

undertakings, was born at Baerton, near Chester, November 7, 1805. He was the son of a landed proprietor, of ancient family, and received an ordinary commercial education at a Chester school. He began his professional career at the age of sixteen as apprentice to Mr Lawton, a surveyor, and on the completion of his term became the partner of his master. Soon after his marriage his master died, and he assumed the sole management of the business. In the local surveys to which he devoted his attention during his early years he acquired the knowledge and practical experience which were the necessary foundation of his great reputation. His first engagement as railway contractor was entered upon in 1835, when, on the invitation of the distinguished engineer Joseph Locke, he undertook the execution of a portion of the Grand Junction Railway. Soon after Mr Locke entrusted him with the completion of the London and Southampton Railway, a task which involved contracts to the amount of £4,000,000 sterling and the employment of a body of 3000 men. At the same time he was engaged on portions of several other lines in the north of England and in Scotland. In conjunction with his partner, Mr W. Mackenzie, Brassey undertook, in 1840, the construction of the railway from Paris to Rouen, of which Mr Locke was engineer. He subsequently carried out the extension of the same line. A few years later he was engaged with his partner on five other French lines, and on his own account on the same number of lines in England, Wales, and Scotland. "At this time," says *The Builder*, "the industrial army set in motion and controlled by Mr Brassey amounted to 75,000 men, and his weekly payments must have distributed, as the price of labour, from £15,000 to £20,000 every Saturday. The capital involved in these various contracts amounted to some £36,000,000 sterling." But his energy and capacity were equal to still larger tasks. He undertook in 1851 other works in England and in Scotland; and in the following year he engaged in the construction of railways in Holland, Prussia, Spain, and Italy. One of his vastest undertakings was the Grand Trunk Railway of Canada, 1100 miles in length, with its astonishing bridge over the River St Lawrence. In this work he was associated with Peto and Betts. In the following years divisions of his industrial army were found in almost every country in Europe, in India, in Australia, and in South America. It must be remembered that, besides actual railway works, he originated and maintained a great number of subordinate assistant establishments, coal and iron-works, dockyards, &c., the direction of which alone would be sufficient to strain the energies of a common mind. His profits were, of course, enormous, but prosperity did not intoxicate him; and when heavy losses came, as sometimes they did, he took them bravely and quietly. Among the greatest of his pecuniary disasters were those caused by the fall of the great Barentin viaduct on the Rouen and Havre railway, and by the failure of Peto and Betts. Brassey was one of the first to aim at improving the relations between engineers and contractors, by setting himself against the corrupt practices which were common. He resolutely resisted the "scampering" of work and the bribery of inspectors, and effected what he called the "smothering of the engineer" by destroying the power of the inspectors and preventing all just grounds of dissatisfaction. Large hearted and generous to a rare degree, modest and simple in his taste and manners, he was conscious of his power as a leader in his calling, and knew how to use it wisely and for noble ends. Honours came to him unsought. The cross of the Legion of Honour was conferred on him. From Victor Emmanuel he received the cross of the Order of St Maurice and St Lazarus; and from the emperor of Austria the decoration of the Iron Crown, which it is said had not before been given to a foreigner. He died at St

Leonards at the age of 65, December 8, 1870. His life and labours are commemorated in a small volume published by Sir Arthur Helps in 1872.

BRAUNSBURG, a town of Prussia, capital of a circle in the government of Königsberg, on the Passaye, between three or four miles from its mouth in the Frische Haff. It is the seat of the Roman Catholic bishop of Ermeland, and possesses numerous Roman Catholic institutions. Of these the most important are the Lyceum Hosianum, founded in 1564 by the Cardinal Bishop Hosius, and in 1818 raised to the rank of a faculty of theology, and the deaf and dumb asylum which was established in 1811. There is also a school for the education of schoolmasters. Brewing, tanning, and weaving are the most important industries of the town, which also carries on a certain amount of trade in corn, ship timber, and yarn. The river is navigable for small vessels. Braunsberg was founded by the Teutonic knights in the middle of the 13th century. Destroyed by the Prussians in 1262 it was restored in 1279, and admitted to the Hanseatic League in 1284. After numerous vicissitudes it fell into the hands of the Poles in 1520, and in 1626 it was captured by Gustavus Adolphus. The Swedes kept possession till 1632. Population in 1871, 10,471.

BRAY, a seaport town and fashionable watering-place of Ireland, 12 miles S.S.E. of Dublin on the railway to Wexford. It is situated on both sides of the River Bray, which separates the two counties of Wicklow and Dublin, the portion in the latter county being known as Little Bray. The town is neatly built, and has a new parish church, a large Roman Catholic chapel, an old castle, a hospital, a court-house, several hotels, and Turkish baths. An esplanade runs along the shore for about a mile. The harbour admits small vessels only, and the trade is of little importance. There is a large brewery, which has been in existence for a considerable time. In the 12th century Bray was bestowed by Strongbow on Walter de Reddesford, who took the title of Baron of Bray, and built a castle in the town. It has since passed into the hands of various families. Its progress during the present century may be estimated by the gradual increase of the population—1841, 3185; 1851, 3156; 1861, 5363; 1871, 6077.

BRAY, SIR REGINALD, architect, was the second son of Sir Richard Bray, one of the privy council of Henry VI. Having been instrumental in the advancement of Henry VII to the throne of England, he was greatly in favour with that prince, who bestowed upon him honours and wealth. His taste and skill in architecture are attested by those two exquisite structures, Henry VII's chapel at Westminster and St George's chapel at Windsor. He directed the building of the former, and the finishing and decoration of the latter, to which, moreover, he was a liberal contributor. He died in 1503, and was interred in St George's chapel.

BRAY, DR THOMAS (1656–1730), was born at Marton, in Shropshire, and educated at Oxford. After leaving the university he was appointed vicar of Over-Whitacre, and rector of Sheldon. Bishop Compton sent him as his commissary to settle the affairs of the infant church of Maryland. He took a great interest in colonial missions, and busied himself in raising sums for purchasing small libraries for the use of missionaries; and to promote this design, he published his *Bibliotheca Parochialis*, and a discourse on *Apostolical Charity*. He endeavoured to establish a fund for the extension of the Christian faith, especially among the American Indians, and it is to his exertions that the Society for the Propagation of the Gospel owes its existence. He was the author of *Catechetical Lectures, Martyrology, or Papal Usurpation, Directorium Missionarium*, and other works.

B R A Z I L

IN presenting an account of this extensive and important country, the only American monarchy we shall give, first, a condensed view of its physical geography, meteorology, and natural products; secondly, a brief historical sketch of the progressive discovery of its coasts and interior, of its gradual settlement, and of the auspices under which its social institutions have developed themselves; and thirdly, an account of its existing political and social condition.

Brazil is bounded on the N. by Columbia or New Granada, Venezuela, and the Guianas, British, French, and Dutch; on the E. by the Atlantic; on the S. by the republics of Uruguay and the Argentine Confederation; and on the W. by Paraguay, Bolivia, Peru, and Ecuador. It extends from about 4° N. lat. to 33° 41' S. lat., and from 35° to 70° W. long. Its greatest length is about 2600 British miles, its greatest breadth about 2500; and it has a seaboard of about 4000 miles.

The original line of demarcation between the Portuguese and Spanish possessions was fixed by two bulls of Pope Alexander VI., the one of the 2d, the other of the 3d of May 1493. The kings of Castile and Portugal afterwards concluded the treaty of Torzillas, which was approved by the Pope in 1529. The reunion of the two crowns in 1580 suspended all discussions about the boundaries. They, however, recommenced after the revolution and independence of Portugal. The treaty of Utrecht in 1777 regulated many points, but the treaties always referred to rivers, mountains, and other positions passing through deserts, the names of which were not well established. For sometime past the Government of Brazil has taken great pains to establish amicably with the neighbouring states the boundary lines of the empire. In 1851 these were established with the republic of Uruguay, in 1857 with the Argentine Republic, in 1858 with Peru, in 1859 with Venezuela, in 1867 with Bolivia, and in 1872 with Paraguay; the lines determined on have in some cases been already surveyed and marked out on the actual frontier, while at present mixed commissions from Brazil and each neighbouring country are employed in tracing out the other lines agreed upon.

With Uruguay the frontier has been marked out along a line passing from the coast in 33° 41' S. lat., through the southern portion of Lake Mirim and along the River Jaguarão, which falls into it, to its most southerly source stream, thence by a line crossing the head of the Rio Negro to the dividing ridge called the Cuchilla Sta. Anna, and afterwards down the stream of the Cuarein or Quarahim to the River Uruguay.

The Uruguay River, from the mouth of the Quarahim upwards to the confluence of the Pepiry on its right bank in 27° 10' lat. divides Brazil from the Argentine Republic, the remainder of the mutual frontier of these countries being formed by the Pepiry to its source and the São Antonio from its rise to its union with the Y-Guasú or Curityba, which river marks the boundary to the Paraná.

Between Paraguay and Brazil the frontier runs from the mouth of the Y-Guasú up the Alto Paraná to the great fall of Guayrá, called Sete Quedas by the Brazilians, and from that westward along the water-parting of the Cordillera of Maracajú, southward of the basin of the Igatimi, to the heights of Amambahy, and along these to the source of the Rio Apa-Estrella, following it down hence to the Paraguay.

With Bolivia the boundary lies along the Rio Paraguay from the mouth of the Apa in 22°, upwards to 20° 11', where the Bahia Negra joins it; along the Bahia Negra, and thence in a line to the lake of Cáceres, cutting through the

midst of this lagoon, and passing onward to Lakes Mandloré, Gaiba, and Uberaba, and from the last to the south end of the ridge called Corixa Grande; from this in a direct line to Morro de Buenavista (Boavista), and to the sources of the Rio Verde; along the middle of that stream to its mouth in the Guapore, and along that river and the Mamore to the Beni, where the Madeira begins in 10° 20' S.; a direct line thence to the source of the Yavari River (found by Chandless in 1867 to be a little south of 7° S. lat.), forms the limit of Brazil with Northern Bolivia and Central Peru. The Yavari continues the boundary between Brazil and Peru down its channel to the confluence with the Amazon at Tabatinga, and the limits commission has been at work during 1874 and 1875 in determining the position of this line. Farther on, the boundary of Brazil with Northern Peru has been described as a line passing northward from Tabatinga towards the mouth of the Rio Apaporis in the River Japura, the frontier with Peru terminating on this line where it intersects the Rio Putumayo, and that with Ecuador beginning there. From the mouth of the Apaporis the continuation of the limit with Columbia or New Granada to that with Venezuela follows a line drawn along the water-parting of the range called the Collina do Guacia or Serra Aracuara, which divides the streams flowing to the Guainia, or Rio Negro, above the Casiquiare, from those which join it below the anastomosis of that natural canal. This line meets the Rio Negro about 20 miles below the separation of the Casiquiare. From the Sierra Cucuby, or Pão d'Azucar, on the opposite or left bank of the Rio Negro, the limit continues eastward over the level ground to the middle of the natural canal called the Maturacá, which in times of flood unites the Cababoris tributary of the Rio Negro with the Barria, a sub-tributary of the Casiquiare channel. Hence the limit is drawn from the Maturacá to the hill of Cupi, the first of the long range of Serras which divide the waters flowing to the Amazon from those tributary to the Orinoco, and those passing through British, Dutch, and French Guiana to the Atlantic. This boundary follows the curves of the water-parting eastward along the Serras named Guahy and Ucuruciro; northward on those of Tapirapécó and Parima; eastward again along the Merevary and Pacaraima heights; southward between the rivers Tacutu and Rupununy, and again generally eastward along the Serras of Acarahy and Tucumuraque to the source of the River Oyapok. This river, from its source to the Atlantic in 4° 22' N. lat., is the present eastward limit of French Guiana. Several islets in the Atlantic belong to Brazil; among them that of Fernando Noronha, 250 miles from Cape S. Roque, high, and having about 6 square miles of area, is important as a penal settlement of the empire.

The immense territory comprised within the line just described and the Atlantic is upwards of 3,288,000 English square miles in area, or not far short of the extent of Europe.

The great river of the lowlands of Brazil, the Amazon, has been called the Mediterranean of South America, and is the largest stream of the globe in every respect, affording, with its great tributaries, free navigation over not less than 30,000 miles within Brazilian territory (see AMAZON).

After the Amazon the Tocantins is the great river of the northern watershed of Brazil. Rising in the Serra das Vertentes in Central Brazil, the Araguaya, its longer head stream, and the Tocantins flow northward for 900 miles, separated by the Cordillera Grande of Goyaz, and unite at about 300 miles from their wide estuary, called the Rio Pará, formed between the island of Maraio and the main-

land. Midway in its course the Araguaya forms the remarkable island called the Ilha Bananal or Sants Anna, which is encompassed by branches of the river 220 miles in length, and contains a central lake of 80 miles in extent. The Araguaya is navigable, but the upper Tocantins is barred by falls, and there is a rapid at some distance below their confluence round which a road has been recently made to unite the navigable portions.

The Turvassú, Maranhão, and Parahyba are the largest of the other rivers of the north-eastern slope. The last named flows for the greater part of its course of 700 miles through level swampy lands, receiving many tributaries from eastward, but few from the west; it is without obstructions, and navigable for a great distance.

The São Francisco occupies a wide enclosed basin of the eastern highland. Rising in the Serra do Espinhaço and the Vertentes of Minas Geraes, it flows north and eastward in a course of 1800 miles. But for a few obstacles the greater part of the river would be navigable, since it has great volume. The chief barrier is in the Falls of Paulo Affonso, about 168 miles from the sea, where the river is contracted between rocks, and plunges in a series of cascades into a narrow rock-impeded channel. Immediately below this, however, it spreads out as a broad calm river, which is regularly navigated by steamers from the Porto das Piranhas to the sea.

Among the rivers of the coast slope south of the São Francisco the chief are the Paraguassú, the largest stream of the province of Bahia, obstructed by many falls; the Rio de Contas or Jussiapé, a considerable river in the south of the province, also innavigable; the Belmonte or Jequitinhonha from the high mountains of Minas Geraes, interrupted by many rapids and cascades, and forming a series of magnificent falls over the eastern edge of the plateau, in which it descends at least 300 feet; the Rio Doce or Chopotó in the province of Espiritu Santo, affording a considerable length of navigation, with portages at its reefs; and the Parahyba do Sul, flowing between the Serra da Mantiqueira and the coast range of Rio de Janeiro, navigated regularly by steamers from its mouth for 60 miles to São Fidelio. Though these coast streams are among the little rivers of Brazil, every one of them is two or three times the length of the Thames.

The great rivers of the southern watershed are the Paraná and Paraguay. The former has its rise in a broad basin, extending for a width of nearly 700 miles across southern Brazil, enclosed by the coast range of the south, the Serra da Mantiqueira, the Vertentes, and its southward interior branch running down into Paraguay. The main and longest head stream of the Paraná is called the Rio Grande or Pará, which rises in the Serra da Mantiqueira, one of its sources being on the slope of Itatiaiossú, the highest point of the whole empire, 110 miles north-west of Rio de Janeiro. The Parahyba joins the Grande on the right from the Pyrenees range in the north, and further on the Paraná-Panama, with its tributary the Tibagy, comes in on the left bank from the inner slopes of the south coast range; the Rio Pardo, Ivinhima, and Iगतimi are smaller tributaries on the left bank from the interior ranges. After the confluence of the Grande and Parahyba the Paraná takes its proper name and flows southward out of Brazil in forming the limit between the empire and the republic of Paraguay. The fall of Urubupunga, 40 miles below the confluence of the Grande and Parahyba, is an obstacle to the navigation of the upper river; but thence to the great "salto" of Guayrá on the frontier of Paraguay, in 24° S., it is freely navigable. The fall of Guayrá, Setequedas, or Seven Falls, is the greatest cataract of Brazil. Immediately above it and below the large island which the Paraná forms between 23° and 24° the river is about 2½

miles in width; its channel is contracted first in passing through a diagonal line of seven islands which stretches across it, and then between the walls of a rocky gorge only 65 yards in breadth, into which the whole mass of water plunges with terrific fury, descending over a slope inclined about 50°, and for a perpendicular height of about 60 feet. The roaring of the cataract may be heard for many leagues round. Below the fall, the river rushes down in a narrow bed with high cliff-like banks, only becoming less rapid and navigable with difficulty as it leaves the Brazilian frontier at the confluence of the Y-Guassú. This tributary, also named the Curityba, has a westward course to the Paraná, from many heads in the inner side of the south coast range, and like all the tributaries of the Paraná between it and the great fall, descends into the deep gorge of the main river by a fine waterfall of 66 feet.

The River Paraguay, the upper basin of which lies in a much lower region of the continent, in the south-western interior of Brazil, is far superior to the Paraná in respect of its navigable qualities, and in the grand natural outlet it affords to the southward. Its sources are in several small lakes on the southern slope of the Serra das Vertentes, between 13° and 14° S., immediately opposite the head streams of the Tapajos, and it flows thence southward, fed by many lateral streams from the range. Its important tributary the Cuyabá, or São Lourenço, rises not far east of the Paraguay, but does not join it until both have passed about 400 miles south. The Taquari, the Mondego, and the Apa, the boundary river of Brazil and Paraguay, are important tributaries from the range which divides the basins of the Paraguay and Paraná; and from the hills of eastern Bolivia the San Juan and Bahia Negra join the Paraguay on the right bank. Throughout its course the Paraguay affords uninterrupted navigation, and is regularly traversed by large Brazilian steamers from the Rio de la Plata to Curumbá, in the province of Matto Grosso, a distance of about 1000 miles in a direct line from Buenos Ayres. Thence smaller vessels carry on a regular traffic for 300 miles further, by the São Lourenço tributary, to Cuyabá in the very heart of inner Brazil. An immense tract of the low country on each side of the upper Paraguay, called the Xarayes, between 17° and 19° lat., is subject to inundation in times of flood.

While the Amazon begins to rise in February or March, and is at its highest flood in June, the Paraná is irregular in its risings, but has its greatest volume in December, and the Paraguay again, regularly swelling and falling, is highest in June.

The surface of Brazil in respect to its elevation is divided into the higher region of plateaus, ridges, and broad open valleys, occupying the whole of the country south of the parallel of Cape S. Roque, and the vast lowland plain of the Amazon, extending inland to the base of the Andes of Peru, Ecuador, and Columbia, and rising again in the extreme north to the ranges which form the boundary with Venezuela and Guiana.

The nucleus of the mountains and plateaus of southern Brazil is not centrally placed, but is formed by the chains named the Serra da Mantiqueira and Serra do Espinhaço, which extend between 18° and 23° south lat., at a varying distance of from 100 to 200 miles from the south-east coast. These are the highest and most important mountains of Brazil, from which the other ranges and plateaus radiate outwards north, west, and south; one of the summits of the Serra da Mantiqueira is the Pico do Itatiaiossú, which is almost certainly the culminating point of Brazil, but the elevation of its peak has been very variously estimated and measured at from 6250 to 8900 and 10,300 feet. Itacolumi, near the town of Ouro Preto, reaching about 5700 feet, and Itambe in the north of the Serra do Espinhaço, 4300

feet, are the other high points of these ranges. The southern coastal range, or the Serra do Mar, begins immediately north of the Bay of Rio de Janeiro, where the Orãos or Organ Mountains, with sharp peaks, rise to perhaps 7500 feet, and follows the line of the shore southward at varying distances from it to near the 30th parallel. The line of the Serra do Espinhaço is prolonged northward by another maritime chain or plateau edge, more distant from the ocean, forming the eastern barrier of the great valley of the Rio São Francisco, and terminating where the river turns eastward to reach the sea.

A range of high plateaus, probably from 3000 to 4000 feet in general elevation, and named collectively the Serra das Vertentes, or the range of the watersheds, but bearing a multitude of different names in its local sections and branches, extends westward from the Serra do Espinhaço, nearly at right angles to its direction, traversing the entire country in curving lines inland for upwards of 2000 miles to where the plateaus of Brazil terminate on the great bend, and the cataracts, of the Rio Madeira. This very extensive range divides the waters flowing northward to the lower Amazon and to the Atlantic shores of the north-east, from those tributary to the great basins of the Paraguay and Paraná in the south. Its highest known portion is that called the Montes Pyreneos, between the heads of the Tocantins and Parahyba in the province of Goyaz, one of the summits of which has been found to be perhaps 9600 feet above the sea (H. R. Dos Genettes, 1868). Long branches ramify northward and southward from the Vertentes; the principal of those trending northward is that which, leaving the main line of division at the Pyreneos, curves round the basin of the São Francisco, terminating in many minor branches on the coast on each side of Cape S. Roque. A lateral branch from this divides the streams of the Tocantins and of the northern Parahyba. Farther west the Cordillera Grande of Goyaz runs north from the Vertentes, separating the Araguaya and Tocantins, and still more inland minor ranges mark out the basins of the Xingu and Tapajos. A southward arm of the Vertentes, or rather a series of plateaus extending from it, divide the Paraguay from the Alto Paraná, and run into Paraguay as the heights of Amambahy, which have an elevation of little over 2000 feet above the sea where they cross the frontier. These are the main lines of height, but over the whole of the plateau of Southern Brazil a great number of lesser ridges run out from these between each of the tributary river basins.

The extremely level character of the great northern lowlands may be judged of by this, that the banks of the Amazon where it enters Brazil at Tabatinga, more than 1500 miles in a direct line from the sea, are not more than 250 feet above the ocean level, and a continuous navigation is afforded by its tributary the Rio Negro, the Casiquiare, and the Orinoco, to the northern coast of the continent.

The great constituent of all the mountain ranges of the southern highlands of Brazil appears to be gneiss, varying from schistose to coarse-grained and porphyritic, or homogeneous and granitic; and though much of it if seen in a small specimen would be and has been described as granite, the larger masses are always stratified. These rocks are of great thickness in the province of Rio, and the Serra do Mar and Serra da Mantiqueira are wholly composed of them; not only does gneiss form the great coast belt from Maranhão to the mouth of the Rio de la Plata, but it sends off a band into Minas Geraes and Goyaz, where the Pyreneos range and a great part of the mountain region are composed of it. The same rock shows itself in the cataracts of the Tocantins, Xingu, Tapajos, and Madeira, as well as in the Parima Mountains north of the Amazon basin, showing that the high land of Brazil is probably everywhere underlaid by it. Clay-slates

with auriferous veins occur in Minas Geraes and in the vicinity of Cuyabá in Matto Grosso, everywhere so metamorphosed that all trace of fossils has been obliterated. True Carboniferous strata occur in Brazil, the coal basins lying just south of the tropic, and being a coast-formation not known northward of Rio. Carboniferous rocks also occur on the Guapore, a tributary of the Madeira on the Bolivian frontier. Red sandstones occupy a large area in the province of Serigpe, underlying the Cretaceous formation. The Jurassic rocks, which extend on the Andes from Chili to Peru, appear to be altogether wanting in Brazil. Cretaceous rocks very probably underlie the great plain of the Amazon; they do not appear on the coast south of the Abrolhos rocks in 18° S., but they occur at intervals northward, and have been examined on an affluent of the River Purus in the upper basin of the Amazon. These appear to have been deposited at a period when the northern part of Brazil was more depressed, while the southern may have been higher than it is now. Tertiary clays and ferruginous sandstone, in horizontal and undisturbed beds, overlie the Cretaceous rocks unconformably on the coast plains outside the plateaus and in the São Francisco valley; the horizontal deposits of the plateau of São Paulo evidently belong to the same group.

Surface "drift" deposits, ascribed with the greater amount of probability to the agency of glacial ice, though the hypothesis has been much disputed, occur as a great sheet of pebbles and overlying clay, extending over an immense area of the empire,—over the whole of the provinces south of Rio, over Minas Geraes in the north-eastern coast provinces, and in the valley of the Amazon westward to the confines of Peru, and not only on the hills but over the lower "campos." Deposits of immense boulders of trap and gneiss, evidently the moraines of former local glaciers, were first described by Professor Agassiz, who found them at many points along the coast land.

True coral reefs occur at irregular intervals along the northern Brazilian coast from the Abrolhos islets, which rise on the submerged border of the continent from a less depth than 100 feet, as far as the shores of Maranhão. They lie in patches at short distances from the coast, leaving navigable channels between them and the mainland. Another class of reefs, also termed "recifes," but of totally different origin, are the consolidated stone beaches, such as those seen at Porto Seguro, Bahia, and Pernambuco (where the reef forms the breakwater of the harbour); these are of precisely uniform character, and have been described by Professor Hartt as the consolidated cores of an ancient beach which has been separated from the mainland by the encroachment of the sea. (*Geology and Physical Geography of Brazil*, by Ch. Fred. Hartt, 1870.) The limestones of the upper São Francisco basin have celebrated bone caverns, which have been made a special object of study by the Danish naturalist Lund. In some of these the remains of extinct animals of high antiquity have been found, such as those of the mastodon, glyptodon, mylodon, toxodon, and megatherium; and with these the stone implements and remains of man, so buried with the bones of the extinct fauna as to leave no doubt that man was contemporaneous with them.

No volcanic appearances have been observed in Brazil. Warm springs occur in several provinces; those of Itapicuri in the province of Bahia have temperatures varying from 88° to 106° Fahr. and are saline; the hot springs of pure water in Santa Catharina range from 96° to 113° Fahr., and there are a great number of alkaline springs about the district of Santa Cruz, in the province of Goyaz, ranging up to 119° in temperature. Near the village of Caldas in Minas Geraes the hot wells are very veluminous, and their somewhat sulphurous waters have temperatures between