the rivers have had to force a passage. The famous red earth of the coffee zone in São Paulo is disintegrated trap.

Referring again to the Espinhaço, we find the older crystalline rocks are subordinated to a series of metamorphic schists, quartzites and limestones; these are

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sharply folded, and a newer series of sandstones (Itacolumites, etc.) and conglomerates rests unconformably in gentler folds on the upturned edges of the older rocks. The sandstones are diamondiferous, and the schists frequently rich in iron, manganese, gold, etc. The carboniferous limestones extend through Santa Catharina to Rio Grande do Sul, with small centres in São Paulo and Paraná. For economical purposes the scope of the present work is limited, not only through the want of adequate space, but more because the geological survey of the Republic is far from being completed, no reliable map being as yet published, or likely to be for some few years.

The immense and almost unexplored region between the Amazon on the north and the Paraná on the south, and defined roughly as bounded by Goyaz on the east and Bolivia on the west, and comprising the greater part of Matto Grosso and West Goyaz and São Paulo, has very few ranges of mountains of importance, and is largely forest land, with immense natural reserves of rubber-producing plants. Summing up, we may classify the rocks of Minas as Archean and Primary with schists, the soils as argillaceous and ferruginous silicates with calcareous basins. Those of S. Paulo as primary and Mezozoic, with trap-sandstones and limestones, with very composite soils out of the coffee zone. Espirito Santo has a large percentage of Tertiary rocks, with argillaceous silicates, limestones and humus. Paraná, Primary and Mezozoic, with sandy and composite soils. Rio Grande and Santa Catharina are largely a continuation of the northern formations, with plains of alluvial in the far south. The above applies principally to the zones under colonization in the above-mentioned states. From the point of view of economic geology, Goyaz, Piauhy, Maranhão and most of the other northern states are almost virgin terri

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tory, and the recent discoveries of semi-precious stones in the State of Rio itself may encourage prospectors. It should be distinctly understood that apart from iron, or manganese, whatever minerals are dealt with in the following lists are enumerated without any idea of leading readers to gather that their exploitation would be necessarily a financial success. No responsibility can be accepted for failure, and before entering into arrangements to float concerns for any mineral enterprise in Brazil, it is taken for granted that capitalists will be pretty sure of their ground first, as they would in undertakings of any other nature.

Palæontology

The pioneer of this science was undoubtedly Dr. Lund, and the results of his explorations may be seen in the National Museum at Rio de Janeiro, and in that in the Museum of Northern Antiquities at Copenhagen. The famous Danish scientist explored more than 250 caverns in the Lagôa Santa district of Minas Geraes. More than 100 species of Mammiferes were discovered, including an *Epus primogenios* with cloven hoofs, a variety of dog named by him *Canis spelaeus*, exceeding in size any living canine; a Pachyterium, an armadillo the size of an ox, also specimens of the Smilodon, with teeth 4 inches long, a Scelydotherium greater in dimensions than a rhinoceros, a Megatherium, Toxodon, llamas, etc. In all 115 species of mammals (50 genera). Fifteen of the species were completely new. The fossils were in many cases metamorphosed into marcasites and calcites. Dr. Ule, in his recent explorations of the limestone caverns of Yporanga in São Paulo, found in the grotto of Corrego Grande fragmentary remains of the Mylodon and Megatherium. At St. José do Rio

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Preto, in the same state, at a depth of 26 metres, many fossil remains were discovered, including those of saurians, and the gigantic miocene tortoise, similar to those from the Argentine pampas. Here, in the hard rock, below alternate layers of sandstone and red earth, well preserved bones of the dinosaurus and allegators were mixed up with pebbles, ferruginous clay, etc.

The Mylodon in the full page plate is mounted in the National Museum at Rio de Janeiro. This colossal sloth (some 3 metres in length), was evidently common in the interior of Bahia.

Other remains have been discovered in Goyaz, in the Turundundum cavern, some rib bones found in 1906 being 2½ inches wide. All the caverns and grottos in the valleys of the São Francisco and Rio das Velhas, as well as those extensive series in São Paulo, etc., are in common with the similar cavities in the rocks elsewhere, in limestone formations as a rule, a few being in soft sandstones.

Fossils of the Coal Measures

The most interesting fossil remains discovered in South Brazil were those of *Mesosaurus brasiliensis*, a reptile of small size, at its largest not exceeding a metre from tip of snout to end of tail. Many fragments of this saurian were found near Iraty station (S. Paulo-Rio Grande Railway), Paraná, in bituminous shales. It was an aquatic creature with a long jaw and numerous fine needle-like sharp teeth, well adapted to enable it to subsist on small fishes. It is considered by Professor MacGregor, of Columbia University, N.Y., to be a new type of proganosaurian. From the Permian rocks.

Scaphonyx Fischeri. This fossil reptile was discovered by Dr. J. Fischer, at Serrilo, Rio Grande do Sul (1902),

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Triassic age. It is considered to be the first fossil land reptile discovered in South America which clearly belongs to the fauna of Gondwana Land (Africa). Was examined by Dr. Woodward of the British Museum.

Erythrosuchus. This fossil reptile has been found at Santa Maria (Rio Grande do Sul), thus forming another link between the Santa Catharina system of Brazil and the South African karoo.

In Vol. VII of the archives of the National Museum at Rio an exhaustive account of most of the Brazilian invertebrate fossils is given by Dr. White, the American geologist who examined the coal measures recently, and the trilobites of the Devonian series of Pará are studied by Mr. Clarke in Vol. IX of the same publication, and Dr. Orville Derby, the director of the mineralogical department of the Ministry of Agriculture at Rio, is at present engaged in writing and editing a new work on fossils.

The fossils principally studied up to the present are those from the cretaceous rocks lying in detached basins from the River Amazon southward to 18°. In the opinion of Dr. White, this extinct fauna differs considerably from the contemporaneous remains found in any other part of the world. Of the eighty-two species of Conchifera examined, most are from the State of Sergipe, and the remainder from Pará and Pernambuco. The gasteropods are especially found in the River Piabas in Pará, and at Maria Farinha in Pernambuco ; cephalopods and echinoideas at Trapiche das Pedras Novas in Sergipe. The Conchifera are usually found in an imperfect condition, as well as the other genera, but they present many beautiful forms. The largest ammonites examined have a diameter of some 8 inches. Freshwater molluscs occur in calcareous layers in the shales at Monserrate, Bahia, and at São Thiago, near Pojuca

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station, 51 miles from the capital of the state. The varieties are Anodonta (four kinds), *Sphaerium ativum* and Pleurocera, Neritina, Planorbis and two varieties of Lioplacodes, all small fossils, none exceeding 1¼ inches in length. The type is quite modern, almost exactly resembling living molluscs.

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CHAPTER XX

MINERALOGY

Achroite (colourless tourmaline)

Found with the other varieties in Northern Minas Geraes.

Actinolite (allied to Nephrite—Jade)

Small clear crystals in schists at Ouro Preto.

Agates

The best are derived from Rio Grande do Sul, found as water-worn pebbles generally. Every variety is encountered, as well as jasper, onyx, sardonyx, chalcedony, cornelians, jaspers, etc., from the amygdaloidal and porphyritic rocks at 30° south latitude, running west up the Uruguay to the Rio Negro. In the Itaperica district, close to Paulo Affonso Falls on the São Francisco River, silicified fossil trees are common, and a huge trunk 70 feet long and 3 feet 8 inches at greatest diameter lies imbedded in the sandstone.

Amethysts

Found in almost all the states, but principally in Bahia, Minas and Rio Grande do Sul. In the latter state a great drusy cavity was discovered in the Serra

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do Mar, at 2,000 feet above sea level. From this deposit no fewer than 15 tons of crystals, more than an inch long and of the deepest purple colour, were extracted and sent to Dusseldorf Exhibition in 1902. Amethysts are also plentiful at Itaberava (Ouro Preto) and at Bom Jesus das Meiras (N.E. Minas Geraes). Specimens have been found half violet, half yellow, and a crystal 12 inches long and 6 inches in diameter was on sale last year at Bonn for £14. The export tax from Minas Geraes is 100 reis per gramme, or 4 per cent. of the estimated local value.

They are also found in Ceará in the Serra da Tauá. One in the British Museum weighs 334 carats.

Analcime

At Itapura (São Paulo).

Anatase (Octahedrite)

Common in the diamond-bearing gravels in Minas Geraes, in small clear crystals, often mistaken for the gem itself. Too soft for use as a gem. Occurs also in prisms in the schists and alluviums at Capão da Lana, near Ouro Preto, in company with the topaz. Is also found in the old gold washings at Valle de Ribeira, São Paulo. Found embedded in quartz and in detached crystals.

Andalusites

In fine crystals and rolled pebbles at Minas Novas, in different shades of grey, flesh, brownish red and green, frequently dichroic, when it is known locally as jacintho. Some from the Serra do Botucatú (São Paulo) are pale salmon pink. Quite suitable for a ring stone when perfect as it is harder than rock crystal.

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The principal district in which they are found is the first named. Sometimes they are hyacinth coloured in one direction and green in another. The rivers Santa Maria, Urubú, Calhão, etc., contain many of these stones.

Anthophyllite

In the Itabirites, near Ouro Preto.

Apophyllite (Albin)

Found at Araraquara, São Paulo.

Apatite

Common in the limestone region of Jacupiranguinha (São Paulo) and near Salinas (N.E. Minas Geraes). Softer than any ornamental stone.

Aquamarines

Found in all shades, from bright to pale blue and greenish blue, graduating to colourless. Abundant in the districts of Minas Novas, Arassuahy and Theophile Ottoni. The principal area commences at the Itamarandubа River, thence north-east to the River Piauhy, near the mouth of the Arassuahy and north to Boqueirão, Porteiras and Salinas. They are found in decomposed pegmatites or in the surrounding debris. In 1910 a Syrian named David Mussi found an extraordinary crystal at Marambaia (Arassuahy).

This is by far the largest precious beryl ever brought to light. In form almost a perfect prism, its length is 45 centimetres, greatest diameter 38 centimetres, and girth 123 centimetres. The colour is a perfectly transparent greenish blue. It was taken out of a cata, or pit, dug in

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the pegmatite vein. It weighed 110½ kilos. Sold for £5,133 in Bahia, it was sent to Idar to be cut. The first large aquamarine found in Brazil was discovered at S. Matheus (Minas Novas) in 1811. It weighed 15 lb., and was accompanied by one of 4 lb. In 1814 during some excavations at Vallongo (Rio Janeiro) a crystal of 14 lb. was taken from the granite and sold locally for £1,500. Another, 7 inches long by ¾ in. thick, fetched £600. A fine greenish blue crystal shown at Brussels Exhibition in 1910 was valued at £2,000. Some gem stones have been found in the River Goaratubá (Paraná). The export tax in Minas Geraes is 4 per cent. or 4$000 a kilogramme.

Arsenic

From Minas do Rio de Contas and Cannabrava, in the State of Bahia.

Asbestos

Large deposits in Minas Geraes at Taquaral (Ouro Preto). Found in several other states, but in small quantities.

Atopite

In manganese workings at Miguel Burnier (Central Railway). Occurs in red and honey-yellow octahedra in Psilomelane. Retail price of specimen crystals, £1 to £5.

Barium

At Araxa in green masses, and also white from Antonio Pereira.

Bindheimite (Antimonate of Lead)

At Morro do Bule (Ouro Preto).

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Bismuth

Sulphide (radio-active), combined with uranium at Encruzilhada (Rio Grande).

Blende (Sulphuret of Zinc)

At Henrique Hargreaves, and in the eruptive rocks of the Parahybuna, and in contact with calamine and argentiferous galena, at Abaeté and other localities in Minas.

Cadmium blende (Greenockite)

At Santa Luzia and Bomfim, State of Bahia.

Cerussite (with **Galena**)

At Gonzaga do Campos (São Paulo).

Chalmersite

A new mineral from Morro Velho mine. Bronze-yellow and reddish cryesalbite. Fine specimens very rare.

Chrysoberyl and **Cymophane** (cat's eye)

Yellow green, golden yellow and brown. Usually found in the Minas Novas district in pebbles not larger than a bean, in the valley of the River Gravatá and its tributaries, in the Serra do Urubú, and in the Neves and Novo streams, and in the rivers Piauhy and Calhão, in quartz veins cutting through gneiss, and in auriferous clays and gravels.

Mame in his book on Precious Stones, published in London in 1816, speaks of a chrysoberyl nine-tenths of an inch in diameter, and six-tenths deep.

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Chrome

Crystals of chrome and chromite of lead are found in micaceous schists at Congonhas do Campo (Ouro Preto), and chromate of iron in the serpentines of the same state.

Cinnabar

In various parts of Minas, especially in Tripuhy (Ouro Preto).

Citrine (False Topaz ; also Smoky Quartz)

Splendid crystals have been found in the Serra dos Crystaes (Goyaz), one of which, a clear yellow brown, was $4\frac{5}{8} \times 4$ inches and valued at £8. This variety of quartz occurs in most of the states, and masses of gem quality are found in the lower parts of the Serra da Estrella near Rio de Janeiro. It is common in Minas, Rio Grande do Sul and Bahia. Colour varies from smoke grey, brown, yellow brown to opaque black. Commonly sold by jewellers and even stone merchants as topaz, but may be easily scratched by a point of the true topaz, and is also much lighter, and possesses no dichroism. A golden-yellow gem weighing 875 carats was bought in Rio for £100, to be presented to Mascagni, the celebrated composer. A beautiful stone found near Petropolis weighs (cut) 108 carats.

Coal and Coal Fields

Bitumen and Petroleum, etc.

For the following matter the author is indebted to the comprehensive report of Mr. J. C. White, the American engineer employed by the Brazilian Government in 1904–6 to study the coal measures of the south.

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The deductions to be made from this report are, in brief, evident submersion of the coast-line from Rio de Janeiro southwards, indicated by the absence of raised beaches and the depth to solid bed rock, varying from 49–65 feet at Rio de Janeiro to 320 feet at Pelotas (Rio Grande do Sul). There appears to be no evidence of recent glacial action, but glaciation is considered to have occurred in the early Permian period of geological history. In Santa Catharina the surface of the ground is frequently covered with transported boulders, some of which are 10 feet each way, embedded in the clay slate or killas, far from any outcropping of the granite. On the central plateau, in western Minas Geraes, facetted pebbles are found in large quantities which are facsimiles of similar stones in the dwyka conglomerate of South Africa, in about the same latitude, i.e., 25–35° south. In the four southern states we find limestones of various characters, as well as other metamorphic rocks of pre-carboniferous age.

In Paraná there are Devonian beds of shales and sandy schists passing into massive conglomerates.

At Xarqueadas, in Rio Grande do Sul, on the property of the S. Jeronymo Railway and Mining Company, a deep boring gave the following result :—Shales and sandstones to some 1,000 feet, with 10 centimetres of coal at 275 metres 78 centimetres, and 6 feet of coal below 278 metres 78 centimetres, and veins of 60 centimetres, 13 centimetres, 80 centimetres, and 30 centimetres intervening between 278 metres 78 centimetres level and the bottom of the boring.

At another trial, 18 kilometres southward of the first, a vein of 13 feet in thickness was found, as well as fourteen small ones, totalling 7 feet 3 inches, in a depth of 654 feet.

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The Rio Bonito beds near Minas, Santa Catharina, have been measured, and correspond as below :—

COAL

Total depth of boring 190·051 metres ; number of veins of coal, six ; entire width of veins, 4·379 metres. Boring was made through clay, shale, and slate. Many other sections were cut in the same field, and veins of coal were penetrated, varying from 30 centimetres to 3 metres in thickness. The total thickness of the narrow veins of coal at Tuberão is about 10 feet.

The Candiota seam at Rio Grande do Sul consists of four veins separated by clay bands. They are 4 feet, 6 feet, 8 feet, and 10 feet in thickness. Below the coal is :—(1) ironstone (hematite), with very high percentage of metal ; (2) sandstone ; (3) limestone, with veins of calcite (Iceland spar), and deposits of graphite, and mica schist.

The coal measures of Santa Catharina seem to be continued into Rio Grande, and to throw offshoots into Paranã, but these latter are hardly worth attention. The S. Jeronymo Company has a monthly sale of some 1,500 tons at present, and national coal is now being used by the Brazilian Lloyd steamers, and by various electrical works in the south.

Analysis shows the coal (taken from twenty-one different localities) to be fitted for briquettes, more than for use in the ordinary way. Thus prepared, it has a fuel value about the same as that of a good class (Anchor Brand) Cardiff briquette.

The conclusion of Mr. White is, that Brazilian coal can successfully compete with that imported, if the former is properly prepared.

A briquetting plant is estimated to cost, ex Köln

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(Cologne), Maschinenbau Humboldt, £11,466, apart from woodwork and belting and freight. Capacity, 30 tons per hour.

A new field has been discovered at Quixambinha in the State of Pernambuco. The area is about 18 square leagues, and the mineral is found at a depth of some 65 feet, under clay mixed with a compound of sand and carboniferous matter. The percentage of carbon is 58·733, and the average amount of ash is 20·520 per 100 grammes.

Petroleum has recently been discovered at Ibitinga, São Paulo; a low grade asphalt occurs in the sandstone at Bofete, and a vast sedimentary deposit of bituminous shale exists along the River Parahba, at Taubaté, in the same state, containing 21·41 per cent. of carbon suitable for gas making, and formerly worked for oil.

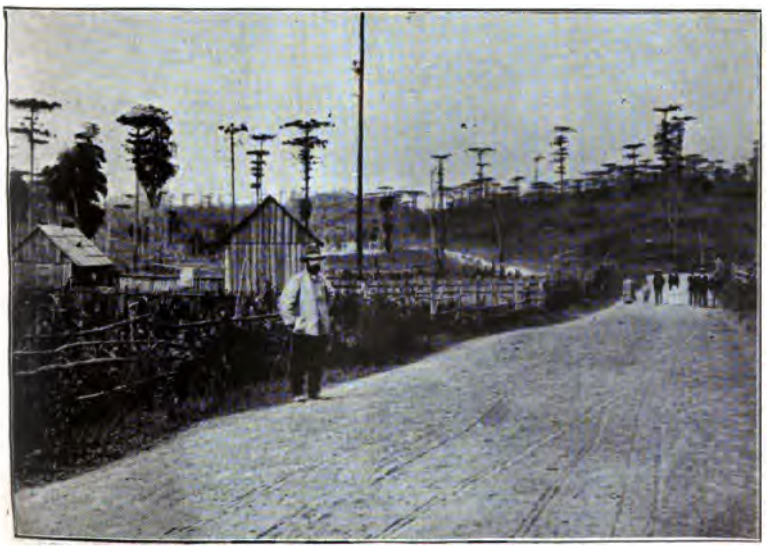
Boghead. The deposits at Camamu on the Marahu River are capable of yielding gas of high illuminative power, and each ton should yield three barrels of oil, and extracts of benzine, phenol, etc., up to the value of £8. There are many places in the States of Bahia, Minas, Espirito Santo and São Paulo where extensive deposits of peat occur, and a concession has been given to a company to work those near Macahé. This mineral differs very much from that common in Europe. There is hardly any trace of vegetable fibre to outward appearance, the substance being compact. There are two great fields of lignite in Minas, one at Gandarella, and the other in the basin of Fonseca.

The basin of Gandarella is 10 leagues from Ouro Preto, and 6 from the station of Raposas (Central Railway). The thickness of the mineral is about 18 feet, and it contains 40 per cent. of volatile matter, and 48 per cent. of fixed carbon. One hundred kilos produce 22 cubic metres of gas. The second deposit named has

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VALLEY DAS ANTAS, RIO GRANDE DO SUL.



IVAHY COLONY, PARANÁ.

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CASCATINHA, PETROPOLIS.



CITY OF MARIA MAGDALENA, STATE OF RIO JANEIRO.

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never been properly examined, but its richness is somewhat less, having almost 18 per cent. of ashes.

A company is now working at Bom Jardim (Minas Geraes) a deposit of lignite and peat, the latter of which contains 7·5 per cent. of ash, 8 per cent. of water, and 62 per cent. of carbon. Briquettes of very good quality are being produced.

Substitutes for Coal

Pirí-pirí (*Papyrus brasiliensis*). A process has quite recently been perfected by Professor Hoering, and a technical report presented to the Egyptian Government by Dr. Hollander, of the Berlin (Charlottenburg) College, is most encouraging, from the point of view of the utilization of the vast quantity of this plant found in the swamps near Rio de Janeiro. A company has been floated in London (February, 1912) to exploit the Egyptian deposits, and there is no doubt whatever that a great opportunity lies in front of capitalists prepared to take out a licence and exploit the plant in Brazil. Analysis of prepared stalks gives 89 per cent. of combustible matter. A factory capable of turning out 50,000 tons of briquettes yearly will cost £35,000 to erect in Egypt, and probably considerably more in Brazil, but the cost of production should not exceed £1 per ton and the sale price reach 30*s.* a ton easily. This plant is a great hindrance to navigation, and its growth is so rapid, that when cut down to the water's edge, it springs up again several feet in 6 weeks. Expenses in Egypt are assumed not to exceed 12*s.* a ton.

Cobalt Bloom (Erythrite)

Found with asbolite and wad, near Tijuco (Diamantina).

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Columbite (Tantalite)

Occurs near Ramalhete, Peçanha (Minas). A block weighing 3 kilos was shown at the Centenary Exhibition at Rio de Janeiro (1908). Samples from S. Anna de Suassuhy weighed several kilos, and were taken out of a deposit of mica. They contained $77\frac{85}{100}$ per cent. of niobic and tantalic acid, 14·20 per cent. of protoxide of iron, and 5·5 per cent. of manganese, and 0·28 per cent. of tungstic acid.

Copper

The principal deposits are at Camaquam (Rio Grande do Sul). The mineral occurs here in gabbro and sandstone. Four veins have been worked, and the ore concentrated on the spot to 28 per cent. pure. Each ton of mineral contains 30 grammes of gold. Exportation in 1907, 1,464 tons. In Serra Martinho, the mineral is a sulphuret, with pyrites, and contains 7 to 25 per cent. of copper. In the State of Bahia the Carnahyba deposits are in the form of carbonates, with some 4 per cent. of pure mineral. The field is large, but at present is unworked. There are also copper deposits at Minas de Pedra Verde in Ceará, and at Grajahú in Maranhão.

A large mass of native copper is exhibited in the University Museum in Lisbon. It was found isolated in Bahia, and no other pieces of any size have ever been discovered. Its weight is 1224 kilos. It was excavated at Cachoeisa, 120 kilometres from the capital of the state, and sent to Lisbon in 1782.

Cyanite

Found at Itabira, in the iron deposits, and at Cova da Onça (Ouro Preto) and Valle da Ribeira, São Paulo. Sometimes the crystals are large enough, and of suffi-

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ciently clear blue colour to cut, but it is unfit for a ring stone owing to its softness—5¼ (Moh's scale)—and its brittle nature.

Delessite

Chlorite, from Paranápanema (São Paulo).

Derbylite (Antimo-titanite of Iron)

A new mineral at Tripuhy (Ouro Preto).

Desmine (Stilbite)

Fine crystals found in the Serra do Botucatú (São Paulo).

Diamonds

Diamonds were first discovered by a gold miner named Bernardo da Fonseca Lobo, working a place in the Morrinhos River near Diamantina in the year 1721. The stones had, however, been used as counters. The Portuguese Government speedily imposed the most rigorous conditions for the exploitation of the industry, and all freemen were banished from the region except those who were charged with the supervision of the slaves, and the protection of the convoys. In 1732 no fewer than 40,000 men were employed in the State of Minas, and from 1732 to 1771 Brazil exported 1,666,569 carats, worth £3,600,000. During the eighteenth century the stones were sold in parcels by contract, the Government at Lisbon entering into arrangements by which the whole of the proceeds of the mines was turned over to the firm interested at a given price. To put up the price, they were in many cases sent from Brazil to Goa, and thence to Portugal, and disposed of as Indian stones, to turn the tables on those who sneered

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at the idea of Brazilian diamonds. The formation, however, resembled very much that of the Asiatic fields.

The average rate for rough stones from 1743 to 1790 was only 9 milreis a carat. The diamond fields were thrown open in 1832, but the supply had then fallen off considerably. The discovery of a gem of 18 carats sufficed to free any slave, and the greatest care was taken in the supervision of the workers to avoid stealing, but in spite of every effort a great deal of smuggling took place, one tropeiro (muleteer) travelling to and from the capital many times with the barrel of his matchlock full of stones, until he was denounced by a jealous comrade.

Brazilian stones are considered to be 50 per cent. better on the average than those from the Cape, owing to the constant attrition they have undergone for many centuries, thus removing all impurities and incidentally providing for the survival of the hardest and most flawless stones. The largest piece of amorphous diamond, or boart, came from Bahia in 1895. It weighed 3,078 carats, and at present prices would be worth £50,000. The main source of the diamond lies in an area extending some 200 kilometres from north to south, and a hundred from east to west, but the gem has been found in various localities, extending from Northern Bahia to Paraná and Matto Grosso, or from about 10 to 25° south latitude. It is, however, quite possible that the gem may be found in the north of Brazil, and in that part of Guiana within the confines of the Republic. The diamonds in Matto Grosso are presumed by Dr. Arrojado Lisboa to have come from the thin layers of old conglomerates which have almost entirely disappeared, and which rest on the sandstones at the base of the central tableland. Where the rivers are rapid and the country hilly, the climate in most of the diamond fields

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is quite healthy, but in certain swampy districts in Bahia mosquito nets should form part of the prospector's equipment.

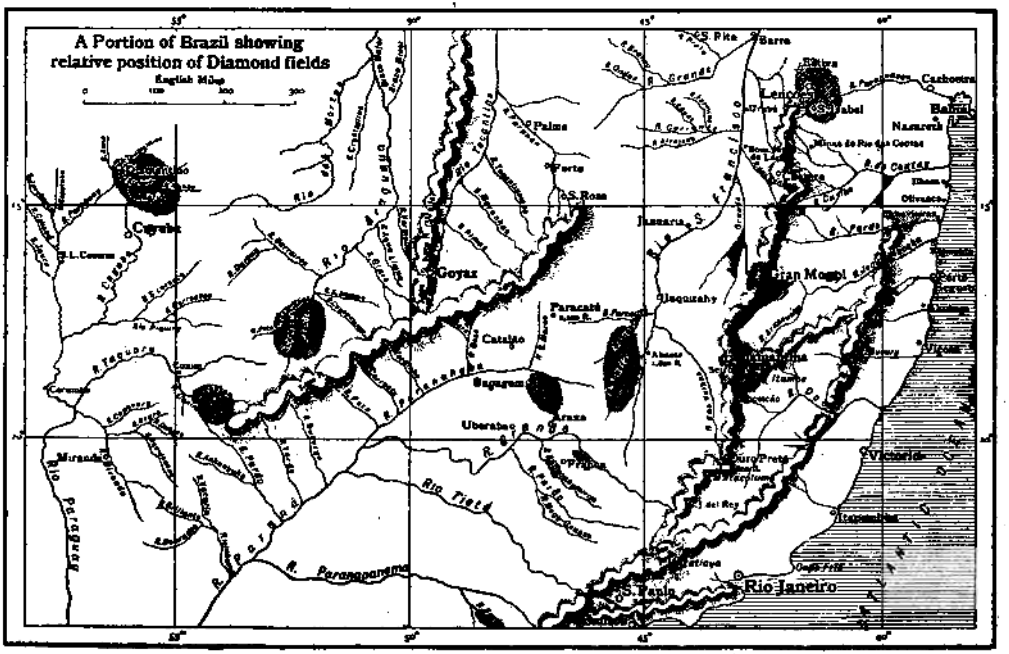
Diamond Fields

That of Diamantina is one of the most important. The city is situated 800 kilometres north-west of Rio de Janeiro, and 250 miles in a direct line from the sea coast. It is accessible *via* the Central Railway to Curvello or Curralinho Stations, thence some 2 or 3 days on mule back. A railway is in course of construction from the latter place, and has reached beyond the Rio das Velhas, and another line from the coast at Victoria (Espirito Santo) is under way. The elevation of the district is from 3,500 to 5,700 feet, and the city is situated 18°29′ south and 43°30′ west.

Here are the head waters of the Jequitinhonha, Arassuahy, and Doce rivers. In 1904 there were two lapidaries at work, with sixty wheels, each of which cut 10 carats a month at a cost of 5 milreis a carat, female labour of course being employed. There is one lapidary in the city of Serro, lying to the south. This area is full of deep ravines, worn by a multitude of streams arising in a saucer-like basin that is filled by the drainings from the tops of the isolated chapadas. This origin of rivers is common in Brazil. The ground in the small hollowed-out plateaux is damp and spongy and studded with clumps of high grass. The outer scarps are very precipitous, and in the summer the streams soon attain a rapidity and volume that works out potholes in their beds where the diamond is most likely to be found. In 1847 one of these potholes yielded 10 lb. weight of diamonds and 28 lb. of gold.

At S. João da Chapada, 12 miles north from Diamantina, in a range running north-west for 6 kilo-

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A Portion of Brazil showing
relative position of Diamond fields
English Miles
0
100
200
300
Cuyaba
Goyaz
Palma
Porto
S. Rosa
Jussaria
Paracatú
Cattalão
Sagarana
Uberaba
Franca
Uzquisahy
Pitanguy
Ouro Preto
Victoria
Rio Janeiro
S. Paulo
Rio Tieté
R. Paranapanema
Rio Pardo
Rio Grande
Rio Francisco
Rio Paraguay
S. Pita
Barra
Caxoeira
Nazareth
Ilheos
Olivaceo
S. Isabel
Leme
Rio Doce
R. Pardo
R. Mucury
R. Jequitinhonha
R. Paraguay
R. Cuyaba
R. Arinos
R. Tapajos
R. Madeira
R. Guaporé
R. Tocantins
R. S. Lourenço
R. Sapucahy
R. Grande
R. Paraopeba
R. Verde
R. Preto
R. Pomba
R. Muriahé
R. Itabapoana
R. Itapemirim
R. Itapicurú
R. Pardo
R. Contas
R. Jacuhype
R. Paraguassú
R. Jacuhype
R. Jacuhype
R. Jacuhype

metres, some £6,000 worth of stones were taken out in 1910.

The gems are found in a sort of blue clay deposit, in beds a few feet in thickness, inter-stratified through a great mass of multi-coloured clays, stained by oxides and organic matter. The surrounding rock consists of sandstones and schists. The stones here are quite small and of a greenish colour, not averaging above 6 to 8 grains each. The two mines (Barra and Duro) were visited by Dr. Orville Derby. They were abandoned for many years.

At Boa Vista (Diamantina) operations are still proceeding by means of electric power, and at Serrinha (Curralinho) satisfactory results are obtained.

At Grão Mogul, 100 miles north of the city above mentioned, the gem was taken out of the Itacolumite rock itself.

In Paraná, in sandstone quartzites, the rivers Tipagy, Pitangru, Yapo, etc., contain diamonds, especially in potholes, the best results being obtained where the conglomerate is formed by a hard blue cement, somewhat similar to the blue ground in South Africa. The largest stone found was worth £60. The gems are small, irregularly shaped, but of fine quality (see the *Geology of Parana*, Dr. Orville Derby. Archives of the National Museum, Rio, vol. iii, 1878).

The diamond-bearing quartzites of Brazil consist of 98 per cent. silica and 2 per cent. of oxides of iron and aluminium.

The small deposits in the Paranápanema, Paraná and Rio Verde in São Paulo are a continuation of the Minas diamond fields.

The beds in the Abaeté and Somno rivers are alluvials and gravels, and recent tests have yielded $\frac{2}{16}$th to $\frac{6}{16}$th carat per cubic metre, at easily accessible depths.

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THE DIAMOND FIELDS OF CENTRAL BAHIA

The Lençoes and Sincora fields are reached from Bahia, either by rail to Queimadas, and thence to Joazeiro on the upper São Francisco River, and so by mule the rest of the journey, or by steamer to Cachoeira across the bay, and on to the present rail head at Bandeira de Mello, about 254 kilometres due west. From this latter place a fairly well beaten track leads to the diamond district through scrubby second growth called catinga, and although the climate is hot, it is as fine and healthy as can be found.

The matrix, according to Professor Branner, appears to be quartzite, with nearly vertical beds, whilst the country rock is composed of granite, gneiss, schists, and old eruptives. The series containing the diamonds, besides the quartzite, comprises itacolumite and conglomerates, and the total thickness of the formation is about 2,200 feet. The matrix is of carboniferous age. Dr. Branner has the credit of being the first to study the geological sequence of the rocks of Central Bahia, and his discoveries are of the greatest value from the point of view of economical exploitation of this diamond field. Strange to say, although the derivation of the gem may be said to have been finally discovered, yet very few prospectors have seen the stone *in situ*; almost all the diamonds are found in the débris in the streams, the conglomerate in the dry diggings, or in the banks of the rivers, or in pockets below the gravels in the bed rock. Though the most elementary methods have been employed for centuries in winning diamonds, yet the search in all easily accessible localities has been so thorough (as far as the surface gravels are concerned), that it is only in the most out of the way places that the ordinary prospector can expect to find a bonanza.

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THE DIAMOND DISTRICT, MINAS GERAES, CACHOEIRA DAS CAETAS.

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By courtesy of the] [*Diamond King Mining Company.*

LAPIDARIES AT WORK, DIAMANTINA.

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Dr. Branner says that the pink quartzites are the main beds, and the streams rise and flow through these rocks everywhere in the Bahia field. The theory is that (according to geological evidence) the gems come from these beds (lavras). It must be noted that no eruptive rocks occur in direct connexion with the lavras, and therefore the diamond cannot be derived from the former. There is, however, a remote possibility of their having originated in peridotites of the old crystalline series, and finding their way into their present matrix after several geological periods, favouring the hypothesis that the latter is their original place of creation.

Recognition of the diamond-bearing formation determines the area in which the gems may be found, or at least in such quantities as would pay for exploitation on a large scale. The most productive area up to the present lies between Sincora on the south, and Morro do Chapeu in the north. This may be due to one of two reasons, either the richness of the deposits, or to the abundant water supply. The stones are not confined to any particular part of the lavras. At Morro do Chapeu they are found in one section of the series, and at Lençoes and Andarahy in another. At Mosquitos there is a sharp line of demarcation between the upper (productive) beds and the lower (barren) ones. The deposits are in all probability the richest in the hitherto unworkable swampy districts, where dredges would be necessary to deal with the gravels buried beneath 20, 30 or more feet of sedimentary deposits and water. It should be also noted that for many years prior to the discovery of the value of the black or amorphous variety, the stones were thrown away and found a resting-place in these very alluvials. Above Bandeira de Mello boats may be used on the river Paraguassú, and the railway will soon be extended to Andarahy and Len-

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çoes. It is interesting to note that the white and highly coloured stones have their angles straight, and the neutral tinted gems rounded.

Itapicurú (Bahia). During 1908–10 a somewhat extensive discovery of diamonds has been made, and it is probable that this small field is a continuation of that of Central Bahia.

The carbons are difficult to distinguish from the ferrous pebbles amongst which they are found, as they have hardly any lustre. They resemble scraps of scoria from a furnace more than anything else.

Diamonds with flaws, or the rough skin very common to Brazilian stones, are put into a crucible at cherry red heat, heaped round with charcoal and submitted to a blast for 3 or 4 minutes, when the crucible is removed from its charcoal bed and a tablespoon of nitrate of potassium thrown over the stones, and the vessel shaken and held over cold water. As soon as the fumes have gone, the gems are taken out, washed and counted, and are found to have lost some 8 per cent. in weight, but doubled in value. The old workings in Bahia are now being washed to recover the carbons formerly thrown away, and there is very little scope for the prospector, except above Andarahy.

In the Minas Geraes fields, as elsewhere, the potholes and deep pools are of course the richest, but frequently an immense amount of débris from ancient workings has been deposited on the diamond-bearing cascalho, in the lower parts of the rivers.

The deposits above water level have also proved worthy of attention. The Abaeté River is some 170 miles long, and varies in width from 200 to 500 feet. Its course is between the Serras Canastra (east) and Matta da Corda (west). The cascalho (gravel) contains jaspers, garnets, gold, platinum, osmium, and iridium.

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besides some thirty other minerals, more or less rare. The Somno flows into the Paracatú, and has a total length of 140 miles. The table-lands consist of itacolumite and schists, containing sand and clay. The upper series is a grey weathered sandstone. The formation in the Somno gravels consists of pingos d'agua (rolled quartz pebbles), jaspers, black tourmalines, limonite, rutile, kyanite, martite, and gold, and an abundance of small garnets. The whole of the rivers in this district, and the small plateaux between, are diamondiferous, and contain gold in connexion in almost every case.

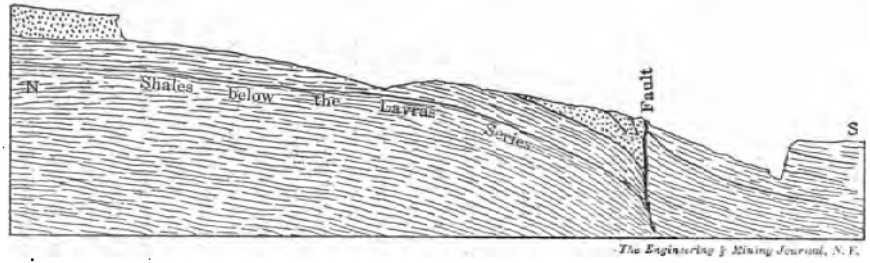
Bagagem and Agua Suja

Bagagem (now Estrella do Sul) is 11 leagues from Araguary (terminus of the Mogyana Railway, São Paulo), but it is situated in Minas Geraes on the River Bagagem, a tributary of the River Paranahyba. The elevation of the country is from 2,500 to 3,500 feet. The distance from Diamantina is 250 miles, and it is situated in latitude 19° 50′ S. and longitude 47° 30′ W. Here the Dresden diamond was discovered, as well as the Estrella do Sul. Agua Suja is some 12 miles from Bagagem. The geology of the district consists of schists with granite dykes, crossed by quartz veins, overlaid by level beds of sandstone, having layers of trap intercalated. In conjunction with the diamonds here are staurolite, rutile, anatase, tourmaline, phosphates, mica, garnets, and pingos d'agua. A large diamond has been found at Uberaba, 60 miles from Bagagem. This town is accessible by rail. Although the Bagagem and Agua Suja workings have been neglected for many years, the discovery of a very fine diamond in 1910 at the former place has revived local interest, and many people are again engaged in searching for the elusive gems.

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Section across Pico Nabuco, showing diamond-bearing beds at the summit, and caboclo shales below.



N.W. section across Riachão da Boa Sorte.
Sitio Cachoeirinha, near the village of Alagoinhas, showing the diamond-bearing strata between the shales, through a fault.



Section N.W. to S.E., from the River São Francisco to the Salitre valley. Showing the general geologic character of the country, for a distance of about 160 kilometres. (By the courtesy of *The Engineering and Mining Journal*, New York.)

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Goyaz

Although many of the rivers are known to be diamondiferous, no systematic exploration has been made. In the early part of 1911 a prospector came into the capital of the state with over three hundred fine stones, found in the Rio Graça, a tributary of the Araguaya.

Matto Grosso

The principal seat of the diamond mining is the River Coxipó Mirim. The depth of cascalho varies, but the maximum is about 14 feet. The satellites are extremely numerous, and comprise various jaspers, amethysts and chalcedonies, rose zircons, anatase, almandine garnets, white topazes, sphenes, native silver, etc., etc. The diamonds are small, the largest found being 5 carats. The form is usually dodecahedron with well curved faces. The surrounding formation is schists and quartzites. No carbonates or boart is found.

Several dredges have been at work in this river.

Cannavieiras District (Salobro)

The route is by steamer from Bahia, or Rio de Janeiro, and thence 56 miles up the River Pardo by canoe to Jacaranda, and on 12 miles by mule. The place is a swampy marsh consisting of the ancient river bed, and the cascalho is found beneath 15 feet of soil and whitish clay, and the work is rendered difficult by the alternate wet and dry seasons, in which latter there is frequently insufficient water to wash the gravels.

Method of Winning Diamonds in Brazil

The diamond industry in Brazil is carried on in quite a different way to that of South Africa. There are no

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great companies that hold a monopoly of the gems in a very extensive area; and, of course, there are no equivalents of the I.D.B. laws; indeed, such a thing would be quite impossible in Brazil. A licence is easily obtained, and the whole of the diamond fields are full of isolated prospectors, and small groups of men that have amalgamated their capital.

They use the following simple tools: A batea, or basin of hard wood, in which the gravel is washed; a carimbé, similar to the batea, but smaller, and used to carry earth or gravel to a distance when water is not available on the spot. The other implements comprise a crow-bar, a scraper or hoe, and a scoop for clearing out holes, as well as a hammer to break up the masses of conglomerate.

Some of the miners dive into potholes, taking down with them a small canvas bag, kept extended by an iron ring. They fill this with gravel and rise to the surface, continuing until sufficient material has been accumulated to last them for some time. Those more up to date employ a primitive sort of diving-suit, or even an old-fashioned kind of diving bell. In this case, one or more canoes are employed. Where sufficient capital is available, the bed of a stream is turned, and a dam constructed.

Storekeepers sometimes make advances and supply provisions, tools, and other necessaries. Others buy claims, and secure perhaps 25 per cent. for allowing more impecunious miners to do the rough work. They take good care, however, to wash the pay-dirt themselves, or to entrust this to those in whose good faith they have confidence. Travelling merchants buy up stones here and there, but most of the trade is done in Bahia. The bulk of the gems go to France, Germany, and the United States.

The miners work only in the dry season, three or four

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together in line, the first with the largest Batea, sometimes 45 inches in diameter and 12 inches deep, and the last one with a small pan, sifting the finest gravel and sand, whilst women go through the débris to pick out the stones which may have been missed. The large pieces of conglomerate are broken by means of a hammer weighing 20 kilos. Explosives are used to break up the boulders blocking streams, so as to get at the pockets, usually the most productive places.

In Matto Grosso and Minas Geraes several dredgers and elevators have been at work during the last 2 or 3 years, but results have not been divulged. The great difficulty to combat is the immense depth to bed-rock in many places, and the interruption to navigation by rapids and waterfalls. What seems to be needed is a light, easily portable dredger, with ability to go down to bed-rock, as much as 40 feet sometimes below the ordinary level of the rivers. At the same time it is a *sine qua non* that expenses be cut down, as that is a very big item, especially in the case of a large dredger. In Bahia and Minas Geraes lands are usually sold to the highest bidder. One good feature of the laws of this state is, that in the case of disagreement between the owner of land and a company proposing to exploit the minerals thereon, the Government acts as arbitrator, fixing the value of the property. Again, no one may refuse leave to prospect undeveloped properties.

PRICES IN BAHIA FOR ROUGH STONES IN 1910

Bons (fine stones), 25*s.* to 50*s.* a carat.
Vitriers (small, but good), 50*s.*
Fazenda fina (small coloured gems), 40*s.* to 45*s.*
Melée (imperfcet), 20*s.* to 25*s.*
Fundos (small, off colour), 10*s.*

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Export tax (Minas Geraes): Rough, 152 $800 a gramme; cut stones, 450 $000 = 1 per cent.

Diamond weights. Oitava, 16 to 17½ carats (nominally). Oitava really equals 32 vintems. 1 vintem ½ carat = 1 1/16th drachms avoirdupois. 4 graos = 1 quilate (carat), 2½ grains (1 vintem). Otavo = 3,586 grammes or 64 grains.

Senhor Augusto Brill, of Avenida Central, Rio de Janeiro, has kindly furnished me with the following figures regarding local prices (1911):—

Rough diamonds up to ¼ carat, 15 $000 to 40 $000.

Rough diamonds from ¼ to 1 carat, 50 $000 to 80 $000.

Rough diamonds from 1 to 2 carats, 80 $000 to 130 $000.

Above 2 carats no fixed rates.

Brilliant cut stones up to ¼ carat, 80 $000 to 120 $000.

Brilliant cut stones ¼ to 1 carat, 150 $000 to 250 $000.

Brilliant cut stones 1 to 2 carats, 300 $000 to 450 $000.

Diamond cutting was carried on in the National Mint (Rio) from 1812 to 1830, and from 1870 to 1873 in Bahia, after which it was commenced in Diamantina.

Some Brazilian Diamonds

The River Abaeté produced a stone of 161½ carats in 1797, and another of 48 carats later, and Curralinho one of 70 carats (1806). The Bagagem district is famous by reason of the discovery of the Estrella do Sul in 1853, weighing in the rough 255 carats or 52,276 grammes and 125 carats cut (see illustration—natural size), and the Dresden green of 119½ carats. In 1910 a third gem was encountered and has been named the Estrella de Minas —the weight 175 carats ($35\frac{8}{10},\frac{754}{000}$ grammes). Dr. Orville Derby, chief of the Mineralogical and Geological Department of Brazil, writing in the September, 1910, number

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of the *American Journal of Science*, advances the theory that the three above-mentioned diamonds were of the same original form, i.e., that of a combination of curved faces, constituting a dome rising from a plane surface. The reproduction, from a photograph of the Estrella de Minas, gives a somewhat false aspect owing to distortion by optical effects, and is somewhat less than natural size. Its greatest length is 38 millimetres, width 22 millimetres, and height 23 millimetres. This gem is now in the possession of Messrs. Durisch, of Rio Janeiro—at least, they so inform me (August, 1912).

Quoting again from the eminent authority first named, the upper Paraná diamond field and that of the Abaeté are the only ones in Brazil that have produced large gems. In 1906 a stone of some 600 carats was discovered in the River Verissimo in Southern Goyaz, not very far from Bagagem, but was unfortunately destroyed by being tested on an anvil with a sledge-hammer. A parcel of fragments shown to Dr. Derby contained nothing of note, the largest piece cutting an 8 carat stone only. The stone when found must have measured some 60 × 36 × 16 millimetres. A splendid brilliant, near to ruby red in colour, weighing 2¾ carats, fetched £3,000 in London in 1909. This diamond dated from Colonial times. A vivid green one of 2½ carats came from Douradinho in 1906, and two blue-white ones of 21 and 36 carats. Senhor Luiz de Rezende, a merchant of Rio de Janeiro, has a very fine collection of coloured stones, but owing to his absence in Europe details are not forthcoming for the present edition of this book.

In 1811 one stone of 36 carats, one of 26, 21, 15 and 14 carats, four over 10 carats, fifty-eight over 5 carats, and 765 from 2 to 5 carats were sent to Lisbon. In 1818 thirty over 5 carats, and 625 from 2 to 5 carats

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were also exported. The Irish Crown Jewels, valued at some £50,000, consist (as far as the diamonds are concerned) of Brazilian gems only, and many ancient stones of value are derived from the same source. Edwin Streeter in his book on Precious Stones says that Minas Geraes produced in the first 20 years 144,000 carats of diamonds. Up to 1850 5,844,000 carats worth £9,000,000 were sold, and some £2,000,000 worth of contraband stones escaped the hands of the authorities.

In 1909 there were 456 claims in the Diamantina district producing gems worth £200,000, from an area of 250,000 hectares. In 1911 there were 437 claims in Minas.

The Prince Regent is said by Mawe (*Journey to Brazil*, 1810) to have possessed no less than £3,000,000 worth of rough diamonds.

Total probable exportation of diamonds in 175 years, i.e., up to 1903, 4 tons. Carbonados, from 1894 to 1903 = 23,466 grammes.

EXPORTATION, 1908–9

To	Carbonates (Boart). Value, 1908.	Value (paper), 1909.	Diamonds. Value, 1908.	Value (paper), 1909.
Great Britain .	78,738$	303,745$	155,067$	63,932$
France . . .	99,430$	161,824$	162,823$	128,973$
U.S.A. . . .	268,514$	119,898$	300$	1,164$
Belgium . .	—	—	1,905$	—

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TOTAL EXPORTATION

1910–1911

	1910.	1911.
Carbonates . .	41,966 $ paper	197,032 $ paper.
Diamonds . .	43,531 $,,	319,918 $,,

Data furnished by the Commercial Museum, Rio de Janeiro (August, 1912).

Undoubtedly many fine stones are sold in London as South African, as the De Beers Company is the largest buyer of Brazilian diamonds. It is somewhat a mystery, however, where the Brazilian gems do go to, as enquiries in London last winter were fruitless, and judging by the inferior quality there are very few of the best Minas or Bahia gems on the European market. Careful search in the windows in Lisbon failed to bring to light a single fine blue-white stone.

Disthene (see Cyanite)

Aggregates of the fibrous variety, called locally "palha de arroz" (rice straw), frequently accompany the diamond in the alluvials.

Emery (Corundum)

Found in São Paulo, 35 miles from the capital, at Matta do Paiol, on the Soracabana Railway. The matrix is a micaceous clayey schist in an advanced stage of decomposition, surrounded by eruptive and limestone

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rocks. The mass contains at least 70 per cent. of greyish blue mineral in lenticular blocks, some of which measure more than 2 cubic yards. Also occurs in the Serra de Itaqui, in the same state, with schorl, quartz and andalusite.

Epidote (Pistacite. Hardness, 6–7)

Found in argillaceous schists in north-east Minas Geraes, in fine clear crystals, in company with green tourmalines. Very pleochoric. Can be used as a gem stone if transparent. Brittle.

Euclase

In the same matrix of chlorite schist as the topaz, at Boa Vista and Capão da Lana, near Ouro Preto. Good specimens very rare, a German who was two months in the locality failing to find a single stone and spending £150 in vain. Fragments have been recovered that would make a crystal 1½ lb. in weight, according to Eschwege in his *Pluto Brasiliensis*. It was formerly extracted without care and usually flawed, and sold amongst lots of topaz. A fine clear blue crystal (fragment) I measured in the Lisbon Museum is 44 × 10 millimetres. Dr. Hussak found a fine gem at Lençoes (Bahia) in 1894, also many broken pieces.

The National Museum at Rio de Janeiro does not possess an example of any value. A clear blue gem 3 × 2 centimetres was offered for £62 10*s*., and one about 10 × 5 millimetres at £12. This gem has about the same hardness as the beryl, but it is so brittle that most lapidaries fail to make a good job of cutting it. The crystals are prismatic, and the lustre is glassy (vitrous). Export tax same as for the aquamarine.

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Fibrolite (Sillimanite)

Found at Diamantina (Minas).

Fluor Spar

Occurs sparingly in Minas Geraes.

Garnet

In quartzose and gneissic rocks in almost all the states. Was formerly to be found on the beach at Rio itself, and enters largely into the concentrated monazitic sands of Rio and Espirito Santo and Minas States. In common with many other gems at Minas Novas, Grossularites, Pyropes and Almandines are found in the rivers S. Antonio, Andarahy and Piabas. Also at Cantagallo and Santa Rita (State of Rio). Hessonite in Minas. Spessartite in limestone rocks at Arassuahy and at Registro on the Central Railway. In the Santa Maria, a tributary of the Calhão, and in the Abaeté, ranging from red to the rare hyacinthine hue.

The Hyacinth, or Rubicelle, is found in Minas Novas in water-worn pebbles, of a reddish yellow tint.

Almandines are also found at the same place, and Grossularites in the Gravatá. Brazilian garnets are usually quite small, the largest gem stones not exceeding a few carats in weight.

Galena (Argentiferous)

In limestone gangues, or in quartz veins at Abaeté, Diamantina, Sete Lagôas, Montes Claros and Caethé. The richest deposit averages 40¼ per cent. of lead, with

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6 to 9 oz. of silver per 100 kilos. The carbonates of Iporanga (São Paulo) yield 450 grammes of silver to the ton, and the quartz gangue 600 grammes.

Gold

The principal gold fields are in the State of Minas, but there are many deposits in other states. The precious metal was formerly worked by placers in the Cantagallo district (State of Rio). The gold here was derived from gneiss, and the small deposits in the River Iguassú and others in the same state were from the same formation. The quality of the mineral wherever found in the alluvials is over 20 carats, but it is extremely fine as a rule. In spite of nearly 350 years of mining, fresh finds are still being made. At Montes Claros some nuggets were discovered recently weighing up to 1½ lb. At Olho d'Auga an alluvial deposit yielded £200,000 of gold within the last 3 years. The entire output of Brazil up to 1903 was some 1,000 tons of refined metal. The tax imposed by the State of Minas is 3½ per cent., charged alike on dust, bars or jewellery. The average cost of extraction varies from 11*s.* to 21*s.* per ton of ore.

The State of Goyaz is very rich in gold placers, and the Bandeirantes from São Paulo were the first to prospect. Caravans assembled from all parts of the country, and mining camps often contained 30,000 people.

Dredging in Matto Grosso has hitherto not proved a success, largely owing to over-capitalization. The rivers have gentle currents with little declivity, the bedrock being soft and the alluvium fine. There is an ample supply of wood for fuel. Dr. Arrojado Lisboa estimates that a capital of £33,000 is sufficient for each dredge employed. Two grains of gold should be saved

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to the cubic yard, and the cost of working a dredge of 3 to 5 cubic feet capacity per bucket, working 120 hours a week, should not exceed £250 a month. Eighty cubic yards an hour ought to produce a profit of £4,000 per annum.

The principal gold mine in Brazil is that of Morro Velho, at Villa Nova de Lima near Sabara. It is under the management of Mr. George Chalmers, A.M.I.C.E., and is a marvel of organization and triumph over difficulties. The mine has been working since 1830, almost without interruption. It was first commenced in 1725, as an open working, and was thought to be exhausted at the end of the century. From 1837 to 1886 it produced 58½ tons of refined gold.

In 1849, 69,336 tons of ore raised, yielded a profit of £38,136. In 1865, 78,883 tons of ore gave £80,438 as a net result. The galleries fell in in 1886, but Mr. Chalmers, the present chief, took charge, and a new company was started with a capital of £250,000. The depth is now 5,000 feet below adit entrance, and the average air temperature of the four hottest months in 1911–12 was 97° Fahr, the rock temperature being 101° Fahr. The present objective is 6,500 feet, at horizon 22. Ventilation is supplied by electrical machinery, used all over the mine. It is very difficult to persuade the native miners to observe measures for their well-being, especially by wrapping up on leaving the workings. The adit temperature in winter is frequently 50° Fahr. below that of the level from whence the miners have come. In spite of this, the death rate is very low, and in the mine itself but six fatal accidents occurred during the year amongst 901 foreign and 37 British miners.

The two most important veins are the Vianna, running north-west to south-east for a length of 300 yards, and varying from 12 inches to 8 feet 6 inches thick. The

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Mina Velha is only 100 yards long, but it attains a thickness of 16 feet in places. Important developments are taking place at Raposos, 6 kilometres from the mine. Almost the whole of the mine is illuminated by electricity, but candles made in the company's own factory are employed in the more distant workings. 2772 H.P. is used in the lighting and working of machinery and hoisting gear, and the cost per H.P. for 24 hours is only $1\frac{1}{8}d.$ The mineral reserve will last for 12 years at least, and it is estimated that 30 tons of gold are contained in the 1,000,000 tons of ore in sight. The population supported by the mine at Villa Nove de Lima cannot be less than 10,000. Brick and tile works, foundries, and wood-working factories are in connexion. The ore is crushed by ten stamps of 1,200 lb. each, and 120 of 750 lb.

The lode contains 31 per cent. of iron and 20 per cent. of silica. Works will soon be established for the treatment of the tailings. During the year ending December 31, 1911, 192,600 tons of ore were treated, and 1,145,788 oitavos of gold recovered, or 6·438 per ton. Of the total gold contents of the ore, $92\frac{40}{100}$ per cent. were saved. A crusher is likely to be put in, which weighs 70 tons, and will break up a mass of rock 3 feet 5 inches by 2 feet 10 inches by 2 feet 6 inches, so small as to pass through a 3-inch ring. The length of lode at horizon 17 is 1,020 feet, with an average width of 11 feet. In January (1913) horizon 18, 5,300 feet deep, is expected to be reached. Some 1,500 lights are in use above ground.

Freights per ton from Rio to Honario Bicalho station, 6 kilometres from the mine works out at £1 16*s.* 3*d.*, and transport to the mine, 15*s.* 7*d.* Mules are mostly used in the workings and are brought up every eight days. An accident in the bottom of the mine can be attended to in 10 minutes, and in another fifteen the patient is

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in bed in hospital. The company runs its own boarding house (at a loss), bakery, corn mill, etc., and keeps a bar to prevent exploitations of the miners. (Beer is 1*s.* 8*d.* a bottle locally.) There are many difficulties with supplies, as eggs are scarce, and butter often bad, and the local chickens at 13*s.* a dozen dear at any price. The company has very extensive deposits of iron, 4,800,000 tons of which contain 58·2 per cent. of pure metal, and 3,000,000 tons, 61·3 per cent. A relatively high percentage of expense is due to the impossibility of using timber to any extent in the mine, all the excavations having to be arched over by stone and cement as in the Passagem mine.

From August, 1888, to February, 1912, £5,246,570 worth of gold has been taken out of this mine. Dividend for 1911, 10 per cent.

The only other important mine at present working is that of Ouro Preto (Passagem), 5 miles from the town, and almost under the shadow of the peak of Itacolumi. The ore is hauled up three inclined planes, diverging at the entrance, and the deposit consists of quartz, pyrites and schorl (massive tourmaline). The other minerals found in the lode are Kyanite, Calcite, Monazite, Graphite, Garnets, Andalusite, and Cerium and Tellurim, of course in very small quantities. The deepest part of the mine (Nov., 1909) is 1,040 metres.

Dr. Eugene Hussak concluded that the lode is of eruptive origin, and is in all essential respects of a typical quartz-pyrite nature, presenting evidence of three distinct processes of filling.

First—An extensive fissure opened by stress along (above, below and across) a bed of brittle rock (quartzite) enclosed between more tenacious schists, was closed by an invasion of pegmatite running off into clear quartz. At this stage the lode contained only the minerals

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characteristic of a granite magma such as is represented in the neighbourhood by a boss of granite; or, possibly, some others that may have been formed near the contact through reactions with the country rock.

Second—A subsequent stress, acting in substantially the same place and manner as the first, fractured this pegmatitic quartz, rendering it accessible to a pneumatolitic action characterized by silica, boron, water vapour, carbonic acid and fluorine ("after effect" of the granitic eruption?), which filled its fissures with tourmaline, sericiticized the feldspar of the pegmatite wherever fissures, often quite minute, permitted access to it, and probably produced the characteristic contact phenomena noted by Hussak.

Third—A third stress, coming near the end of the second phase of the lode, fractured the tourmaline filling and gave access to a pneumatolitic action characterized by sulphur, arsenic, metallic oxides and metals (gold and silver), which filled the fissures of the lode, invading to some extent its pre-existing portions, and probably also some of the adjacent and enclosed country rock.

(From an article on the mineralization of the gold-bearing lode of Passagem, by Dr. Orville Derby, *American Journal of Science*, September, 1911.)

The stamp mills are erected on one side of the ravine through which the River Carmo flows. The ore reserve is 152,717 tons, and the yield per ton for the half-year ending December 31, 1911, was 12 grains (92·30 per cent.), the net profit £5,076. During the whole year 69·680 tons of ore were mined, with a total net profit of £12,205. Eighty stamps (750 lb.) are in operation, and under the able direction of Mr. Arthur J. Bensusan, A.M.I.C.E., the cost of extraction only amounted to £1 4*s*. 3¼*d*. per ton of ore treated. The mine employs nearly 1,200 men.

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A mine that in its day was highly prolific was that of Congo Socco in the Itabirites. From September 23 to 25, 1829, 193 kilos of gold were extracted, and from 1826 to 1856, 12,887 kilos.

The total production of gold in Minas Geraes in 1911 amounted to $4\frac{388}{1000}$ tons.

The Serra do Espinhaço for a length of quite 200 kilometres is auriferous. Recent analysis gave an average of 15 to 20 grammes per ton for some 200 deposits.

The Rio Gurupy yields 2/580 grammes,
Tapera ,, 4/900 ,,
Maquiné ,, 80/000 ,, in veins of Itabirite.

The average for all Minas Geraes may be reckoned at 12 grammes per ton, and it is calculated that 8 grammes will give sufficient profit. It is difficult to point to any particular locality as being worth prospecting, as the whole of the Espinhaço and its spurs is impregnated, perhaps the most promising speculation being placer mining by means of dredgers, and hydraulic sluicing of the high banks of gravel left by the old miners in many place. The River Doce (upper portion), Rio de Contas, Pardo, Paraguassu and Itapicurú, all falling into the sea between Espirito Santo and the São Francisco, are undoubtedly worth trying, as well as many of their tributaries. The minerals usually associated with gold and diamonds in the deeper gravels, as yet entirely untouched, are porphyries, chalcedony pebbles, black tourmalines, rutile, hematite, magnetite, emery, etc.

At Lavras (S. Gabriel), in Rio Grande do Sul, the Brazilian Goldfields, Ltd., has 24 square miles of claims, out of 100 square miles in the district. The distance from rail is 30 miles, and transport to nearest port will be about £3 a ton.

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In Maranhão an English geologist (Mr. T. Bowers) has found many rich alluvial deposits on the rivers Turyassú, Gurupy, etc.

In 1800 there were 8,000 people engaged in gold mines, now there are hardly 3,000.

Export tax (Pará) on gold dust 5 per cent. on official value, 2½ per cent. in addition, 1 per cent. import tax.

Graphite

Abundant in Minas near Ouro Preto, Marianna, Santa Barbara, etc. At Emparedado, 18 miles from the right bank of the River Jequitinhonha, it occurs in veins from 19 to 40 inches thick, some masses weighing hundreds of pounds. The percentage of carbon varies from 50 to 85. Want of easy transport has prevented this valuable deposit from being worked up to date. There are also other occurrences of this mineral at Itabira do Matta Dentro, and in the State of Rio, at São Fidelis, 83 per cent. pure. At Tripuhy and the localities first mentioned graphitic schists occur in thick veins and yield 10 to 11 per cent. of carbon. Those at Tripuhy are now being worked, as well as those of S. Fidelis, the mineral from the latter being used in a pencil factory on the Ilha do Governador (Rio Janeiro).

Heulandite

Red and yellow crystals 2 to 3 centimetres in length are found in the Serra do Botucatú, São Paulo.

Iolite (Dichroite, Cordierite or Water Sapphire)

This curious gem forms one of the numerous group of precious and semi-precious stones found in company

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in the river beds of north-east Minas. It is discovered in various shades, from greyish white to lavender blue. Frequently the stone is very trichroic, a single specimen showing grey, smoky blue and white. Hardness usually somewhat above that of rock crystal, and specific gravity about the same, i.e., 2·86–2·66.

Iron

Iron exists in every state in Brazil. In São Paulo, Paraná, Santa Catharina, and Rio Grande do Sul the ores are magnetic; in Goyaz, Minas Geraes, Bahia, etc., they are usually hematites. The Minas Geraes field is crossed for 90 kilometres by the Central Railway, between Lafayette and Miguel Burnier stations. The, Leopoldina Railway is now only some 80 kilos from the great outcrop at Itabira do Matta Dentro, and the French line from Victoria (Espirito Santo) is expected to reach there in a year or two. This company has installed special equipment with a view to dealing with the mineral traffic. The hematite is known as itaberite, and by erosion the ores have been divided into three classes:—(1) The hard metal outcrop; (2) loose rubble mixed with quartzites; (3) ferruginous sands in the valleys. Minimum quantity of ore, judging from visible deposits:—2,000,000,000 tons, one block containing 20,800,000 tons of rubble, carrying 50 per cent. of iron.

Analysis at Krupp's Works (Essen) and the United States Steel Corporation's Laboratory gives:—Phosphorus 0·0024 per cent., silica 1 to 3 per cent. The whole of the fifty-two outrops surveyed by the Government mining engineers are reckoned to contain not less than 12,000,000,000 tons of ore of the highest possible grade. This is in one district only (central Minas Geraes). A small ironworks (Usina Esperança) has been in opera-

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tion a long time now, and producing 6 tons of metal daily, makes a profit of 44 francs per ton.

Kilburn Scott, M.I.C.E., says that the iron deposits of Minas Geraes exceed all others, not only in quantity, but in quality, and ease of extraction.

A bill has been introduced in Congress, to grant 4 per cent. interest to the first five ironworks employing national materials, to be increased to 6 per cent. if Brazilian coal or other combustible is used. In connexion with this it must be noticed that very encouraging experiments have been carried on by Dr. Arthur Barbosa with an electric furnace at Ouro Preto. The expenses of installation (amounting to £4,370) were authorized by the late Minister of Industry.

An American syndicate with a capital of 300,000 contos has been formed to acquire the deposits of Central Minas. Forty steamers have been already freighted and work will be found for 10,000 men.

In Paraná there is an immense deposit of ore at Bom Retiro do Mundo Novo (Antonina), which is situated only 3 miles from a seaport, accessible to vessels of 300 tons burthen. The quantity of ore is calculated as 6,000,000 tons.

Analysis, No. 1.—Metallic iron, 35·63 per cent.; manganese, 18·20 per cent.; sulphur, 0·37 per cent.; silica, 8·40 per cent.

No. 2.—Peroxide of iron, 83·20 per cent.; oxide of manganese, 3 per cent.; silica, 6 per cent.; loss, 7·80 per cent.

The deposits of Central Minas (Gaya, etc.) are estimated at 247,000,000 cubic metres. Immense quantities have been discovered at Theresopolis, in the State of Rio Janeiro itself. The above state offers exemption from taxes for 10 years to the first company operating a works. The average metallic contents of eight

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deposits in Minas Geraes varies from 60 to 80 per cent.

The Federal Government has offered the following concessions to concerns starting furnaces for iron smelting. Reduction on freights on the Federal railways for raw and manufactured products. Combustibles and other materials for ore reduction shall pay 8 reis per ton per kilometre. Pig iron in bars, etc., 12 reis. Iron or steel, manufactured or partly manufactured, 14 cents. Also exemption from consumption taxes and customs charges, and special transit and constructive facilities.

A concession has been granted to a Brazilian company (February, 1911) of free transport over the Central Railway of up to 1½ million tons of iron ore, and money subsidies to a considerable amount for each ton of rails, plates, girders and other iron and steel goods made in the country of native materials. The Victoria-Diamantina Railway Company has concluded contracts with Bessemers, and other steel manufacturers, to furnish at least 2,000,000 tons of ore annually. The whole of the line will be electrified by Messrs. Dick Kerr & Co., of London, falls on the River Doce furnishing ample power. Four steamship lines have also undertaken to reduce the coal freight 50 per cent. Transport of the ore to the ship's side will cost only 8 reis per ton per kilometre, or 1s. per 100 kilometres. Analyses made in ten European laboratories give 70 per cent. of pure iron in these hematites.

Meteoric Iron

The Bendigo Meteorite. Discovered in 1784 by Bernadino da Motta Botelho, whilst herding his cattle; he informed the Governor of Bahia, and in 1785 an attempt was made to remove it by means of a truck built on purpose.

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It took 3 days to load it, and after going back for fresh water they harnessed eighty oxen and drew it 300 yards to the bed of the stream near by, where they had to abandon it.

Mr. Mornay, an Englishman in the State's service, visited it with the discoverer in 1811, and found it resting in a bed of rust. Spix and Martius saw it in 1818 and took 2 days to get a few fragments off with the aid of instruments and fire. The largest piece is now in the Munich Museum.

In 1883 Dr. Orville Derby, then Director of the Section of Geology in the National Museum, conceived the idea of removing the mass, as the railway was being constructed in Bahia. The line came within 114 kilometres, but a report of an engineer detailed to examine the road to Bendigo in 1886 was unfavourable on account of the great expense likely to be entailed. A young naval officer, however, became interested, and the *Sociedade de Geographia* of Rio discussed the affair in 1887; subscriptions were made, and on the motion of the President of the Society, the Marquis de Paranágua, the naval officer (José Carlos de Carvalho) was given charge of the operations, and Baron Guahy generously offered to make good any deficiency, and the Government promised its co-operation. On August 20 the same year, Lieutenant Carvalho proceeded to Bahia with two engineers, and a special truck was devised to work on rails if necessary, and the work was started on September 7, and the march commenced on November 26. The rail head was reached March 14, 1888, and the meteorite landed in Rio de Janeiro June 15. The distance to the railway was covered in 126 working days, at an average daily rate of 900 metres. Free transport was given both by rail and sea, and the services of the staff at the Naval Arsenal requisitioned for landing. The

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dimensions of the mass are: Length, 2·2 metres; greatest width, 1·4 metres; weight at Bahia, 5,360 kilogrammes. A piece cut off in Rio weighed 60 kilos. It is the largest meteorite in any museum, and contains several rare minerals, amongst which are cohenite, kamasite, schreibersite, as well as chromite, copper and cobalt, and many globules of magnetic iron. There are many small meteorites in various parts of Brazil, but none worthy of notice. A fall took place in Santa Catharina many years ago, in which the mineral fragments were scattered over an area of many kilometres. The above achievement is one of the greatest ever undertaken, as the country was very wild, and mountains had to be crossed in one instance 2,400 feet above sea level. Many streams had to be forded and tracks made through the forest. The undertaking may indeed be said to have been quite unique.

Jasper

At Areia (Bahia) and in many localities in Minas and Rio Grande do Sul. Red, yellow and variegated.

Kaolin

At Bom Jardin, Carinhanha and other places in Bahia and in Minas Geraes, and Rio Janeiro.

Lewisite.

At Tripuhy, near Ouro Preto, in minute yellow or brown octahedrons. A new mineral.

Manganese

The principal mines of this mineral are at Miguel

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Burnier (in limestone) and Queluz in a granite gangue. At Morro da Mina the ore is 50 per cent. pure, each wagon fills in 1 minute, and wages only average 2*s.* 6*d.* daily. The mineral is remarkably free from sulphur and phosphorus. The Queluz deposit has a reserve estimated at 5 million tons. The Miguel Burnier deposit is some 6 miles long, running from east to west. The figures relating to the working of these two mines are as follows (per metric ton) :—

	M. Burnier.	Queluz.
Extraction	16$000	6$500
Freight to Rio	6$300	7$500
Cartage in Rio	4$000	4$000
Minor expenses	6$700	7$000
Freight to Europe	12$000	12$000
Total	45$000	37$000
	or £3 0*s.* 0*d.*	or £2 9*s.* 4*d.*

The distance from Queluz to Rio is 500 kilometres, equal to 300 miles.

A very large deposit exists at Urucum, 30 kilometres from Corumbá (Matto Grosso), with an estimated reserve of 30 million tons. Total expense of shipping from this mine to a Continental port would average not less than 45*s.* under the most favourable conditions. The Argentine Republic should prove a better market, if smelting difficulties could be surmounted. There are also deposits of this mineral, in the form of psilomelane, at Goyanna (Pernambuco) and in the Chapada Diamantina and the Serra de Jacobina in Bahia, at Villa Nova, 444 kilometres from Bahia city. Another locality is at Nazareth, close to the city itself. Manganese is also found at Perus in São Paulo, near

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Curityba in Paraná, and in the State of Rio de Janeiro itself.

Exports (1910)—253,953 tons.

Marble

Very fine pure white, rose, and onyx marbles are worked in Minas, and vermilion, straw-coloured and blue-black varieties abound in the Bahia Chapada, as well as brecciated and beautifully veined kinds. There are also fine deposits near Paty de Alferes in the State of Rio, and black marble of excellent quality at São Roque, São Paulo.

In Paraná, green and rose coloured marble is found at Lapa, black at Bocayuva, and snow white at Areias.

Mica

The best quality comes from Goyaz, but the principal exportation is from Santa Lucia de Carangola (Minas). Average size of plates, 6 × 6 × 3 inches. It is put up in boxes of 100 lb. weight, and the expenses entailed are: Extraction, freight, etc., to the railway, £50 a ton; freight to Rio, £1; export tax, £6; freight and insurance to Europe, £7; total, £64; average value, £150. Exportation in 1908 — 43 tons. There are also important deposits at Itaperica (São Paulo), São Paulo de Muriahé (Minas), in Bahia near Paulo Affonso falls, in the Itapicurú valley, and near Jacobina, in beautiful crystals imbedded in pegmatites. In the State of Rio it occurs at Campos, Conservatoria, São Fidelis and Paquequer, plates up to 2 metres long being found at the latter place. This mineral is common throughout Brazil, but owing to the extraordinary manner in which the matrix is disintegrated, it is necessary to excavate to a great depth in order to obtain mica of a nature suitable for export.

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Monazitic Sands

These extend from the south of Bahia to near Rio de Janeiro, along the sea coast, and there are many deposits on the banks of the rivers inland. The exportation is mostly in the hands of two contractors, who have practically a monopoly of the trade.

In 1910 15,664½ tons of a value of £212,376 were sent to Germany. The Federal treasury received in export taxes over £100,000. The present stock held in Hamburg amounts to some 8,000 tons.

There was a working agreement between the two concessionaries to fix the price at £5 15s. per cent. of oxide of thorium, making the value of the sands £28 15s. per ton when concentrated.

A plant is being worked on the Parahyba River (State of Rio) at Lage near Sapucaiá, where the sands pass over eight Wilfley tables to separate the quartz, etc., and the concentrates pass after through seven Humboldt magnetic separators. From raw material containing 2 per cent. of thorium mineral worth £28 a ton can be turned out at the rate of 50 tons a month. A deposit of monazite at Corrego da Onça (Minas) contains 5·72 per cent. of thorium. There are also important beds of these sands at Dattas (Minas) and in the Casca and Jequitinhonha rivers in the same state. The sands are concentrated naturally from deposits of Tertiary age, containing decomposed gneiss. The present total cost to Hamburg is reckoned at between £15 and £20 a ton. Professor Otto Haln, of Frankfort, estimates that the radio-active principles found in monazite will shortly quadruple the value of the sands, at present used only for making gas mantles, which are composed of 99 per cent. of thoria and 1 per cent. of ceria.

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There are now two small factories in Rio utilizing these sands. Analysis gives: Cerium, 62·10 per cent.; thorium, 1·5–15 per cent.; yttrium, 1·0–3·0 per cent.; lantharium, 2·5 per cent.; iron, 2·5 per cent.; and aluminium, 3·0 per cent. Professor Lacroix, of Paris, says that iridium should also be found as a constituent. As the deposits of Brazil are greater than those of all the rest of the world, it would be very profitable if another use were found for the sands.

A contract has been entered into by the Federal Government with the Paris banker, Gabriel Chouffour, for the exploitation of the monazite deposits, on the following terms:—

£12,000 to be paid at once.
£24,000 when 9,000 tons are exported.
£36,000 when 18,000 tons are exported.
£48,000 when 27,000 tons are exported.

The contract is for 15 years, and 50 per cent. of the profits from the sale of nitrate of thorium to go to the State.

Current price (1912)—500 $ per ton.

Exports (1910)—5,437 tons, worth 1,912,881 $.

Molybdenite

Found in quartz veins in Paraná, and in small quantities in the gneissic rocks elsewhere.

Nickel

Occurs in Santa Catharina and Minas as pyrrhotine, and also sparsely in the hematites and other iron ores of the latter states.

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Opal

Milky opal of little value occurs at Agua Suja and elsewhere in Minas. Specimens may be seen in the National Museum at Rio.

Palladium

In the itabirites in Minas Geraes. Palladium gold (very pale) appears peculiar to Brazil. It occurs particularly in connexion with the gold from the mine of Gongo Soceo, closed down for many years. It appears also in lenticular pockets in company with the yellow metal, sometimes forming 4·80 per cent. of the latter. Found also at Candonga, and always in a jacutinga gangue.

Pearls

Although fine pearls are found in many rivers, both north and south, no effort has been made to organize fisheries up to the present. The Araguaya and lakes caused by its overflow, from Leopoldina almost to the mouth, in Goyaz, contains large numbers of small fresh-water pearls of various colours, some of which are of fine quality.

Perofskite

Found amongst other minerals at Ogua Suja.

Phenakite

Discovered in Brazil in 1908 only. The principal source of this stone, which when sufficiently clear is well adapted for jewellery, is São Miguel de Piracicaba (Minas); here some splendid specimens have been found

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of a water-clear hue. The exceptional crystal illustrated is in the possession of Dr. Krantz, of Bonn. Some stones of a faint reddish tint, the largest aggregation of which is $11\frac{1}{2} \times 9 \times 5\frac{1}{2}$ centimetres, are for sale in Germany at prices varying from £12 10s. to £20. They are mostly in connexion with muscovite mica. The average size of the crystals from this locality is, however, quite small, some of the clearest being not more than 5 millimetres in length. The coloured specimens are markedly dichroic, and the hardness being about equal to the topaz, i.e. 8, the stone is suitable for a ring, when cut brilliant fashion showing to good effect.

I have in my possession a perfect gem, step cut, weighing some 3 carats. It was part of a crystal not less than 30 carats, found in a lot of aquamarines.

Platinum

This rare mineral is disseminated through the auriferous jacutinga in Gongo Socco, between the itabirites; also in gold-bearing quartz amongst crystalline schists in Pernambuco; also in the diamondiferous cascalho on the east side of the Espinhaço, from Itambe de Matta Dentro to Itambe da Serra (Minas) and the Abaeté River and its tributaries, in deposits derived principally from olivine matrices; also at Serro, in the veins of primary schists, and finally in the alluvium of the Matto Grosso rivers, and in the State of Parahyba do Norte.

Pumice Stone

At Vizeu in the State of Pará. Sometimes large quantities float down the Amazon, derived from the Andes of Peru.

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Pyrolusite (Manganese dioxide)

In the municipality of Curityba (Paraná) and near Ouro Petro (Minas).

Rock Crystal

Common in many states, but exported principally from Goyaz (Serra dos Crystaes), *via* Uberaba and Santos. It is packed in wet hides and finds its way principally to Germany. Worth locally 2*s.* a lb. for the best qualities. Abundant also at Congonhas do Campo, and some exportation is made on a small scale from Seté Lagôas and from the Jequitinhonha valley (rose quartz), and many other parts of Minas and Bahia. Sagenitic quartz (Fleches d'Amour) occurs in the Valle da Ribeira, São Paulo. At the time of writing 10 tons of the finest rock crystal is on show at the Commercial Museum in Rio de Janeiro. A most extraordinary double-ended crystal was recently sent to Europe. It measured 10 × 9½ inches. Export tax (Minas) on all kinds of crystal except citrine and amethyst, is 100 reis a kilogramme.

Quantity exported from Minas in 1911, 7½ tons. Goyaz exports from 20 to 30 tons yearly.

Rhodonite (Silicate of Manganese)

Found near Ouro Preto. Rose pink. Hardness 5½–6½. Can be polished like marble.

Ruby

Exceedingly scarce. A gem of half a carat has been discovered at Abbadia dos Dourados, and another small stone came from the Agua Suja gold mine. Ruby corundum in a massive form occurs in several places in São Paulo.

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ITATIAIÁ: CAMPO REDONDO.

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ITATIAIÁ: DRY LAKE BED, "SUMMER."



ITATIAIÁ: HEXAGONAL CRACKS IN EARTH OWING TO EXTREME DRYNESS.

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Rutile (Titanium dioxide)

Magnificent crystals have been taken from cavities in the mica schist at Corumbá (Matto Grosso), and prismatic crystals from Morro Velho gold mine (Minas). This mineral is also found in São Paulo, with sagenitic quartz, and twin crystals from the Chapada Diamantina of Bahia are priced in Europe up to 50s. each. Hardness 6–6½.

Salt

The principal seat of this industry is in Rio Grande do Norte, in the municipality of Macáo, and at Mossoró, where the marine salt contains 98 per cent. of chloride of sodium. In 1907 687,785 alquieres of 160 litres were exported. Cabo Frio, in the State of Rio, has also small salt works. Minas and the Bahia Chapada contain many salt pans, hardly worked as yet, and the best refined salt is all imported from England.

Saltpetre

The largest deposit of this mineral is in the Chapada, in an area of 12,500 kilometres in the limestones and shales. The caverns in Central Minas contains some deposits of saltpetre, especially in the basins of the Rio das Velhas and São Francisco. The mineral occurs in the same way in São Paulo, but none of the Brazilian deposits are large.

Samarskite (synonimous)

Euxenite group. A blackish pitch-like mineral recently discovered by Dr. Ferraz at Pomba (Minas) contains: Niobic acid, 40 per cent.; titanic acid, 19 per cent.; yttria, 28–30 per cent.; thoria, 2 per cent.; uranium oxide, 10 per cent.; radio-active.

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Scheelite (Calcium Tungstate)

Found in Morro Velho Mine, also at Sumidouro da Marianna (Minas).

Sapphires

As satellites of the diamond in the Coxim River in Matto Grosso. They are small and cloudy, but common; called locally azulinhos. Occur also in the Sapucahy River in São Paulo. The alluvial clays and detritus of Cannavieiras (Bahia), the sands of the River Doce (Espirito Santo), and the Sapucahy Mirim (near Garimpo das Canoas), the Salobro (Bahia), and as reported, some of the river gravels of the State of Rio de Janeiro itself, all contain the sapphire. Opaque blue corundum is found in São Paulo.

Scorodite (Arsenate of Iron)

Fine crystals at Antonio Pereira (Ouro Preto).

Silver (Argentite)

On calcite in the Serra do Mar, Paraná.

Sphene (Titanite)

Small green crystals in the Minas Novas district. This gem is curiously lustrous, and appropriate for any use in jewellery except for rings, owing to its softness ($5\frac{1}{2}$). Has a reddish tinge one end when dichroic.

Spinel

Many beautiful spinel (red) and balais rubies (crimson) are found in the sands of the River Piuna in Espirito Santo. Fancy stones are often found, in blues and violets. Most of these gems are perfectly crystallized

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in octahedrons like those of Ceylon. They are also found in the sands of the River Paraguassú (Bahia) at Machado Portella, accompanied by monazite and xenotime.

Spodumene (Triphane)

Found at Arassuahy, also near Diamantina, in greenish yellow and blue crystals. Called cambalaxo locally. Sometimes sold in mistake for chrysoberyls, but much softer.

Staurolite

Valle da Ribeira (São Paulo), and in the mica schist of Arassuahy, in crystals up to $\frac{3}{4} \times 2$ inches. Colour, brownish black. Forms a great part of the schists some 20 miles from Ouro Preto, also at Franca (São Paulo).

Stibnite (Antimonite)

With bismuth, at Furquim, in contact with gold, and at Passagem de Marianna. Native antimony is found in the valley of Itapirapuan (São Paulo). Stibnite crystals also exist in the auriferous deposits of Caethé, and near the base of Itabira do Campo.

Stilbite

Serra de Brotas (São Paulo). See Henlandite (near Stilbite).

Stolzite (Tungstate of Lead)

At Marianna, near Ouro Preto, in tabular crystals.

Sulphur

The most important deposit is that of Curraes Novos,

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in Rio Grande do Norte. This is very extensive, and there are other smaller ones in the same state.

Talc and Soap Stone

Common near Ouro Preto, Santa Barbara, Marianna, etc., etc. Many churches in Minas and Bahia have their fonts and other ornamental vessels, and parts of their interior structure, made of an excellent variety of this stone.

Tin

Stream tin forms from 10 to 40 per cent. of the sands of the River Paraopeba in Minas, and small grains are associated with monazitic sands in the Mercury, and at Salinas, and in Rio Grande do Sul. Cassiterite is found at Sanga Negra and Caçapava, Rio Grande do Sul.

Topaz

The yellow and orange and brown topaz is principally mined in a range of hills near Ouro Preto in a matrix of lithomarge and chlorites, combined with small angular fragments of partly decomposed quartz. The surrounding rocks are itacolumites and clay slates. It occurs here in every shade of yellow and amber and wine yellow, and occasionally fine pink and rose crystals, and some having the colour of the Calais ruby are found. The basin or hollow in which they are discovered is a small one north of the above city, the veins bearing east 15°–20° north, or east-north-east. Dr. Gorceix (*Annaes de Escola de Minas* (Ouro Preto, vol. i., 1881) says the gems are derived from eroded rocks of the Quaternary period. They may be said to exist at present in metamorphic schists. They occupy a series of cracks (*fendas*) in the rocks, with small quantities of rutite and fluor spar,

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and a quantity of magnetite (in sharp crystals) and pyrites. Very little work is doing at the present moment, and what there is, is below the surface (some 70 feet) at Boa Vista. Janettaz (*Diamants et Pierres Precreuses*) quotes a topaz 10 × 4 inches. The white and blue gems are derived from the decomposed granitic rocks of north-east Minas, near Arassuahy. Here they are usually found water-worn, in the river gravels. One almost clear white in the National Museum weighs 4½ lb., and far larger ones have been recorded. At Capão da Lana and Boa Vista, Ouro Preto, the matrix occurs in a fracture parallel to the micaceous strata, bearing west 15° south. A small deposit exists in Rio Grande do Sul, and the stone is said to exist in the State of Rio. A wonderful gem was recently offered to the Brazilian Government weighing 2½ lb. It was originally presented by the Emperor Dom Pedro to Pope Pius IX, who gave it to the King of Naples. The celebrated Cariello engraved it with the figure of Christ breaking the Eucharist bread. The work is of the most delicate description, and took twelve years to execute. The price asked was £40,000.

Dr. Costa Senna, Director of the School of Mines at Ouro Preto, has a clear, bluish-white stone weighing 48¼ grammes. This came from Salinas in a parcel of aquamarines. It retains most of the crystal faces. I have one weighing about 100 carats. Mawe (*op. cit.*) writes of a splendid gem of a fine blue colour measuring 4 × 3 centimetres when cut as an oval brilliant. A ruby red topaz of 24 carats rough sold in the nineteenth century for £5. The trade price at that time was—

Yellow stones, per oitavo, 50 reis to 2½ $000
Blueish stones, per oitavo, 50 to 200 reis.
White stones, per oitavo, 5 to 50 reis.

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The Bragança (white) in the Portuguese Crown Jewels weighed 1,680 carats.

M. Ratte, a Paris jeweller, had in his possession a cut gem of 31 carats, crimson with a yellow centre. Amongst the most notable crystals on the market this year may be mentioned a blue and white, 5 × 2 centimetres, £13; a white one, 5 centimetres long, £7; a blue, 7 centimetres long, £6 5*s*.; a blue, 6½ centimetres long, £5. A *really* blue stone would be a great find. Those called blue are quite pale as a rule, but when clear are very brilliant gems. Topazes have been found in the Tibagy River in Paraná.

Tourmalines

Tourmalines were first brought to the coast by Fernandes Tourinho, and they were known as emeralds and sapphires (the blue variety) until the eighteenth century. The rubellite was recognized as a tourmaline in 1733, but even Mawe, the English mineralogist, imagined the indicolite was a sapphire. These stones were first worked in 1770, but it was not until the twentieth century that any systematic exportation took place. Formerly it was the fashion to present strangers in the district where they are principally found (north-east Minas) with a fine stone as a curiosity; but in 1905 the value of large clear gems had risen to £100 a kilo, and of smaller stones from £15 to £35 on the spot. The districts of Porteiras, Larangèiras and Salinas are the headquarters of the trade, mostly in the hands of German agents. Those of Itambacury are found in a cascalho in the forest, below 2 to 3 feet of earth. Green stones have been discovered weighing a pound, with rubellites (crimson, purple and pink) and indicolites (deep to clear blue) up to 3 inches long.

The itambacury (Theophile ottoni) gems are all

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green. One stone found in the Piauhy was 30 × 9 centimetres. The whole of the basin of the lower Arassuahy and the Jequitinhonha and upper Rio Doce is noted for these stones, and the matrix is usually decomposed quartz veins, running through pegmatites and gneiss. Some are found with red centres surrounded by green, others vice versa, some red at one end and green at the other, some brown (dravite), yellow, and colourless (see Achroite). Dr. Nilo Pecanha, ex-President of the Republic, had a very rare gem presented to him, yellow with a green core.

Tourmalines are also common in the auriferous formation of Antonio Pereira (Ouro Preto). Schorl or massi tourmaline and large black isolated crystals are met with in many parts of Brazil. Value of rubellites on spot, from 10*s.* to 15*s.* the gramme. Green stones, from 9*d.* to 1*s.* a gramme. Export tax (all colours) from Minas, 800 reis per gramme. Recent finds of rubellites, one 13 × 6 centimetres, one end rose violet, £37 10*s.*; one 9 × 3 centimetres, £12; one dark red 18½ × 10 centimetres, £30; one 17 × 8½ × 12 centimetres, £25; and one 14 × 8 centimetres, £25; one black, £4 10*s.* Offered at these prices in Europe. Rheinisches Mineral Kontor, Bonn.

Tremolite (Amphibole)

Occurs near Ouro Preto. Near nephrite or jade.

Vanidinite (Vanadate of Lead)

At Sumidouro de Marianna gold workings.

Wavellite

Near Carandahy in acicular crystals (a rare form). A compound of alumina, phosphorus and water.

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Wolframite

As in Cornwall, extending to a few fathoms depth only. At Encrusilhada in quartz veins from 12 to 20 inches thick. The proportion of acid is some 40 per cent. This Rio Grande deposit is the only one of any importance known. Copper sulphides and monazite accompanies the ore.

Xenotine (Yttrium Phosphate)

At Tripuhy (Ouro Preto) and at Datas near Diamantina, crystals occurring up to 3 centimetres in length.

Zeolites (Hydrous Silicates near Felspar)

From the augite porphyry, São Paulo.

Zircons (Silicates).

Usually small. At Caldas (São Paulo) and Tripuhy and Agua Suja mine (Minas Geraes). Hardness 7½.

Mining Openings in Brazil

There are good openings in Brazil in the mining states for properly organized companies. Only a very small portion of the alluvium has been explored. Most of the river gravels (untouched at 20 to 50 feet below the surface of the water) contain enough gold to pay for dredging propositions.

One dredge, started in the Diamantina district, digs to a depth of 50 feet, and the buckets are able to cut into the bed-rock (a soft sandstone) to 4 or 5 feet. The expense of running is £6 daily, handling 1,000 yards of gravel. *Quoting from the statement of the operators*, the affair is a great success. With regard to the new law of Bahia, the proprietor of mineral lands is obliged

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to work them, or submit to Government arbitration with regard to their sale. No licence is required to prospect with movable plant, and concessions may be readily obtained on navigable rivers, in reaches up to 50 kilometres in length. All diamond mines being the property of the State, no question can arise as to ownership. A licence for placer work costs a few milreis only. To quote the British Consul at Bahia, the new regulations are well calculated to encourage exploitation of this, the richest zone in Brazil. The laws seem to have been based on the best features of those elsewhere. The taxes payable are from ½ to 10 per cent. In the case of monazitic sands they are very heavy, but the profits afford sufficient recompense for this impost. To sum up, most of the abandoned properties were discarded for want of sufficient capital, or were failures through bad management. Legislation has been effected to protect prospectors, and to guarantee to them the result of their labour The climate is excellent, and quite suited to northern Europeans. Registration and survey is obligatory, and no one can now pretend to ownership of a claim who is not possessed of properly stamped documents.

Exports of Precious Stones (other than Diamonds or Carbonates)

	1908. Value.	1909. Value.
To Germany . . .	165,545 $	120,125 $
,, Great Britain . . .	11,500 $	4,000 $
,, France	44,097 $	42,920 $
,, U.S.A.	1,000 $	2,675 $
,, Argentina . . .	162,560 $	——
,, Belgium	——	1,000 $

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AGATES

1908.	1909.
Germany—79,483 kilos, value 17,343$	29,122 kilos, value 12,525$

Total Exportation

1910.	1911.
148,663$	418,556$

Table of some Brazilian Precious Stones, with their Optical and other Properties

Gem Stone.	Hardness.	Specific Gravity.	Refractive Index.	Degree of Pleochroism.	Relative Value.
Diamond	10	3·52–3·55	2·417–2·439	None	1–2
Carbonates	—	—	None	—	—
Chrysoberyl	8½–8¾	3·5–3·8	1·742–60	Dichroic	3
Cymophane	—	—	None	None	2–3
Yellow Topaz	8	3·40–3·60	1·607–37	Dichroic	4
Rose ,,	—	—	—	—	3
Blue ,,	—	—	—	Faint dichroism	3–4
White ,,	—	—	—	None	6
Phenacite	7½–8	2·966–301	1·620–68	None	4
Pink ,,	—	—	—	Distinct dichroism	3–4
Euclase	7½	3·03–3·10	1·620–71	Trichroic	2
Blue Beryl	—	2·63–75	1·567–85	Strong dichroism	3–5
Green ,,	—	—	—	—	—
White ,,	—	—	—	None	4–6
Green Tourmaline	7	3·0–3·02	1·616–1·652	Strong dichroism	4–5
Rose or Purple Tourmaline	—	—	—	—	3–5
Blue Tourmaline	—	—	—	—	2–4
Achroite	—	—	—	None	4–6
Spodumene	6½–7	3·17–3·20	1·657–1·676	Distinct dichroism	5–6
Sphene	5½	3·35–3·45	1·888–979	Distinct dichroism	3–4
Epidote	6½	3–44	1·727–771	Strong dichroism	5–6
Spinel (rare)	8	3–58	1·716–730	None	2–3
Balais Ruby	—	—	—	—	—
Andalusite	7½	3·16–3·20	1·632–643	Dichroic to trichroic	3–5
Amethyst	7	2·50–2·80	1·543–1·554	Faint	5–6
Citrine or Cairngorm	7	—	—	—	6
Garnet	6½–7½	3·15–4·3	1·740–1·815	None	5–6

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CHAPTER XXI

THERMAL SPRINGS AND TOURIST RESORTS

PARA. Near the City of Monte Algere there are hot sulphur springs that have never been analysed or tapped.

Parahyba do Norte. At St. João do Rio do Peixe analysis has been taken of some waters lightly sulphurous, and with a temperature varying from 21·5 to 32·2 centigrade.

Ceará. Close to Tamboril there are acidified crystalline springs entirely unused. Another in the vicinity of Santa Quiteria has a temperature of 35° centigrade. The most important springs are at Caldas, 12½ kilometres from Barbalho.

Pernambuco. Mineral waters are found at Pajehú de Flores.

Bahia. Close to Itapicurú, 220 kilometres from the capital of the state, there are thermal springs, with a temperature of 39° centigrade. They contain chloride of sodium, lime and magnesia, sulphate of soda and bicarbonate of soda, carbonate of lime and magnesia. Four parts out of five are of the first named. There are seven other hot springs of a similar nature in the vicinity of the above.

There are also thermal springs at Santa Luzia (Caetite), Morro do Chapéu, Jacobina and Abbadia.

Rio de Janeiro. In Parahyba do Sul there is a mineral

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spring, classified between bicarbonates and ferruginous effervescent types. It is a proto-thermal fountain. It is under the name of salutaris, and is prescribed by the local doctors for anæmia, dyspepsia, and female irregularities. In six years 49,307 boxes of 48 small bottles were sold in different parts of Brazil. In Santa Rita (Magé) there is a spring of water, very good indeed for affections of the liver and stomach. Of this, in the first three months of 1907, 43,930 bottles were sold.

Federal district (municipality, etc., of the capital of the Republic). Formerly there were many ferruginous springs (chalybeates) in Cosme Velho, Santa Theresa, Tijuca and Boa Vista de Gavea, but the growth of the city has, so to speak, swallowed them up.

São Paulo. In Tatuhy a spring furnishes 3,000 quarts in 24 hours. It is largely impregnated with carbonic acid gas. In Santos there are several mineral springs, and in Campinas six of gaseous nature, as well as others in different parts of the state, as Leme, Rocinha, Mogy-Guassu.

Paraná. The hot springs of Xapecó are of sulphurous nature, and are mostly used for affections of the skin.

Santa Catharina. In this state, at Pedras Grandes (Tubarão), there are waters with a temperature of 41° centigrade, and very valuable in cases of rheumatics and contagious skin complaints. There are three other springs of a similar nature in the same state.

Rio Grande do Sul. The principal spring is at S. Gabriel, and consist of carbonates and ioduretes of iron. Four parts out of seven are ferruginous.

Matto Grosso. From the granite, at a place called Frade, water gushes at 42° centigrade of heat, of a ferro-magnesia nature, employed in cutaneous diseases.

Goyaz. In the Serra das Caldas there are three thermal springs, varying from 22° to 42° centigrade, of

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the same nature as the above. Experiments prove them to be minus acids or alkalis. They are frequented by persons suffering from rheumatics and skin complaints.

Minas Geraes

Caxambú. Caxambú is in the municipality of Baependy, situated about 2,800 feet above sea level. The mineral springs have been noted for a long time, and their reputation has increased so much that there is now quite a small town in the locality, with hotels, electric light, baths, etc. Nearly 100 persons are engaged in the bottling of water from five or six springs, others being used locally only, for medical purposes.

The use of these waters cures indigestion and constipation, diabetes, etc. Character of fountains D. Pedro and Viotti, gaseous acidulated waters like seltzer. Fountain D. Isabel more gaseous, and contains a large percentage of iron, tonical. Fonte D. Leopoldina, more alkaline and gaseous than the first two named. Fonte Intermittente, similar to D. Isabel, but more alkaline, and with less iron. Exportation, 1906, 20,917 boxes, of 48 bottles. Aguas de S. Lourenço, altitude 2,800 feet, average temperature 12° to 16° centigrade. Gravel soil. There are two hotels. The springs are seven in number, very suitable for stomach complaints and dyspepsia. The exportation is not so great as that from Caxambú.

Aguas Virtuosas de Lambary, 3½ leagues from Campanha. There are three springs. The most important one is gaseous, of carbonic acid type. Its temperature is 23° centigrade. There are forty-three men employed at the place, which possesses a hydropathic establishment. Cambuquira, waters similar to those at Caxambú. The exportation from these two districts, in 1905, was 5,926 boxes, containing 48 bottles in each.

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Aguas de Fervedouro (Carangola), nearly 2,000 feet above sea level. There are four fountains, furnishing more than 600,000 litres in 24 hours. The water is reputed valuable in cases of paralysis, rheumatism, anæmia, scrofula, and other cutaneous and deeper seated diseases.

The most important bathing station is Poços de Caldas. These latter have been known since 1786, so they are in all probability the oldest frequented thermal springs in Brazil. There are two hydropathic establishments with four springs. Two are tapped at 42° centigrade, and one has a temperature of 45° centigrade, and the other 36° centigrade. The discharge of the four springs amounts to 416,372 litres daily. They are distinctly sulphurous. The concern is a large one, the loan raised to form the establishment amounting to no less than about £100,000. There is an hotel with 400 rooms, a casino, park, and athletic grounds. The whole is under the control of the State Government. The climate is splendid, as the place is situated at nearly 4,000 feet above sea level, on dry ground. In 1905 28,502 baths were taken.

Poçinhos do Rio Verde (Caldas). Water suitable for diseases of the liver, kidneys, etc.

Aguas Santas (near Mattosinhos), 2,700 feet altitude. Cold waters, arsenical and sulphurous.

Aguas sulfurosas, alcalinas, do Araxá. (The title describes fully the type of these warm springs, 26° to 27° centigrade.) The waters are so strongly impregnated with alkaline properties that the rough loose skin of the hands peel off immediately on contact with the spring. The smell denotes their vicinity if out of sight. Araxá is delightfully situated, 2,800 feet above sea level, and the climate is perfection itself. Pulmonary diseases are absolutely unknown to the natives of the district.

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The colour of the water is violet, turning to green. The springs are seven in number, and yield 3,600 litres of water daily. Dyspepsia and ordinary derangements of the digestive system disappear, as if by magic, after a few days' use of these waters, which are equally suitable for bathing in and drinking. They are situated some little distance from the town. Medical researches lead to the opinion that these springs are superior to the most famous European ones, such as Carlsbad, Baden, Aix-la-Chapelle, etc.

THE VOYAGE TO BRAZIL, FROM LIVERPOOL TO MANAOS

Here we have little choice of routes. If we take the Booth line, the steamer proceeds *via* Havre, 510 miles, 2 days; Leixões (Oporto), 820 miles, 6 days; Lisbon, 1,000 miles, 10 days; Madeira, 1,520 miles, 12 days; Pará, 4,270 miles, 21 days out. Belém do Pará is 86 miles from the sea, and nearly all the city is built a few feet only above high-tide level. Vessels drawing 30 feet will soon be able to come alongside the quays, and the steamer traffic is already very great. In 1907 no fewer than 4,866 vessels entered the port, carrying over 2,000,000 tons. The population of the city (1909) is over 200,000. It boasts of a magnificent theatre "Da Paz," a unique system of parks and squares, a fine museum, and a first-rate rapid transit service. From here to Manáos is, by most direct route, 850 miles, and the steamer is due there a week later than at Pará. Manáos is essentially an American city. A quarter of a century since it was but a town of no great pretensions; to-day it is a more cosmopolitan city than Pará, with a population approaching 100,000. The principal street is Avenida Edouardo Ribeiro. Its theatre rivals that of

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Pará, and other edifices abound that would do credit to a first-rate European city. Everything is on the most lavish scale, the illumination of the place costing £40,000 per annum. (For other routes, see Transportation.)

From England to Rio de Janeiro there are several lines, and one can travel either by Royal Mail Pacific Line from Southampton (Fridays) or Liverpool (alternate Thursdays), calling in the former case at Vigo (Sunday), and Lisbon (Monday), Madeira (Wednesday), and reaching Pernambuco in 13 days from England. Here the steamer has to lie outside, and the passenger embarked in and disembarked from small boats by the aid of chairs. As there is usually a heavy swell on this operation is more amusing to the onlooker than to the person swinging in mid air. The usual tribe of bumboatmen crowd round the ship with pineapples (a revelation to the northerner), oranges, parrots, marmosets, curios and ocelot skins, until the warning siren drives them off in a hurry. The 400 miles steaming to Bahia will take some 30 hours, and if any delay occurs, we shall be behind time at Rio. Bahia is composed of an upper and lower city, the latter being the centre of commercial life, and the former the residential quarter. One gains access to this by means of elevators. This old city is representative of colonial life. Here the mulattress can be seen at her best, and here, in an atmosphere of old-time faith and somnolescence, we see revealed Brazil as she was. To-morrow this will be changed. The tinkling of church bells is already drowned by the more strident note of the electric car, and with the completion of the new port works, the development of the railway system, and the consequent increased volume of trade, Bahia will be a great city. At present she is the centre of the tobacco and sugar and cacão trade,

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EUCLASE,
OURO PRETO.
Value £75.



THE ESTRELLA DO SUL DIAMOND FOUND AT "BAGAGEM" (MINAS GERAES) IN 1853.
Weight, rough, 250 carats; cut, 125 cts.



ESTRELLA DE MINAS DIAMOND, 1909,
174½ CARATS, FOUND AT BAGAGEM.
Slightly reduced in size.



BLUE BERYL, MINAS NOVAS.



WHITE TOPAZ, MINAS NOVAS.



FINE PHENAKITE CRYSTALS, S. MIGUEL DE PIRACICABA MINAS.



AMETHYST CRYSTAL, MINAS GERAES.



GREEN TOURMALINE CRYSTAL,
MINAS GERAES.

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and her cotton industries are also not unimportant, as well as the exportation of diamonds and other precious stones.

From Bahia to Rio de Janeiro Port is 742 miles, and wind and tide being favourable, Cabo Frio, the first light, should be abreast by tea-time on Sunday; otherwise, and in case of delay at Bahia, speed is reduced, and it is 5 or 6 on Monday morning when the great cone of the sugar loaf, "Pao de Assucar," looms up 1,383 feet on our port bow, and we wait the officer of health and the customs, and as a general rule everybody is on shore by 8 o'clock, unless waiting on board for friends or going on to Santos the same afternoon.

Landing fee in launches, 1 franc each person; small boats, 2 $.

The Lamport and Holt line runs fast cargo steamers from Liverpool and London to Brazil, but these are not specially suitable for ladies. From Bordeaux one may take the French mail boat every fortnight, or the Bremen Lloyd from Bremen, or the Hamburg-American and Hamburg-South American steamers from Boulogne-sur-Mer or Southampton.

To those desiring a good table, coupled with cleanliness, punctuality, and freedom from snobbishness and iron-bound etiquette, I would heartily recommend the Royal Holland Lloyd steamers, sailing every 3 weeks from Dover. These vessels are equipped with submarine signalling apparatus, Marconi system of wireless telegraphy, Stone Lloyd automatically closing watertight compartments, electric laundry, and the 1st class cabins are an eye-opener in every sense of the word. The 2nd class is quite comfortable, and my personal experience of the *Frisia* (after having travelled on British, French and German ships for the last 22 years) was gratifying in the extreme, and I must take this

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opportunity of expressing my indebtedness to the kindness of the commander, the purser, the doctor and *maitre d'hotel.* Even the *stewards* and *waiters* must not be forgotten, as they were most attentive and obliging. This Company's steamers call at Boulogne on leaving Dover, and after touching at Coruña, Vigo, and Lisbon, proceed direct to Rio de Janeiro. The tedium of the 14 days from port to port is relieved by the appearance of a Marconi bulletin at frequent intervals, the ships being in touch with Poldhu station (Cornwall) up to mid-Atlantic, and then getting in contact with Fernando Noronha Island, whence important news is flashed in a moment. During the entire voyage the steamer is in constant touch with one or another of the vessels which are equipped with wireless, and in case of necessity help would be speedily at hand.

This Company has (1913) two large and fast steamers on the service (*Gelria* and *Tubantia*), (see Transportation section).

The Holland Lloyd steamers usually arrive at Rio de Janeiro the same time as the Royal Mail boats, and we speedily pass the Sugar Loaf and fortress of São João on the left, and Santa Cruz on the right, and come to anchor well within the bay. This magnificent harbour is some 18 miles long by 16 wide, and contains nearly 100 islands, the largest being Governador (left) and Paqueta (right), both far in out of sight of the city.

Rio de Janeiro extends 9 miles from north to south and 10 from east to west, and may be termed a garden city. The area of the Federal District is 1,116·593 square kilometres, with a population of only 3,928 to the square kilometre. The city proper covers an area of 158·316 square kilometres. Rio is double the size of Paris, with not a quarter of the population. Landing at the Caes dos Mineiros, pass up Visconde de In-

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hauma, and turn on the left along Primeiro do Março. The Stock Exchange (Bolsa) and the Post Office are on the left, and the Cathedral and Commerical Museum on the right facing the Praça 15 de Novembro. Here is the Telegraph Office on the far corner, right-hand side looking seawards, towards the Caes Pharoux, with the Ministry of Public Works hidden at the back, and the Marine Museum and Naval Club near by in the square. The Astronomical Observatory is on the Morro do Castello. Continue on to Rua Misericordia, containing next to the Telegraph Station, the Chamber of Deputies. The Central Market is close to sea front (turn down on left), and the Military Arsenal, Laboratory and School of Medicine at the end of Rua Misericordia, and the great hospital of the same name, adjoining, in the Rua de Sá Luzia. Following this street, the Avenida Central is reached, but it is better to traverse this by starting from near the Marine Arsenal at Prainha. From the Caes dos Mineiros turn along Primeiro do Março (right), and taking the last street on the left, the Avenida Central is struck close to the end. This splendid road was cut right through the heart of the city, 641 houses having to be demolished. It is about 100 feet wide and some 2,100 yards in length from Prainha to Avenida Beira Mar, which is 5 kilometres 200 metres long, and 33 metres wide, and when the extensions to S. Christovãi are completed, there will be 11 kilometres of continuous promenade.

At Prainha there is a statue to Visconde de Mauá, founder of the first railway in Brazil. The continuation of the water front leads past the old docks and wharves, through a district full of warehouses and deposits, to the new quays in course of construction, 3,400 metres in length, with a minimum width of 300 feet. This extension of almost $2\frac{1}{8}$ miles is available for steamers

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of the largest tonnage, as there is a mean depth alongside of 31 feet. The equipment is of the most modern type, and has cost in the neighbourhood of 120 million francs. Commencing at Prainha, we find in the Avenida Central, on the right the Brazilian Lloyd building, the Amortisation Bank, the Light and Power Co., the *Jornal do Brasil*, *O Paiz*, Central Tram Station (Jardim Botanica lines), Naval Club, and the municipal theatre at the end, costing over £1,000,000 to build. On the left is the Diario de Noticias, *Jornal do Commercio*, and Equitative Insurance Co. of Brazil. Turn down Rua S. Pedro on the same side as far as Rua da Candelaria. Here is the most magnificent church in Rio, containing many beautiful pictures. Continuing along Avenida Central we pass the Supreme Tribunal of Justice, Western Telegraph Company, O Seculo, and reach the National Library. This contains 300,000 printed books, half a million manuscripts, 100,000 engravings and 28,000 coins. The building has thirty telephone lines, and the clocks in each room are regulated by electricity. Pneumatic tubes convey readers' forms to the proper section, and automatic carriers are in general use. The place is cleaned every day by the vacuum process, by machinery fixed in the basement. All printed matter addressed to the library is conveyed from the G.P.O. in a special motor van. The School of Fine Arts is adjoining, and contains pictures by many of the old masters, including Raphael, Titian, Canalletto, Correggio, Paul Veronese, Reni, Murillo and Ribera; the Flemish painters Rubens, Vandyck, Teniers; and such French masters as Le Brun, Poussin and Greuze, as well as many works of note by the leading Brazilian artists. The Supreme Tribunal adjoins the National Library. At the end of the Avenida is the Monroe Palace, brought from S. Luiz Exhibition and re-erected

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in 6 weeks. The Market took some 4 years to build, and occupies a space of no less than 22,500 square metres.

The Conversion Bank is in Rua Primeiro do Março, and the Laboratory of Analysis at the Custom House, close to the landing place, and baggage can be cleared from 12 to 4 p.m. daily. It is necessary to give your name to one of the clerks, and obtain a slip bearing an indication of the number of packages, etc., before the employés will place them on the examining tables. With courtesy and patience the necessary formalities are soon fulfilled.

The Fleet Street of Rio is the Rua Ouvidor, now renamed Moreira Cezar, in which there are still some five newspaper offices, and the principal publishing houses, and some of the best shops. Coming from Primeiro do Março (or Rua Direita—Straight Street—as it was formerly called), the Avenida Central is crossed and the Fargo de S. Francisco reached. Here is the Polytechnic School and the Portuguese Literary Society, and a little to the left Praça Tiradentes, containing the S. Pedro Theatre, the Derby Club and the Ministry of the Interior, and on the left side the Moulin Rouge Music Hall and the Theatre S. José. In the centre of the square is the equestrian statue of Dom Pedro I.

In the Largo S. Francisco is that of José Bonifacio de Andrade, pioneer of independence, and first proclaimer of the rights of the Indians and the iniquity of slavery. Out of Praça Tiradentes leads the Rua do Lavradio (on the left), close to the Moulin Rouge, with the Masonic Hall, the Apollo Theatre and the Police headquarters. Continuing across Praça Tiradentes, the Parque de Acclamação (Praço de Republica) is reached, with the Palace of Justice on the corner. This great garden has an area of nearly 147,000 square metres, and contains some 66,000 varieties of plants, besides

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many kinds of Brazilian animals and birds in a state of absolute freedom. On the left side is the fire brigade, and proceeding round the square we find the Senate and the Mint, and at the opposite corner the terminus of the Central Railway. Below this is the Ministry of War, Barracks, and the Normal School, with the Foreign Office opposite, and the Prefecture, Free Law School, Faculty of Medicine and National School of Music on the remaining side.

A battle of flowers is held in this beautiful garden every September.

Retracing our steps from the Praça da Republica, along Ruas Rio Branco and Carioca, we arrive at Largo da Carioca, and turning to the right across this, pass the Lyric Theatre and turn down into the Avenida Central close to the Naval Club. At the *Hotel Avenida*, the largest in Brazil, we take the Jardim Botanica car, and in front of the Passeio Publico, a garden with aquarium (admittance 1 $000), pass the Casino Music Hall and traverse the Largos da Lapa, and Gloria (monument to Alvares Cabral, the discoverer of Brazil, by Bernadelli), and proceed along the Avenue Beira Mar, a waterside promenade 3¼ miles long and 38 metres wide. The tram lines branch here, and our way leads up to the Largo Machado (Parque Fluminense Music Hall and statue to the Duque de Caixas), and straight on to Praça José de Alencar (*Hotel dos Estrangeiros* on left). From the Largo Machado, a line runs up Rua Larangeiras to Aguas Ferreas, where the Electric Railway to the Corcovado commences. From Praça Alençar the Praia de Botafogo is reached, with the Regatta and Automobile Clubs, and the Moorish Pavilion. The line turns down now and proceeds *via* Largo dos Leões to the Botanical Gardens. Their area is not less than half a million square metres, and there are 50,000 species of vegetation.

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The great palm avenue is 740 metres long, with 134 palms averaging 80 feet high, and a cross avenue is 540 metres long with 140 palms 70 feet high. The mother palm, from which every other one in Brazil has sprung, was planted in 1809. It is 114 feet high, and its greatest diameter is 4 feet 3 inches.

Dom João VI, amongst other estimable actions (after planting the mother palm with his own hands), decreed that every seed should be carefully saved and burnt as soon as the avenue was completed, in order to conserve the monopoly of the Royal Palm. The slaves working in the garden hid some of the seeds and sold them, and in this manner grew up the stately trees found in many gardens to-day.

Besides these incomparable wonders there are magnificent alleys of bamboos and mangueiras, and a multitude of other wonders of the vegetable kingdom, including splendid clove, nutmeg, cinnamon and other fragrant spice trees; and a very rich herbarium commenced by the late Emperor, Dom Pedro II.

The Director is Dr. Willis, late Superintendent of the Gardens in Ceylon.

Retracing our steps, the tram returns from the Largo Machado *via* Cattete, where we see the President's Palace on the right-hand side. From Praça 15 de Novembro we can get frequent cars to São Christovão for the National Museum and Quinta da Boa Vista.

The Museum is closed owing to extensive alterations (1911), but the park is well worthy of a visit, as is also the Aquarium (free). From the main gate to the Museum leads an avenue of Sapucaias some 500 yards long. The Museum contains (in the vestibule) the famous Bendigo meteorite spoken of in a previous chapter, and a fine collection of archæological and ethnographical exhibits. The mineral section is quite un-

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worthy of such a place, that of the School of Mines at Ouro Preto being the best in Brazil. When the building is re-opened there will be some three laboratories in active operation (vegetable, chemistry, agricultural, entomology and phytopathology), besides the ordinary departments of the Museum, requiring the services of a small army of scientists.

Starting from Praça da Republica, or 15 de Novembro, the Zoo is reached on the Villa Isabel line, fare 300 réis (admission 1$, children 500 reis). Efforts have been made recently to bring these gardens somewhat up to the mark, and there are many interesting animals on view. It is proposed by Dr. Lacerda, Director of the National Museum, to transform the park surrounding the latter (called Quinta da Boa Vista) into a Zoological Gardens.

There are racecourses at the Jockey Club and Derby Club, quite easy of access, either by train or rail. Races take place on Sundays as a rule.

Rio Janeiro is full of places of interest, and the Misericordia Hospital is worthy of a detailed visit. This great institution has fifty-seven doctors, fifty-eight nursing sisters, thirty male nurses, and nearly two hundred other employés. In 1910 12,171 cases were treated and 154,600 outdoor patients attended to. The Oswaldo Cruz Pathological Institute at Manguinhos is under the care of the foremost specialists of the country, including the doctor from whom it obtains its name. It is the most completely equipped in the world.

Founded in 1900, the smallpox microbe has been discovered, and the definition of various obscure diseases has been made. The Museum contains 190 species of mosquitos (19 new) and 150 species of ticks (9 new), including 40 classes of carrapatos.

Other institutions are:—The Polyclinic (treated

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750,000 cases last year), Pasteur Institute, Municipal Vaccination Institute, National and Municipal Laboratories of Analysis, Military Bacteriological and Chemical Laboratories, also Police, Children's, Lying-in and British Hospital (Rua do Passagem 188), and Deaf, Dumb, Blind, Orphan and Lunatic Asylums.

Institute Oswaldo Cruz, Manguinhos (Rio de Janeiro). Founded in 1901, with a view to prepare the anti-pest serum, it has developed in such a manner that almost every kind of serum in use in the Republic bears the mark of the Institute. The staff consists of Dr. Oswaldo Cruz (Director), assisted by eight Brazilian specialists, Dr. Prowazek (from the School of Tropical Medicine in Hamburg) and three other foreign doctors. The building (constructed especially for the purpose) contains laboratories, museum, library, operating and lecture rooms. There are also separate pavilions for the study of plague, animal houses, an hospital for human beings and one for animals, stables, aquarium (fresh and salt water), staff residences, crematorium, etc., etc. The Institute can be reached by rail or water in about 45 minutes from Rio de Janeiro. The publications of the Institute number nearly 100, and by exchange or purchase, no fewer than 421 periodicals are received, in every European language.

The Children's Protection and Assistance Institute, Rio de Janeiro.—Statistical and Historical Notes furnished by Dr. Moncorvo, Junior, founder and director of the above Institution:—The Institute was recognized as of public utility by a decree dated November 17, 1909. Silver medal awarded at St. Louis Exposition. Gold medal at the International Exhibition of Hygiene at Rio, 1909. Grand Prize at the National Exhibition at Rio, 1908. Gold medal at the South American Congress (S. Paulo), 1910. Grand Prize at

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the International Exhibition at Rome (1912). The Institution was opened by Dr. Moncorvo on July 14, 1901, and the Central Dispensary annexed (now Dispensary Moncorvo) has done a great work in the medical and surgical treatment of children, as well as in the propagation of hygiene amongst the people. Like all the other departments of the Institute, this dispensary is in charge of specialists and comprises the following sections:—Puericulture Intra-uterine: (i) Gynecology; (ii) Protection of poor women in a state of gravidity; (iii) Midwives and Accouchement (at the homes of the patients). Puericulture Extra-uterine: (i) Milk distribution (sterilized); (ii) Crêche; (iii) Hygiene of the newly born infants; (iv) Examination of wet nurses; (v) Examination of mothers demanding sterilized milk; (vi) Vaccination. Medical Assistance: (i) Skin diseases; (ii) Surgical aid; (iii) Orthopedia; (iv) Massage, electrotherapy and medical baths. Also Clinics for diseases of the Eye, Ear, Nose and Throat, and Dental Surgery. The Institute has the invaluable assistance of a number of the first ladies of the capital, who aid the work by means of an association founded with a view to devote its whole time to the work of the Institute. These devoted women give their money and labour freely. Factories and other buildings where children of tender age are employed are periodically inspected by the doctors of the Institute, as well as the public elementary schools. From July 14, 1901, to December 31, 1911, over 40,000 individuals were aided by the Institute, of whom 36,240 received medical assistance. (I hope in a future edition to deal more fully with this admirable work.)

The Treasury is in Avenida Passos, in the centre of the city.

On the water front of Praça 15 de Novembro are the

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Caes Pharoux, from which ferry boats start every 15 minutes to Nictheroy, 20 minutes' journey; fare, 300 reis. A pleasant train ride from the latter city is to the Sacco de S. Francisco; single fare, 300 reis.

Telegraph Offices.—The principal ones are in the Avenida Central (*Jornal do Commercio* Building), Largo Machado, Stock Exchange, Praça da Republica (Central Railway Station), and the head office in the Praça 15 de Novembro.

The principal clubs are: Germania, Praia Flamengo 132; Français, Rua 7 de Setembro 67; City (International), Rua Chile; and English, Rua da Quitanda. Naval and Military in Avenida Central.

Navigation Companies.—Royal Holland Lloyd in Rua Primeiro do Março 29; Hamburg-American Line, Avenida Central 79; North German Lloyd, Avenida Central 66; Lamport and Holt in Primeiro do Março 121; Italian Lloyd, Primeiro do Março 53; Messageries Maritimes, Primeiro do Março 107; Austrian Lloyd, Visconde de Inhauma 84; Royal Mail, Avenida Central.

Banks.—Banco do Brasil, Rua Alfandega 17; London and Brazilian, Rua Alfandega; London and River Plate, Rua Alfandega; Brazilian Bank für Deutschland, Rua da Quitanda; Française-Italiene, Alfandega.

Some of the principal Hotels.—Allen's, in Rua Humaytá; *America*, Cattete; *Avenida*, Avenida Central; *Estrangeiros*, Praça J. de Alencar; *France*, Praça 15 de Novembro; *Grande*, Lapa; *Globo*, Primeiro do Março; *International*, Sylvestre; *Metropole* (Larangeiras), Tijuca (Tijuca).

A Ritz Carlton Hotel is in course of construction in the Avenida Central. It will have 500 bedrooms and 150 suites. There will be room for 1,200 visitors. The building has 8 floors. Ready in 1914.

Some Restaurants.—Franziskaner, Avenida Central

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152 ; *Globo*, Primeiro do Março ; *Heim*, Assemblea 119 ; *Londres*, Assemblea 115 ; *Madrid*, Gonçalves Dias 69 ; *Paris*, Uruguayana 41 ; *Rotisserie Americana*, G. Dias 52 ; *S. Americana*, 7 de Setembro 86.

Public Departments.

Ministry of Interior and Justice : Praça Tiradentes 65.
Ministry of Finance : Avenida Passos 17.
Ministry of Foreign Affairs : Marechal F. Peixoto 152.
Ministry of War : Praça da Republica.
Ministry of Marine : Rua Primeiro do Março.
Ministry of Agriculture, Industry and Commerce : Praia Vermelha.
Ministry of Public Works : Praça 15 de Novembro (near).
Senate : Rua do Areal.
Direction of Public Health : Rua Clapp 17.
Archives Public : P. Republica 12.
Head Fire Brigade : P. Republica 97.
Laboratory of Bacteriology : Rua Reachuelo 109.
Obras Contra as Seccas : Avenida Central 137. (Irrigation Commission.)
Department of Geology, etc., Ministry of Agriculture : Praia Vermelha.
Amortisation Bank : Avenida Central.
G. P. Office : Primeiro do Março.
Immigration Department : Avenida Central.

The whole of the gas and electric lighting, the tram and electric power of the city is in the hands of a powerful Canadian syndicate, and the sewerage and sanitary arrangements are subject to the control of the City Improvements Company, an Anglo-Brazilian concern.

The Postal Department has a pneumatic system installed, with ten public and three official stations,

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and messages can be delivered in 15 minutes anywhere in the centre.

Churches.—(Foreign) British, Rua Evaristo da Viega; German Lutheran in Rua Invalidos; American Methodist in Rua Conde de Baependy.

Press Agencies.—Havas, Avenida Central 145; Americana, Avenida Central 296.

British Consulate: Rua General Camara 2.

U.S.A. Consulate: Avenida Central 117.

Press.—Rio has fourteen morning, six afternoon, and three evening papers. The *Jornal do Commercio* averages twenty pages daily, and the *Jornal do Brasil* sixteen pages.

The maximum summer temperature of Rio is 34·8° C. (December), and the minimum winter 12° C. (June). The water supply of the capital amounts to 237·9 litres per head, or a total of 237,904,877 litres for a population of one million persons within the Federal District.

At noon in Rio it is 1.56 p.m. in New York, and 10.1 a.m. in London.

Excursions from Rio.—To Paqueta Island from Caes Pharoux, four times daily; fare, 500 reis single on week-days and holidays; Sundays, five times daily. First boat, 7 a.m.; last boat, 6 p.m. Returning up to 7.30 p.m.

Trips in the bay (3 hours) at 2 p.m. on Sundays, 1 $500 return.

To Governador Island. Week-days: four times daily; fare, 500 reis single. Sundays: first boat, 7 a.m.; others at 12.4 and 5.50; returning up to 5.10 p.m.

The Corcovado. By electric railway tram from Avenida Central to Cosme Velko (*via* Larangeiras). Thence to Sylvestre, Paineiras, and Alto do Corcovado. Return fares respectively, 2 or 3 milreis. Trains about

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every hour on Sundays; week-days every 2 or 3 hours. Or from Largo do Carioca to Sylvestre from 5 a.m. to 1 a.m. every half-hour; Sundays every 15 minutes. At Paineiras is the aqueduct built by the Jesuits, and still in good repair. It is 6 kilometres in length to the Ponte do Inferno (Bridge of Hell), and it leads from thence to Tijuca.

From Paineiras, the rail mounts almost to the very top of the mountain. Here there is a gigantic band-stand or shelter, taking up almost all the apex. We are 670 metres above Rio Janeiro, and the whole of the city is spread out like a chessboard beneath us. With good glasses an area of 100 kilometres can be swept, including the bay and the surrounding mountains.

Tijuca. Trams to Boa Vista, thence to Alto da Tijuca. Here, hardly an hour from the very centre of Rio, one is in the midst of nature's mysteries. There is the Vista Chineza, and the furnas (ovens), a great pile of eroded boulders as well as the grotto of Paul and Virginia, the Emperor's Table, the Solitude, etc. There is the distant flat-topped Gavea Mountains. Across yon blue bay, with its hundred wooded islands, chief of which are Governador, and lovely Paquetá, a green fringe comes out to meet the water, and behind, the sombre cloud-capped ranges of the Estrella (left), and the Organs (right), north and north-east. Behind the Estrella is the lovely Tinguá, a mysterious solitary peak, evidently of different origin to its fellows, judging by its suspiciously volcanic-like cone.

Fare from Praça de Novembro, 1$400 return to the terminus. From thence 3 or 4 hours' walk to the peak, 3,400 feet above the city.

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Rio de Janeiro Car Fares

	6 a.m. to 1 a.m.	1 a.m. to 6 a.m.
Taxis (1 or 2 persons): the first hour	8$ ..	9$
Per extra person	1$ ..	2$
Per hour after.	4$ ..	5$
Taxis (1,600 metres): 1 or 2 persons .	1$400	
Per 400 metres after . . .	200 reis	
From 1 to 6 a.m., 1,200 metres . .	1 400 $	
Per 300 metres after . . .	200 reis	
4-Wheel horse carriages—		
2 persons, first hour . . .	6$ ..	7$
Each extra person	1$ ..	2$
Per hour after.	3$ ..	4$
2 Wheelers (Tilburys), seat 1 person only	4$ ..	5$
Per hour after.	2$ ..	3$

There are now over 3,000 motor cars in the city.

The best time to reach Brazil is in the winter, from June to September. Let us take our baggage and turn our attention towards the Queen of the Serras (Petropolis). Supposing we arrive by steamer at Rio in the early morning, and we are prudent enough not to be burdened with heavy luggage, we may get our goods and chattels cleared, and have done with customs' formalities before noon, if we elect to have late breakfast on board. I must go with you to be your guide, counsellor and friend, for, of course, you are ignorant of the romantic and expressive language of Camões. Call a carregador (porter) and have your luggage trundled to Praia Formosa Station. Trams marked Luiz Durão will convey one for 200 reis from Praça 15 de Novembro, and the station should be reached by 4 p.m. From

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Praça 11 de Junho, just above the Central Railway Station, the route follows the Canal do Mangue, bordered with a splendid palm avenue. This ancient open sewer is now cleansed and conducted along a channel 20 metres wide to the sea near Praia. Vermelha, the first section, measuring 1,200 metres, and a second (commencing close to the Leopoldina Railway Station) 1,400. Trains leave at 6, 8.20 and 10.30 a.m., and 3.50, 4.20, 5.40 and 8 p.m., making the journey in 1¾ hours.

The return fare for 2 days is 4$000. Leaving at 4.20, the Jockey Club racecourse is passed, and a number of suburbs, until Penha is reached, with its twin-spired church perched on a huge rock. Here during the month of October, every Sunday, a sort of Kermesse is held, and the faithful crowd to the sacred fane in such numbers that trains have to be run every 5 minutes. A long dreary stretch of swamp now faces the traveller, with the bulrush and papyrus (*Cyperus princeps*) growing everywhere. Estrella, an ancient decayed port, forms a sort of oasis in the morass, and at 5.25 the foot of the mountains is reached. Here a strange sort of monster comes behind to push us up the steep grade. The train is literally buried in the narrow cutting, and tremendous boulders overhang the line at every turn. Some wag has adorned one of perhaps 4 or 5 hundred tons with the invitation "Va com esta!" in Anglice, meaning, Take this with you.

Formerly the most frequented route was by water from Prainha to Maná and thence by train, now the only way is by rail direct. In old times, as one passed the barrier at Prainha, they received a ticket with the number of their seat in the train at Maná. Beware of sitting down at random in the carriage marked "Assignantes" (season ticket holders), as most seats are allotted to the "Diarios," as those travellers are called who hold

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the above tickets, and their names are seen on cards above the seats. This carriage is a variety of club where half a dozen nationalities are united in a species of free-masonry, and its members are brokers, merchants and Government employés as a rule, and often a couple of games of bridge are in progress at the same time, card tables being produced by the conductor as soon as the train is under way.

One finds the same four in the same place every day. Coming down from Petropolis at 7.35 a.m., and going up as a rule at 5.40 p.m.

Oblivious to everything but the cards, but sometimes relieving the tedium of the journey by politics or jokes. Sometimes a solemn Britisher, who considers himself a cut above the crowd, "don't you know," takes up a corner, buried in the latest number of the *Times*. Most evenings one can hear the nasal drawl of a down-easter or two, unfortunately prejudicing sensitive people against them by their atrocious accent, when in reality they are often very good fellows. You can also stake your existence that your fellow travellers will comprise a sprinkling of Germans, and perhaps a diplomat or two, with the stupid stove pipe and frock coat of conventional style. Amongst the habitués of the "Diarios" car there is a spirit of "hail fellow well met," that permeates an olla podrida of several social ranks shut up daily together for three or four hours.

If we are going up in the summer, i.e., November to March, the vegetation is literally sodden with wet, reeking strata of mist being passed through at intervals. At 400 metres above sea level, Meio da Serra is reached, with a tumbledown hovel of a station, the chapel with a bandstand in front, and collection of small houses of the employés of a large cotton mill in the background. The train is usually divided into two or three sections,

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and a little above passengers in the hindmost look across the bend at the first part. The summit of the pass is reached at 2,600 feet, and the signs of civilization are once more visible in the form of electric light, rows of pretty villas, and electric trams. At least these should be running before the middle of 1912. The engine is replaced by one of the usual type, and a very few minutes suffice to bring us to Petropolis itself, between 2 and 3 miles further on. The space in front of the station is crowded with carriages, and perhaps a dozen private motor cars, and a motor bus. There is no lack of hotels, either the *Pensão Central* (Austrian), *Hotel Eurêpa* (Portuguese), *Hotel Rio de Janeiro* (German) or *Modern* (Italian) suiting travellers with a full purse, or *Meyer's Pension* or the *Bragança Hotel* those with more modest means.

Agassiz speaks of the delicious climate of this mountain city, with its average summer temperature of 19° C. Its origin is due to Major Frederick Köeller, a German officer of Engineers in the employ of Dom Pedro II. It was formerly called Corrego Secco, and Dom Pedro I bought the whole of the domain as a sporting estate, and took possession of it in 1844. His palace was first in the Rua Marechal Deodoro, and this house became in turn the *Hotel MacDowell* and *Mills*. It is now the *Pensão Macedo*. The new palace (now College of St. Vincent de Paul) was built in 1845, but a coach road had already been built and the same year Major Köeller obtained the Imperial estate for a rental of 1 conto yearly, and some 200 Germans on their way to Australia were persuaded to leave the ship at Rio.

They were engaged on this road, and began to form the colony at the same time. A few months later 2,000 more arrived, and Petropolis became a city in

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1854. First the summer residence of the Court and its parasites, it became capital of the State for a time, and has now developed into a busy industrial city, unspoiled, however. The public library has some 15,000 works of reference, and the reading room is well supplied with European periodicals. The death-rate is 13 per thousand. Population, 30,000. Press—*Cruzeiro* and *Tribuna* (daily, except Monday), *Nachrichten* (German) twice weekly. There are six colleges and many factories. The most important is that of the Companhia Petropolitana, at Cascatinha, employing 1,100 hands, and turning out 7½ million metres of cotton yearly. The latitude of the city is 22°30′55″ south, longitude (east of Rio) 0°69′22″.

The journey up from Rio took 4 hours in 1865, but the tired traveller had at that time an English hotel to fall back on. At present there is none unfortunately. Car fares in the city are: per hour 4, wheel, 5 milreis; per hour after, 3 milreis; 2 wheel (seat only one passenger), 2 milreis; second hour, 1 milreis. Mr. Dent speaks of the absence of negroes in 1885. This can no longer be said, and in the summer coloured mendicants flock in from all the surrounding districts. Brazilians are perhaps too charitable, and the irresponsible children of Ham abuse this virtue. The climate is magnificent from April to October, and although the summer is very wet the heat is greatly tempered and the vegetation is glorious. Arums, roses, jasmins, heliotrope, etc., etc., are always in bloom. The principal orchids are Oncidium crispum, Cattleyas, Miltonias, Loelia, Sophronites maxillaria, Stanhopeâ, Houlletia and Jonopsis.

Amongst other blossoms are Magnolia grandiflora, camellias, hydrangeas, cannas, anonaceas, gladioli, carnations, and every other kind of exotic flowers. A

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wild raspberry (Rosacea) fruits freely during most of the year, and many kinds of oranges, limes and lemons fill the gardens, with a score of varieties of bananas.

The trams will shortly run all over the city, and daily milk and garden produce cars will bring in supplies from the suburbs. There are silk, cotton and woollen mills, breweries, nail, furniture and ice factories, and envelope and stocking factories. Should we arrive in June, the change in temperature from Rio to the cool regions of the high serra is great, and a good overcoat should be donned the moment the train reaches a few hundred feet above sea level. There are many delightful excursions, but the first thing to be seen is the view from Alto da Serra, just beyond the gap at the station. Before 8 a.m. the plain at the foot of the mountains is quite invisible, being hidden by the heavy cloak of white cloud that leaves only some of the loftier foot hills peeping above the snowy mass, like islands in the midst of an ocean. A gentle breeze blowing from seawards opens up gaps in the *mer de nuages*, and the fleecy billows driven against the serried cliffs accentuate the illusion, breaking like huge waves in a stormy sea on a rocky shore. In an hour or two the freshening wind clears the whole of this away, with the aid of the sun, leaving only a dun-coloured cloud hovering above the city of Rio de Janeiro in the far distance; in the foreground the dark green-clad serra and the speckled plain, with the iron road driven straight across it, and in the middle distance the blue waters of the bay.

Another time we can go by the Caminho dos Mineiros (the miner's road) to Caxambú, and leaving the dark depths of the reservoir away on our left, ascend by a mountain road to the summit of the pass (5,300 feet), and look down on the northern side of the bay, and at Magé, and Piedade beyond, where starts the tiny line

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that creeps up the Serra to Theresopolis, the coming rival to Petropolis. Look across yon awe-inspiring valley, there looms in front a tremendous mountain mass, with an assemblage of huge boulders at its highest point. From where we stand it is inaccessible, but we shall succeed in reaching it another day. There is also the Fazenda Ingleza, a famous picnic place, the Crémerie Buisson, the Presidencia, the Cortiço, the top of that towering wall of rock, seen at Meio da Serra, and then there is Cascatinha (the little cascade), and Correias, further along the line towards the interior. In short, there are enough excursions for a month, but whatever is missed, Itaassú (or Pedra Assú, as it is called wrongly, with its bilingual name, half Portuguese, half Guarani) must be visited. We must leave our hotel well provided with blankets and creature comforts at 4 p.m., and take horse, or tramp to Pereira's, the last house, the veritable Uitima Thule. Here under the hospitable roof of this rosy, cheery old chap, we may sleep after our 2 to 2½ hours' journey, as the morn must see us under way as soon as daylight permits, at 6 to 6.30 anyhow. At Pereira's we are about 1,000 metres above the sea, or 300 higher than the station at Petropolis. From this, if we are wise, we shall not attempt more than 100 metres rise per half-hour, including halts, and so we shall come out at Isabeloca in about 4 hours, and here we can pause a while. In front, as soon as we leave the forest, appears a flattened basin, with its edges formed by low hills, the most elevated of which is crowned by a huge group of boulders of gneiss, forming the Castello of Itaassú, and the culminating point of the whole of the coastal ranges. In the winter the basin is dry, but the summer converts it into a lake of some 2 or 3 miles in length if the season is a wet one, and it is not at all

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pleasant to make the journey after the spring rains have set in in October. In any event, a guide is useful, as the forest is almost impenetrable and no habitations are to be found after Pereira's is left behind, and one might wander a week without hearing a human voice or seeing a trace of human footsteps. Look down, where we stand, and see a tiny white cluster of houses representing Petropolis, and nearer still the winding road leading from the city to the sombre way by which we have ascended.

Everything is different here. That great sheet of water with its countless isles that frames Rio de Janeiro, is diminished, as if we had been looking through the wrong end of the telescope. The ocean looms large before us. We stand where man is made to feel his littleness. Sea, sky, and mountains combine here to exert a dominating influence over the human soul. Consider now the herbage at our feet. We left in the town a hundred forms of familiar flowers, roses, dahlias, magnolias, camellias, heliotrope, jasmine, cannas, hortensias, and the flaming branches of the bougainvillea. Ere we reached Pereira's, the last climbing fuchsias had been left behind, and the orchids, those mimics of the butterflies, have long since gone, or at any rate nearly all of them. In the dark depths of the forest we had hardly noticed the change, but now the ground is covered with a profusion of flowers we fail to find in the sub-tropical zone below. There are bulbs scattered here and there, hardly attached to the soil, and besides the amaryllides, many sorts of plants of an alpine character, and which, alas, would not live even if we were successful in transplanting their seed or roots to Petropolis. Breakfast dispatched, we step out manfully, in Indian filè, along a tiny path that has been worn by the tapirs on their way to the pool. Shortly we

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seem to be lost in a labyrinth of sword-grass tufts, reaching 6 and 7 feet in height, and so toiling for an hour, we cross the little stream trickling through the farther side of the swamp (a lake in February), and climb up the other side to the shelter of those boulders that form the Castello, or the Itaassú (great stone) itself. Here we are 2,250 metres above Rio, or approximately 7,400 feet, and the height of the boulders may be 35 to 40 feet more. One I measured is 33 feet.

The altitude given is that taken by two compensated aneroid barometers, afterwards corrected by observations that had been taken simultaneously in Petropolis. If possible to climb up one of the higher boulders, the labour entailed will be well repaid, but one needs nerves and muscles of steel for such a task. I think a few persons have succeeded in getting up by aid of the sparse vegetation growing in the clefts of the rocks. I once managed this feat at considerable risk, and some damage to my clothes, but certainly I was in far better training than at present.

Probably there is no view so comprehensive in all Brazil, and certainly there cannot be any so glorious. Far as the eye can reach in the west, north, and south, rise serried masses of mountains fading away towards the setting sun in the distant valley of the Parahyba. The ranges take the most fantastic forms, seemingly due not to nature, but to the cyclopean architecture of some bygone race of demi-gods. Towers, spires, domes, minarets are scattered here and there in picturesque confusion. In the north there are isolated masses and peaks marking the site of Novo Friburgo, and the vicinity of Cantagallo, where the gold mines formerly existed. We cannot always catch a glipse of Itatiaiá, for this monarch of all Brazilian mountains sometimes hides himself in the clouds. Here we must sleep, and

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the first thing to do is to collect fuel, a very scanty thing indeed, and perhaps we shall find nothing but the feathery tops of the taquaril, a small cane, hardly as long as a walking-stick. Then a pile of these same tops must go towards making our bed, and a wind screen of some sort thrown up, for the great boulders form a sort of funnel here. If we have completed our preparations to brave the elements, we may perhaps make a tour of our fortress, finding that it takes at least half an hour. Night comes on apace, and we boil our billy, and sit under the dark rock watching the moon rise, surely twice the size of the northern sphere, and as bright again. Now with the disappearance of the sun, rude Boreas comes sweeping and whistling through the crevices all around, blowing the ashes of our dying fire in every direction. Cover up well, and creep in close together as we may, one or other must need jump up now and then to replenish the blaze. Towards morning there is a thin film of ice over the pool which lies amidst the rocks. It is not, however, the temperature marked by the mercury that chills us. It is that bitter, piercing blast that comes sweeping across this exposed site all the way from the Antarctic regions.

Sunrise sees a pair of shivering pilgrims, struggling to get up their circulation, and to stimulate the flagging energies of the fire. Nine a.m. soon arrives, and the homeward march must be begun. We go down naturally much quicker than we came up, and arrive at Pereira's by 2 p.m., where we lunch and rest, and take horse back to Petropolis.

Unfortunately, although the Piabanha River winds through the town of Petropolis, and the Itamarity joins it ere it reaches Cascatinha, there is no fishing. The dyes from the factories have poisoned all the large fish that have not been destroyed by dynamite cart-

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ridges; so if we want any angling it will be necessary to travel some 3 or 4 leagues at least. There are, however, many rivers which contain abundance of finny life, and some, as the dourado and pirarucú, afford good sport. The seas swarm with a hundred different types of scaly monsters, and some amusement may be had, with rod and line, from the rocks near the Gavea (Rio de Janeiro).

We can take the train, when tired of Petropolis, to Itaipava, and from there amble gently into Theresopolis the same afternoon. Here there is less distraction. Only one hotel worth stopping at (*Hygino*), and hardly anything to do but amuse ourselves by excursions amongst the mountains and woods. From here we join the iron road again, and afterwards the boat to Rio de Janeiro. If limited in time, we can come out to Rio by the Royal Mail streamer, leave her on the Monday morning, or Sunday night, go straight up to Petropolis, visit Itaassú, etc., and leave for Theresopolis the following Monday, and remain there until Friday, arriving at Rio on that day. We have then 4½ days left to make the acquaintance of the capital, as the steamer leaves on the following Wednesday afternoon. Otherwise inclined, a journey to Ouro Preto and Morro Velho to see the gold mines, Bello Horizonte, and thence to São Paulo, and, if time permits, from Paranaguá to Curityba and back, may fill up our time. To do justice to Brazil, a month should be spent in Rio alone, adding at least from May to the beginning of October in the provinces, not forgetting the Iguassú Falls (Paraná).

No one need fear the want of the common necessities of civilized life. As long as no attempt is made to travel away from the iron road, most European luxuries can be obtained. The American habit of living in hotels has caught on in Brazil, and in such places as Petropolis,

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Friburgo, Theresopolis, Poças de Caldas, etc., many families remain *en pension* for months together, to save the bother of a house and its attendant worries. Reference to the table of cost of living will convince the sceptic that prices are not out of proportion to those of Europe. I have in my mind a type of 10*s.* a day hotel, very common in the provinces in England, that certainly treats its guests far worse than one of the same class in Brazil. It is also interesting to compare the cost of living in certain resorts in France and in South Brazil. The Brazilian who has travelled in Europe is generally more exacting in the way of diet than the average British tourist, and he is not so disposed to phlegmatically put up with it as the latter; and, as he expressively puts it, frequently *passando uma decompostura no hoteleiro*; that is, giving him a good dressing down, in language more forcible than polite. The verb *to descompôr* is in common use in every-day life, indeed, and Anglo-Brazilians are adepts in its employment.

Sao Paulo (City and State)

The State has a coast-line of not less than 600 kilometres, with one first-class port (Santos) and several small ones. It is 1,100 kilometres in length from east to west, and 1,000 from north to south. There are some 57,000 farms in the State, of a total value of not less than 1,052,000 contos. Of its riches in coffee, cattle, etc., we have spoken elsewhere. No fewer than eighty towns are illuminated by electricity, and most of them utilize it for factories of various kinds. Imports since 1904 have increased enormously, especially from the U.S.A., 100 per cent.; Germany, 87 per cent.; and the United Kingdom, 60 per cent. The 1912 budget amounted to 69,760 contos for revenue and 69,741 for expenditure.

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Italians possess 81⅛ million francs, Portuguese 55¼, and Germans 50⅛ million francs of rural property in the State.

During the first half-year of 1912 the custom house at Santos received 45 million francs in revenue, of which something more than half was for import duties. This sum is greater than the entire annual revenue of several other states united.

The line from Santos to São Paulo city is double all the way, and the whole of the rolling stock is in perfect condition and without a superior anywhere, the engines being kept as bright as possible. According to agreement, the Company cannot pay more than a given dividend, and the consequence is, that the balance is expended on the line, the trains, and the stations. There are thirteen tunnels on the way to the capital, which is reached in less than three hours. The city takes its name from the fact that the first mass was celebrated on the site, on the same date (25th of January) as St. Paul was converted. Founded on that day in 1554, it became capital of the province in 1815. The Tropic of Capricorn passes through it.

The population of the capital is well over 300,000. It has three railways running through it, and a splendid service of electric cars. There are some magnificent buildings, prominent amongst which is the Municipal Opera House, The Departments of Finance, Agriculture, Police, etc., besides the Normal School, Polytechnic College, Ipiranga Museum, São Paulo Railway Station, and the Commercial College. There are over 100 elementary schools in the city. The press is well represented with ten daily newspapers, prominent amongst which are—*O Estado de São Paulo, O Correio Paulistano, A Platea* and *A Tribuna*. Foreign papers include *France-Brésil, Le Messager de St. Paul, Fanfulla,*

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Deutsche Zeitung, *Voz de España* and *Al Alkar* (Syrian).

The police and military organization is the best in Brazil.

A palace of industries is partly completed, with a great hall for demonstrations of agricultural machinery in working order, and a splendid commercial museum is being built. Some £700,000 is to be laid out on city improvements. In 1911 296 motor cars were imported. The population of this city is now increasing at the rate of 40,000 yearly. In January, 1912, there were 31,000 houses of a value of 328,572 contos, or an average value of over £700 per house. 7,462 were inhabited by Italians, 1,515 by Germans, and 318 by French.

The value of house property is reckoned in São Paulo at 10 years' rental.

Of the total urban property in the State, the—

Italians	own	23,520	lots, of a	value of	113,234	contos
Portuguese	,,	12,834	,,	,,	118,005	,,
Germans	,,	3,498	,,	,,	41,926	,,
Spaniards	,,	1,488	,,	,,	8,628	,,
Syrian	,,	619	,,	,,	3,728	,,
French	,,	464	,,	,,	7,246	,,
British	,,	80	,,	,,	4,723	,,
Other nationalities	,,	1,327	,,	,,	14,158	,,

Total, 43,830 proprietors, Value, 311,648 contos

There are some 500 factories in São Paulo City with a working capital of £4,000,000, and the average dividend earned was 10 per cent. in 1911.

Hotels include the *Sportsman*, *Grande*, *Albion*, *Allemão*. A large modern hotel is constructing.

There are British and American Consuls, and British, German, Italian and French banks.

Situation of capital, 23°34′05″ south, 3°28′30″ west of Rio de Janeiro.

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Rail from Rio, Santos, Curityba, Parto Alegre, etc., etc. Direct railway communication with the States of Rio Grande do Sul, Paraná, Matto Grosso, Goyaz, Minas Geraes, and Rio Janeiro. Indirectly with Espirito Santo and Bahia, and with the Uruguay Republic.

Steamers from Santos to all ports of the Republic and the United States and Europe.

Principal Exports.—Coffee, sugar, maize, beans, rice, grapes, tobacco, mandioca, cattle, rubber, etc.

Principal Imports.—Butter, cheese, potatoes, wine and foreign manufactures.

Paulo Affonso Falls

A capital article has appeared in the *Bulletin* of the Bureau of American Republics. This is illustrated by some very good photographs of the falls. To get to them, it is necessary to take steamer from Pernambuco or Bahia to Penedo. From Penedo to Piranhas, the nearest port to the falls, one may proceed by small steamer or sailing boat (canoa), taking 2 days to cover the 150 miles. From Piranhas a railway runs to Pedras, from whence 2 or 3 hours' riding brings the traveller to the edge of the tremendous cañon through which the river runs. Five branches of the river unite near here, four of them descending in a series of cascades and rapids, to form the great Mai do Cachoeiro (Mother of the Falls) in its final leap. The best view from a spectacular point is obtained from the cliff, 300 feet above water level, and owing to the exuberance of tropical growth, it is necessary to make a clearing before the falls can be seen. Below, the whole mass of water roars angrily through a narrow passage, between blackened rocks. Above, a thousand miles of unobstructed navigation leads into the heart of Brazil, until at Pirá-

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porá the Central Railway is struck, and one may take train direct to Rio de Janeiro, less than a couple of days' journey.

Itatiaiá

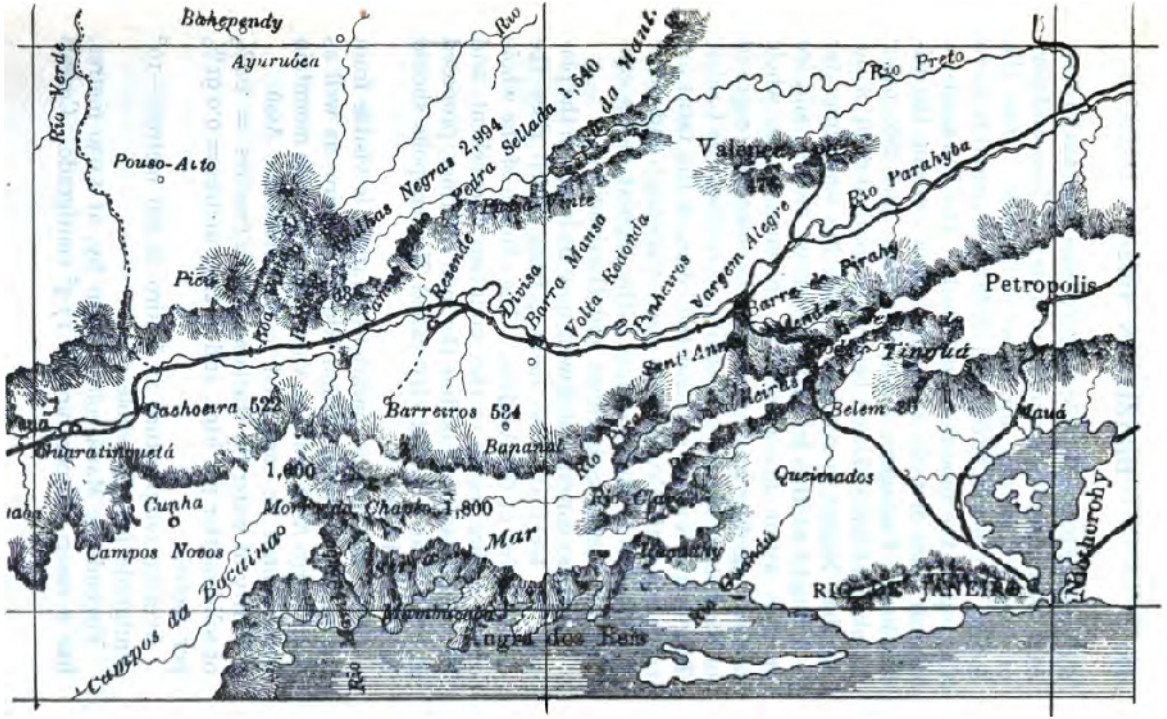
Thanks to the Ministry of Agriculture, it is now quite easy to visit this mountain. Starting from Rio de Janeiro, one may either alight at Campo Bello, or Itatiaiá stations, on the São Paulo branch of the Central Railway, and those persons who are practically interested in colonization should make a point of visiting the Government nucleii at Visconde de Mauá and Itatiaiá, the latter extending from 800 to 2,500 metres above sea level.

The Casa da Invernada (Winter Lodge) is some 17 miles from Itatiaiá station, and lies at an altitude of some 2,200 metres. The region from sea level up to 600 metres consists of tropical vegetation, and the forests extend up to the 1,700 metre level. Palms disappear at 1,400 metres, and a few hundred feet higher apples, pears and other European fruits thrive. In Santa Catharina palms cannot exist above 1,000 feet, but here, at a comparatively small difference of latitude, they flourish at thrice the altitude. In the high peak district of Itatiaiá the level lands afford excellent pasture, as they are well watered by the small lakes or tarns which exist at the top of the mountain. The auracaria, or graceful South American pine, rears its spreading and lofty head up to 2,000 metres, above which altitude the vegetation takes on another character.

Summer temperature at this level averages 57° Fahr., with a maximum of 72°. The winter minimum is well below freezing point.

There is very little variation during the year, but

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ITATIAIÁ.

Reduced from the Map of Barão Homem de Mello, 1876.

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the weather is usually cold and dry from April to October. At 2,200 metres the streams are frozen in June and part of July, ice forming up to an inch thick. From the Retiro, or Casa da Invernada, a day is required to go to the top of the mountain and back. The Pyramids, a conical mass of rock, are passed after crossing the Ribeirão da Passagem, a small stream, and two other brooks and lakes skirted before the toothed crest of the Agulhas Negras is reached. Snow lies sometimes for a fortnight at this level, nearly 3,000 metres, and ice crystals attain a considerable thickness. The whole of the jagged series of rocks and boulders is comprised of Nephelene Syenite or Foyaite, as in Poços de Caldas, Tinguá and Cabo Frio, and the edges of the tarns are carpeted with Cryptogams (295 varieties) and some 271 classes of Phanerogams. The highest peaks contain patches of Sphagnum and Harrisonia.

Some 300 varieties of flowers may be found on the plateau, or level at 2,200 metres, from which rises the curved spine of the Agulhas. The climate of the whole of the higher region of the mountain is excellent, and Dr. Richardson, of London, the food reformer, proposed in 1877 that a model city called Hygienopolis should be founded here.

Under favourable conditions, Itatiaiá is visible from the peak of Tijuca, behind Rio de Janeiro, as well as from Morro Assú, but the view from this huge mountain mass cannot be compared to that from the Assú.

Purity of water on Itatiaiá.—At 823 metres = ·04% of solid matter per litre, and at 2204 metres = 0·0 91% per metre.

Average temperature at Retiro (2,200 metres)—10° centigrade for the whole year.

Visconde de Mauá colony, near by, at 1,030 metres, has a mean temperature of 17·5° centigrade. Cereals

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and European fruits grow to perfection on both colonies.

Limestone Caverns

There are so many natural features of interest in Brazil that it is difficult to choose, but the naturalist should not miss the limestone caverns of the valley of the river Ribera in São Paulo. Dr. Krone studied some forty-one in 1908, and the stalagmitic formations are so beautiful that one (exceedingly rare), shown on accompanying plate, affords but a poor idea of the splendid groups. The air is exceedingly dry, and the region so out of the beaten track that such natural gems remain entirely undisturbed. In the valley of the Rio das Velhas, in Minas, there are also many highly interesting caverns worth visiting from many points of view, but especially from that of the student of Palæontology.

Any other resorts will be dealt with in alphabetical order in the gazetteer.

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CHAPTER XXII

SCIENCE, ART AND LITERATURE

Literature

RUY BARBOSA must be given pride of place as a thinker and idealistic writer, and the author of literary works of uniform excellence. He has been a journalist, working on several Rio papers. His literary life began in 1874, with a monograph entitled, *Crime against Industrial Property*, and a long series of important treatises, written at home and in exile. (Letters from England, 1896.)

Amaro Cavalcanti. Was a professor of languages at 20 years of age. Is a famous political economist.

José Maria Da Silva Paranhos (Barão do Rio Branco), Foreign Minister. Of this master mind we have already written, in men of affairs, otherwise he would have undoubtedly headed this page. Not only a statesman, but an historian. Was Consul-General in Liverpool, Minister in Berlin and Berne, and special Ambassador on a mission to the U.S.A., Foreign Minister from 1902 to 1912. (Died February 10.) He added a territory to Brazil equal to the whole of France. Born 1845.

Joaquim Nabuco (1849–1909). The polished classical scholar and brilliant orator. Another of the old school, graduating, like the Barão do Rio Branco, under the

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Empire, formerly Minister to England, and afterwards Ambassador at Washington. Nabuco was not a very popular man; he was at times haughty and uncompromising, and such qualities did not commend themselves to the young Republicans. His books are full of that spirit of romantic melancholy which seems engendered by the atmosphere and vast brooding silences of Brazil; this minor key that is sounded by the soft summer winds in the palm groves of the north, and the pine woods of the south. Nabuco is well interpreted in the phrase—"Defiance and contempt of the littleness and meanness of man." He wrote: "The judgment of the masses, which elevates us to-day and lowers us to-morrow, represents only the dust of the roads," and "Tyranny had beenrevived in Brazil at the point of the same bayonets that had put it down."

Machado de Assis (1839–1908). Graduated from the printing form, and attained the first prize in the Academy by sheer force of merit. He was called the prince of Brazilian literature. First a psychologist, the master of comedy, verses (1869) being succeeded by an *olla podrida* of material. His best known work is *Braz Cubas*, a novel. His epitaph is best expressed by saying—He was a child of his own work, he owed what he was to his constant labour.

Mello Moraes (a Bahiano). One of the sweetest lyrical poets; is, like most Brazilian writers of repute, many-sided. The historian of the gypsies, the student of folk-lore, and the voice that cries out as a soul in the wilderness.

Assiz Brazil. Diplomat, agriculturist, and economist. He has written on law, politics, and poetry, and excels in all he attempts.

Graça Aranha (Dr.). Maranhão has the honour of being the birthplace of this gifted writer. He is a

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jurist, and has been charged with many most important international questions, but above all, he is a romancist and idealist. So far, the most important work from his pen is *Canaan*, a sad yet fascinating story, breathing forth the subtle essence of the national character; a romance, yet a broken melody, a fugue without an end. This great book is translated into Spanish, German, and French. I say great, because it succeeds in enthralling the reader, of holding his attention captive, and thus fulfilling the mission of a true work of genius. This romance was written in London in 1902, whilst the author was first secretary of the special mission to England. His latest work, *Malazartes*, was performed at the Theatre Femina in Paris in 1911.

Medeiros e Albuquerque. He is the Didot of the Brazilian Academy; an encyclopædia in himself. Journalist, poet, and tale-teller. He was born in Recife, and it is no discredit to the south to say that the north is the cradle of Brazilian literature.

Affonso Celso—"The Catholic." A count of the Holy Roman Empire; meriting a title, if only by his literary work. He has translated, in verse, the masterpiece of Thomas à Kempis. A member of the Historical Institute and the Academy.

Coelho Netto (Maranhense, like Dr. Graça Aranha). Suffice it to say that any one of his books would have made an author's reputation. Comedies, tragedies, librettos, criticisms, historical chronicles have poured forth from his pen since 1883, when his first work saw the light.

João Ribeiro. Is best known as a grammarian, having been responsible for several philological works.

Rocho Pombo. The leading historian of the younger generation. A journalist and novelist.

José Carlos Rodrigues. The Gordon-Bennet of South

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America. A self-made man. He is managing editor of *O Jornal do Commercio*, undoubtedly the greatest newspaper printed in the Portuguese language. Added to literary and linguistic ability, he possesses great business capacity, and has rendered the Republic enormous services. The *Journal of Commerce* is the doyen of the South American press. During the presence of the American fleet in January, and the British squadron in December, 1908, a large section of the paper was printed in English for the benefit of the visitors.

Alcindo Guanabara. Chief editor of *O Paiz*, a journal of marked intellectual force.

Rodrigo Octavio. Lyric poet. Campinas, 1866.

Raymundo Corrêa. Poet. Maranhão, 1860–1911.

Quintino Bocayuva. One of the founders of the Republic. 1835–1912.

Homen de Mello (Baron). São Paulo, 1837. Geographer, historian, etc.

Oliveira Lima. Historian and diplomat, Recife, 1867.

Sylvio Romero. Specialist in folk-lore. Sergipe, 1851.

Euclydes da Cunha. Historian, novelist and diplomat. Cantagallo, Rio, 1868–1909.

No list of literary giants would be complete without the name of Capistrano de Abreu. The greatest eulogy possible is to say that this historian would have been famous in any land, and at any epoch. He is a native of the State of Ceará, born 1853, and his works include most exhaustive and minute studies of the colonial times, as well as translations from English, French, etc.

José Verissimo. Pará, 1857. The leading critic, justly feared and admired. An anthropologist, college professor and educational writer.

Amongst other romance writers, we may mention

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Nestor Victor, Aluizo Azevedo, Xaxier Marques, Pires de Almeida, Inglez de Souza, *ad infinitum*. We must not, however, forget Madame Julia Lopes de Almeida, perhaps the leading woman writer in Brazil. She has published *O livro das Noivas* (The bride's book), *A Fallencia*, and *A familia Medeirós*, amongst other works.

The greatest playwright is Arthur Azevedo (Maranhão). Has written more than forty plays, operas, and sketches, besides short stories.

Poets are well represented by Olavo Bilac, and Magalhaes de Azeredo, Augusto de Lima, Fontoura Xavier Lucio de Mendonça, Luiz Edmundo, Luiz Guimares (has had his verses translated into Spanish, French, and Swedish).

Classical Writers, etc.

Gonçalves Dias. Maranhão, 1823–64. Greatest of lyric poets.

José de Alencar. Ceará, 1829–77. O Guarany, Iracema, etc. National romancist *par excellence*.

José Bonifacio de Andrade e Silva. Santos, 1765–1838. Essayist, orator, patriarch of independence.

José do Patrocinio. Campos, 1851–1905. Journalist and orator. Steadfast fighter in the cause of the slaves.

Couto de Magalhaes. Minas, 1837–98. Anthropologist and historian.

Rocha Pitta. Bahia, 1660–1738. Historian.

Fagundes Varella. Rio, 1841–75. Lyric poet.

Varnhagen. S. Paulo, 1816–78. Historian.

Gregorio de Mattos. Bahia, 1663–1736. Satiric poet. The best hated. His enemies were innumerable.

Casimero de Abreu. Rio, 1837–60. Lyric poet.

Castro Alves. Bahia, 1847–71. Epic poet.

Tavares Bastos. Alagôas, 1839–75. Publicist.

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Through his efforts the River Amazon was opened to international commerce.

Salvador de Mendonça. Rio, 1841. Romancist, journalist and diplomat.

Carlos de Laet. Rio, 1847. Professor and journalist, critic and descriptive writer.

Musicians

Alberto Nepomuceno (Ceará). His *magnum opus* is *Artemis*, an opera. Henrique Oswaldo, winner of the great international contest organized by *Le Figaro*, his piece, *Il neige*, taking the palm from 600 competitors. Meneleu Campos, Francisco Braga, Dr. Abdon Milanez (a very popular composer), and Carlos de Mesquita head the list of musicians.

Artists

The Brazilian sculptor, *par excellence*, is Rodolpho Bernadelli. He has peopled the gardens and groves of his native land with beautiful marble forms. Corrêia Lima is a young and gifted pupil of Bernadelli, a fine group (Mater Dolorosa) coming from his hand.

The principal painters are—Aurelio de Figueiredo (Paulo e Francesca), Rodolpho Amoedo (a Narração de Philetas), Antonio de Parreiras (a Derrubada), Rodolpho Chambelland (a Sahida do Baile—leaving the ball), Elyseu Visconte, J. Baptista, and Henrique Bernadelli (Tarantella, Casas Brancas, Meditando, Syria).

Glancing at an *Anthologia Brasileira* of prose and verse, I find extracts from 155 writers, and it is safe to say that this number hardly represents the leading literary Brazilians. For a country whose literary life hardly amounts to a couple of hundred years, the record, both of amount of work and quality of output, is a magnifi-

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cent one. A most impressive feature of the history of literature in Brazil, is the fact that so many authors have suffered (even to death) for their principles, and that in nearly every case the work has been considered before the workman. Power and preference has been sacrificed to the ideal, and the result is glorious traditions and bright promise for the future.

Science

Dr. Oswaldo Cruz, head of the most complete biolo gical laboratory in the world, at Manguinhos (Rio de Janeiro). Responsible for the sanitation of the capital and many other hygienic triumphs.

Santos Dumont needs no introduction. He is a Mineiro, born in 1873.

Admiral Huet Bacellar. Improvements in torpedo tubes.

Landell de Moura (Father). First inventor of the wireless telephone.

Radler de Aquino (Lieut.). Discoverer of a new method of calculating the speed of ships by water pressure.

Mello Marques, naval officer. A new submarine.

Ribeiro da Costa. Unsinkable boats, hydraulic turbines, etc.

Edwardo Claudio (Dr.). A new propeller called "*Trochoide.*"

Oswaldo Faria. Transformation of alternative currents into positive ones.

Vital Brasil (Dr.). Discoverer of antidotes for ophidic poisons.

Moreira Fonseca (Dr.). Application of these poisons in the cure of various diseases, especially yellow fever.

Barbosa Rodrigues. Great works on Brazilian flora, etc.

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Capanema, Barão de. Inventor of explosives, wet carbonizing process, etc., etc.

Carlos Chagos (Dr.). Discoverer of the disease bearing his name.

Carlos Moreira (Dr.). Zoologist, botanist and icthyologist.

Roquette Pinto (Dr.). Ethnography and archæology.

Lacerda (Dr.). Many works on abstract and concrete science. (Director of the National Museum.)

Drs. Chapot Prevost, Paes Leme, Baptista Lacerda are famous physicians. Space does not permit of any more names being mentioned, and those of many eminent men are omitted because of this.

Amongst distinguished foreigners in the service of the Republic one may mention Dr. Orville Derby, chief of the geological service, and Drs. Herman and Rudolph von Ihering, of the São Paulo State Museum.

There are many others, but the above will suffice.

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APPENDIX I

GAZETTEER

Population; D., District; C., City or Urban. Temperature, Centigrade. M., Metres above sea. K., Kilometres. R., Rio. S. P., São Paulo.

Town.	State.	Population.	Latitude. Hr. Min. Sec.	Longitude (Meridian of Rio). Hr. Min. Sec.	Press.	Railway.	Hotels.
Abaeté . . Diamonds.	Minas . .	25,000 D.	19 09 16 S.	—	—	Oeste de Minas	—
Abrolhos (islands)	Bahia . .	—	17 51 31 S.	4 28 33 E.	—	—	—
Alagoinhas .	—	50,000 C.	12 17 30 S.	4 49 51 E.	—	Bahia-Alagoinhas	—
Alegre . . .	Espirito Santo	18,000 D.	—	—	—	Leopoldina	—
Alegrete . .	Rio Grande do Sul	8,000 C.	29 46 58 S.	12 33 21 W.	—	—	*America*
Alfenas . .	Minas. . .	31,000 D.	21 15 00 S.	2 58 00 W.	—	Minas-Rio .	—
Amargosa .	Bahia. . .	21,000 D.	—	—	—	Tram road Nazareth	—
Amparo . . 170 K. from S. P.	S. Paulo . .	12,000 C.	—	—	*O Arado* .	Mogyana .	*Grande*
Angra dos Reis	Rio . . .	20,000 D.	—	—	*Gazeta* . .	Central Rly. from Rio	*da Silva*
Antonina . .	Paraná . .	12,000 D.	25 26 00 S.	5 33 00 W.	—	Morretes-Antonina	—
Aracajú . .	Sergipe . .	30,000 C.	10 55 00 S.	6 01 00 E.	—	Aracajú-Laranjeiras	*Brasil*
	Max. temp., 31° C.; min. temp., 19° C.		Trams.	Theatre.	Public Library.		
Aracaty . .	Ceará. . .	30,000 D.	—	—	*Correio da Manha*	—	—

On the River Jaguaribe.

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Araraquara .	S. Paulo . .	8,000 C.	—	—	—	Paulista, .	*Mazza*
322 K. from S. P.							
Arassuahy. .	Minas. . .	—	—	—	—	—	—
N.E. centre of precious stone district.							
Araxá . . .	Minas. . .	40,000 D.	—	—	*O Araxá* .	Railway constructing (Oeste de Minas)	—
Theatre.							
Avaré . . .	S. Paulo . .	4,000 C.	—	—	—	Soracabana	—
386 K. from S. P.							
Baependy .	Minas. . .	28,000 D.	21 50 00 S.	11 41 00 W.	—	Sapucahy .	—
870 M. above sea. Av. temp., 18.6° C. Near Caxambu.							
Bagé . . .	Rio Grande do Sul	18,000 C.	31 20 50 S.	11 02 21 W.	*O Dever* .	S. Paulo-Rio Grande (Brazil Rly. Co.)	*Paris, Brasil, Commercio*
Cattle. Dried meat. Theatre. Electric light, etc.							
Bahia . . .	Bahia. . .	280,000 C.	12 58 16 S.	4 39 08 E.	*Diario de Bahia, A Bahia, Diario de Noticias*	—	*Paris, Sul Americano, Bergmann*
Capital of State. Electric cars, lighting and power. Railway stations. British and American Consuls. British bank. Custom House. Markets. Theatres, S. João and Polytheama. Centre of cocoa and tobacco trade. The City of Churches (over 100). Post, telegraphs, markets, business houses, railway station and Consulates in lower town. Public buildings, schools, hotels and churches in upper town.							
Barbacena .	Minas. . .	10,000 C.	21 14 43 S.	0 35 06 E.	—	Central . .	*Grande, Central*
Electric light. 1,132 M. above sea level. Av. temp., 17·3° C.; max., 10° C.; min., 2° C. 378 K. from Rio.							
Barra Mansa .	Rio . . .	26,000 D.	—	—	*O Municipio*	Central . .	*Santos*
Barra do Pirahy	—	10,000 C.	—	—	*O Commercio*	Central . .	*Universal*
Barra do Rio Grande	Bahia. . .	—	11 05 51 S.	0 00 36 W.	—	—	—
On the S. Francisco River.							
Baturité . .	Ceará. . .	15,000 C.	—	—	*Oitenta e Nove*	Baturité	—
Manicoba rubber.							

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Town.	State.	Population.	Latitude. Hr. Min. Sec.	Longitude (Meridian of Rio). Hr. Min. Sec.	Press.	Railway.	Hotels.
Baurú . . .	S. Paulo . .	—	—	—	—	Soracabana	—
Coffee. Cattle. 439 K. from S. P.							
Bebedouro .	—	4,000 C.	—	—	—	Paulista	—
471 K. from S. P.							
Belem do Pará	Pará . . .	200,0000 C.	1 26 59 N.	5 19 39 W.	*Folha do Norte, A Provincia do Para, O Jornal*	Pará-Bragança	*Paz, America, Pinnet*
Capital of State. Rubber exportation. British and American Consuls. Institute Lauro Sodré. Museu Goeldii. In Pará State there are 2,160,000 cacão trees and 7,000,000 rubber trees.							
Bello Horizonte	Minas . .	25,000 C.	19 55 22 S.	1 10 6 W.	*Diario de Minas, Diario de Noticias, Minas Geraes*	Central . .	*Grande, Globe, Commercio*
920 M. above sea. Electric trams, light, etc. Telephones. Capital of State. Public buildings include Post Office, Law School, President's Palace, Congress Library, Market, Banks, Free Schools of Music and Law, Dental College, Clubs. Two theatres. Bello Horizonte is a model city, laid out on the most approved plans. Prevailing winds, E.N.E. to E.S.E. 604½ K. from Rio. Dairy Produce. Manufactures. Av. temp., 19.8° C.							
Belmonte . .	Bahia. . .	80,000 D.	15 51 50 S.	4 18 12 E.	—	—	—
Sea coast.							
Bomfim . .	Minas . .	39,000 D.	20 00 00 S.	1 26 00 W.	—	—	—
959 M.							
Bomfim . .	Bahia. . .	10,000 C.	10 27 26 S.	3 03 11 W.	—	Bahia-S. Francisco	*Lobo*
445 K. from Bahia.							
Bom Jesus das Meiras	—	—	—	—	—	—	—
In the Chapada (diamond district).							
Bom Successo	Minas. . .	28,000 D.	—	—	*O Juvenil* .	Oeste de Minas	—
844 M.							
Botucatú . .	S. Paulo . .	32,000 D.	22 55 00 S.	4 16 45 W.	*Diario da Tarde*	Soracabana	*Villela*
Coffee. Electric light. 308 K. from S. P.							

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Bragança . .	Para . . .	15,000 C.	1 05 40 S.	3 50 30 W.	*O Caeté* . .	Bragança (terminus)	—
Cotton. Maize. Tobacco.							
Brejo . . .	Maranhão .	—	—	—	*O Debate* .	—	—
Cotton. Carnauba.							
Blumenau. .	Santa Catharina	10,000 C.	26 55 16 S.	5 58 54 W.	*Blumenauer Leitung*	Small local line	—
Max. temp., 37° C.; min. temp., 3° C.							
açapava . .	Rio Grande do Sul	—	30 28 15 S.	11 53 49 W.	*O Caçapavano*	—	*Viajantes*
Cachoeira . .	Bahia . .	30,000 C.	—	—	*A Bahia, A Cachoeira*	Central da Bahia	*Juvenal*
78 K. from Bahia.							
Cachoeira . .	Rio Grande do Sul	45,000 D.	30 02 55 S.	9 04 21 W.	*O Commercio*	S. Paulo Rio Grande (Brazil Rly. Co.)	*Alliança*
Cachoeiro . .	Espirito Santo	3,000 C.	—	—	*O Argentir, O Argos*	Leopoldina	*Machado, Serpa*
Coffee							
Caethé . .	Minas. . .	—	19 53 20 S.	0 29 27 W.	—	Central . .	—
Manufactures of pottery and textiles. 943 M. altitude.							
Caixas . . .	Maranhão .	20,000	4 51 59 S.	0 11 03 W.	*Jornal de Caixas*	Caixas-Cajazeiras	—
480 miles from S. Luiz.							
Caixas . .	Rio Grande do Sul	5,000 C.	29 10 25 S.	8 02 00 W.	*O Brasil* .	Brazil Rly. Co. From Porto Alegre	*Globo*
Cametá . .	Pará . . .	10,000 C.	2 14 19 S.	6 16 39 W.	—	—	—
Cacão. Rubber. On the Para River.							
Camocim . .	Ceará. . .	—	3 12 00 S.	2 28 00 E.	*A Palavra* .	Sobral . .	—
Cattle. Cotton. Carnauba.							
Campinas . .	São Paulo .	45,000 C.	22 54 03 S.	3 54 01 W.	*Cidade de Campinas, Diario de Tarde*	Paulista .	*Villela*

Centre of coffee district. The Princess of the West. Statue to Carlos Gomes, composer of the opera "Guarany," who was born here. Electric trams, light, etc. 693 M. 105 K. from S. P. Max. temp., 36° C.; min. temp., 0° C.

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Town.	State.	Population.	Latitude. Hr. Min. Sec.	Longitude (Meridian of Rio). Hr. Min. Sec.	Press.	Railway.	Hotels.
Campos	Rio	30,000	21 45 24 S.	1 50 21 W.	*Monitor Campista*	Leopoldina	*Hotel Flavia*
Seat of sugar industry. Trams. Electric light. Preserved fruit.							
Cannavieiras	Bahia	20,000 D.	15 41 00 S.	5 03 00 E.	*Monitor do Sul*	—	—
Seaport. Max. temp., 31° C.; min. temp., 18° C. Fishing. Cacão.							
Cantagallo	Rio	36,000 D.	—	—	*Correio do Sul*	Leopoldina	—
Caravellas	Bahia	8,000 C.	17 43 30 S.	3 56 15 E.	—	Bahia-Minas	*Argentina*
Whale fishing.							
Castro	Paraná	12,000 D.	24 47 30 S.	6 50 07 W.	—	S. Paulo-Rio Grande	*Beimel*
984 M. Matte. Pine wood. Cereals.							
Cataguazes	Minas	42,000 D.	—	—	*O Cataguazes*	Leopoldina	*Villas*
Theatre. Electric light. Banks, etc. Coffee.							
Catalão	Goyaz	8,000 C.	18 10 25 S.	4 48 00 W.	—	Goyaz From S. P. *via* Mogyana Rly.	*Barbosa*
Cattle.							
Caxambú	Minas	—	22 00 00 S.	1 45 00 W.	*O Caxambuense*	Sapucahy	*Palace, Hotel Caxambú, Grande*
Hot springs. 80 Mo.							
Corumbá	Matto Grosso	10,000 C.	18 59 38 S.	14 25 34 W.	—	—	*Hotel International*
Crato	Ceará	20,000 D.	7 14 02 S.	4 02 00 E.	—	—	—
Cattle. Cotton. Carnauba.							
Cruzeiro do Sul	Territory do Acre	1,000 C.	7 38 27 S.	29 25 54 W.	—	—	—
Rubber.							
Curvello	Minas	60,000 D.	—	—	*O Porvir*	Central	—
798 K. from Rio. Rubber. Cattle. Hides.							

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Curytibá . .	Paraná . .	50,000 C.	25 25 04 S.	6 06 09 W.	*A Republica*	Curitybá-Ponta Grossa Curitybá-Paranaguá	*Grande, Roma*

Capital of State. Electric trams, lighting, etc. British Consul. Museum, etc. Rail from Rio and Paranaguá. 900 M. above sea level. Large foreign population. Max. temp., 37° C.; min. temp., 8° C. Fine modern city. Dairy produce. Manufactures.

Cuyabá . .	Matto Grosso	20,000	15 16 00 S.	12 15 11 W.	*Gazeta Official*, *O Pharol*	—	—

Capital of State. British Vice-Consul. Max. temp., 41° C.; min. temp., 4° C. Gold. Diamonds. Cattle.

Diamantina .	Minas .	56,000 D.	18 10 00 S.	0 26 00 W.	*Estrella Polar*, *O Jequitinhonha*	Curralinho-Diamantina (not quite finished)	—

1,132 M. above sea. Four newspapers. Two hospitals, etc. Famous for jewellery and centre of diamond cutting. Mule from Rio das Velhas (Minas). Max. temp., 25° C.; min. temp., 9·5° C.; av. temp., 21° C.

Entre Rios .	Minas. . .	12,000 C.	—	—	—	Central and Leopoldina	*Franklim*

198 K. from Rio.

Estancia . .	Sergipe . .	23,000 D.	—	—	*A Razão* .	—	—

Cotton.

Feira de S. Anna	Bahia. . .	25,000 D.	—	—	*O Municipio*	Central-Bahia	—

Great cattle fairs.

Fernando do Noronha	Pernambuco.	—	3 50 30 S.	10 45 09 E.	—	—	—

Island. Guano deposits.

Florianopolis .	Santa Catharina	30,000 C.	27 36 00 S.	5 19 54 W.	*O Dia*, *O Albor*	—	*Grande, Commercio*

Capital. Theatre. Museum. Library. Max. temp., 32° C.; min. temp., 5° C.

Formiga . .	Minas . .	5,000 C.	—	—	*O Democrata*	Oeste de Minas	*Garcia, Commercio*

1,000 M. Coffee.

Formosa . .	Goyaz . .	2,000 C.	—	—	—	—	—

900 M. 312 K. from Goyaz.

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Town.	State.	Population.	Latitude. Hr. Min. Sec.	Longitude (Meridian of Rio). Hr. Min. Sec.	Press.	Railway.	Hotels.
Fortaleza	Ceará	50,000 C.	3 43 36 S.	4 39 11 E.	*A Republica, Jornal do Ceará*	Baturité	*France, International*
Capital. Max. temp., 31° C.; min. temp., 20° C. Trams. Theatre, etc.							
Garahuns	Pernambuco.	40,000 D.	8 53 25 S.	6 46 17 E.	*O Sertão*	Gt. Western	—
Manufacture of leather clothing. 894 M.							
Goyana	—	20,000 D.	—	—	*A Cidade*	—	*Papagaio*
Cotton.							
Goyaz	Goyaz	16,000 C.	15 55 26 S.	6 57 31 W.	*O Goyaz*	—	—
Capital. Gold. Diamonds.							
Guarapuava	Paraná	10,000 D.	25 23 36 S.	8 16 58 W.	—	—	—
1,095 M. Cattle. Cereals. Matte. Pine wood.							
Iguapé	S. Paulo	3,000 C.	—	—	—	—	—
Seaport. Rice.							
Ilhéos	Bahia.	20,000 D.	14 47 40 S.	4 07 25 E.	*A Lucta*	—	*Lopes, Coelho*
Max. temp., 37° C.; min. temp., 19° C.							
Itabira	Minas.	38,000 D.	—	—	*O Arauto*	Central	—
Iron.							
Itajahy	S. Catharina.	22,000 D.	—	—	*Novidades*	—	*Central*
Seaport.							
Itauna	Minas.	—	—	—	*O Municipio*	Oeste de Minas	—
Itapemirim	Espirito Santo	13,000 D.	—	—	*Correio do Sul*	Leopoldina	—
Coffee.							
Jacobina	Bahia.	36,000 D.	—	—	—	—	—
449 K. from Bahia. Cattle. Fruit preserves.							
Jaguarão	Rio Grande do Sul	18,000 D.	32 33 32 S.	10 10 00 W.	*J. do Commercio*	—	*Biot, Francez*
380 K. from Porto Alegre.							
Jahu	S. Paulo	26,000 D.	22 16 00 S.	5 12 00 W.	*Imparcial*	Paulista	*Toscano*
Coffee. 394 K. from S. P.							
Januaria	Minas.	10,000 C.	15 29 35 S.	1 10 12 W.	—	—	—
On the River S. Francisco. Cattle. Cereals, etc. Steamers to Joazeiro and Pirapora.							

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Joazeiro . .	Bahia. . .	14,000	9 25 14 S.	2 41 20 E.	*Correio de São Francisco*	Bahia-S. Francisco	*Hotel Paris.*
Max. temp., 40° C.; min. temp., 15° C.							
Joinville . .	Sta Catharina	8,000	26 18 16 S.	5 40 03 W.	*Commercio de Joinville*	Brazil Rly. Co.	—
Juiz de Fôra .	Minas. . .	30,000	21 45 36 S.	0 10 03 W.	—	Central .	*Grande, Central, Renaissance*
Two banks. Four newspapers (principal, *O Pharol*). Twelve private colleges. Theatres. Electric trams, lighting, etc. Industrial city. Railway junction. Protestant chapels, etc., etc. International population. Av. temp., 18·3° C.; max. temp., 36° C.; min. temp., 2·5° C. 675 M. 275 K. from Rio.							
Jundiahy . .	São Paulo .	16,000	23 11 02 S.	5 42 48 W.	*A Folha.* .	S. Paulo Rly. Terminus	*Stadt Hamburgo*
Lambary . .	Minas. . .	—	21 59 00 S.	2 7 00 W.	*O Lambary* .	Musambinho	—
900 M. Lake. Casino. Thermal Springs. Av. temp. 19° C. Eight hotels.							
Laranjeiras .	Sergipe . .	10,000 C.	—	—	—	Aracaju-Laranjeiras	*Telles*
Cotton. Carnauba.							
Lavras. . .	Minas. . .	25,000 D.	21 10 00 S.	1 52 00 W.	*Folha de Lavras*	Oeste de Minas	—
900 M.							
Layfayette .	—	—	—	—	—	Central . .	—
931 M. 462 K. from Rio.							
Limoeiro . .	Pernambuco.	24,000 D.	—	—	—	Gt. Western	—
Cotton. Sugar.							
Livramento .	R. Grande do Sul	9,000 C.	30 53 13 S.	12 23 00 W.	—	Brazil Rl. Co.	*Pinto, Correa*
600 K. from Porto Alegre.							
Lorena. . .	S. Paulo . .	8,000 C.	—	—	*Gazeta* . .	Central . .	*Paiva*
Coffee. 280 K. from S. Paulo.							
Manãos . .	Amazonas .	80,000	3 06 05 S.	16 52 19 W.	*O Amazonas, Correio do Norte, A Noticia, A Illustraçao*	—	*Cassina, Gran*
Museum. Theatres. Electric trams and lighting. American and British Consuls. Capital of State. Fine modern city. Rubber district. Palace of Justice cost £400,000. The theatre £750,000. Rubber. Tortoiseshell. Medicinal plants.							

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Town.	State.	Population.	Latitude. Hr. Min. Sec.	Longitude (Meridian of Rio). Hr. Min. Sec.	Press.	Railway.	Hotels.
Macéio. . .	Alagoas . .	35,000 C.	9 40 26 S.	7 27 06 E.	*A Tribuna, O Gutemburg*	Gt. Western	*Commercial, Universal*
Seaport. British and American Consuls. Six colleges. Library.							
Maragogipe .	Bahia. . .	25,000 C.	—	—	*A Vanguarda*	—	—
Tobacco.							
Minas Novas .	Minas. . .	—	17 14 00 S.	0 35 00 E.	*O Civilista* .	—	—
Precious stones. 922 M.							
Montes Claros	—	6,000 C.	—	—	*A Verdale* .	—	—
Morro do Chapéu	Bahia. . .	26,000 D.	—	—	—	—	*Bahia*
1,082 M. Diamonds.							
Mossoró . .	Rio Grande do Norte	13,000 D.	—	—	*O Mossorense, A Ideia*	—	*Todo*
Cotton. Carnauba.							
Natal . . .	—	15,000 C.	5 46 41 S.	7 51 57 E.	*A Capital, A Republica, Diario do Norte*	Gt. Western	*Colombo*
Capital. Max. temp., 30° C.; min. temp., 19° C. Seaport.							
Nazareth . .	Bahia. . .	10,000	—	—	—	Tram road, Nazareth	—
Tobacco.							
Nazareth . .	Pernambuco.	—	—	—	—	Gt. Western	—
Nictheroy .	Rio . . .	50,000 C.	22 53 46 S.	0 03 07 E.	—	Leopoldina	*Soares*
State capital. Electric cars, etc. Opposite Rio de Janero.							
Novo Friburgo	Rio . . .	20,000 C.	22 17 15 S.	0 38 30 E.	*O Friburgense*	Leopoldina	*Grande*
Formerly a German and Swiss Colony. Founded by Swiss Guards of Dom Pedro I. Max. temp., 30° C.; min. temp., 1° C.							
Obidos. . .	Pará . . .	18,000 D.	1 54 00 S.	12 21 30 W.	—	—	—
On the Amazon River. Cacao. Brazil nuts. Rubber.							
Oeiras . . .	Piauhy . .	20,000 D.	—	—	—	—	—
Cattle.							
Olinda . .	Pernambuco.	10,000 C.	8 00 35 S.	8 19 21 E.	—	Gt. Western	—

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Ouro Fino . .	Minas . . .	37,000 D.	—	—	*Gazeta* . .	Sapucahy .	—
850 M. Electric light. Theatre.							
Ouro Preto .	Minas . . .	10,000	20 23 22 S.	0 19 54 W.	—	Central . .	*Grande*
Mining and Pharmacy Schools, Gymnasium (State). Electric light. 1,250 M. above sea level. Mineral district. Topazes.							
Palma . . .	Goyaz . .	3,000 C.	—	—	—	—	—
Cattle.							
Palmas . .	Rio Grande do Sul	—	26 27 00 S.	8 49 00 W.	*O Palmense*	—	*Garibaldi*
Palmeira . .	—	13,000 D.	—	—	—	—	*Ristow*
Palmyra . .	Minas . . .	—	—	—	*O Mercantil*	Central . .	—
837 M. 324 K. from Rio.							
Parahyba . .	Parahyba .	20,000 C.	6 07 35 S.	8 14 14 E.	*O Estado de Parahyba, O União*	Great Western	*Central, Allemão*
Max. temp., 34° C.; min. temp., 17° C. British Consul.							
Parahyba do Sul	Rio . . .	—	—	—	*O Imparcial*	Central . .	—
Coffee. 188 K. from Rio.							
Paranáguá .	Paraná . .	15,000 C.	25 31 20 S.	5 21 30 W.	*Correio da Manhã*	Paranáguá-Curityba	*Zanchetta, Brasil*
Seaport.							
Parnahyba .	Piauhy . .	15,000 D.	2 59 00 S.	1 26 21 E.	*O Nortista* .	—	*Miramar*
Passo Fundo .	Rio Grande do Sul	26,000 D.	—	—	—	Santa-Maria-Uruguay	*Internacional*
Peçanha . .	Minas . . .	—	16 23 00 S.	0 47 00 E.	—	—	—
Pelotas . .	R. Grande do Sul	30,000 C.	31 46 53 S.	9 14 29 W.	*Diario Popular, Correio Mercantil*	Rio Grande-Bagé (Brazil Rly. Co.)	*Alliança, Brasil* .
Traffic in dried meat (Xarque). Max. temp., 40° C.; min. temp., 3·5° C.							
Penedo . .	Alagoas . .	16,000 C.	10 18 28 S.	6 14 29 E.	*O Penedo, O Luctador*	—	*Alagoana*
Great market town on the River São Francisco. Pottery.							
Pesqueira . .	Pernambuco.	16,000 D.	—	—	—	Central . .	*Pernambuco*
Pilar . . .	Alagoas . .	15,000 D.	—	—	*A Ordem* .	—	—
On the River Parahyba.							

Digitized by Google

Town.	State.	Population.	Latitude. Hr. Min. Sec.	Longitude (Meridian of Rio). Hr. Min. Sec.	Press.	Railway.	Hotels.
Pindamonhangaba	S. Paulo . .	14,000 D.	22 58 00 S.	2 19 00 W.	*Folha do Norte*	Central . .	—
Coffee.							
Piracicaba. .	—	40,000 D.	—	—	*Gazeta* . .	Soracabana	—
Coffee. Dry healthy climate. Sanatorium, Agricultural College and Private Schools.							
Poços de Caldas	Minas . .	7,000 C.	21 45 00 S.	3 24 00 W.	—	Mogyana .	*Globo, Sul,* etc.
Av. temp., 17° C. 1,200 M. 582 K. from Rio. Thermal springs.							
Ponta Grossa.	Paraná . .	10,000 C.	25 06 25 S.	6 59 37 W.	*A Folha Rosae, Diario de Parana*	S. Paulo-Rio Grande, Curityba-P. Grossa, Brazil Rly. Co.	*Bindo, Palermo*
Cattle. Matte. Pine wood. Cereals.							
Porto Alegre .	R. Grande do Sul	130,000 C.	30 01 57 S.	8 00 00 W.	*Gazeta de Commercio, A Federaçao, Deutsche Zeitung, Stella d' Italia, Correio do Povo*	Brazil Rly. Co.	*Brazil, Central, Becker*
Capital. Electric trams and light. Industrial city. First-class administration. On River Tocantins.							
Porto Nacional	Goyaz . .	1,500 C.	—	—	*Norte de Goyaz*	—	—
Pouso Alegre .	Minas . .	50,000 D.	—	—	*A Cidade* .	Sapucahy .	*Abreu*
Propria . .	Sergipe . .	7,000 C.	10 12 31 S.	6 18 13 E.	—	Timbo-Propria	— *Central*
On the River S. Francisco.							
Quarahy . .	Rio Grande do Sul	8,000 D.	30 39 50 S.	14 29 20 W.	*O Insentivo, Gazeta*	—	—
Queluz. . .	Minas . .	10,000 C.	20 39 12 S.	0 36 55 W.	*Gazeta* . .	Central . .	*Moura, Haya*

1,000 M.

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Recife (Pernambuco)	Pernambuco	200,000 C.	8 05 07 S.	8 19 12 E.	*Correio de Recife, Diario de Pernambuco, A Provincia, Jornal de Recife*, etc.	Gt. Western	*Hotel de France, Pension von Landy*
Ocean port. Gateway to Brazil. British and American Consuls. Fine buildings. Electric lighting, trams, etc.							
Rezende	Rio	16,000 D.	—	—	*O Regenerador*	Central	—
190½ K. from Rio.							
Ribeirão Preto	S. Paulo	20,000 C.	21 10 20 S.	4 38 51 W.	—	Mogyana	*Fonseca, Simões*
Max. temp., 40° C.; min. temp., 1° C.							
Rio Grande	Rio Grande do Sul	40,000 C.	32 00 00 S.	8 58 00 W.	*Diario de Rio Grande*	Brazil Rly. Co.	*Paris, Grande, Germania*
British and American Consuls. Max. temp., 32° C.; min. temp., 1° C.							
Sabará	Minas	—	19 47 00 S.	1 11 00 W.	—	Central	—
Salinas	—	—	16 23 00 S.	0 47 00 E.	—	—	—
915 M.							
Santarem	Pará	6,000 C.	2 24 48 S.	11 32 37 W.	—	—	—
Rubber. Cacao. Brazil nuts. On the River Tapajos.							
Santos	São Paulo	70,000	23 56 27 S.	3 09 07 W.	*A Tribuna*	S. Paulo	*Grande, Washington, Internacional*
Greatest coffee port in the world. British and American Consuls. Fine docks. Electric lighting and trams. Fine modernized town. 3 miles from sea. Birthplace of Father Bartholomeu de Gusmão, the first aeronautist.							
Sete Lagãas	Minas	40,000 C.	—	—	—	Central	*Hotel Drummond*
684 K. from Rio.							
S. Carlos do Pinhal	S. Paulo	—	28 08 00 S.	4 40 30 W.	—	Paulista	*Tassoni*
271 K. to S. P.							
S. Felix	Bahia	25,000 D.	—	—	—	Central-Bahia	—
Huge tobacco factories.							

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Town.	State.	Population.	Latitude. Hr. Min. Sec.	Longitude (Meridian of Rio). Hr. Min. Sec.	Press.	Railway.	Hotels.
S. Fidelis . . Mica.	Rio . . .	4,000 C.	—	—	*O. S. Fidelis*	Leopoldina	*Branddo*
S. Francisco .	Sta Catharina	16,000	26 14 17 S.	5 28 59 W.	—	—	—
S. João da Barra	Rio . . .	6,000 D.	21 38 10 S.	2 06 56 E.	*O Combatente*	Leopoldina	—
Max. temp., 33° C.; min. temp., 0·5° C.							
S. João d'El Rei	Minas . .	—	21 08 00 S.	1 17 00 W.	*O Reporter* .	Oeste de Minas	*Oeste de Minas*
British Vice-Consul. Max. temp., 33° C.; min. temp., 0·5° C. 880 M. 463 K. from Rio.							
S. Leopoldo .	R. Grande do Sul	—	30 43 03 S.	8 06 09 W.	*Deutsche Post*	—	*Kock*
São Luiz . .	Maranhão .	50,000 C.	2 29 23 S.	1 07 24 W.	*Avante, Diario de Maranhao, Revista do Norte*	—	*Hotel Central*
Capital of State. British Consul. Called the "Athens of Brazil," owing to the number of literary men born in the city, including the poet "Gonçalves Dias." Max. temp., 34° C.; min. temp., 21° C.							
S. Matheu. .	Espirito Santo	12,000 D.	18 53 34 S.	3 19 13 E.	—	—	—
Santa Maria .	R. Grande do Sul	12,000 D.	29 40 11 S.	—	*A Tribuna, O Estado*	Porto Alegre-Uruguayana	*Hambourg*
S. Thomé . .	Rio	—	22 02 00 S.	2 06 51 E.	—	—	—
Cape and port. Fruit and fish exported to Rio.							
Sobral . . .	Ceará. . .	29,000 D.	—	—	*A Patria, O Rebate*	Sobral . .	—
Cotton. Carnauba.							
Soracabá . .	São Paulo .	20,000 C.	23 39 00 S.	—	—	Soracabana.	—
Coffee. 110 K. from S. P.							
Taubaté . .	S. Paulo . .	16,000	—	—	*O Norte, Jornal de Taubate*	Central . .	*Hotel Pereira*
Steam trams. Coffee. 154 K. from S.P.							
Therezina . .	Piauhy . .	50,000 D.	5 04 56 S.	0 21 36 E.	*O Piauhy, O Norte*	—	*Castello Branco, Castro Silva*

Capital of State. Cattle. On the Parnabyba River.

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Tibagy. . . Diamonds.	Paraná . .	—	24 42[8]30 S.	7 31 20 W.	—	—	—
Trinidade . . Island.	Espirito Santo	—	20 32 26 S.	13 50 46 E.	—	—	—
Tubarão . . Coal.	Sta Catharina	20,000 D.	—	—	—	Brazil Rly. Co.	*Cometa*
Turvo . . .	Minas. . .	30,000 D.	—	—	*A Farpa* .	—	—
Uba . . . Coffee.	—	36,000 D.	—	—	*Folha do Povo*	Leopoldina	—
Uberaba . .	—	25,000	19 45 21 S.	4 15 10 W.	*W. Gazeta, Lavoura e Commercio*	Mogyana .	*Carvalho*
Uruguayana . Sheep. Cattle. Agates, etc. Diamonds.	Rio Grande do Sul	14,000 C.	29 45 18 S.	13 55 09 W.	*A Nação* .	Brazil Gt. Southern	*Progresso, Alliança*
Valença . .	Rio . . .	4,000 C.	—	—	*O Correio* .	União Valenciano	*Central*
Vassouras .	—	12,000 D.	—	—	*O Municipio*	Central . .	—
Victoria . .	Pernambuco	12,000 D.	—	—	*O Lidador* .	Gt. Western	*Alvares*
Victoria . .	Espirito Santo	20,000 C.	20 18 50 S.	2 50 35 E.	*Commercio do Espirito Santo, Diario da Manha, A Renascença*	Leopoldina, Victoria-Minas	*Bologne and d'Europe, Internacional*
State capital. Electric trams and light. British and American Consuls. Rail from Nictheroy (Rio). New port works. A great future before it. See Transports.							
Villa Nova de Lima	Minas . .	10,000 C.	—	—	*O Ideal* . .	Central Rly. station near	—
For Morro Velho gold mine, see Gold. British Vice-Consul.							
Vizeu . . .	Pará . . .	1,000	1 05 20 S.	3 18 10 W.	—	—	—
On the River Gurupy. Tobacco. Rice. Mandioca. Cacao. Gold.							

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APPENDIX II

GLOSSARY

Agata. Agate.
Alcatrão. Tar.
Amianto. Asbestos.
Aquas minerals. Mineral waters.
Ardosias. Slates and slatey clays.
Areia. Sand.
Areias monaziticas. Monazitic sands.
Arenito. Sandstone.
Arenoso. Sandy.
Argilla. Clay.
Azulinhos. Small pale sapphires.
Betumen. Bitumen.
Breu. Pitch.
Batea. Bowl of hard wood used for washing diamond-bearing gravels.
Berilio. Beryl.
Boart. Amorphous carbon. Hardness equal to diamond.
Brejo (or Pantano). Swamp or marsh; bog.
Cal. Lime.
Calcareos. Limestone rocks.
Caco. Disintegrated quartz in angular fragments.
Caldeirões. Potholes.
Carvão de Pedra. Coal.

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Camada. Layer.
Cambalaxo. Spodumene.
Canga. Brecciated, spongy ferruginous deposit.
Carbonados. Spherical carbon (diamond) of a greyish black colour.
Carimbé. Wooden bowl in which gravel is carried.
Cascalho. Diamond-bearing conglomerate or pebbly gravel.
Catinga. Scrub or undergrowth.
Cata. Open working; a pit or hole.
Captivos de Cobre. Rutite, etc., etc., found as satellites of the diamond.
Corrego. Small ravine with watercourse.
Chapada. Tableland or plateau.
Copalina. Fossil gum.
Cinnabrio. Cinnabar.
Cobre. Copper.
Capa. Covering formation of lode.
Chumbo. Lead.
Cristal da rocha. Rock crystal.
Dobras. Folds.
Enxofre. Sulphur.
Estanho. Tin.
Estrellada. Starred. Coloured clays with white fragments (diamond formation).
Esmeril. Emery.
Estrada. Road.
Falha. Fault.
Favas. Rolled pebbles of various minerals.
Feijões. Rolled black tourmalines.
Ferro. Iron.
Fenda. Crack.
Flor da terra. Surface of the earth.
Fosfato de calcio. Guano.
Folhelo. Shale.

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Foz. Mouth of river.
Feitor. Foreman.
Formação. Association of minerals amongst which diamonds are found.
Garimpeiro. One who works a garimpo or placer. Formerly an illicit miner.
Gamella. Vessel used in washing diamond-bearing gravel. Larger than the batea.
Gres. Sandstone.
Giz. Chalk.
Granadas. Garnets.
Grupiaras. Gravel patches on hill-sides (in diamond fields).
Gurgulho. Dry working consisting of cascalho, or conglomerate.
Gypso (or Gesso). Gypsum.
Hulha. Coal.
Itabirites. Iron ires of the Itabira district. Generic term for hematites in Minas. (Fer Oligiste.)
Itabirite. Pedra brilhante (*Anglice*, bright stone.)
Itacolumite. White quartzose sandstone, flexible, in thin layers.
Jacintho. Andalusite.
Jacutinga. Multi-coloured iron glance (pyrolusite), also occurs in pockets with gold (friable Itabirites).
Jazida. Deposit of any mineral.
Kaolino. China clay.
Lage. Flat sand bank.
Lapa. Foot wall, usually of clay slate (killas),
Lavrito. Boart, or amorphous diamond, in appearance like scoria.
Leito. Bed.
Lavra. Gold or diamond washing in a river.
Malacacheta. Mica.
Marmore. Marble.

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Morro. Mount.
Nafta. Petroleum.
Ninho (or Bucho). A large pocket in a gold mine, very rich.
Nivel. Level.
Ouro (or Oiro). Gold.
Oligisto. Hematite.
Pederneira. Flint.
Pedra pomes. Pumice stone.
Pedra hume. Alum.
Pedra sabão. Soapstone (talc).
Pedra de mó. Grindstone.
Pedra de toque. Touchstone.
Picarra. Micaceous clay, or clay slate (killas).
Pico. Peak.
Poço. Well or boring.
Poeira. Dust.
Polvora. Powder.
Pedreiro. Mason.
Platina. Platinum.
Praia. Beach.
Plombagina. Plumbago.
Rocha. Rock.
Salitre. Saltpetre.
Sal. Salt.
Secundina. Clay schists. Second layer in diamond formation.
Sertão. Contraction of desertão (great desert). Name given to the high plains, etc., of the interior. Always being approached but never reached. In Rio, Western Minas is the Sertão. In Minas, Goyaz is the Sertão, etc., etc.
Schistos. Schists.
Salto. Waterfall.
Serviço. Working, or lavra.

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Setio. Country house and farm.
Soldo. Wages.
Soltar. Let go.
Sondar. To sound.
Sublocação. Sub-letting.
Tabatinga. Red talcose clay used in pottery.
Terra-roxa. Red earth common all along the coast and in São Paulo, Rio, Minas, etc.
Termo. Term or limit.
Terraço. Terrace.
Teso. Escarpment.
Testada. Ridge or boundary.
Thermas. Hot springs.
Tincal. Borax.
Titulo. Title or claim.
Turfa. Peat.
Turvo. Muddy, discoloured water.
Turma. Gang of men.
Usar. To make use of.
Vasa. Oooze or mud.
Varar. To gauge or measure.
Varzea. Meadow or savannah subject to floods.
Veia. Vein or lode.
Vieiro. Vein or lode.
Vertente. Watershed.
Via-ferrea. Railway.
Viga. Beam.

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APPENDIX III

BRAZILIAN AND FOREIGN DIPLOMATIC, AND CONSULAR CORPS

Brazilian Embassy in Washington—Ambassador, Dr. Domicio da Gama.

LEGATIONS IN—

Argentina (Buenos Aires), Austria (Vienna), Belgium (Brussels), Bolivia (La Paz), Chile (Santiago), Colombia (Bogotá), Cuba (Havana), Denmark (Copenhagen), Great Britain (London), France (Paris), Germany (Berlin), Holland (The Hague), Italy (Rome: Quirinal and Vatican), Japan (Tokio), Mexico (Mexico City), Paraguay (Assumption), Peru (Lima), Portugal (Lisbon), Russia (St. Petersburg), Spain (Madrid), Switzerland (Berne), Uruguay (Montevideo), Venezuela (Caracas).

CONSULATES IN—

GERMANY

Consul-General (1st class), Hamburg. Consuls in Bremen, Altona, Dresden, Dusseldorf, Frankfort O.M., Munich, Berlin, Leipzig. Vice-Consuls in Brake, Breslau, Carlsruhe, Cologne, Elberfeld, Hanover, Kiel, Lubeck, Königsberg, Mayence, Nuremberg, Remscheid, Stettin, Stuttgart, Wiesbaden.

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United States of America

Consul-General in New York. Vice-Consuls in Baltimore, Boston, Brunswick, Calais, Charleston, Chicago, Fernandina, Gulfport, Mobile, New Orleans, Norfolk, Pascagoula, Pensacola, Philadelphia, Port Arthur, Richmond, Savannah, S. Francisco, S. Juan (Porto Rico), St. Louis, Wilmington (N. Carolina). Commercial Agent in Darien.

Argentina

Consul-General (1st class) in Buenos Aires. Consul in Rosario. Vice-Consuls in Alvear, Bahia Blanca, Concepción de Uruguay, Corrientes, La Plata, Libres, Monte Caseros, Posadas, S. Thomé, Tucuman.

Austria-Hungary

Consul-General (2nd class) in Trieste. Consul-General in Budapest. Consuls in Fiume, Vienna. Vice-Consul in Carlsbad.

Belgium

Consul-General (1st class), Antwerp. Vice-Consuls in Brussels, Bruges, Charleroi, Ghent, Liège, Namur, Ostend, Verviers.

Bolivia

Consuls in Villa Bella, La Paz. Vice-Consuls in Cobija, Manôa, Sucre, Pedra Branca, Santa Cruz de la Sierra, Santa Rosa de las Minas, S. José, Trinidad.

Chile

Consul-General (1st class) at Valparaiso. Consuls at Iquique, Santiago. Vice-Consuls at Concepción, Lota, Coronel, and Talcahuano.

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CHINA

Consuls at Tientsin and Shanghai.

COLOMBIA

Consul-General at Bogotá. Consuls at Barranquilla and Carthagena.

COSTA RICA

Consul at Costa Rica (San José).

CUBA

Consul at Havana.

DENMARK

Consuls at Copenhagen, Elsinore, and S. Thomas (Danish West Indies).

DOMINICAN REPUBLIC

Consul at Santo Domingo.

EGYPT

Consul-General at Alexandria. Vice-Consul, Cairo.

EQUADOR

Consul-General at Quito. Consuls at Cuenca, Guayaquil, Loja.

FRANCE

Consul-General (1st class), Havre, Marseilles, Paris. Consuls at Bordeaux, Boulogne, Cayenne (French Guiana), Cannes, Dakar (Senegal), Nice, Cherbourg, La Rochelle. Vice-Consuls at Amiens, Bayonne, Brest, Calais, Cette, Dunkirk, Lyons, Nantes, Oran (Algiers), Vichy, Tourcoing, Toulon, Hyères, Lille, Rouen.

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Great Britain and Colonies

Consul-Generals (1st class) in Liverpool and London. Consuls in Calcutta, Sydney, Cardiff, Dover, Georgetown, Gibraltar, Glasgow, Hong Kong, Manchester, Mauritius, Kingstown (Jamaica), Trinidad (B.W.I.), Santa Lucia, Singapore, Southampton and Newfoundland. Vice-Consuls in Adelaide, Barbados, Belfast, Birmingham, Bombay, Bradford, Bristol, Cape Town, Cowes, Dublin, Dundee, Falmouth, Gaspé (Canada), Guernsey, Halifax, Harbour Grace, Hobart Town (Tasmania), Hull, Jersey, Leeds, Leith, Malta, Maryport, Melbourne, Milford Haven, Montreal, Newcastle, Newport, Paspebiac, Plymouth, Portsmouth, Pretoria, Quebec, Rangoon, S. John (New Brunswick), Sheffield, Swansea, Newfoundland, and Wellington (N.Z.).

Greece

Consul in Athens.

Guatemala

Consul in Guatemala.

Haiti

Consul in Port-au-Prince.

Holland

Consul-General (2nd class) in Rotterdam. Consul in Willemstad. Vice-Consul in Amsterdam.

Italy

Consul-General (1st class) in Genoa. Consuls in Naples, Rome, Venice. Vice-Consuls in Alghero, Ancona, Bari, Brindisi, Cagliari, Catania, Chiavari, Civita-Vecchia, Florence, Liorne, Lucca, Messina, Milan,

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Milazo, Palermo, Riposto, Rome, San Remo, Spezzia, Turin.

JAPAN

Consul-General (2nd class) in Yokohama. Vice-Consuls in Kobé, Tokio.

MEXICO

Consuls in Mexico and Vera Cruz.

MONACO

Consul in Monte Carlo.

MOROCCO

Vice-Consuls at Mazagan, Mogador, Rabat, Tangier.

NICARAGUA

Consul in Managua.

NORWAY

Consul in Christiania. Vice-Consuls in Bergen, Christiansund, Trondhjem.

PANAMA

Consul in Panama.

PARAGUAY

Consul-General (2nd class) in Assumption. Vice-Consuls in Concepción and Villa Encarnación.

PERU

Consul-General (1st class), Iquitos. Consul at Lima. Vice-Consuls at Arequipa, Mollendo, Nazareth, Caballo Cocha, Santa Rosa.

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Portugal and Colonies

Consul-General (1st class) at Lisbon ; ditto (2nd class) at Oporto. Consuls at Braga, St. Vincent, Quelimane. Vice-Consuls at Faro, Caminha, Figueira, Fayal, Madeira, St. Michael, Sal Island, Lagos, Angra, Loanda, S. Thiago, Setubal, Vianna do Castello, Villa do Conde, Villa Real.

Russia

Consul at St. Petersburg. Vice-Consuls at Abo, Cronstadt, Helsingfors, Libau, Moscow, Odessa, Reval, Riga, Rostoff, Warsaw, Nicolayeff.

S. Salvador

Consul at San Salvador.

Spain

Consul-General (2nd class) in Barcelona. Consuls in Vigo, Cadiz, Las Palmas (Grand Canary), Teneriffe. Vice-Consuls in Alicante, Almeria, Bilbáo, Cartagena, Cordova, Coruña, Ferrol, Gijon, Granada, Irun, Madrid, Málaga, Marin, Palma (Mallorca), Santa Cruz (Palma), St. Sebastian, Santander, Seville, Tarragona, Torrevieja, Valencia, Vigo, Villagarcia, Xerez.

Sweden

Consul at Stockholm. Vice-Consuls at Gothenburg, Calmar, Gefle, Hernösand, Hudiksvall, Malmo, Norrköping, Ornkoldsvick, Sundsvall, Visby, Westerwick.

Switzerland

Consul-General (2nd class), Geneva. Vice-Consuls at Berne and Lausanne.

Turkey

Consuls at Beyrouth and Jaffa.

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URUGUAY

Consul-General (1st class), Montevideo. Consul at Salto. Vice-Consuls at Artigas, Cerro Largo, Paysandu, Rivera, Rocha, San Eugenio, Santa Rosa, Taquarembo.

VENEZUELA

Consul-General at Caracas. Vice-Consuls at Bolivar, La Guayira and Puerto Cabello.

COMMERCIAL ATTACHÉS—

Dr. Eugenio Emery to the Legations in Great Britain, France, Belgium, Switzerland and Italy.

Dr. D. de Campos to those in Germany, Austria, Denmark, Norway and Sweden.

Dr. da Costa Barradas to the Embassy in Washington, and the Legation in Mexico.

Dr. Aluizio to the Legations in Argentina, Chile, and others to be added.

FOREIGN REPRESENTATIVES IN BRAZIL

Hon. E. V. Morgan, United States Ambassador in Rio de Janeiro.

United States Consuls in Rio, Pará, Pernambuco, Santos and Bahia.

Consular Agents in Fortaleza, Maceió, Manáos, Rio Grande do Sul, Maranhão, S. Paulo and Victoria.

British Minister Plenipotentiary in Rio Janeiro—Sir William Haggard.

British Consul-General in Rio. Consuls in Bahia, Pará, Porto Alegre, Pernambuco and S. Paulo.

Vice-Consuls in Aracajú, Curityba, Cuyabá, Florianopolis, Fortaleza, Maceió, Manáos, Morro Velho, Parahyba, Paranaguá, Rio Grande do Sul, Santos, St. John d'El Rey, Maranhão, Uruguayana and Victoria.

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APPENDIX IV

SALARIES AND COST OF LIVING

(1) RIO JANEIRO

SALARIES

Daily

Smith, 6 to 10 milreis.
Millhand, 5 to 10 milreis.
Leather worker, up to 10 milreis.
Scalemaker, 9 milreis.
Glass blower, up to 20 milreis.
Brick and tile maker, 8 milreis.
Baker, 8 milreis.
Brewer, 12 milreis.
Hatter, 8 milreis.
Shoemaker, 8 milreis.
Cabinet maker, 10 milreis.
Founder, 10 milreis.
Painter, 6 to 15 milreis.
Tram conductor, 6 to 8 milreis.
Day labourers, 2½ to 3 milreis.
Gardeners, 3 to 5 milreis.
Turners, 6 to 8 milreis.
Tailors, 4 to 8 milreis.
Printers, 6 to 10 milreis.
Masons, etc., 5 to 10 milreis.

Monthly

Clerk, junior, 100 to 200 milreis.
Bookkeeper or cashier, 200 to 600 milreis.
Shop assistant, 60 to 500 milreis (without lodging) with board.

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SALARIES MONTHLY—*continued.*

Civil guard, 150 to 250 milreis.
Police, 120 to 200 milreis.
Seaman, 80 to 100 milreis.
Ship's steward, 40 to 60 milreis.
Man-servant, 40 to 100 milreis.
Male cook, 50 to 200 milreis.
Female cook, 30 to 100 milreis.
General servant, 15 to 50 milreis.
Nurse girl, 15 to 40 milreis.
Foreign nurse, 40 to 100 milreis.
Wet nurse, 50 to 150 milreis.
Postman, 100 to 300 milreis.

COST OF LIVING

3rd class hotel, 5 to 6 milreis daily.
2nd ,, ,, 6 to 8 ,, ,,
1st ,, ,, 9 to 16 ,, ,, (in Manãos, 20 milreis daily).
Pension, with room, from 100 to 300 milreis monthly.
,, without room (2 meals), 50 to 100 milreis monthly.

PRICES OF PROVISIONS

RIO AND DISTRICT

Beef, kilogramme, 400 to 800 reis.
Mutton, 1$200.
Pork, 1$200.
Veal, 1$000.
Chickens, 800 reis to 1$200 each.
Ducks, 1$000 to 2$500 each.
Turkeys, 3$000 to 6$000 each.
Eggs, per dozen, 800 to 1$500, according to season.

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Bread, 400 to 500 reis a kilo.
Wine (Rio Grande), 500 to 800 reis a hectolitre.
,, (Portuguese), 1$000 to 5$000 a bottle.
Rice, 300 to 500 reis a litre.
Salt, 400 to 500 reis.
Sugar, 550 to 800 reis a kilo.
Potatoes, 200 to 400 reis a kilo.
Paraffin, a tin (32½ lb.), 4 to 5 milreis.
Milk, 400 to 500 reis a litre (300 reis in Petropolis).
Coffee, 1$000 to 1$600 a kilo, roasted and ground.
Tea (Lipton's), 250 grammes, 2 milreis.
Cheese, per kilogramme, from 1½ to 2½ milreis.
Rabbits, each, from 1 milreis.
Matte, per kilo, from 800 to 1,000 reis.
Cocoa (pure), 100 grammes, 1$200.
Barley, per kilogramme, 1$000.
Tram fares, from 100 to 400 reis.

(2) SAO PAULO

SALARIES

	From	To	
Tanners	5$	6$	daily
Hatters	5$		,,
Sculptors	10$	15$	,,
Founders	5$	6$	,,
Blacksmiths	6$	8$	,,
French polishers	3$	4$	,,
Lithographers	7$	12$	,,
Chauffeurs	5$	6$	,,
Engine drivers	7$	10$	,,
Watchmakers	5$	6$	,,
Painters	6$	7$	,,
Masons	6$	8$	,,
Shoemakers	4$	5$	,,

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SALARIES—*continued.*

	From	To	
Saddlers	5$	6$	daily
Coopers	5$	6$	,,
Dyers	3$	4$	,,
Wood turners	6$	8$	,,
Glass blowers	5$	6$	,,
Florists	3$	5$	,,
Hair dressers	3$	4$	,,
Linotype operators		15$	,,
Printers	3$	7$	,,
Carpenters	5$	8$	,,
Plasterers		12$	,,
Cabinet makers	8$	10$	,,
Tram drivers	3$	7$	,,
Mill hands—			
Beaters	4$	5$	,,
Carders	5$	5½$	,,
Spinners	4½$		,,
Female spinners	3$	3¾$	,,
Foremen	6¼$	7$	,,
Tailors	4$	5$	,,
Tailors' fitters	7$	8$	,,
Tailors (monthly)	150$	to 200$	
,, cutters (ditto)	400$	to 600$	
,, piece work—			
Dress coats, each		50$	
Frock coats, each		40$	
Morning coats, each		30$	
Jacket, each		20$	
Trousers, each		6$	
Vests, each		5$	
Electricians (monthly)	200$	to 250$	
Chauffeurs (monthly)	200$	to 250$	

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Cost of Provisions in Sao Paulo

Milk, per litre, 250 to 300 reis.
Butter, per kilo, 2$500 to 3$500.
Eggs, per dozen, 1$000.
Beef, per kilo, 500 reis.
Mutton, per kilo, 1$000.
Pork, per kilo, 1$000.

Cost of Living in Pará, Manãos, etc.

Beef: Pará, 1$000 to 1$400 per kilo; Manãos, 1$500 to 2$500 per kilo.
Lard (15 kilos), 64$000.
Dried meat, 2$000.
Chickens, 10$000 to 15$000.
Sugar and butter in the Acre district, prohibitive prices.
Beer, 2$000 to 3$500 a bottle.
Port, whisky, brandy, etc., 10$000 to 12$000 a bottle.

Prices of Clothing, etc. (Rio de Janeiro)

White shirts, 3$ to 8$.
Night shirts, 4$ to 7$.
Undervests, 3$ to 6$.
Cotton socks, dozen pairs, 8$ to 15$.
Woollen socks, 20$ to 30$ dozen.
Collars, 1$000 to 1$500 each.
Cuffs, 1$000 to 2$000 pair.
Cotton handkerchiefs, 200 to 800 reis each.
Linen handkerchiefs, 1$000 to 1$500 each.
Braces from 2$000 to 3$000.
Ties, 500 reis to 4$000.
Straw hats, 5$000 to 10$000.
Felt hats, 5$000 to 25$000.
Imitation Panama hats, 10$000 to 18$000.
Legitimate Panama hats, 25$000 to 100$000.
Boots, 15$000 to 35$000.
Umbrellas, 5$000 to 30$000.

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PRICES OF CLOTHING, ETC. (RIO DE JANEIRO)—*contd.*

Waterproofs, 30 $000 to 60 $000.
Crash and holland suits, 25 $000 to 60 $000.
Serge suits, 50 $000 to 80 $000.
Fine cashmere suits, 80 $000 to 120 $000.
Dress and frock-coat suits, 150 $000 to 200 $000.
Alpaca jackets, 20 $000.
Fancy vests, 5 $000 to 20 $000.
Linen trousers, 10 $000 to 20 $000.
Gloves, 3 $000 to 10 $000.

Ladies' clothing must be reckoned at least twice the European prices, and this rate will apply to most items of general use. Pianos and household furniture cost still more, but the quality of the latter is very good.

WHOLESALE PRICES (RIO DE JANEIRO)

October, 1911

NATIONAL PRODUCE

Fine rice, per 100 kilos, 44 to 47 milreis; inferior, per 100 kilos, 32 to 34 milreis.
Mandioca flour, per 100 kilos, special, 18 milreis; coarse, 13½ to 14 milreis.
Black beans, best, per 100 kilos, 21 milreis.
Butter beans, per 100 kilos, 31½ to 34½ milreis.
Maize, per 100 kilos, good, 15 milreis; white ditto, 13 to 13½ milreis.
Aguardente, per pipe, from 140 to 160 milreis.
Alcohol, 38 to 40 degrees, 240 to 290 milreis; 36 degrees, 230 to 235 milreis.
Pea nuts, per 100 kilos, from 21 to 22 milreis.
Potatoes, per kilo, 240 to 260 reis.
Lard, per 60 kilos, from 62 to 72 milreis.

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Pork, per kilo, 400 to 600 reis (fat).
Flour (sack), 22 to 25 milreis.
Tobacco, 15 kilos, from 9 to 26 milreis (Goyaz).
Butter, per kilo, 1$800 to 2$800.
Matte, per kilo, 440 to 580 reis.
Tapioca, 100 kilos, 18 to 20 milreis.
Salt, 60 kilos, 8 to 10 milreis.
Tallow, per kilo, 560 to 660 reis.
Wine (Rio Grande do Sul), per pipe, 120 to 125 milreis.
Alfalfa hay, per kilo, 180 to 210 reis.
Bacon (all fat), per kilo, 860 to 960 reis.
Maize meal, 100 kilos, 14 to 24 milreis.

Foreign Produce

Turpentine, litre, 800 reis.
Tar, barrels of 170 kilos, 43 milreis.
Rice, 100 kilos, 39 to 42½ milreis.
Lard (American), per lb., 800 to 840 reis.
Stock fish (Norwegian), per box, 39 to 40 milreis.
Stock fish (Halifax), per case, 40 to 41 milreis.
Pitch, 280 lb., 34 to 35½ milreis.
Tea (Indian), green, per kilo, $6\frac{2}{10}$ to $9\frac{5}{10}$ milreis; black, per kilo, 6 to 9 milreis.
Cement, 10 to 15 milreis a barrel.
Cinnamon, per kilo, 1½ to $1\frac{6}{10}$ milreis.
Peas, green, per 100 kilos, 64 to 66 milreis.
Gin (Focking), per case, 32 to 33 milreis.
Paraffin, case of 65 lb. net, $6\frac{8}{10}$ to $7\frac{2}{10}$ milreis.
Bricks, 1,000, 120 milreis.
Butter, per kilo, 1$750 to 2$400.
Hams, per lb., $1\frac{7}{10}$ to $1\frac{9}{10}$ milreis.
Pepper, per kilo, $1\frac{1}{10}$ to $1\frac{2}{10}$ milreis.
Starch, 100 kilos, 25 to 26 milreis.
Wines, Portuguese claret (Collares), per pipe, 340 to 360 milreis; port, inferior to regular, 300 to 340 milreis.

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Linseed oil, per kilo, $1\frac{2}{10}$ to $1\frac{1}{4}$ milreis, in barrels; 940 to 1,000 reis, in tins.

Timber, spruce, per dozen, 82 milreis; Swedish white pine, 82 milreis; Swedish red pine (deals), 84 milreis; American, per foot, 280 reis.

Olive oil, 16 litres, 22 to 27 milreis.

Bran or middlings, 100 kilos, $9\frac{2}{10}$ to $9\frac{5}{10}$ milreis.

French tiles, 1,000, 230 to 240 milreis.

PRICES OF COLOURED GEMS IN RIO

Given by SENHOR AUGUSTO BRILL, *Av. Central, Rio de Janeiro*

Tourmalines of *all* colours (except fine blues)—

	Rough (per gramme).	*Cut* (per carat).
Common	200 reis to 1$000	4 milreis.
Good . .	1$000 to 4$000	From 8 milreis up to 35$000.
Fine . .	5$000 to 10$000	8 to 10 milreis for a parcel of mixed colours. *Fine* blues at top prices only.

Aquamarines, pale greenish blue or ordinary green, as common tourmalines; pale clear blue, as good tourmalines; fine blue aquamarines, as fine tourmalines.

Topaz (Ouro Preto district), ordinary yellow, 500 reis to 3$000 a gramme; amber to wine-coloured and very pale rose, 4 to 12 milreis a gramme; fine rose (very rare), 10 to 20 or 25 milreis a gramme, rough. White topazes have no sale; pale blue, cut, 30 to 40 milreis a carat, very rare.

Amethysts from Rio Grande or Minas, 100 to 500 reis a gramme, rough; from Bahia, 500 reis to 1$000 a gramme. Cut stones, from 4 to 12 milreis a gramme.

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Garnets, citrines, hematites and similar ornamental stones, 200 reis to 1$000 a gramme.
Cut garnets, 4 to 8 milreis a gramme.
Chrysoberyls, rough, 1$000 to 4$000 a gramme ;. cut, 8 to 12 milreis a carat.
Euclase, rough, with terminal facets, 20 to 40 milreis a gramme (very rare).
Phenakites, andalusites, etc., etc., according to supply for mineralogists and collectors. No fixed value.

With regard to the prices charged by the rubber merchant to the collector, they do not come within the scope of this chapter. It must of course be understood in considering the above, that salaries are correspondingly high. If one reckons the cost of living in Manáos as double that of Rio, it may be safely assumed that pay corresponds. These things, it goes without saying, automatically balance themselves the world over.

In Amazonas turtle flesh is largely consumed. In Minas beef is sold without bone, and is relatively cheaper than anywhere, except in Rio Grande do Sul. In Petropolis butter is sold by the pound, and is always made in the district. Here most country people bake their own bread. Throughout Brazil, mandioca flour, rice and beans are the staples. Except in the south general use is made of dried salted beef (xarque) or carne seca. The common drink is locally brewed beer. A vast quantity of cachaça or paraty is drunk (white rum), and it is very cheap, serving as a beverage, or as methylated spirits. Fish is dear (in Rio) owing to the want of proper vessels for the purpose, and fruit is generally not too cheap, bananas being usually about four or six for 100 reis, and oranges two to four for the same sum. In Bahia oranges (navel) are, however, of the finest, and in Pernambuco and vicinity pineapples are cheap, and most excellent.

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APPENDIX V

CUSTOMS TARIFF, ETC.

By Article 27, of Decree No. 2321 of December 30, 1910, the following articles are exempt from Customs duty :—

1. Machinery and materials for the installation of sugar mills.

2. Phosphates, nitrates, sulphates, and all other chemical manures, as well as formicides and weed killers. One copy each of scientific books, paintings, and a reasonable amount of jewellery and plate.

Material imported for the use of high schools and museums, or for State use or for free tuition of any kind. Works of propaganda dealing exclusively with Brazil.

Passengers' ordinary effects in use, and tools, and instruments necessary for the following of a trade or profession.

Coal, parts of vessels, and for the maintenance of ships engaged in the coasting trade, and for railway engines, etc. Live stock under certain conditions, as well as seeds and plants of a useful kind.

The baggage of foreign diplomats and literary notabilities, scientists and politicians, and high officials

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in the service of the Republic shall be admitted without any difficulty whatever.

PAYING 2 PER CENT. DUTY

Agricultural engines, rubber valves, wire and wire netting, metal tubes, furnace bars, belts and pulleys for transmitting power, rails and railings, spades, hoes and bills, metal barrels, and bottles imported by the proprietors of mineral springs.

PAYING 5 PER CENT. DUTY

Agricultural implements, and machinery for coffee, cocoa, tobacco, cotton, rice, barley, wheat, etc., and for textile factories and irrigation works. Dairy supplies, tin plates, wine barrels (empty), salt beef casks, and machinery for extract of beef and preserved meat factories and refrigerating purposes.

Material imported by states, municipalities, etc., for traction and public works of any kind.

PAYING 10 PER CENT. DUTY

Material for the installation of factories for preserving fish, vegetables and fruit, silk cocoons and material for silk mills, etc. Swarms of bees, and material for bee culture. Machinery for cement and galvanized iron works. Motors, furnaces, and lamps and stoves of every sort, and engines, etc., using alcohol as a combustible. Wild animals destined for collections and exhibitions.

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CLASSIFIED TARIFF.

Description of Articles.	Rate.	Tax.
	per cent.	
Felt or beaver hats. . .	60	6$400
Brushes, mother of pearl or ivory backs or tortoiseshell .	50	36$000 kilogramme
,, bone or wood for hair and clothes	—	8$000 dozen
,, shaving and hat .	—	6$000 ,,
,, tooth and nail .	—	2$000 ,,
,, metal cleaning .	—	2$000 ,,
,, scrubbing . .	—	9$000 ,,
,, brooms and others	—	4$000 ,,
,, for tarring . .	—	6$8000 ,,
,, painter's . . .	—	3$200 kilogramme
,, artist's (fine). .	—	25$000 ,,
,, second . . .	—	12$000 ,,
,, house decoration	—	5$000 ,,
Harness, one animal . .	60	from 40 to 240$000 set
Boots and shoes, top . .	60	20$000 pair
,, half . .	60	15$000
,, ordinary .	—	7$000
,, satin shoes	—	up to 14$000
Boots and shoes, ordinary children's, etc., also slippers .	—	from 700 reis to 6$000
Pens (nibs), ordinary . .	50	4$000 kilogramme
,, gilt. . . .	50	30$000 ,,
Hats or caps, any other kind	60	4$700 each
Belts, any kind . . .	60	10$000 kilogramme
Ties, any kind	60	6$300 dozen

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CLASSIFIED TARIFF—*continued.*

Description of Articles.	Rate.	Tax.
	per cent.	
Gloves, kid	—	27 $000 dozen
,, ordinary	—	10 $000 ,,
Leggings, leather	60	5 $000 pair
Saddles	—	30 to 50 $000 each
Oil, animal (tins)	50	$300 kilogramme
,, machine (tins or flasks)	50	1 $200 ,,
Lard	50	$300 ,,
Meat, ox, sheep, pig	30	$100 ,,
,, game	30	$500 ,,
,, dried	20	$200 ,,
Wax, ordinary	50	$700 ,,
,, prepared	50	1 $000 ,,
,, candles, etc.	50	2 $400 ,,
,, figures, etc.	50	4 $000 ,,
Glue or gelatine	50	$200 ,,
Condensed milk	60	$500 ,,
Tongues, etc.	30 to 50	$300 to 1 $200
Cheese	50	1 $200 kilogramme
Soap, unscented	50	$400 ,,
Tallow	25	$100 ,,
Sponges, fine	50	20 $000 ,,
,, ordinary	50	5 $000 ,,
Pearls	2	ad valorem
Buttons, bone or horn	60	1 $000 kilogramme
,, ivory, tortoiseshell, or mother of pearl	60	12 $000 ,,
Combs, bone or horn	50	6 $000 ,,
,, ivory	—	28 $000 ,,
,, tortoiseshell	—	60 $000 ,,
Barley, in grain or malted	25	$040 ,,
Infant's food	50	2 $000 ,,
Tea	50	3 $000 ,,
Tar	15	$200 ,,

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CLASSIFIED TARIFF—*continued.*

Description of Articles.	Rate.	Tax.
	per cent.	
Camphor	25	1$000 kilogramme
Brandy, Whisky, Rum in casks	—	1$500 ,,
Ditto in other vessels	—	1$300 ,,
Gin	—	$800
Opium	50	12$000
Bitters, in barrels	—	$500
,, other vessels	—	$300
Wines, champagnes, etc.	—	1$600
Artificial essences	30	6$000
Blacking, liquid	50	$250
,, paste, etc.	—	$800
Indigo, aniline	20	1$200
Perfumes	60	4$000
Ink	50	$600
Varnishes	—	$080
Mineral waters, any kind	60	$350
Acids	25	
Capsules, medicinal	25	20$000
Carbonates	20 to 50	
Chlorate and muriates	50	
Citrates	40	
Extracts, medicinal	50	
Vitrates	50	
Oxides	15 to 50	
Pepsine, paste	50	15$000
,, powder, etc.	—	5$000
Phosphates and sulphates	50	
Sulphurets and tartrates	25 to 50	
Wines, medicinal	50	3$000
Timber	50	
Chests	50	

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CLASSIFIED TARIFF—*continued.*

Description of Articles.	Rate.	Tax.
	per cent.	
Billiards, ordinary and fine	50 to 60	200$000, 500$000 each set
Chairs	60	
Beds and sofas	50 to 60	
Stockings, according to size	—	3$200 to 6$800 dozen pairs
Underclothing, shirts . .	80	8$000 dozen
,, pants, etc.	60	
Shirts, starched . . .	—	8$000 kilogramme
Cuffs ,, ...	—	5$000 dozen pairs
Collars ,, ...	—	3$600 dozen
Photographs and prints .	50	
Ditto for educational works	15	
Printed matter	15	manuscripts free
Paper	50	
Silk and fine linen . . .	60	
Asbestos, marble, jasper .	20	150 reis a kilo
Cement, emery	—	coal free
Precious stones . . .	2	ad valorem (gold free)
China and glass . . .	50 to 60	
Gold jewellery	15	ad valorem (silver free)
Silver ,, ...	15	
Copper, worked . . .	50	
Lead, tin, and zinc . .	30 to 60	
,, ,, in bars	15	
Iron and steel	30 to 60	
Aluminium and antimony	25	
Arsenic and sulphur . .	20	
Mercury and phosphorus .	20	
Nickel, potassium, sodium	25	
Other metalloids . . .	25	ad valorem

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CLASSIFIED TARIFF—*continued.*

Description of Articles.	Rate.	Tax.
	per cent.	
Guns and rifles, steel barrel	50 to 60	12$000
,, bronze ,,	50 to 60	20$000
Revolvers, powder . . .	60	
Shot, lead	80	
Swords	50	
Penknives and razors, fine	50	7$000 dozen
Scissors and table knives .	50	
Watches, gold.	20	10$000 each
,, repeaters. . . .	20	30$000 ,,
Clocks	50	
Carriages	30 to 60	
Butter, pure	50	1$500 kilogramme
,, substitutes . . .	50	3$500 ,,
Eggs	—	free of duty
Guano	—	,, ,,
Fish, etc., including shell fish	20 to 50	from $060 to 1$200
Cotton piece goods . .	60	
Panama hats	60	6$300 each
Straw ,, ...	—	1$600 to 2$600
Bed clothing, cotton, etc. .	60	
Stockings, fine	60	
Furniture, not specified .	50 to 60	
Umbrellas and sunshades cotton or linen . .	—	1$500 one
,, ,, woollen .	—	3$000 ,,
,, ,, silk . .	—	7$000 ,,
,, ,, lace edged	—	14$000 ,,
Chocolate, fancy and plain,	50	3$000 kilogramme
Games and sealing wax .	50	
Fans, masks, hooks . .	50	
Pneumatic tyres . . .	5	ad valorem
Motor cars, commercial .	5	,,

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CLASSIFIED TARIFF—*continued.*

Description of Articles.	Rate.	Tax.
	per cent.	
Motor cars, private . .	7	ad valorem
Instruments, scientific .	15	
,, ,, some exceptions.	50	
,, musical . .	50	
Balances	50	
Mills, large, motor force .	15	
,, coffee, wheat, etc. .	50	$700 kilogramme
Machinery	15	
Type, printing	15	
Bicycles	25	50$000 one
,, child's	25	20$000 ,,
Rubber goods	50	
Pipes and whips . . .	50	
Sauces	50	
Paraffin	50	
Skates	50	3$500 pair
Tar and Pitch	—	010 reis a kilo
Oars	—	048 reis a metre
Canvas	—	160 reis a kilo
Copper tubes	—	100 reis ,,
Leaden pipes	—	026 reis ,,
Galvanized sheets . . .	—	030 reis ,,
Rubberoid ,, . . .	—	030 reis ,,
Galvanized tubes . . .	—	004 reis
Enamelled tubes . . .	—	044 reis
Automatic balances . .	8	ad valorem
Ships' lamps	—	320 reis a kilo
Engine ,, ...	—	320 reis ,,
Tin tubes	—	048 reis ,,
Fireclay bricks, etc. . .	8	ad valorem
Iron cables	—	032 reis a kilo
Nails	—	002 reis ,,
Fish plates, etc. . . .	—	002 reis ,,

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Machinery for electrical installations, physical apparatus, telegraph or telephone posts, etc., 8 per cent. ad valorem.

Institutions of charity and public assistance will be conceded a rebate of 90 per cent. on the current tariff on drugs and medicines in general, medicinal plants and roots, and surgical instruments, as well as all other appliances used in medicine or surgery.

In all cases where exemption from duty is granted, the tax known as expediente (bureau tax) will be levied.

It should be particularly noted that this tariff is in course of revision, and that there are other charges to be added to the foregoing table, such as 2 per cent. port works tax, Consular fees, stamps and other additions which in some cases bring total duties to over 100 per cent. Tariffs, again, frequently include packing when by weight, and catalogues, etc.; put in cases to fill up are charged at the same rate as ordinary printed books. I also quote the warning of *The Times* correspondent in Brazil against sending goods not ordered, and against including stationery, invoice forms, etc., charged at a very high rate of duty.

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APPENDIX VI

SOME INDUSTRIES IN BRAZIL

Industry.	No. of Works.	Hands.	In Contos of Reis.	
			Capital.	Production.
Matches	18	3,969	17,060	21,275
Electrical material	1	33	50	160
Rubber goods	2	18	13	36
Iron	23	501	1,746	3,669
,, wire	8	54	76½	101
Marble	23	439	1,099½	1,824
Lead and zinc	8	321	1,941	1,881 4/10
Optical goods	3	23	270	210
Brushes, etc.	21	250	671½	1,583
Balances	1	16	400	600
Butter and cheese	138	981	2,996 7/10	6,998 749/1000
Billiards	2	14	70	160
Jewellery	20	167	822	1,940
Biscuits	13	467	1,995	3,282
Mineral waters and spirits	145	1,655	6,630 971/1000	9,211 658/1000
Buttons	1	150	160	250
Breweries	186	2,942	27,555 8/10	22,686 290/1000
Quarries	21	699	1,826	3,309
Hats (men's)	46	3,105	10,417	15,384 2/10
,, (ladies')	37	163	1,398	1,727

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SOME INDUSTRIES IN BRAZIL—*continued.*

Industry.	No. of Works.	Hands.	In Contos of Reis.	
			Capital.	Production.
Coal (animal)	1	9	40	54
Boots and shoes.	119	7,379	10,117	26,726 9/10
Lime and cement	36	1,027	11,259½	4,976 340/1000
Gas mantles	2	11	31	60
Cocoa, etc.	15	484	2,435	3,680
Candles (wax)	9	107	711	914
Blacking	4	17	35	106
Nails	6	165	820	1,185
Glue	3	14	40	81
Confectionery	40	1,203	1,988	4,208
Preserves.	14	506	1,530	2,211½
Shipbuilding	17	3,622	2,215	5,785
Rope making	7	586	2,514	2,382
Corsets	11	148	458	879
Ties	11	689	1,003	2,320
Tanned hides	108	1,967	9,485	15,091 1/10
Caskets and cases	2	9	11	40
Inks	8	98	465	968 8/10
Pins	2	35	188	161
Hair pins, etc.	2	74	80	190
Meat extract	1	200	6,000	700
Fireworks	1	3	20	16
Maize meal	1	10	10	54
Cotton mills	161	45,942	234,428 4/10	135,025 668/1000
Woollen ,,	15	1,957	14,848	11,375 2/10
Linen ,,	2	160	1,230	648
Silk ,,	5	244	965	1,042 320/1000
Aramina ,,	1	200	1,500	630
Artificial flowers.	32	432	694	1,337½
Foundries	169	6,861	22,964	31,625 240/1000
Lasts (boots).	3	46	74	220
Formicides	2	51	200	270

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SOME INDUSTRIES IN BRAZIL—*continued.*

Industry.	No. of Works.	Hands.	In Contos of Reis.	
			Capital.	Production.
Gloves	9	89	288	468
Ice	5	81	550	1,734
Oils and resins	20	532	3,390 8/10	4,493 646/1000
Images	2	9	14	40
Hams	6	37	238	403
Musical instruments	19	151	249 6/10	402 3/10
Underclothing	31	2,218	3,151	6,298½
Machinery	12	268	1,055	984
Trunks and valises	27	250	1,248	2,864
Matte	44	4,975	14,250	22,573
Transport material	31	1,718	8,429 6/10	11,013 884/1000
Furniture	85	2,843	6,033	11,760
Flour mills	100	1,499	16,416 3/10	39,359½
Cardboard, etc.	17	606	5,083	3,987
Wall papers	6	228	1,596	1,620
Umbrellas, etc.	24	195	3,221	3,729
Perfumery	17	382	1,460	2,081 75/100
Helmets	1	12	6	15
Lace, etc.	1	28	45	96
Pastry	87	683	2,602 29/100	3,897 485/1000
Pres'rv'd tomatoes	4	100	515	570
Horn combs	3	93	210	484
Photography	15	116	1,093	2,099
Pianos	1	4	40	30
China and pottery	179	2,553	10,547 135/1000	10,363
Chemicals	60	1,153	6,502	10,212
Sugar refineries	22	454	10,437 786/1000	15,413 760/1000
Wooden shoes	18	134	273	679 4/10
Lard	34	587	4,350	13,485
Soap and tallow candles	91	1,763	15,145 6/10	22,039 715/1000

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SOME INDUSTRIES IN BRAZIL—*continued.*

Industry.	No. of Works.	Hands.	In Contos of Reis.	
			Capital.	Production.
Saw mills . .	197	3,766	14,488	31,379
Salt	53	2,146	9,461	3,126$\frac{368}{1000}$
Harness and saddlery . . .	40	1,309	2,517	4,448
Syrups and Liqueurs . .	8	35	250	475
Bellows . . .	1	6	15	28
Sugar mills . .	199	13,136	74,061$\frac{589}{1000}$	67,257$\frac{363}{1000}$
Tobacco manufactories . .	104	7,407	12,950$\frac{919}{1000}$	20,318$\frac{785}{1000}$
Cooperages . .	4	14	20	72
Lamps . . .	1	12	6	32
Varnishes . .	1	42	200	60
Glass	7	1,328	2,975	3,638
Wine	104	1,316	2,877½	4,870$\frac{340}{1000}$
Vinegar . . .	5	19	79	114
Pemmican . .	26	3,782	6,277	38,769$\frac{3}{10}$
Total . .	3258	151,841	665,976$\frac{663}{1000}$	741,536$\frac{108}{1000}$

In 1910 3,400 establishments, 160,000 hands, £55,000,000 capital.

Five cotton mills in Rio district employ 8,000 hands, and turn out 75½ million metres of goods. Four in Petropolis, 2,500 hands, manufacturing 17 million metres. Apart from the textile trades, the largest establishments are engaged in the manufacture of sugar, tobacco and jerked beef. The great factory of Danne-

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mann at Bahia (S. Felix) employs 1,600 hand workers, turning out £150,000 worth of tobacco and cigars. Three match factories produce with 2,200 employés £900,000 worth of goods. A shipbuilding firm at Rio, "the only one worth mentioning in Brazil," employs 1,500 men, turning out work value £120,000 annually.

Openings for Factories

There are excellent openings for paper, cement, pins and needles, rubber goods, fine woollens and silks and poplins, hats in felt and straw, cooperages, manure works, sewing thread, chemicals, paint, varnish and starch, cornflour, arrowroot, glass, fine salt, preserves, pottery and china, oils and resins, toilet and shaving soaps, perfumes, soap and candles, buttons, blacking, ice, ropes and canvas, cocoa and chocolate, pianos, tanneries, acetylene, aluminium, nails, etc.

Hop-growing is unknown, and copra, cocoanut oil and butter-making and margarine works are non-existent; and amongst other cities Bello Horizonte offers free sites, free power and exemption from taxes for 5 years to approved concerns with a capital of over 20 contos of reis.

Exports

Rio de Janeiro produces tobacco, sugar, coffee, spirits, fruit, potatoes and timber.

São Paulo—Coffee, sugar, tobacco, hides and fruit.

Paraná—Matte, timber, hides, etc.

Minas—Dairy produce, gold and precious stones, coffee, tobacco.

Rio Grande do Sul—Hides, skins, preserved meat, cereals, tobacco, matte, wine, fruit, honey, cattle.

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Bahia—Tobacco, cacão, sugar, coffee, cotton fibres, rubber, cocoa nuts, fruit, timber, diamonds, etc.

Pará and Amazonas Acre Territory—Rubber, cacão, medicinal plants.

Matto Grosso—Rubber, vanilla, diamonds, medicinal plants.

Goyaz—Diamonds, cattle.

Piauhy and Ceará—Cattle, mandioca, carnauba wax.

Santa Catharina—Fruit, cereals, etc.

Espirito Santo—Coffee, timber, spirits, fruit.

Alagôas, Parahyba Sergipe, Pernambuco, etc.—Cotton, fruit, cocoa, rubber, carnauba wax.

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APPENDIX VII

EXPORTING HOUSES

State.	Firm.	Town.
	CARNAUBA WAX.	
Rio Grande do Norte	Julius von Sohsten .	Natal
,,	M. F. do Monte e Ca. .	Mossoró
,,	Camillo Figueiredo e Ca.	,,
	CASTOR OIL	
Rio Grande do Norte	J. von Sohsten. . .	Natal
	COFFEE	
Bahia . . .	Anderson & Rowe, Rua das Princezas 6	Bahia
,, . . .	F. Stevenson, Rua Cons Dantas 6	,,
,, . . .	Leib e Ca., Rua Cons Saraiva 4	,,
,, . . .	Steinbach e Ca., Rua Cons Dantas 29	,,
Espirito Santo	A. Prado e Ca.. . .	Victoria
,,	Hard Rand e Ca. . .	,,
,,	Ornstein e Ca. . . .	,,
Rio de Janeiro	Arbuckle & Co., R. São Bento 2–4	Rio

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State.	Firm.	Town.
Rio de Janeiro	Herm Stolz e Ca., Rua da Saude 104	Victoria
,,	John Moore, Rua da Candelaria 8	,,
,,	Pinto e Ca., Saude 78–84	,,
São Paulo . .	Baldwin & Co. . . .	Santos
,, . .	Barbosa e Ca. . . .	,,
,, . .	E. Johnson & Co. . .	,,
,, . .	Prado, Chaves e Ca., Rua S. Antonio 2	,,
,, . .	Theodor Wille e Ca. .	,,
,, . .	Rombauer e Ca. . .	,,
,, . .	Rôxo e Ca.	,,
,, . .	E. Whittaker & Co. .	,,

COCOA

Pará . . .	A. Delbert	Pará
,, . . .	A. Marques e Ca. . .	,,
,, . . .	Gruner e Ca. . . .	,,
Bahia . . .	F. Benn e Ca., Rua das Princezas 13	Bahia
,, . . .	F. G. Aldin, Rua das Cohertos 34	,,
,, . . .	G. H. Duder, R. das Princezas 18	,,
Pernambuco .	T. D. Evans, Rua do Commercio 48	Pernambuco
,, .	E. Lins Caldas . .	,,
,, .	Prohlmann e Ca. . .	,,

COTTON

Rio Grando do Norte	Alves e Ca. . . .	Natal
,,	Julius von Sohsten .	,,

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State.	Firm.	Town.
Rio Grando do Norte	Francisco Solon . .	Macáu
,,	Luiz Cabral e Ca. . .	Assú
Ceará . . .	Boris Frères . . .	Fortaleza
,, ...	J. Lopes e Ca. . . .	,,
Maranhão . .	Neves e Ca. . . .	São Luiz
,, . . .	Bastos Lisboa e Ca. . .	,,
	COTTON SEED OIL	
Rio Grande do Norte	F. Solon e Ca. . . .	Natal
,,	Julius von Sohsten . .	,,
	MATTE	
Rio de Janeiro	Manoel Lisboa, Caixa 575	Rio
Paraná. . . .	David Carneiro . . .	Curytiba
,, ...	Manoel de Macedo . . .	,,
,, ...	B. A. de Veiga . . .	,,
,, ...	H. Gomm	Antonina
Santa Catharina	Companhia Industrial	Joinville
Rio Grande do Sul	Schroder e Ca. . . .	Porto Alegre
,,	Marquez Veiga e Ca. . .	Passo Fundo
Matto Grosso .	Companhia Matte Larangeira	Corumbá
	MANDIOCA MEAL	
Sta Catharina.	Eduardo Horn e Ca. .	Florianopolis
Rio Grande do Sul	C. Torres e Ca.. . .	Porto Alegre
,,	Soares e Ca.	,,
,,	Thomsen e Ca.. . .	,,
,,	Lawson, Sons & Co. .	Rio Grande
,,	Granja e Ca.	Pelotas

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State.	Firm.	Town.
	Monazitic Sands	
Espirito Santo	Antenor Guimarães e Ca.	Victoria
	Piassava Fibre	
Bahia	Duder Brothers	Bahia
„	F. Benn & Son.	„
„	Wilson, Sons & Co.	„
„	Alfredo H. de Azevedo	„
„	F. Stevenson & Co.	„
„	Wildberger e Ca.	„
	Precious Stones	
Rio de Janeiro	Emmanuel Bloch, Ourives 89	Rio
„	Farani e Ca., Ouvidor 39	„
„	Hugo Brill, Av. Central	„
„	Castro Araujo, Rua da Alfandega 68	„
„	Levy, Rua do Ouvidor	„
„	Luiz Rezende e Ca., Ourives 69	„
„	M: da Silva Ribeiro, Av. Central 15	„
	Resins and Gums	
Pernambuco	Julius von Sohsten, Rua do Commercio 13	Pernambuco
Espirito Santo	J. Zenzen e Ca.	Victoria
Bahia	M. Ulmann e Ca., Rua das Princezas 12	Bahia

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State.	Firm.	Town.
	RUBBER	
Amazonas .	A. H. Alden . . .	Manáos
,, .	B. Levy e Ca. . . .	,,
,, .	Gordon e Ca. . . .	,,
,, .	Leite e Ca.	,,
Pará . . .	A. C. A. Astlett . .	Pará
,, . . .	E. Pinto Alves. . .	,,
,, . . .	D. A. Antunes e Ca. .	,,
,, . . .	Braja Sobrinho e Ca. .	,,
Bahia . . .	F. Benn & Sons . .	Bahia
,, . . .	F. G. Alden	,,
,, . . .	Rossbach Brazil Coy. .	,,
,, . . .	Wildberger e Ca. . .	,,
Rio Grande do Norte	H. T. Green . . .	Natal
Maranhão . .	Neves & Co. . . .	São Luiz
	SUGAR	
Rio Grande do Norte	Alves e Ca. . . .	Natal
,,	Julius von Sohsten .	,,
	SKINS, ETC.	
Rio Grande do Norte	F. Cascudo e Ca. . .	Natal
,,	A. de Souza Mello. .	Mossoró
,,	Camillo Figueiredo .	,,
Maranhão . .	Neves e Ca. . . .	São Liuz
	TOBACCO AND CIGARS	
Bahia . . .	Borel & Co. . . .	Bahia
,, . . .	G. W. Bley. . . .	,,
,, . . .	Moraes e Ca. . . .	,,

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State.	Firm.	Town.
Bahia . . .	Danemann e Ca. . .	Bahia
,, . . .	C. Martfeld . . .	,,
,, . . .	F. Vieira de Mello. .	Maragogipe
,, . . .	Stender e Ca. . . .	,,
,, . . .	Pezler e Hoening . .	Cachoeira
,, . . .	Costa Ferreira e Penna	São Felix
Rio Grande do Sul	C. Forres e Ca.. . .	Porto Alegre
,,	Reis e Cezar . . .	,,
,,	E. Dreher e Ca. . .	,,
,,	M. Minabarrij e Ca. .	,,
,,	Steno Gomes e Ca. .	,,

TIMBER (Hard Woods)

Pernambuco .	Antero de Vasconcellos	Pernambuco
,, .	Affonso Pessoa. . .	,,
,, .	Azeuedo Irmãos . .	,,
,, .	Benevenuto Leite . .	,,
Bahia . . .	Duder Bros. . . .	Bahia
,, . . .	Stevenson e Ca. . .	,,
,, . . .	João Dias Silva . .	,,
Espirito Santo	A. Prado e Ca.. . .	Victoria
,,	J. Zingen	,,
,,	Manoel Evaristo Pessoa	,,
,,	Antenor Guimaraes e Ca.	,,
Rio de Janeiro	John I. Duncan . .	Campos
,,	Castro e Ca. . . .	,,
,,	Pereira, Soares e Ca. .	,,
,,	Fernando Bezamat .	,,
,,	Castro e Rocha . .	,,

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APPENDIX IX

OFFICIAL LIST OF THE LIGHTHOUSES ON THE BRAZILIAN COAST

From the Chart of Admiral Jaceguay.

Number.	States.	Names of the Lighthouses.	Geographic Position. Latitude.	Geographic Position. Longitude W. of Greenwich.	Characteristic of the Light.	Class of the Lighthouses. Effective Range of Light in fine Weather, in Miles.	Altitude of the Light in Metres. Above Ground.	Altitude of the Light in Metres. Above High Water.	Nature and Form of the Building.
			° ′ ″	° ′ ″					
1	Amazonas.	*Correntesa*	3 12 30 S.	59 43 35	White fixed	D. 6 6	11·00	—	White candelabrum.
2	Pará . .	*Macapá*	0 00 50 N.	51 12 00	White fixed, flashing alternated from 30 to 30 seconds	D. 5 12	10·50	22·00	White column.
3	„ . .	*Bailique*	1 00 00 N.	49 55 45	White flashing, from 30 to 30 seconds	D. 5 13	15·55	18·30	White cylindric tower.
4	„ . .	*Ilhadas Flexas*	0 03 00 S.	48 56 40	White fixed	D. 6 10	6·50	8·00	White column.
5	„ . .	*Ilha do Machadinho*	0 09 20 S.	48 44 20	Red fixed	D. 6 8	9·00	9·50	White column.
6	„ . .	*Pontado do Simão Grande*	0 17 30 S.	48 25 10	White flashing, from 30 to 30 seconds	D. 5 10	10·00	12·00	White column.
7	„ . .	*Soure* . .	0 41 55 S.	48 31 20	Red fixed	D. 6 6	7·60	—	White candelabrum.
8	„ . .	*Joannes* .	0 51 30 S.	48 31 15	White fixed	D. 6 12	8·00	14·00	White column.

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OFFICIAL LIST OF LIGHTHOUSES ON THE BRAZILIAN COAST (*continued*).

Number.	States.	Names of the Lighthouses.	Geographic Position. Latitude.	Geographic Position. Longitude W. of Greenwich.	Characteristic of the Light.	Class of the Lighthouses. Effective Range of Light in fine Weather, in Miles.	Altitude of the Light in Metres. Above Ground.	Altitude of the Light in Metres. Above High Water.	Nature and Form of the Building.
			° ′ ″	° ′ ″					
9	Pará . .	*Arrozal* .	1 20 40 S.	48 48 40	White fixed	D. 6 7	—	9·60	White column.
10	„ . .	*Mandihy* .	1 37 40 S.	49 10 00	White fixed	D. 6 8	8·51	16·50	Red column.
11	„ . .	*Camelleão* .	1 51 30 S.	50 05 00	White fixed	D. 6 7	8·51	9·00	Red column.
12	„ . .	*Buiussú* .	1 48 20 S.	50 16 55	White fixed	D. 5 12	10·00	—	White column.
13	„ . .	*Freichal* .	2 02 28·9S.	53 59 13·5	White fixed	D. 5 11	10·40	12·00	White column.
14	„ . .	*Capim* .	1 32 30 S.	48 52 05	White fixed	D. 6 7	—	9·60	White column.
15	„ . .	*Cotijuba* .	1 15 30 S.	48 38 30	White fixed	D. 6 7	7·51	9·64	White column.
16	„ . .	*Tatuóca* .	1 11 45 S.	48 30 10	White fixed	D. 6 12	7·50	9·70	White column.
17	„ . .	*Chapéo Virado*	1 08 35 S.	48 28 30	Red fixed	D. 15 12	10·50	11·40	White column.
18	„ . .	*Collares* .	0 53 00 S.	48 17 00	White fixed	D. 5 12	—	11·80	White column.
19	„ . .	*Salinas* .	0 35 10 S.	47 21 30	White fixed, flashing alternated from 2 to 2 seconds	D. 3 15	12·20	31·00	White truncated conic tower.
20	„ . .	*Caeté* . .	0 42 05 S.	46 30 37	White fixed	D. 6 12	10·00	12·00	White column.

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21	„ . .	*Gurupy* .	0 56 00 S.	46 13 00	White, flashing from 20 to 20 seconds	D. 3	20	35·50	36·10	White cylindric tower.
22	Maranhão .	*S. João* .	1 17 40 S.	44 32 35	White fixed	D. 3	14	—	25·90	Hexagonal red tower.
23	„ .	*Itacolomy* .	2 10 40 S.	44 24 35	White fixed, flashing from ½ to 2 minutes.	D. 3	18	17·50	48·00	White tower.
24	„ .	*Alcantara* .	2 24 50 S.	44 24 50	White fixed	D. 6	9	8·50	22·00	White column.
25	„ .	*Barra* . .	2 30 20 S.	44 17 45	White and red fixed . .	D. 6	7 w. 4 r.	—	9·00	White column.
26	„ .	*S. Marcos* .	2 29 20 S.	44 16 55	White fixed	D. 4	15	—	36·27	Octagonal white tower.
27	„ .	*Sant' Anna*	2 16 20 S.	43 36 25	White turning, 2 white flashing and 1 red, 30 seconds between each flashing	D. 2	20	45·60	60·00	White cylindric tower.
28	„ .	*Preguiças* .	2 34 30 S.	42 44 30	Lighting light. White flashing from 3 to 3 seconds with eclipses from 2 seconds	D. 3	17	28·00	33·00	White tower.
29	„ .	*Tutoya*. .	2 40 40 S.	42 14 04	White, flashing from 6 to 6 seconds	D. 5	12	10·00	14·00	Purple iron frame
30	Piauhy .	*Pedra do Sal*	2 49 00 S.	41 43 25	White fixed	D. 4	10	12·50	18·00	Octagonal white tower.
31	Ceará . .	*Camocim* .	2 51 30 S.	40 52 50	White, flashing from 30 to 30 seconds	D. 5	12	10·50	13·80	Purple column.
32	„ . .	*Mucuripe* .	3 42 10 S.	38 27 25	White, flashing from 10 to 10 seconds	D. 4	12	9·30	33·40	White cylindric tower.

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OFFICIAL LIST OF LIGHTHOUSES ON THE BRAZILIAN COAST (*continued*).

Number.	States.	Names of the Lighthouses.	Geographic Position. Latitude.	Geographic Position. Longitude W. of Greenwich.	Characteristic of the Light.	Class of the Lighthouses. Effective Range of Light in fine Weather, in Miles.	Altitude of the Light in Metres. Above Ground.	Altitude of the Light in Metres. Above High Water.	Nature and Form of the Building.
			° ′ ″	° ′ ″					
33	Ceará . .	*Aracaty* .	4 24 20 S.	37 44 30	White fixed	D. 5 10	11·20	16·00	Purple tronconic tower.
34	„ . .	*Itapagé* .	2 51 00 S.	40 00 00	Lighting light. Alternated flashing white and red	D. 4 15	26·00	26·50	Purple column.
35	Rio Grandé do Norte	*Mossoró* .	4 57 12 S.	37 07 10	White, flashing from 15 to 15 seconds	D. 5 12	12·06	14·06	White column.
36	„	*Ponta do Mel* .	4 57 12 S.	36 53 20	White, flashing from 30 to 30 seconds and partial eclipses	D. 3 20	13·75	99·75	White tower.
37	„	*Olhos d'Agua*	(Projected)	(Projected)	Lighting light. Double white flashing	D. 4 —	50·00	—	—
38	„	*S. Roque* .	„	„	Lighting light. Flashing white and red	D. 5 —	8·00	—	—
39	„	*Macáo* .	5 05 40 S.	36 38 20	White fixed, alternated white flashing from 30 to 30 seconds.	D. 5 12	12·00	13·30	White column.
40	„	*Caiçara* .	5 02 30 S.	36 01 27	White, with flashing from 5 to 5 seconds	D. 5 10	8·65	10·65	Red iron frame.

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			° ′ ″	° ′ ″					
41	„	*Reis Magos*	5 45 05 S.	35 11 15	White, double flashing alternated with red flashing from 30 to 30 seconds	D. 5	10	—	14·13	White tower.
42	Parahyba	*Pedra Secca*	6 57 20 S.	34 48 45	White, with eclipses and flashings, from 1 to 1 minute	D. 4	10	—	16·30	White octagonal tower.
43	Pernambuco	*Roccas*	3 52 00 S.	33 47 41	White, with flashings from 10 to 10 seconds	D. 5	15	16·00	18·50	White iron frame
44	„	*Olinda*	8 01 20 S.	34 50 45	White fixed, flashing from 2 to 2 minutes	D. 4	12	—	19·00	Red octagonal tower.
45	„	*Recife*	8 03 22·2 S.	34 51 55·5	2 white flashing and 1 red flashing from 30 to 30 seconds	D. 1	20	—	24·10	White octagonal tower.
46	„	*Santo Agostinho*	8 20 40 S.	34 55 51	White fixed	D. 1	25	48·80	105·00	White iron tower.
47	„	*Tamandaré*	8 43 30 S.	35 05 06	Alternated flashing white and red from 20 to 20 seconds	D. 3	14	14·00	20·50	White iron tower.
48	„	*Fernando de Noronha*	3 48 30 S.	32 23 26	—	D. 13	—	—	—	—
49	Alagôas	*Maceió*	9 39 20 S.	35 42 30	White fixed with flashings	D. 3	20	—	60·20	Masonry tower.
50	Sergipe	*S. Francisco do Norte*	10 30 30 S.	36 22 10	White fixed	D. 4	10	—	18·00	White iron tower.
51	„	*Aracajú*	10 58 20 S.	37 03 55	White with scintillation from 30 to 30 seconds	D. 13	17	13·50	38·27	White tronconic tower.

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OFFICIAL LIST OF LIGHTHOUSES ON THE BRAZILIAN COAST (*continued*).

Number.	States.	Names of the Lighthouses.	Geographic Position.		Characteristic of the Light.	Class of the Lighthouses.	Altitude of the Light in Metres.		Nature and Form of the Building.
			Latitude.	Longitude W. of Greenwich.		Effective Range of Light in fine Weather, in Miles.	Above Ground.	Above High Water.	
			° ′ ″	° ′ ″					
52	Sergipe .	*Rio Real* .	11 26 30 S.	37 22 15	White fixed	D. 6 10	—	21·50	Quadrangular tower.
53	Bahia . .	*Itapoan* .	12 57 00 S.	38 20 55	White fixed	D. 3 12	—	20·80	Red tronconic tower.
54	„ . .	*Santo Antonio da Barra*	13 00 37·4S.	38 32 05·5	2 white flashing and 1 red flashing from 10 to 10 seconds	D. 1 18	16·25	37·20	White tronconic tower.
55	„ . .	*Santa Maria*	13 00 26 S.	38 31 55	Red and green fixed in different sectors	D. 6 5	8·00	16·00	Red column.
56	„ . .	*Forte do Mar*	12 58 20 S.	38 30 55	Red fixed	D. 6 5	4·20	15·20	White column.
57	„ . .	*Ilha do Frade*	12 48 48 S.	38 38 21	Red fixed	D. 6 9	9·50	30·40	Red column.
58	„ . .	*Morro de São Paulo*	13 22 35 S.	38 54 25	White with flashings from 1 to 1 minute	D. 1 25	24·00	82·80	White tronconic tower.
59	„ . .	*Belmonte* .	15 51 50 S.	38 52 09	White with flashings from 10 to 10 seconds	D. 3 18	35·00	35·50	White tower.
60	„ . .	*Kiepe* . .	13 50 58 S.	38 57 21	Red flashing from 10 to 10 seconds	D. 5 13	16·00	18·50	White frame.
61	„ . .	*Porto Seguro*	16 25 00 S.	39 04 06	2 white flashing and 1 red flashing from 30 to 30 seconds	D. 5 15	10·00	50·00	White tower.

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62	„ . .	*Abrolhos* .	17 57 30 S.	38 41 05	Powerful white flashing from 30 to 30 seconds, and total eclipses	D.M.	23	22·00	60·00	White cylindric tower.
63	Espirito Santo	*Rio Doce* .	19 37 10 S.	39 49 15	White and red flashing alternated from 30 to 30 seconds	D. 3	18	34·29	37·54	White tower.
64	„ .	*Santa Luzia*	20 19 30 S.	40 15 25	White fixed	D. 4	12	11·50	23·00	White octagonal tower.
65	„ .	*Escalvada* .	20 43 20 S.	40 25 26	White with flashings from 30 to 30 seconds	D. 5	15	16·50	27·00	Purple tower.
66	„ .	*Ilha do Frances*	20 54 40 S.	40 45 20	White fixed	D. 4	14·1	11·60	47·73	Masonry tower.
67	Rio de Janeiro	*São João da Barra*	21 38 10 S.	41 03 25	White fixed	D. 6	12	—	13·00	White column.
68	„	*Cabo de São Thomé*	21 02 00 S.	41 03 15	White flashing from 1 to 1 minute with total eclipses	D. 1	19	45·00	49·00	Red tronconic tower.
69	„	*Ilha de Sant' Anna*	22 25 25 S.	41 42 40	Alternated flashing white and red, from 10 to 10 seconds	D. 4	20 w. 15 r.	15·00	135·00	White tower.
70	„	*Cabo Frio* .	23 00 40 S.	42 00 00	White flashing from 20 to 20 seconds, with total eclipses	D. 1	30	16·00	144·00	White tronconic tower.
71	„	*Ponta Negra*	22 57 30 S.	42 40 00	Lighting light. Double white flashing	D. 5	20	8·00	68·00	White column.
72	„	*Ilha Rasa* .	23 03 40 S.	43 08 15	2 white flashing and 1 red flashing from 15 to 15 seconds	D.M.	25	26·00	96·00	White triangular tower.

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OFFICIAL LIST OF LIGHTHOUSES ON THE BRAZILIAN COAST (*continued*).

Number.	States.	Names of the Lighthouses.	Geographic Position. Latitude.	Geographic Position. Longitude W. of Greenwich.	Characteristic of the Light.	Class of the Lighthouses. Effective Range of Light in fine Weather, in Miles.	Altitude of the Light in Metres. Above Ground.	Altitude of the Light in Metres. Above High Water.	Nature and Form of the Building.
			° ′ ″	° ′ ″					
73	Rio de Janeiro	*Santa Cruz*	22 56 10 S.	43 07 45	White fixed	D. 6 10	—	—	—
76	„	*Guaratiba* .	23 04 20 S.	43 33 05	White flashing from 5 to 5 seconds	D. 3 18	9·50	—	White tower.
77	„	*Castelhanos*	23 09 42 S.	44 05 25	White fixed with double flashing from 30 to 30 seconds	D. 3 25	16·30	106·00	White tower.
83	S. Paulo .	*S. Sebastião*	23 58 30 S.	45 15 21	Sparkling light with flashing from 10 to 10 seconds	D. 3 20	16·50	74·00	White tower.
84	„ .	*Moéla* . .	24 03 05 S.	46 15 30	Alternated flashing white and red, from 30 to 30 seconds	D. 1 24	9·50	103·50	White tower.
85	„ .	*Lage de Santos*	24 19 30 S.	46 10 30	White flashing from 10 to 10 seconds	D. 5 18	7·00	37·50	Purple frame.
86	„ .	*Queimada Grande*	24 28 30 S.	46 40 05	Lighting light. Double white flashing from 10 to 10 seconds	D. 4 23	9·50	82·80	White tower.
87	„ .	*Bom Abrigo*	25 06 40 S.	47 51 45	Two white flashing and one red flashing from 15 to 15 seconds	D. 6 14	12·25	154·40	White tower.

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			° ′ ″	° ′ ″					
88	Paraná .	*Fortaleza* .	25 30 55 S.	48 19 22	Red fixed	D. 6	6	—	16·00	Column.
89	„ .	*Conchas* .	25 32 40 S.	48 18 48	White fixed	D. 5	18	17·50	60·00	White tower.
91	„ .	*Cayobá*. .	25 51 40 S.	48 33 25	Red flashing from 10 to 10 seconds	D. 5	15	7·00	—	White iron frame.
92	Santa Catharina	*Ilha da Paz*	26 11 30 S.	48 30 44	White flashing from 20 to 20 seconds	D. 4	20	15·00	83·00	White tower.
93	„	*Sumidouro*	26 10 35 S.	48 34 30	White fixed	D. 6	8	8·30	9·00	White column.
94	„	*Itajahy* .	26 57 12 S.	48 30 05	White with flashing from 30 to 30 seconds	D. 5	12	10·50	56·00	White column.
95	„	*Arvoredo* .	27 18 00 S.	48 22 15	White and red alternated from 2 to 2 minutes and white light in the intervals	D. 2	23	14·70	90·00	Purple tronconic tower.
96	„	*Anhato-mirim*	27 25 30 S.	48 34 15	White fixed	D. 6	12	8·25	39·10	White column.
97	„	*Naufragados*	27 50 30 S.	48 34 45	White with flashings from 45 to 45 seconds	D. 3	16	—	42·60	White tronconic tower.
98	„	*Imbituba* .	28 16 45 S.	48 40 15	White fixed	D. 6	10	6·50	21·00	White candelabrum.
99	„	*Santa Martha Grande*	28 38 00 S.	48 49 45	White with double flashing from 30 to 30 seconds	D.H.	23	28·60	76·10	Masonry white tower.
100	Rio Grande do Sul	*Torres* . .	(Projected)	(Projected)	Lighting light; 3 white lighting and 1 red lighting	D. 3	—	10·00	—	Iron tower.
101	„	*Mostardas*.	31 16 30 S.	51 01 45	White and red flashing alternated, from 30 to 30 seconds	D. 3	17	34·00	35·00	White tronconic tower.

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OFFICIAL LIST OF LIGHTHOUSES ON THE BRAZILIAN COAST (*continued*).

Number.	States.	Names of the Lighthouses.	Geographic Position.		Characteristic of the Light.	Class of the Lighthouses.	Altitude of the Light in Metres.		Nature and Form of the Building.
			Latitude.	Longitude W. of Greenwich.		Effective Range of Light in fine Weather, in Miles.	Above Ground.	Above High Water.	
			° ′ ″	° ′ ″					
102	Rio Grande do Sul	*Cidreira* .	30 11 10 S.	50 15 30	Two white flashing and one red flashing, from 10 to 10 seconds	D. 4 17	25·00	27·00	Red iron tower.
103	„	*Barra* . .	32 07 29 S.	52 06 18	White with scintillations from 30 to 30 seconds	D. 2 16	29·45	31·65	Red tronconic tower.
104	„	*Sarita* . .	32 32 01 S.	52 29 00	Double white flashing from 5 to 5 seconds	D. 4 13	26·00	29·00	Purple tower.
105	„	*Albardão* .	33 12 14 S.	52 44 25	Lighting light. White flashing with eclipses from 30 to 30 seconds	D. 3 20	37·00	42·00	Purple tower.
106	„	*Chuy* . .	(Projected)	(Projected)	Lighting light. Double white flashing	D. 4 —	25·00	—	Purple tower.
107	„	*Estreito* .	31 47 40 S.	51 54 15	White fixed	D. 3 12	—	15·00	White tower.
108	„	*Bujurú* .	31 29 31 S.	51 26 46	2 white flashing and 1 red flashing from 12 to 12 seconds	D. 5 13	19·00	21·00	White tower.
109	„	*Capão da Marca*	31 19 25 S.	51 10 54	White fixed	D. 4 12	15·50	16·00	Purple tronconic tower.
110	„	*Christovão Pereira*	31 04 23 S.	51 11 55	White flashing from 10 to 10 seconds	D. 5 14	27·50	29·50	White tower.

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111		„	*Itapoan* .	30	23	37 S.	51	05	27	White fixed	D. 6	12	12·90	16·50	Masonry tower.
112		„	*Alegre* . .	32	14	00 S.	52	48	30	White fixed	D. 5	12	—	17·00	Masonry tower.

REMARKS.—The numbers missing on this list belong to minor lighthouses not mentioned on the chart.
All the lighthouses of every class are shown on this chart by the sign ═ ●, the name of each one being followed by the initial L.
The abbreviations D., D. M., and D. H. are to mean respectively: dioptric, dioptric half-radiant and dioptric hyper-radiant.
The numbers of the lighthouses are those mentioned in the catalogue of the "Illumination and seamarks of the coast, ports, bars, rivers and navigable lakes" of U.S. of Brazil, published November, 1909, by the Brazilian Navigation Superintendency.
The lighthouses and other illuminative signs, not connected with international navigation, are not mentioned on this chart.

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CONCLUSION

Any sketchiness, or want of detail, apparent in this book is due to the fact that in the first place it is the work of one pair of hands, that I am quite unable to make any advance arrangements either for obtaining data or for publication, and that I have had to make two return journeys to Brazil within 14 months, and prepare the material for last year's edition as well as this in between. Unfortunately, also, out of all the States in the Republic, only four or five have any proper organization for compiling statistics, and I have been obliged to consult no fewer than 150 different works in order to compile this volume.

J. C. OAKENFULL.

ARCACHON, FRANCE.
January, 1913.

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Lisbon, Oporto, Manáos, Pará, Pernambuco, Bahia, Santos, S. Paulo, Curityba, Rio Grande do Sul, Porto Alegre, Montevideo, Buenos Aires, Rosario de Santa Fé, Paris, and the New York Agency.

Also on the following Bankers—
Messrs. Glyn, Mills, Currie & Co., London.
Credit Lyonnais, Spain.
Société Générale, Paris, and Branches.
Anglo-Oesterreichische Bank, Austro-Hungary (Anglo-Austrian Bank).
Messrs. Joh Berenberg, Gossler & Co., Hamburg.
Credito Italiano, Italy.
Banco de Portugal, Portugal.
Imperial Ottoman Bank, Turkey.

CORRESPONDENTS.

The bank has agents or correspondents in all the principal ports and cities of Brazil, Uruguay, Argentina and the United States of America.

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The British Bank of South America, Ltd.

HEAD OFFICE:

MOORGATE STREET, LONDON, E.C.

Capital . . .	£2,000,000
Idem paid up . .	£1,000,000
Reserve Fund . .	£1,100,000

Office in

RIO DE JANEIRO, Rua Primeiro de Março, 45 & 47
Rua da Hospicio, 1, 3, 5 & 7,

São Paulo, Bahia, Buenos Aires, Montevideo, and Rosaria.

Correspondents in Pernambuco, Pará, Manáos, Ceará, Victoria, Maceió, Maranhão, Santa Catharina, Paranaguá, Curityba, Rio Grande do Sul, Pelotãs, Porto Alegre, Santos, Piauhy, Matto Grosso.

Draws on its Head Office in London; The London Joint Stock Bank, Limited, London, and all principal towns in the United Kingdom; Messrs. Heine & Co., Paris; Banque de Bordeaux, Bordeaux; J. Berenburg, Gossler & Co., Hamburg, and Correspondent in Germany; Banco Belinzaghi, Milan; Banca Commerciale Italiana, Genoa; Societá Bancaria Italiana, Genoa, and Correspondents in Italy; Messrs. E. Sainz & Hijos, Madrid; Garcia Galamarte & Co., Madrid, and Correspondents in Spain, Crédit Franco Portugais, Oporto; Banco de Portugal, Lisbon, and Correspondents in Portugal; The Bank of New York, N.B.A., New York; E. Raoul & Co., Havre; also draws on South Africa, New Zealand, and principal cities on Western Coast of South America.

Opens current accounts. Receives deposits at notice for fixed periods and transacts every description of banking business.

Circular letters of credit available in all parts of the world.

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The London and River Plate Bank, Ltd.

Established 1862.

CAPITAL

Authorised . . .	£4,000,000
Subscribed . . .	£3,000,000
Paid up	£1,800,000
Reserve Fund . .	**£2,000,000**

29 Rua da Alfandega and 112 Rua da Quitanda;

And at London, Paris, Antwerp, New York, Santos, São Paulo, Pernambuco, Pará, Manáos, Bahia, Curityba, Victoria, Buenos Aires, Rosario, Mendoza, Concordia, Bahia-Blanca, Barracas, Cordoba, Paraná, Tucuman, Once, Boca, Montevideo, Paysandú, Salto and Valparaiso.

AGENCIES IN BRAZIL—

Maranhão, Ceará, Maceió, Rio Grande do Sul, Pelotas and Porto Alegre.

Correspondents in all other chief Towns of Brazil.

Bills of Exchange issued and purchased at the following places: London, and all the principal towns of the United Kingdom; Paris, and all the principal towns of France, and of the Argentine Republic, Uruguay, Chili, United States, Canada, and Japan.

Current accounts opened with commercial firms and private individuals.

Deposits received for fixed periods or at 30 days' notice of withdrawal. Letters of Credit issued—Stock and Share Orders executed, and every description of banking business conducted.

Terms ascertainable on application to the Bank.

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BRAZILIAN CONSTRUCTION BANK

(BANCO CONSTRUCTOR DO BRAZIL)

(PETROPOLIS SECTION).

Water Supply and Electrical Illumination of the above City.

AVENIDA 15 de Novembro No. 881.

PETROPOLIS

(STATE OF RIO JANEIRO).

BRAZIL.

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SOCIÉTÉ FINANCIÈRE AU BRÉSIL.

RUA DE S. PEDRO No. 36.

Adresse Télégraphique : MOBILIER, RIO. *Bôite Postale :* No. 1464 RIO DE JANEIRO.

Cette Société a été fondée par le Crédit Mobilier Française (avec un Capital de 60 millions de francs).

La siège social est à Paris—

30-32 RUE TAITBOUT.

Administration de la Société Financière au Brésil :

Président—Mr. de Lapisse.
Vice-Président—Mr. Demetrio Ribeiro.
Administratêur Dèlegué—Mr. J. B. Mérier.
Secrétaire Général—Mr. E. Charlat.

Empreza Constructora Rio Grande do Sul.

RUA DE S. PEDRO No. 36.

Adresse Télégraphique : RIOSUL, RIO. *Bôite Postale :* No. 1464 RIO DE JANEIRO.

Cette Société a été fondée par le Credit Mobilier Française, le Banco da Provincia de Rio Grande do Sul et la Société Financière au Brésil.

Direction de l'Empreza Constructora Rio Grande do Sul :

Prêsident—Mr. Demetrio Ribeiro.
Vice-Président—Mr. J. C. Charpentier.
Directeur Technique : Mr. A. V. Rebouças.
Administrateurs—MM. Virgilio Gordilho et J. B. Mérier.

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Docks and Port of Bahia Concessionary Coy.

HEAD OFFICE :—
27 RUA SACHET, RIO DE JANEIRO, BRAZIL.

Directors : **Commander (Chevalier) Augusto José Ferreira (President). Dr. Miguel A. Ribeiro Lisboa (Technical Director).**

Paris Representative : **Mr. Edouard Fontaine de Laveleye, 39 bis Rue de Chateaudun.**

Bahia Representative : **Dr. Frederico Ferreira Pontes, 40 Rua de Arsenal.**

THE Docks and Port Concessionary Coy. of Bahia is a Brazilian Society for the purpose of the construction and exploitation of the port of S. Salvador, Capital of Bahia, in accordance with the concession granted by the Federal Govt. of Brazil by decree No. 5,550 of June 6th, 1905, which specified the necessary works for such purpose, and their mode of execution, with slight modifications and additions made in later decrees of the Federal Govt. The works should be concluded on Decr. 31st, 1913, and comprise the construction of two breakwaters (exterior and interior), the first being 920 metres long and the second 1,200, destined to form an artificial port in front of the quay.

A wharf of 2,000 metres in length with a depth of water of 8 metres alongside 1,450 metres of quay, and 10 metres in an extension of 855 metres. There will be 15 metal constructed warehouses, each 100 metres long, more or less, with an average capacity of 2,000 sq. metres, destined for merchandise and other

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imported goods. The cranes and other machinery of the quay will be of the most modern type.

Behind the line of warehouses an Avenida 20 metres wide will be made, parallel to the quay, which will permit free and easy access to the port.

The whole of the construction work is being executed by the **"Société de Construction du Port de Bahia,"** with head office in Paris, which is equipped with the most up-to-date material possible.

The capital of the Concessionary Coy. is 50,000 contos in Brazilian money, divided into 250,000 shares of 200$000 each, or 500 francs, at the rate of 400 reis the franc.

To execute the contract the Board of Directors of the Coy. in an Extraordinary General Meeting, authorised a foreign loan of £3,000,000 or 75,000,000 francs, in 150,000 bonds (debentures) of 500 francs, each bearing interest at the rate of 5 per cent. per annum.

Of the 150,000 bonds authorised and whose emission is under the control of the "Caisse Commerciale et Industrielle of Paris," 134,000 were issued up to August 31st, 1912, of which 25,000 were disposed of by Messrs. Boulton Bros., of London.

The Port works are well advanced, and every means is taken in order to have 750 metres of quay ready for exploitation in Feby., 1913.

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R.M.S.P. & P.S.N.C.

to

SOUTH AMERICA.



Weekly from Southampton, Liverpool & Glasgow to

BRAZIL,

Uruguay, Argentina, Chile & Peru,

via France, Spain, Portugal, Madeira, Canary Is., St. Vincent & Falkland Is.

Also

REGULAR SERVICES

to West Indies, Pacific, New York; Straits, China & Japan; Bermuda, etc.



YACHTING CRUISES

to Norway, Mediterranean, Holy Land, Egypt; Morocco, Canary Is. & Madeira, Spain & Portugal; Azores, etc.

Apply—

THE ROYAL MAIL STEAM PACKET COMPANY
THE PACIFIC STEAM NAVIGATION COMPANY

London: 18, Moorgate St., E.C. Liverpool: 31–3, James St. Also Offices at Buenos Aires, Rio de Janeiro, New York, etc.

Lamport and Holt Line

Mail and Passenger Service between New York, Brazil and River Plate.

Average Passage, Rio—N. York=17 days.

The following first-class Mail and Passenger Steamers sail for New York, calling at Santos, Rio de Janeiro, Bahia, Trinidad, and Barbados.

VESTRIS, 12,000 tons. **VASARI**, 10,000 tons.
VOLTAIRE, 10,830 tons. **VERDI**, 8,040 tons.

Tickets issued for the circular trip from Rio to New York, and thence to Liverpool, Southampton, London, Hamburg, or Bremen, by the Cunard, White Star, and American liners.

Special Tourist Tickets issued for the round trip to New York, in connection with the new twin-screw steamer, *Vestris* (12,000 tons).

Cabins de Luxe, Staterooms with Private Bath, etc. Single-berth Cabins.

All Passenger Steamers are equipped with the latest system of Wireless Telegraphy.

AGENTS—

RIO DE JANEIRO ..	**Norton, Megaw & Co., Ltd.**
SANTOS	**F. S. Hampshire & Co.**
BUENOS AIRES ..	**J. S. Boadle & Co.**
MONTEVIDEO	**A. Real Azua.**
NEW YORK	**Busk & Daniels.**

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The

EMPREZA BRAZILEIRA DE NAVEGAÇÃO,

Rua da Quitanda No. 118,

RIO DE JANEIRO.

Telephone No. 3681. Telegraphic Address: BRAZIL.

Maintains a regular service between Rio de Janeiro and the following ports:—

Itapemirim, Piuma, Benevente, Victoria, Caravellas, Ponta d'Areia, Ilhéos, Bahia, Aracajú, Penedo and Villa Nova.

PARACATÚ RAILWAY Coy.

CAPITAL, 10,000,000$000.

Head Office:

118 RUA DA QUITANDA 118

(4th Floor).

Directors:

Dr. BENTO DINARD DE ARAUJO.
Dr. FERNANDO DE SOUZA ESQUERDO.
Dr. ALVARO MENDES DE OLIVEIRA CASTRO.

Chief Engineer: Dr. PEDRO BOSISW.

Initial Station: MARTINHO CAMPOS.
(E. F. Oeste de Minas.)

Terminus: PLATEAU OF GOYAZ.

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Pão de Assucar Aerial
(SUGARLOAF)
Railway Company

EXTRAORDINARY excursion to the top of the Sugarloaf, stopping on the Morro da "Urca," a point of reunion for travellers passing through Rio de Janeiro.

Magnificent views, unique in South America.

Incomparable beauty and security, due solely to the first-class installation made with the material furnished by

I. POHLIG A. G. de CÖLN, ZOLLSTOCK.

Perfect Safety Guaranteed.

This excursion stands alone, and from the top of the Sugarloaf may be seen the island of "Raza," the Ocean, all "Copacabana," Leme Ipanema, and the city of Rio de Janeiro.

The view is so magnificent that it cannot well be described.

The Cars will make special journeys when the number of passengers are sufficient.

Return ticket to the top of the Morro da "Urca," 2$000 each person.

The trams of the Jardim Botanica Coy. serving the line bear the legend "Praia Vermelha," and leave the terminus in the Avenida Rio Branco every few minutes.

Directors { **AUGUSTO RAMOS,**
FRIDOLINO CARDOSO,

RIO DE JANEIRO, BRAZIL.

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The Rio de Janeiro Tramway, Light & Power Coy., Ltd.

Visitors to Rio de Janeiro.

THE first desire of visitors to Rio is to explore further the beauties they have sighted when entering the harbour. This can easily be done by taking the tram which starts from the Praça 15 de Novembro at the landing stage, going to the Tijuca Mountain, the car running over this Company's system, through the city and then a delightful 30 minutes' run up the mountain. A pleasant day may thus be spent that will linger long in the memory. The visitor can take a tram down in the cool of the evening. The journey up or down takes just one hour. The points most worthy of notice on the Tijuca are:—The Chinese View, The Emperor's Table, Great and Little Cascades, Grotto of Paul and Virginia, Excelsior View, and, if possible, the Peak itself. Most of the above, with the exception of the latter, can be seen in a circular drive of 2 or 3 hours through delightfully shady woods. Should the visitor desire to visit the Peak, saddle-horses should be ordered in advance by telephone, as they are not always available. The highest point is 3,300 feet above sea-level, or 1,100 feet higher than the Corcovado. The trams from Jardim Botanico Station (Avenida Rio Branco) run to several other places of interest, viz.: The Botanical Gardens and Leme, Ipanema and Copacabana beaches. From the same station Aguas Ferreas cars convey one to the foot of the Corcovado Mountain, where the Electric Railway starts to the summit. There the excursionist is spellbound by the immense panorama of sea, city and plain, rivalled only by the splendour of Tijuca.

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VICTORIA-DIAMANTINA RAILWAY.

Lines in Traffic

Victoria-Diamantina Rly.

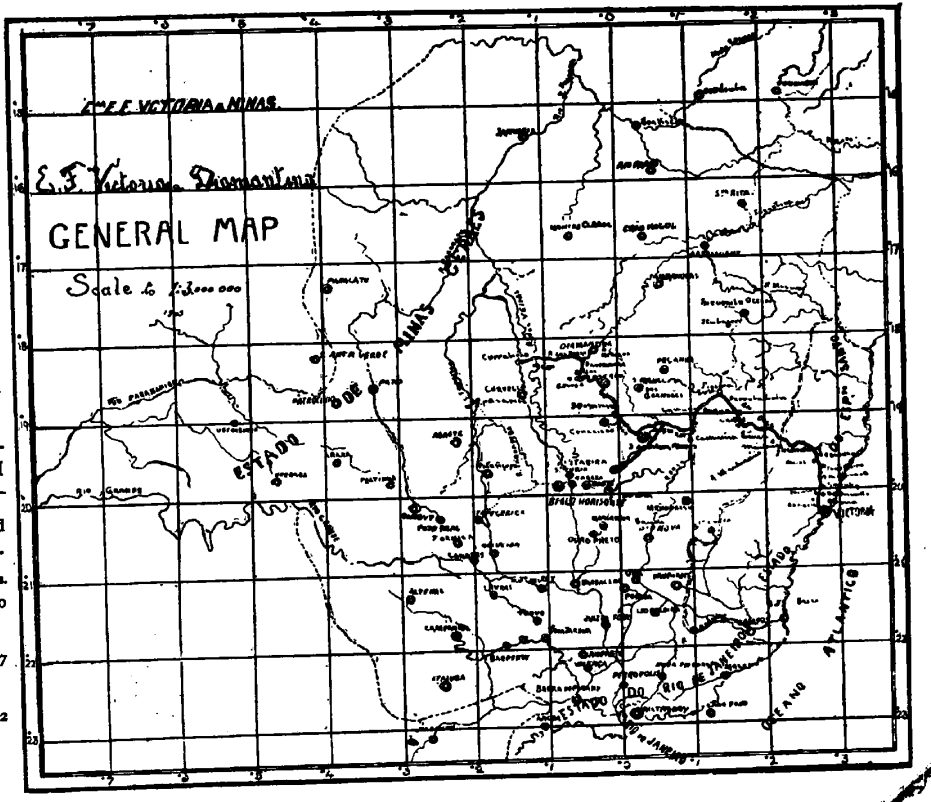
In traffic

In construction

Under survey

Other lines under survey and in studies.....

	kilometres.
Victoria-Derrubadinha	345,000
Derrubadinha-Barra de Sânto Antonio	80,597
Barra de S. Antonio-Itabira	82,502



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THE EQUITATIVA MUTUAL LIFE INSURANCE COY.

(Terrestrial and Maritime).

Business realized, over 300,000,000$000

Policies paid out, over 14,000,000$000.

Guarantee and Reserve Funds, over 15,000,000$000.

Agents in every State of the Republic and in Europe.



Edifice the Coy.'s Property.

Policies drawn (in money) every 3 months.

Drawings take place on the 15th of January, April, July, and October every year.

Ask for a Prospectus.

THE LAST WORD IN LIFE ASSURANCE.

Exclusive Invention of the Coy.

125 AVENIDA RIO BRANCO 125
Rio de Janeiro,
BRAZIL.

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FEDERAL CAPITAL LOTTERIES.

Brazilian National Lotteries Co.

PUBLIC DRAWINGS

under the fiscalisation of the Federal Government at 2.30 p.m. (Saturdays at 3 p.m.) at

No. 45 Rua Visconde de Itaborahy, Rio de Janeiro.

Prizes of 16,000$000; 20,000$000, 25,000$000 and 30,000$000; and on Saturdays 50,000$000 100,000$000 and 200,000$000.

GREAT CHRISTMAS LOTTERY, drawn for on December 21st.

Prize 500,000$000.

Requests for tickets for the interior should be accompanied by 500 reis for postage and registration.

General Agents:

NAZARETH & CO.,

94 Rua do Ouvidor, Rio de Janeiro.

CAIXA 817 (P.O. Box). Telephone: LUSVEL.

U

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Companhia Mechanica and Importadora de S. Paulo.

PAID-UP CAPITAL - - -	£333,333	0	0.
RESERVE FUND - - -	186,666	0	0.
OUTSTANDING PROFITS -	120,000	0	0.

Head Office:

36 Rua 15 de Novembro, S. Paulo, Brazil.

London Buying Office:

Broad Street House, New Broad Street, E.C.

Rio de Janeiro Office: 117 Avenida Rio Branco.

Santos Office: 86 Rua 15 de Novembro.

Foundry and Depot:

Rua Monsenhor Andrade-Braz, S. Paulo.

Telegraphic Addresses:

MECHANICA, S. PAULO. JAVASEO, RIO.
" SANTOS. BLADESMITH, LONDON.

Sanitary Material Manufactory: AGUA BRANCA (S. PAULO).

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Also Steam and Foundry Coal, Coke, Pig Iron, Bar Iron, Sheet and other Iron, Black and Galvanized Tubes, Cement, Zinc Roofing, Plain and Barbed Wire, Bricks, Fireclay, etc., etc.

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BRITISH MANUFACTURERS ASSOCIATION, Ltd.,

RIO DE JANEIRO.

65 Rua 1º Março 65.

P.O. Box 1016, *Cable Address:* "CROSSBAR."

Codes used: Bentley's and A B C (5th Edition).

REPRESENTATIVES OF—

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The Midland Railway Carriage & Wagon Co., Ltd., Birmingham.
Joseph Booth & Bros., Ltd., of Leeds.
Verity's Ltd., London.
Callender Cable Co., Ltd.
Fleming, Birkby & Goodall, Ltd., Halifax.
Thos. & Wm. Smith, Ltd., Newcastle-on-Tyne.
Hawkins & Tipson, London.
Beldam Packing & Rubber Co., London.
Welin Davit Engineering Co., Ltd.
Llewellyn & Ryland, Ltd., Birmingham.
Jas. Arnott & Sons, Ltd., Newcastle-on-Tyne.

Newcastle Office: **Milburn House.**

Buenos Aires Branch: **Talcahuano 253.**

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F. H. WALTER & Coy.

RIO DE JANEIRO.

Rua da Quitanda No. 141. *P.O. Box* 7.

Cable Address :—"SCIPIO."

Codes used :—A1, Lieber's, A B C (5th Edition), Bentley's and Western Union.

General Merchants and Commission Agents.

Agents for—

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YARROW & CO., LTD.
WHITEHEAD & CO., LTD.
WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
METROPOLITAN CARRIAGE, WAGON, & FINANCE CO., LTD.
COMMERCIAL UNION ASSURANCE CO., LTD.
J. & E. WALL, LTD.
ETC., ETC.

LONDON HOUSE :—

JACOB WALTER & CO.,
Billiter Square Buildings,
E.C.

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HIME & CO.

Cable Address: "FERRO," Rio de Janeiro.
P.O. Box 593.

Codes used: WESTERN UNION, LIEBER'S STANDARD, BENTLEY'S, A1 (1888 Edition), A B C (4th and 5th Editions).

Central Office and Stores:

52 Rua Theophile Ottoni 52

FACTORIES:

Rolling Mills, Mule and Horse Shoes, Charcoal Box Irons, Lead Pipes, Scales, etc.
Wire Nails, Bolts, Nuts, Rivets, etc.
Wrought and Cast Iron, Tinned and Enamelled Hollow Ware.

Castings of every description.

IMPORTERS of

Iron and Steel, Copper, Yellow Metal and all other Metals; Cement, Hardware of every description; Paints; Oils; Railway Material; Agricultural Implements, etc., etc.

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Agents for Schneider & Cie. (Creusot), and Orenstein & Koppel, Ltd. (Berlin).

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Caixa Postal:
(P.O. Box) 474.

Telegraphic Address:
"LAPORT."

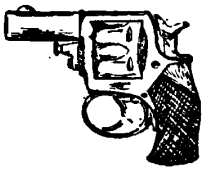
EMILE LAPORT & Co.

(Successors of HENRIQUE LAPORT & Co.)

Importers of Arms and Ammunition and other Articles for Shooting, Fencing, etc., etc.

FOUNDED IN 1825.

Representatives of the French Arms and Cycle Manufactory of St. Etienne.



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Representatives of the Vintage of Bordeaux Wines of J. BIGOURDAN.

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(Corner of Rua dos Ourives),

RIO DE JANEIRO.

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Model Establishment of Aviculture.

Awarded Prizes by the Federal Government.

List of Breeds of Fowls.

LAYERS.

COCHIN CHINAS (White, Black, Yellow, Speckled). BRAHMAS (Light). PLYMOUTH ROCK (Yellow, White, and Speckled). DORKINGS (White, Black, Silvered). ORPINGTONS (White, Black, Blue, Yellow, Jubilee). WYANDOTTES (White, Black, Yellow, Silver, Speckled, Blue Colombian). RHODE ISLAND RED. FAVEROLLE. LANGSHANS. COUCOU DE MALINE. MODERN LANGSHANS. LEGHORNS (White, Golden) HAMBURGS (Gold and Silver). MINORCAS (Black). ANDALUSIANS (Blue). BRESSE (White).

GAME COCKS.

INDIAN. MALAY. OLD ENGLISH GAME. PHŒNIX. MODERN GAME.

ORNAMENTAL FOWL.

PADOUES, crested (Yellow, Silver, Gold, and Black—white crested). HOUDANS. AMERICAN TURKEYS. PHEASANTS. PEKINESE DUCKS.

Price of Eggs, 15$000 a dozen. 2,000 Birds always in stock.
Pairs of Chickens, 60$ to 90$. Adults, 120$ to 150$.
Pairs of Prize-winners at European Shows, from 200$.

Address : 55, LADEIRA DO ASCURRA. Telephone— 5418, Rio de Janeiro.

"Cruzeiro do Sul."

LIFE, ACCIDENT, AND FIRE INSURANCE CO.

(Terrestrial and Maritime).

More than 15,000,000$000 worth of business done.

Guarantee Deposit in Brazilian Treasury, 300,000$000.

THE LOWEST TARIFF OF ANY COMPANY.

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(Corner of Rua da Alfandega),

RIO DE JANEIRO, BRAZIL.

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(Formerly CASA MOREIRA)

Jeweller and Watchmaker,

101-103, RUA DA OUVIDOR,

RIO DE JANEIRO.

Telegraphic Address: "Agemo, Rio." *Telephone, 2567.*

Established 1875.

Trades in all sorts of Precious Stones and Jewellery, Watches, Silverware and Objects of Art.

Well-equipped Workshops for manufacturing Jewellery in perfection.

Also a Foundry for melting Gold and Platinum.

Sells and exports rough and cut diamonds or any other kind of precious stones.

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NEW YORK,

U.S.A.

ARBUCKLE & CO.

RIO DE JANEIRO

SANTOS—VICTORIA

BRAZIL.

Coffee Importers and Exporters

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Telegraphic Address: "SALDOSE, RIO DE JANEIRO."

Telephones:
Gerencia (Manager) 1159.
Office . . . . . 1590.
Warehouse . . . 3558.

Codes used:
A B C 5th Edition
Western Union.

Electrical Installations for Power and Lighting, Electric Bells, Telephones, Telegraphs, Artistic Fittings, Mechanical Workshops.

DODSWORTH & CO.

Civil, Hydraulic, Mechanical and Electrical Engineers,

CONTRACTORS,

83-85, Avenida Rio Branco, RIO DE JANEIRO.

BUYING HOUSE:

141 Rue Lafayette 141, PARIS.

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TRAJANO DE MEDEIROS & CO.,

ENGINEERS,

Manufacturers of Rolling Stock
for Railways and Tramways.

Well installed factory for every kind of Iron or Timber Work.

Office : 76, RUA DE S. JOSÉ, 76,
RIO DE JANEIRO,
BRAZIL.

Italian Warehousemen and Corn Merchants.

TEIXEIRA, BORGES & CO.,

Commission Agents in Coffee
and other Brazilian Produce.

P.O. Box, 294. *Telegraphic Address :* "ARIEXIET."
Telephone 132.

110, RUA DO ROSARIO, 112,
(Formerly 66-68)
RIO DE JANEIRO.

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THE LIDGERWOOD MANUFACTURING Coy., Ltd.

Importers and Manufacturers of

Agricultural Machinery, Turbines and Water Wheels.

Fixed, Semi-fixed and Locomotive Engines, Boilers of every description, including Vertical, Multitubular, etc., for Agriculture, Factories and Marine use.

Aerial Transporters operated by Steam or Electricity. Electric, Steam and Hand Cranes for Large or Small Works.

Steel Wire Cables, Rubber, Balata and Single and Double Leather Belts.

Complete Installations of Machinery for Coffee and Rice Cleaning and Preparation, as well as every other description of Machinery and Accessories for Power Transmission.

A large stock of Galvanized Tubes for water, also Red and Black Tubing for Steam, etc. Vertical Saws, Sugar Mills, Stills, Hydraulic, Electric and Steam Power Presses, Pneumatic Tools, Rock Drills, Pumps, Meal and Salt Mills, Special Hose Pipes for compressed air, and every description of Crushing Machinery.

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39 AVENIDA RIO BRANCO 39

(P.O. Box 171). **RIO DE JANEIRO, BRAZIL.**

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The ALLIANÇA Spinning and Weaving Co.

TELEGRAPHIC ADDRESS: "SARPEDON."
P.O. Box 1094.

MILLS:

471 Rua das Laranjeiras No. 471

Telephone 390.

WAREHOUSE AND OFFICE:

Rua de S. Pedro No. 44.

Telephone 368.

RIO DE JANEIRO, BRAZIL.

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Patent Office.
Telephone 3311.

P.O. Box 314.
Telegrams : BUSCO.

BUSCHMANN & CO.

Procure in Brazil or Abroad

Patents of Inventions,

Registration of Trade and Commercial Marks,

Literary Copyright.

Engineering Plans and Legal Business undertaken.

Sworn Public Translations.

Rua General Camara No. 34,

RIO DE JANEIRO,

BRAZIL.

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The . . .

EXTRA SANTA ALDA COFFEE

owes its exceptional qualities to the fact that it is kept in its husks to mature for five years in perfectly airy and well-ventilated stores, being, just previous to exportation, cleaned and prepared by the most perfect machines, separating the beans into exactly equal sizes, etc.

To obtain the best results with this coffee, it should be roasted over a slow bright fire until it is of a clear chestnut colour.

Being old coffee, it only loses in flavour by being roasted too fast, or at too high a temperature.

After grinding it should be used in the proportion of one part coffee to two and a half parts water.

All Orders should be sent to

Snr's. Meirelles Zamith e Cia.,

71, Rua 1º de Março, 71,

RIO DE JANEIRO,

BRAZIL.

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