

tagne. Some of the spores appeared to be uniseptate, but this might arise from ocular deception. It grew in a loose soil in a wood composed of hazel, beech and firs, in October last.

I am, Sir, your obedient servant,

Wraxall, near Bristol,  
23rd December, 1844.

C. E. BROOME.

VIII.—*On the Laws which regulate the Geographical Distribution of Littoral Mollusca.* By M. ALCIDE D'ORBIGNY\*.

THE author in the first place urges the importance of investigations on the geographical distribution of the coast mollusca, as applied to general palæontology. It is, in fact, in the laws which at present regulate the geographical distribution of creatures that we must logically seek by comparison for light upon the successive animalization on the surface of the globe at all geological periods, in order to substitute well-ascertained facts for doubtful theories.

The author selected, as the theatre of his observations, South America, where he resided for eight years. Being at first of opinion, *à priori*, that the configuration of that continent, with relation to its latitude, the abrupt or very gradual slopes of its coasts, and the general currents which wash them, must have an immense influence upon this question, he points out particularly the characters which distinguish that part of the world, assisted, for these currents, by M. Duperrey's important map of the *movement of the waters*, without which he would have been unable to explain the anomaly of some facts. He presents in a table the name and *habitat* of 362 species of littoral mollusca, which, divided according as they belong to either of the two oceans, give 156 species peculiar to the Atlantic ocean, 205 species peculiar to the Pacific, and a single species common to both seas.

He examines separately the local faunas of the Atlantic and of the Pacific. In the first he finds that the Falkland islands have a peculiar fauna, that the fauna of the temperate regions is more numerous than that of the hot regions, and that each of these regions possesses from four to six times more peculiar than common species. The Pacific presented identical results relatively to the number of species peculiar and common to the hot and temperate regions; but the currents have there more influence on the partition of the species and on the separation of the local faunas where their action ceases.

His observations of the influence due to the orographic configuration of the coasts upon the zoological composition of the re-

\* From the 'Comptes Rendus,' Nov. 18th, being an abstract by the author.



spective faunas which inhabit them, led him to the following results:—In ninety-five genera cited, fifty, or much more than half, are found only on one side, whilst forty-five only are common to the two seas. From this he concludes, that the configuration of the two coasts of South America, the one abrupt on the side of the Pacific, the other rising in a gentle acclivity from the Atlantic, have a greater influence upon the whole than the parallelism of the zones of latitude which the local faunas of the two oceans traverse equally.

In a fourth chapter, devoted to general deductions and conclusions, the author considers separately the action of the currents, the temperature, and the orographic configuration.

The general currents tend, by their incessant action, to diffuse upon all the points where they pass, the mollusca which can bear a great difference of temperature. In fact, in the Atlantic twelve species extend over nineteen degrees, and in the Pacific fifteen species are distributed over twenty-two degrees of latitude, traversing several different zones of heat, and cease to exist at the furthest northern limits of the currents, as is seen at Brazil and to the north of Callao (Peru). Thus we must, without any doubt, attribute to the general currents that influence of unequal value which carries the littoral mollusca of the cold regions in the Atlantic as far as the tropic only, and in the Pacific as far as eleven degrees more to the north.

The author finds the currents to have two opposite influences: by their continual action they tend evidently to diffuse the littoral mollusca beyond their natural limits of latitude; but when they are distant from the continent, as at the Falklands, when they double a cape advanced toward the pole, as at Cape Horn, or when they abruptly leave the coasts, under the hot regions, as at Payta, they then serve to isolate local faunas.

The effect of temperature is to confine species within more or less restricted limits; the proof of which lies in the number of mollusca peculiar to the different zones of heat traversed by the general currents, and above all in the sudden difference which is remarked between the composition of the local faunas of Payta and that of the parts situated to the north of Rio Janeiro. In fact, as soon as the action of the currents ceases to be felt, the temperature at once resumes all its influence, and a fauna peculiar to the hot regions begins to appear.

The orographic configuration of the coasts is marked by the different zoological forms which are observed between the two oceans: in fact, independent of the numerical amount of the genera which have been spoken of, it is easy to convince ourselves that the genera which predominate in the Pacific live principally on the rocks, whilst those of the Atlantic, which are wanting on



the southern side, inhabit only the sandy bottoms. It is seen that the difference of orographic configuration of the coasts of the two oceans which wash South America exercises, by these conditions of existence more or less favourable which it offers to the littoral mollusca according to their genera, an immense influence upon the zoological composition of the faunas which inhabit them.

The author states it as a negative fact, that the greatest affluents, the Plata for example, which at its mouth is 128 kilomètres wide, have absolutely no influence upon the composition of the marine faunas of their environs.

M. d'Orbigny deduces from the facts observed by him the following conclusions, which apply immediately to the palæontologic faunas of the tertiary deposits:—

1. The faunas of two neighbouring seas, having an intercommunication, but separated only by a cape advanced toward the pole, may be distinct.

2. There may exist, at the same time, by the sole action of the temperature, in the same ocean and on the same continent, distinct faunas, according to the different zones of temperature.

3. Under the same zone of temperature, upon coasts in the neighbourhood of one and the same current, the currents may determine particular faunas.

4. A fauna distinct from the fauna of the nearest continent may exist upon an archipelago when the currents isolate it.

5. Distinct faunas, or at least differing much among themselves, may exist upon neighbouring coasts, by the sole action of orographic configuration.

6. When the same species are found over an immense extent of latitude, in the same basin, the currents will be the cause of it.

7. The identical species between two adjoining basins indicate direct communications between them.

8. The greatest affluents have absolutely no influence upon the composition of the neighbouring marine faunas; thus all the deductions which have been drawn from them, in the case of the tertiary basins, become illusory.

The author concludes by a final palæontological comparison. He has said that, with the exception of one species common to the two American oceans, all the others were, in the actual fauna, peculiar either to the Atlantic or to the Pacific, and the *ensemble* of the genera was very different in the two seas. The comparison of these results with the deductions drawn from the totality of the fossil shells of the lowest tertiary beds of South America, proves that these last, although differing specifically, are nevertheless in the same geographical conditions as the actual fauna.



Might we not conclude from this, that at the epoch when these tertiary beds were formed, the latitude, the currents, and the orographic configuration, had the same influences as at the present day? Thence it may be allowable to imagine that the Cordilleras had, at that geological epoch, sufficient height to form, upon a vast scale, a barrier between the two seas, and that, since that epoch, the south continent has not changed its form.

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### BIBLIOGRAPHICAL NOTICES.

*Elements of Comparative Anatomy.* By Rud. Wagner, M.D.; translated from the German by Alfred Tulk, M.R.C.S.E.

THE greatest naturalist of modern times was also the highest authority in comparative anatomy; even as the first and greatest of naturalists in ancient times was also well-versed in the internal structure of the animals he classified. Cuvier and Aristotle had alike an intimate conviction of the necessity of comparative anatomy to the accomplishment of the zoologist. But comparative anatomy has still higher tendencies than those it possesses as guiding the zoologist in his arrangements: the form and structure of the living things that people and that have peopled this earth are intimately associated with its history, so that the geologist and palæontologist are scarcely less interested in a knowledge of comparative anatomy than the zoologist. More than this: function is identical throughout the animated realm of nature, and the physiologist, and, as a derivative from him, the physician and the surgeon, are all alike interested in possessing a comprehensive knowledge of the organs by which the specific functions, whose sum constitutes the life in each particular species of animals, are performed. Hence it comes that comparative anatomy has often been the preparative to the highest eminence ever achieved in the medical profession. We need only quote Mr. John Hunter in proof of the fact.

We had been for some time without a good elementary treatise on comparative anatomy in the English language. Strange as it may appear, it must still be allowed that there are certain subjects upon which we do not seem destined ever to possess perfectly satisfactory rudimentary works by native authors: comparative anatomy is one of these. The old standard was Blumenbach, which, translated by Mr. Lawrence, came to a second edition under the revision of Mr. Coulson. Then we had Carus, with the extent of whose success among us we are unacquainted. Now we have Wagner, a work which we cannot but regard as a great improvement upon all its predecessors. The grand features of the subject are in fact presented in the elements of comparative anatomy with the hand of a master, and the minor details are also there, just to the point that comes short of tediousness. The book is truly excellent, and we recommend all our readers to procure a copy, to interleave it, and have it at hand as the repository of any observations which they themselves may make.





Orbigny, Alcide Dessalines d'. 1845. "VIII.—On the laws which regulate the geographical distribution of littoral mollusca." *The Annals and magazine of natural history; zoology, botany, and geology* 15, 42–45.

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