19. *Spirifera minima*, Moore. Perfect enlarged exterior.
20. ——— ———. Exterior of the ventral valve.
21. *Terebratula* (?) *minuta*, Moore. Perfect shell, enlarged exterior.
22. ——— ———. Interior of dorsal valve.
23. *Rhynchonella* (?) *coronata*, Moore. Enlarged dorsal aspect.
24. ——— ———. Interior, showing ventral aspect.
25. ——— ———. Exterior of ventral valve.

FOREIGN CORRESPONDENCE.

Lunar relations of Earthquakes.

M. A. Perrey, in a paper read before the French Academy on the frequency of earthquakes during the latter half of the 18th century—relatively to the age of the moon, and of the frequency of the phenomenon at the time of the moon crossing the meridian—furnishes a series of facts worthy of the highest consideration. Referring to his previous labours on this subject, he points out that, in the present paper, in contradistinction to his former method, if an earthquake has taken place on the same lunar day, in different parts of the earth without the intermediate district being affected, that day is entered as many times as earthquakes have taken place. In this way he has found that from 1801 to 1850 the earth has trembled three thousand six hundred and fifty-five days, with a marked preponderance at the syzygies.

If the mean lunation of 29·53 days be divided into eight equal parts the earthquakes will not be found to distribute themselves equally, but will show a preponderence at the beginning, the middle, and the end—the curves representing which will take a wave-like form, with two maxima and two minima.

Uniting the numbers of the first and last eighths of the lunar month, the sum will express the monthly frequency at the new moon; the second and third combined give the frequency during the first quarter; the fourth and fifth at the full moon; while the sixth and seventh show the frequency at the last quarter.

Again combining the results for the two syzygies and the two quadratures, we find that from 1751 to 1800

	Shocks of Earthquakes.
At the Syzygies	1901·18
At the Quadratures..................................	1753·82
Difference in favour of Syzygies..............	147·36

After some further references to his preceding memoirs, M. Perrey proceeds—"One is then justified in admitting that earthquakes are more frequent at the syzygies than at the quadratures; the conclusion we have arrived at from our researches of 1853 is now proved to be applicable to a whole century. But this law, true for a century and a half century, will it hold good for a quarter, or say a tenth, of a century?

"I have divided the latter half of the eighteenth century into two portions of twenty-five years each; and calculations similar to the above have led to similar results: so also for ten-yearly periods. I have also divided it into ten periods of five years: the numbers not being great in this case, the irregular and perturbating causes it might be easily imagined would regain their sway, and mask the differential action of a continuous influence. Nevertheless, in eight of these ten periods the preponderence is with the syzygies.

These results, however, of which the concordance is very striking and demonstrative of an influence connected with the movement of the moon in its orbit, are not the only ones to be mentioned. M. Perrey has found that the numbers of times the days of perigee and apogee with the two days preceeding and following have been marked by shocks of earthquake, are as follows:—

	Days of shock.
Perigee	526
Apogee	465
Excess at perigee	60
Or, counting only the day before and after:—	
Perigee	313
Apogee	278
Excess at perigee	35

M. Perrey concludes by referring to journals kept at Monteleone, Messina, Calanzaro, and Scilla, at which places in every instance, the shocks felt with the moon on the meridian exceed those felt at other times.

This paper was followed by one by M. Gentili, "On the cause assigned to Earthquakes, founded on observations made at different times at the summit of the Soufrière, a volcanic mountain in Guadaloup."

Capillary Infiltration of Water in Rock-strata.

This journal was the first to call attention in this country to the important researches of M. Daubreé on the metamorphism and chemical conditions of rocks.

Another contribution to our science, under the title of "Experiments on the possibility of a capillary infiltration through porous materials, in spite of a strong counter-pressure of vapour," has been recently presented to the Académie des Sciences, by this eminent experimentalist.

"Every day," he says, "in the great phenomena which make manifest to us the internal activity of our globe, immense bodies of water, in the form of vapour, are disengaged.

"One naturally asks if the supply of this water is not kept up partially, at least, from the surface, and, if so, by what means?

"It is difficult to imagine this supply produced by a free circulation; for the way open to the descending water would form a means of escape which would naturally offer itself to the ascending vapour. Now the immense pressure of this vapour in the volcanic districts—a pressure great enough to force columns of lava, about three times denser than water, to vast heights above the sea-level—proves that these safety-valves do not exist.

"I have therefore been led to examine whether the water cannot penetrate into these deep and hot reservoirs, not by fissures as previously imagined, but in virtue of the porosity and capillarity of the intervening beds."

M. Daubrée then refers to the experiments carried on by M. Jamin, showing the influence of capillary attraction in changing the conditions of equilibrium between different pressures by means of a column of liquid, and points out that the geological problem requires a variation in the temperature not introduced by M. Jamin,—in fact the liquid in one part of the connecting column must be reduced to a state of vapour, in which, perhaps, it will be governed by different laws.

M. Daubrée then proceeds to describe his apparatus as follows:—

"I have therefore constructed an arrangement, of which the principal end is to join—by means of a partition of porous sandstone of a fine close grain—on one side a closed chamber, in which the pressure of the steam=one seven-eighth atmospheres, and on the other a space in direct communication with the external air, half filled with water, which soon was heated to the boiling point: in the latter chamber—of course, being open to the atmosphere—the ordinary pressure was not exceeded, although the thickness of the sandstone partition was but two centimètres. The result of the experiment proves that the water is not driven back by the counter-pressure of the vapour: the difference of the pressure on both sides of the partition does not prevent the liquid from penetrating from the region comparatively cold to the region comparatively hot, by a kind of capillary attraction; favoured also by the rapid evaporation going on in the latter."

M. Daubrée promises further experiments with a thicker partition, which will enable the vapour in the first chamber to be raised to a higher temperature.

The results he has already arrived at prove that capillary attraction, in addition to weight, can—in spite of very strong interior counter-pressure—force water to penetrate from the superficial and cold regions of the globe into the interior, where, by reason of high the temperature and pressure, it, in the shape of steam, is capable of producing great mechanical and chemical results.

"Do not the foregoing experiments," asks M. Daubrée, "also make us acquainted with the main-spring of volcanic action and of other

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pnenomena generally attributed to the generation of vapour in the interior of the globe, as, for instance, earthquakes, the formation of hot springs, the filling up of metalliferous veins, as also the various cases of the metamorphism of rocks.

"Without excluding the original water, which,element like, is generally supposed to be incorporated with the interior melted masses—do not these experiments show that the infiltrations descending from the surface act in such a manner that the interior regions are continually being replenished and exhausted; the replenishment being effected in a way the most simple, though vastly different from the syphon and ordinary sources of supply.

"Thus a phenomenon, slow, continuous, and regular, becomes the cause of sudden and violent manifestations comparable to explosions and losses of equilibrium."

Note on the New Mineral Fournelite.

M. Ch. Mène, in order to establish the chemical formula of the mineral found by him near Beaujeu (Rhône), has made several analyses of specimens of different densities furnished him by the proprietor of the mines: the results fully confirm those previously arrived at in September last.

The average percentage of the components—leaving the quartz out of the question—is as follows:

Copper	32·0
Lead	12·0
Sulphur	23·0
Iron	3·0
Arsenic	8·0
Antimony	22·0
	100·0

Whence the following symbol is derived:—

$$3Cu^2 S + 3Sb^2 S^2 + Pb S. + Fe. Ar.$$

Chemical Characters of Combustible Minerals.

M. E. Fremy, who for a long time has been carrying on chemical investigations on the tissues of vegetables, has laid before the Academy of Sciences of Paris the results of his recent researches "On the Chemical Character of Combustible Minerals," in which he has also sought to inquire if the substances which compose them present any analogy with those which form the unaltered tissue of plants.

Admitting with other geologists that peat, lignite, coal, and anthracite have been formed under different circumstances, and belong to rocks of very different ages, he has endeavoured to trace in these varieties of combustibles, the degree of alteration of the organic tissue.

The study of the peat has presented really no new fact. Besides the unaltered elementary organs which are met with in such great quantities in the fibrous peat, he has found according to the state of alteration of the combustible, variable proportions of those brown compounds—neutral or acid, azotized or non-azotized—which are designated under the general title of *ulmic compounds.*

The presence of these bodies, which have been already studied by M. Payen, nevertheless goes to establish a very clear distinction between the peats and the unaltered organic tissues. The chemical examination of the lignites offers more interest.

In these researches distinction has been made between the lignites presenting still some woody structure, and those which offer the aspect and compactness of coal. The first constitute the xyloid lignite or fossil wood: the second form the compact or perfect lignite.

In respect to chemical characters, all the varieties of lignite may be placed in one or other of these classes.

Although the xyloid lignite may sometimes have the tenacity and the appearance of ordinary wood, he has recognized that in that combustible the woody tissue has experienced a great modification. It is reducible to a fine powder by trituration; and submitted to the action of a weak solution of potash it yields to that alkali a considerable quantity of ulmic acid.

The two following re-actions tend to establish a well-marked difference between the ordinary wood and xyloid lignite.

When the azotic acid reacts at a high temperature on the wood it dissolves a part only of the fibres and medullary rays, and leaves the cellular matter quite pure, which dissolves without coloration in concentrated sulphuric acid; and possesses all the properties that M. Payen has studied with so much precision.

Under the same circumstances the xyloid lignite is attacked with great energy and transformed into a yellow resin, soluble in alkalis and in an excess of azotic acid.

When wood and xyloid lignite are comparatively submitted to the action of hypochlorites very marked differences between these two substances are likewise established. The hypochlorites exercise upon the wood a reaction, which, perhaps, may be compared to that of the azotic acid; they dissove rapidly a part of the fibres and medullary rays, and leave the cellulose matter in a state of purity.

The xyloid lignite is attacked by the alkaline hypochlorites; is desolved nearly entirely by these reactives; and leaves only imponderable traces of fibre, and colourless medullary rays.

It follows from the preceeding facts, that when the woody tissues have arrived at that state of modification which constitutes the xyloid lignite, still preserving the appearance of wood, they have experienced in their substance a great modification, and contain then direct new principles, characterized by their complete solubility in azotic acid and the hypochlorites

After having determined the chemical characters of xyloid lignite, it was interesting to inquire if the compact lignite—which presented no longer the texture of the woody tissues, which is black and shining like coal, and which often offers such analogies with this latter substance as to put at fault the most experienced engineers—would preserve the chemical character of the xyloid lignite, or would ally itself with the coals.

In a geological point of view this comparative study of the xyloid lignite, compact lignite, and coal appears to possess a great importance. If there really existed a certain affinity between the state of alteration of the combustible minerals, and the age of the rocks containing them, one comprehends it would be of interest to geology to possess a chemical character—independently of those pointed out by M. Cordier—which would permit the exact appreciation of the degree of modification of the organic body, and the determination of the age of a rock by the state of alteration of the combustable mineral found in it.

M. Fremy has applied himself, then, to find a series of chemical reactions acting differently on the combustible minerals, and permitting him to arrange the series of their varieties according to their degrees of alteration, and the chemical characters they would thus present. The reagents he employed were potash, the hypochlorites, sulphuric acid, and nitric acid.

Having pointed out the difference between woody tissue and xyloid lignite, he goes on to show in what this latter differs from compact lignite, which having lost all trace of its original organization is only liable to be mistaken for certain varieties of coal.

The manner of burning, the reaction of the volatile products of combustion upon litmus, and the colour of the ashes form in themselves well-known distinctive characters, which chemical reagents enable us to judge of with the greatest exactness.

When, therefore, a compact lignite is submitted to the action of strong potash the solution sometimes turns brown, and a small quantity of ulmic acid is held in solution; but generally this is not the case, which fact immediately establishes a distinction between compact and xyloid lignite.

M. Fremy is of opinion that the lignites which resists the action of potash are those nearest the coal-measures.

The compact lignites, which in their brilliancy and blackness resemble coal, are entirely dissolved in the alkaline hypochlorites, and are immediately acted upon by nitric acid, producing the yellow resin before mentioned.

These characters, then, render it easy to distinguish between lignite and coal, as this latter mineral is *not* dissolved by the hypochlorites, and is only slowly acted upon by nitric acid. On the former of these tests M. Fremy lays great stress.

Coal and anthracite, although resisting alkaline solutions and hypochlorites, dissolve readily and completely in a mixture of concentrated sulphuric and nitric acids: the liquid becoming of a dark brown colour, and holding in solution an ulmic compound, which is easily deposited by the addition of water.

M. Fremy states, parenthetically, that in connection with this subject he has exposed woody tissue to a temperature of two hundred degrees (Cen.), for several days, and has noticed several modifications successively take place, producing substances quite comparable to those found in the lignites—the first changes resembling the xyloid; the latter the compact lignites—resisting the alkalis, and yielding readily to the hypochlorites.

M. Fremy then sums up the results of his observation as follows:

1. The chemical characters of the combustible minerals subjected to the reagents pointed out are effaced by age; and the organic matter resembles graphite the more as the rock from which it is taken is older. An exception, however, must be made in the altered rocks. This result is entirely in accordance with the observations of the celebrated Regnault upon the subject.

2. The first degree of alteration of woody tissue, represented by peat, is characterized by the presence of ulmic acid, and also woody fibres and the cells of the medullary rays, which can be purified and extracted in great quantity by means of azotic acid and the hypochlorites.

3. The second degree of modification corresponds to fossil wood or xyloid lignite, which is in part soluble like the preceding body in the alkalis; but its alteration is more marked, for it is dissolved almost entirely in nitric acid and the hypochlorites.

4. The third stage of alteration is represented by perfect lignite, which the reagents tell us already partakes of the nature of coal,—in consequence, therefore, the alkaline solutions generally do not act upon it, although it is completely soluble in the hypochlorites and nitric acid.

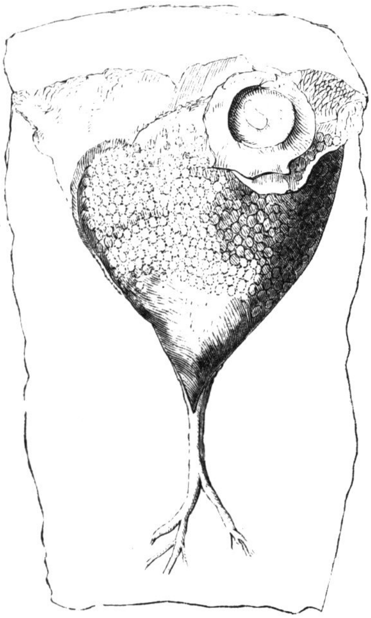
5. The fourth degree of modification corresponds to coal, which is insoluble in alkaline solution and the hypochlorites.

6. The fifth state of alteration is shown by anthracite—which evidently resembles graphite—resisting the reagents which acted upon the preceding combustibles, as we have seen, and being attacked but slowly by nitric acid.

From this it will be seen that the chemical reagents employed by M. Fremy confirm the classification of combustible minerals recognized by geologists.

In concluding M. Fremy expresses an opinion to the effect that the substances which we have been considering are far from being the only modifications which the organic matter undergoes in its changes to the combustible minerals: he thinks that there are intermediate transformations of the organic tissues, which correspond to the differences which are noticeable in the different kinds of coal and lignite.

The question whether the reagents are sensible enough to characterize these varieties in the different kinds of coal, or in the same bed even, M. Fremy proposes to examine in a future communication.



VENTRICULITES IMPRESSUS.

(Toulmin Smith.)

S. J. Mackie Del.

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Palæontological Researches in Greece.

From a communication on the researches in Greece, by M. Albert Gaudry, we extract the following interesting remarks:—

M. Gaudry states that in superintending the excavations which the Academy had placed under his care, he was struck not only with the size of many of the quadrupeds disinterred at Pikerimi, but also with the numbers of the different animals which were found together. There were numerous remains of antilopes. The bones collected by him in 1855 and in 1860 attest the presence of more than a hundred and fifty of these ruminants. It is probable that formerly some of these species lived together in large herds, as in our own time. All the zoologists who have lately given themselves to the study of the antilopes have agreed to divide them into several genera. Mr. Gray, in his catalogue of the Mammals in the British Museum, admits nearly thirty-seven genera derived from the old genus "Antilope." Most of the fossil kinds found in Greece cannot be classed in any one of these divisions; and to conform to the modern nomenclature should be arranged in new groups. Nevertheless, to these groups M. Gaudry only gives the title of sub-genera; for antilopes form a tribe in which, with few exceptions, it is difficult to determine true genera—that is to say, groups which separate themselves one from the other by an *ensemble* of special characters. M. Gaudry exhibited a series of skulls of antilopes which he found at Pikerimi. One of them presenting a strange appearance, its horns being raised upon the front part which forms the protection of the orbits, the region situated behind the horns being very long and narrow, and the occipital crest very straight.

The animal to which such a skull belonged cannot be included in any of the sub-genera of antilopes known at present. M. Gaudry proposes to call it *Palæotragus Rouenii.* After having given the measures of the skull, he goes on to say "Seen from behind the fossil reminds us of the skull of a horse, by its very straight occiput rising in the centre; but in all the other characteristics it differs from it: it is a true Ruminant. By the lengthened and rectangular form of that part of the skull which extends behind the orbits, the Palæotragus resembles the Helladotherium; but it differs from it by its non-sloping occiput, by having horns, and the molars being more furrowed. The discovery of this gigantic Ruminant has been already announced to the academy.

The lengthening of the posterior part of the skull, the molars marked with deep furrows, and the want of the lacrymal cavity, admit of some affinity between the Greek fossil and the giraffe, did not the position and form of the horns establish a distinction between them. By its rather confined face, deprived of the lachrymal cavity, the Palæotragus resembles the goat; but differs from it in the form of the teeth and the posterior part of the skull. The spreading of its horns, and their implantation in the orbits, reminds one of certain kinds of stags, especially the muntjàc, differing from them in the persistency of its horns. Although the Palæotragus is very large, there are others found in Pikerimi much larger."

M. Gaudry showed two skulls which proved that in all probability the two species named by M. Wagner *Antilope speciosa*, and *A. Pallasii* were one and the same.

This new fossil reminds one, by its form, its proportions, and the position of the axes of the horns, of the sub-genus *Damalis* of of Hamilton Smith, and even more of the sub-genus *Oryx* of de Blainville, in which, following Ogilby's example, he includes the sub-genus *Aigocerus* of Demarest, now called Hippotragus; but it differs from both in its dental system.

M. Gaudry has also discovered the bones of an antilope taller than any of those of which the skeletons are in the museum at Paris, even including the *Oreas canna*: he proposes to name this *Palæoryx*. A very similar skull, though much smaller, has also been found by him. Besides the difference in size, the horns are more massive in proportion to the size of the head, and flatter. This species he has named *Palæoryx parvidens.*

On the Substances Worked by the Primitive Inhabitants of Gaul.

M. Robert has presented to the Academy of Sciences a supplement to his geological researches on the substances, more particularly stones, worked by the primitive inhabitants of Gaul.

In his preceding memoir he had suggested that the enormous blocks of stone found suspended, as it were, in the centre of fluviatile deposits, could only have got there by means of icebergs at the time of the breaking up of the ice on the river which flowed through primitive France.

It supported of this opinion that all the Latin authors agree in stating that the climate was very cold at the time of the conquest, and that the rivers were often sufficiently frozen over to allow the Gauls to move easily from place to place, whence one can infer that when the thaws arrived, occasions were furnished to the liberated ice to carry boulders along with it.

As stated in that previous memoir, M. Robert affirms that the deposits along the rivers in which the Celtic remains have been found have been formed by the water which previously filled the valleys. He furthermore adds, that the great thickness of the beds of soil, which cover the Celtic remains, shows that a very long period has elapsed since their deposit.

M. Robert does not admit that the first men in Europe were contemporaneous with the great pachyderms, the elephant, mastodon, rhinoceros, &c. On the contrary, he considers that an enormous lapse of time separated their epochs; for the remains of those found with the Celts are very much rolled and worn, while the bones of the auroch, horse, &c., are with difficulty distinguished from those of the present day.

"It is probable," he continues, "that when the peoples of Asia emigrated westward on the look out for fertile countries, still retaining their fondness for stones, whether as a custom, a religion, or a sign, we know not, they established themselves naturally in the valleys, then deeper than at the present time, and watered by rivers which offered them, with resources of all kinds, a milder temperature than could be met with on the elevated plains. It is probable that oftentimes they were obliged to evacuate their habitations in consequence of considerable floods: hence the confusion of the remains so precipitately abandoned; flints, with rolled stones of every kind, and real fossil-remains washed from the real diluvium, mixed with the bones of the animals, domestic or savage, drowned in the inundations."

In the sand-pits at St. Acheul, near Amiens, hatchets have been found, which, though coarsely worked, appear to belong to two epochs; some formed out of chesnut-brown—almost yellow flint, and with very round edges, apparently coming from a long way off, being much water-worn; the others in bluish-black flint with white spots, more or less sharp, with very flat edges, do not appear to have been rolled at all. The angles in these last are as sharp as when they left the hand of the workman; and one would say they had been fashioned on the very spot in which they are found. In fact, it is very easy to find rolled flints from which precisely similar hatchets could be made.

M. Robert has in his possession the largest hatchet found in this locality; it is thirty centimètres long, and weighs one thousand eight hundred grammes, and has, evidently been made from one of the cylindrical flints which there abound.

Although the bed in which these celts have been found is forty mètres above the level of the Somme, the greatest resemblance exists between it and those at Prècy-sur-Oise, and near the Seine at Paris. Like these last the lower strata are composed of rolled stones, which contain in their cavities white sand and very delicate fresh-water shells (principally Lymnea), which would inevitably have been reduced to fragments in a strong current. The upper strata consists of a thick deposit of yellowish sand.

One finds also at St. Acheul boulders of sandstone, which, however, are smaller than those at Prècy on the Oise, which in their turn are smaller than those of the Paris basin. In fact, the size of these boulders is exactly proportional to the transporting force, whether ice or current.

The nature of these worked flints may throw some light on the localities in which they are found, where all other means fail us.

In the Commune of Gouvieux (Oise) there is an abrupt eminence, called Toutvoyes, where exists what is generally supposed to be a Roman camp. M. Robert attributes it to the Gauls, the first inhabitants; for on carefully examining the locality, which was admirably chosen as a strategical position, he found spread upon the limestone soil a considerable number of hatchets, arrow-heads, and darts, formed out of flints obtained from the neighbouring chalk, or the fluviatile deposits which envelope the foot of the hill, in all respects similar to the celts found at Meudon.

The only hatchet which did not belong to the locality was a milky white polished one, similar to those found at Brégy.

M. Robert continues:

"To strengthen my opinion that the deposits which line the valleys traversed by water-courses, have been formed by those water-courses, and consequently have nothing to do with the diluvium; the boulders, rolled pebbles, the sand, and even the mud, have been derived from the lands washed by the rivers and their feeders.

"I applied myself some time ago, before I studied these Celtic remains from a geological point of view, to the collection of the rocks and fossils to be found in the fluviatile deposits of the Paris basin. Without enumerating all, I may mention having collected the following:—

1. Representatives of almost all the rocks which enter into the composition of the Paris basin.
2. Rocks of La haute Bourgoagne, principally a reddish quartz-like porphyry, which is rather common, and granite rocks.
3. Nerinæ, Terebratulæ, Madrepores, &c., belonging to the secondary formations.

It is as well to remark that these objects have always been picked up along the rivers in going towards their heads, but never above the supposed *situs* before having been carried by the water. We have, therefore, strong presumptive evidence that these same water-courses have transported all the materials which enter into the composition of the fluviatile deposits in which the Celtic remains have been embedded.

Fossil Fuel at Chiriqui, in Veragua, in Grenada.

During the summer of 1859, the United States government sent to Chiriqui, in the hope to discover a favourable line for a railway across the isthmus, an expedition to which Dr. Evans was attached as geologist.

He discovered in the Eocene Tertiary formation of that country an extensive and thick deposit of lignite of excellent quality, and extremely bituminous. M. Jules Marcou has referred the fossils of this deposit to the genera *Cardium*, *Ceritheum*, *Arca*, *Natica*, *Mytilus*, and *Nucula*, which belong to the age of the "Calcaire grossière" of Paris,

The collective thickness of the beds of coal is nearly seventy-four feet, and six are so near each other as to form a mass thirty feet in thickness, capable of being worked by the same gallery. The localities were it is seen are Cultivation creek, Blanco river, Sheinshik creek, Pope's Island. There are numerous debris of plants in the clay. A microscopic examination of the coal shows that it is formed of cellulose plants, the structure of which may be seen both in the cinders and in thin slices of the coal.

What is very remarkable is, that these Tertiary coals are exactly like those of the coal-measures proper, whilst the fossil fuel of the same age found in Oregon and Washington is non-bituminous.

It would appear that we have in the coal of Chirigui, formed in the Tertiary clays under the tropics, a modern instance of the conditions in which the coal beds in the coal-measures have been produced, thence results the resemblance of these Tertiary coals with those of the coal-measures proper, which, beyond a doubt, were formed under a tropical temperature.

An interesting geological fact is that the coal-measures have not yet been traced in South America. All the beds there observed belong to the Tertiary epoch.

On a means of recognizing the Shores of Ancient Seas.

M. Marcel de Serres, in a recent letter on a means of recognizing the ancient shores of the seas of geological epochs, after referring to his studies on the boring-mollusca, points out a locality near St. Apolis, in the neighbourhood of Pézenas as very interesting. There the cretaceous rocks, which run parallel with and adjoin the Mediterranean, are full of thimble-shaped cavities, the work of these mollusca. On the north side of the mountain nothing of the kind is seen; the rocks thus perforated are not elevated above the level of the soil beyond the point at which they have been bored, and the miocene beds rest on them.

Knowing as we do that the boring-mollusca are to be found in the vicinity of the coast-line, are we not justified in looking upon this spot as an old sea-shore? M. Marcel proceeds:—

"I am now endeavouring, by the consideration of similar facts, to determine, by means of the rocks attacked by these animals, the localities which mark the extent of the ancient seas, and I believe I have succeeded in a locality now well known in a geological point of view—I mean the basin of Neffier. There the palæozoic beds are bounded on the south-east by the tertiary marine formations; these are composed in certain localities of masses of polyps of the genus Astrea, pierced by a great number of Modiolæ and Petricolæ, and others.

As these different species recede but little from the coast, and the polyps occupy the same position as they did in the same sea, they seem to represent its ancient margin; a fact confirmed by their position relatively to the Mediterranean, near which these beds are situated.

On the Tertiaries of Bigorre.

M. Leymerie has communicated to the French Academy a note on the Tertiaries of Bigorre, principally studied in the valley of the Adour. From this note, which is very interesting, we extract the following description of the locality mentioned:—

"The Tertiaries of Bigorre consist entirely, in the valley we have named, of a lacustrine deposit, formed at the foot of the Pyrenees after the last rising of the land; and do not offer at any point the smallest indication of an upheaving force.

"This deposit in the first instance formed a table-land extending from the foot of the mountains; but this has since been divided by the diluvium streams into strips, as it were, now found separated by the valley of the Adour, and numerous dales.

"In the region which occupies us in the present paper, the tertiaries follow the bend of the hill between Bagnères and Louides, and an outlying prominence, whose elevation was too great for the tertiary waters to cover.

"For this reason, on either side of this hill, we see the tertiaries commence by two beds which cover and level the cretaceous schists and overlying beds, pierced and diversified by granite and ophites, which never, however, reach the surface.

"One of these beds begins at Bagnères, but only on the right side of the Adour, whence it extends to the east to join itself to the plain of Launemezan.

"The other commences not far from Lourdes, to the left of the valley of Adé. They leave between them the hill above mentioned, which is entirely uncovered by these deposits.

"A little to the north of Montgaillard (Vieille Ossun), near the plain of Tarles, one sees the outliers of the Pyrenees represented by the conglomerate of Palasson, dip under the tertiaries in such a manner that from this limit all the hills in the valley are composed of it."

PROCEEDINGS OF GEOLOGICAL SOCIETIES.

Geological Society of London,—March 6, 1861.

1. "On the Successiou of Beds in the Hastings Sand in the Northern portion of the Wealden Area." By F. Drew, Esq., F.G.S., of the Geological Survey of Great Britain.

Having first referred to the division of the Wealden beds by former authors into the "Weald Clay," the "Hastings Sand," and the "Ashburnham Beds," and the subdivision of the "Hastings Sand" by Dr. Mantell into "Horsted Sands," "Tilgate Beds," and "Worth Sands," and having defined the district under notice as lying between and in the neighbourhood of the towns of Tenterden, Cranbrook, Tunbridge, Tunbridge Wells, East Grinstead, and Horsham. Mr. Drew proceeded to describe, first, the several beds in the meridian and vicinity of Tunbridge Wells. The Weald Clay is at least six hundred feet thick in this district, and is underlaid by sands and sandstones, termed by the author the "Tunbridge Wells Sand," on account of its being well exposed there. This subdivision is about one hundred and eighty feet thick, and was described in detail; an important feature being the "rock sand," or massive sandstone forming the picturesque natural rocks of that neighbourhood, The

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