twinned felspar microliths has formed round them. These bodies lie approximately normal to the surface of the residual kernel, which they actually penetrate like pins set in a cushion. Zoisite also, which is present in nearly all the altered sandstones, as a product of metamorphism, sometimes pierces the quartz from outside. Augite and hornblende have likewise been developed, not infrequently as microliths, which, though grouped together in one common crystallographic outline, are not united.

Further stages of change are described as occurring in certain rocks where the fragmental character, though to the unaided eye still traceable, is found to have been replaced by an entirely crystalline structure, giving rise to rocks which must be classed with the diabases. These masses sometimes have their pyroxene in the form of diallage, and are destitute of olivine, but usually contain much zoisite and frequently also hornblende. Diorites of similar origin occur, sometimes with a predominance of hornblende as in true amphibolites.

The shales are silicified and intersected by innumerable quartz-veins, in which, or projecting from their walls, are frequently abundant zoisite crystals. Yet the metamorphism has not destroyed the microscopic fossils contained in the strata. But the most remarkable example of metamorphism cited by Mr. Becker is the conversion of these same felspathic sandstones into serpentine—an alteration referred to in Prof. Whitney's description of this region. He asserts that field observation conclusively proves the great mass of the serpentine, estimated altogether at more than 1000 square miles, to have been made out of the sandstones, either immediately or through an intermediate granular rock. Sections are seen where sandstone shades off into serpentine, and areas of highly-inclined sandstones pass along the strike into the same rock. In this conversion, the change begins along the cracks, working toward the centres of the included fragments, and producing a structure like that seen in decomposing olivine. The felspar fragments are corroded externally, their cracks being irregularly widened and filled with serpentine which sometimes projects as teeth into the clear felspathic mass. Even the quartz-grains have not been able to resist the alteration, but may be seen with their outer parts replaced by serpentine, which likewise penetrates their interior in long slender green needles. Apatite has also been replaced by serpentine, and the same transformation may be surmised in the case of mica and garnet. Mr. Becker states that chemical analyses and microscopic tests demonstrated that the serpentine diffused through the sandstones and forming the massive exposures is all the same mineral. He will no doubt in due time produce the detailed evidence on which his statements are founded. In the meantime he will of course be prepared for much scepticism and even for angry denial of his results. The careful elucidation of the problem he has attacked cannot but be of enormous service in throwing light upon the vexed question of metamorphism. He claims that the rocks which he has been investigating furnish a colossal example of regional metamorphism of which all the successive stages can be studied. Many thousands of square miles of rock have been subjected to such intense lateral compression that they have been utterly shattered, the average size of the unbroken lumps not being greater than that of an egg. In rocks thus crushed warm interstitial water would have potent chemical reactions. Warm basic solutions are believed to have first been produced, and to have converted the sandstones and some of the shales into holocrystalline compounds containing augite and hornblende. Serpentinisation is supposed to have followed at a lower temperature, while silicification came last, as the solutions finally became acid. Geologists will await with impatience the appearance of the monograph in which these conclusions are maintained.

THE COMPOSITION OF THE EDIBLE BIRD'S-NEST (COLLOCALIA NIDIFICA)

THE nature of the material which forms the edible bird's-nest has been the subject of some controversy. In 1817 Sir Everard Horne (*Phil. Trans.*, 1817, p. 337) suggested that it is the product of the activity of certain glandular structures which he figures in his paper, and which he associates with the gastric glands. In the "Origin of Species" (6th ed., p. 228) Darwin indorses the view of its being entirely a secretion by the bird, speaking of it as "inspissated saliva," and showing how the amount of saliva devoted to nest construction differs with different species. He mentions in particular a North American species which he says "makes its nest (as I have seen) of sticks agglutinated with saliva and even with flakes of this substance." Writing at about the same time, Bernstein (*Journal für Ornithologie*, 1859, p. 111) connects the nature of the material with certain developments of the bird's salivary glands, which he says are noticeable during the nest-building season.

On the other hand, it has been maintained by many observers that the nest of this species of swift is con-

Fig. 1
Celebes nest. Lamellated structure (mag. 50 diam.).

structed similarly to the North American species referred to by Darwin, the chief difference being that instead of sticks the bird uses certain algæ which are found in considerable masses on the walls of the caves which they frequent in the breeding season. Other algæ also have been suggested as those used.

It has further been supposed that the algæ are partially digested before being utilised, and that after regurgitation the material so acted on is worked up into the form of the nest.

A suggestion was made by Mr. E. L. Layard, H.M. Consul in New Caledonia, in a letter to NATURE, September 17, 1884 (p. 82), which seemed to reconcile the conflicting theories. He says that the first quality of nest which is produced early in the breeding season consists entirely of animal secretion, but that later on, if the first nests are destroyed, the birds cannot replace them by this secretion alone, and so use extraneous substances to help in the construction. The second and inferior qualities of nest are so formed differently from the first.

In a paper published in the *Journal of Physiology* (vol. vi. p. 40), I have given the results obtained from an

examination, both microscopic and chemical, of the nests used for soup at the Health Exhibition of 1884. Since then I have had, by the kindness of Mr. W. T. Thiselton Dyer, Director of the Royal Gardens, Kew, the opportunity of examining various specimens of the nests,

Fig. 2

Borneo nest. No alga present (mag. 200 diam.).

obtained from other places than the first-named, and differing from one another in quality.

The results of my experiments on these nests do not modify in any essential particular those which I had obtained before from the first ones examined. After prolonged soaking all alike became gelatinous in texture, and

Fig. 3

Celebes nest. Alga present (mag. 200 diam.).

then were easily seen to be made up of laminæ affixed by their faces to each other. Whether the observation was made by teasing with needles or by cutting sections, this laminated structure was very evident. Fig. 1 is a section of a nest from Celebes, enlarged about 50 diameters. The laminæ are fairly regular in disposition, and show

no trace of any vegetable structure between them or in their substance. Here and there may be noted small granular bodies resembling epithelium cells. These are seen more distinctly in Fig. 2, which is a section of a nest of inferior quality from Borneo enlarged 200 diameters.

Another nest, also from Celebes, but marked as being of inferior quality showed the presence of algæ. A section of this, taken from the part where the greatest quantity was found, is shown at Fig. 3, the enlargement being again 200 diameters. The presence of the alga in this inferior nest seems at first to bear out Mr. Layard's suggestion, but an examination of the mode in which it is disposed in the nest-substance does not confirm his view of its being here even an agglutination of algæ because the supply of saliva had failed. The alga-cells, though fairly numerous, are not in large quantity when compared with the amount of nest-substance, nor are they regularly placed in layers as would be the case if agglutinated as suggested. Their somewhat scanty amount and their irregular position would be better accounted for on the theory of their being accidental constituents. In many sections debris of one kind or another mixed with the secretion is not at all infrequent, small feathers being the most numerous. In the nest in question the alga was not present throughout, many sections showing none, others a little, the quantity varying very much. The amount found may perhaps be connected with the feeding of the birds, and result from debris of food remaining in the mouth, and so mixed up with the secretion next produced.

The nest-substance gave no micro-chemical reactions that could connect it at all with cellulose, so that it could not be formed by the partial digestion of the alga and regurgitation of the resulting matter. On the other hand, it did give very striking evidence of its close relationship with the body *mucin* described by various authors,¹ and well known as a product of the animal body. The reactions obtained with the first material used (that from the Health Exhibition) were confirmed completely by the experiments made upon the nests from Kew.

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NOTES

MR. ADAM SEDGWICK, M.A., Fellow and Lecturer of Trinity College, Cambridge, has been nominated by the President and Council of the Royal Society to be recommended for election by the Society on June 4, in place of the late T. R. Lewis, one of the selected candidates, who died soon after the selection was made.

SINCE our last week's note the eruption of Mount Etna has gone on increasing in violence. A correspondent of the *Standard* sends some valuable notes on the progress of the eruption. Under date Catania, May 19, 8.40 a.m., he writes:—"The eruption of Mount Etna assumed alarming proportions last evening at 5 o'clock. Earthquake shocks were felt in all the communes in the immediate vicinity of the volcano. At Zafferato, where the shocks appear to have been attended with upheaval of the soil, the disturbance is described as being so severe that the panic-stricken inhabitants fled from the neighbourhood. In the district of Bronte heavy showers of sand descended, and a gigantic column of thick black smoke was seen to emerge from the central crater of Etna towards the west." "10 a.m. An eruption has occurred near Nicolosi, to the north-west of Montegrosso, quite as severe in character as that of 1883. The lava has begun to stream down towards Nicolosi, accompanied by severe shocks of earthquake. 10.55 a.m. In addition to the

¹ Eichwald, "Ueber das Mucin besonders der Weinbergschnecke," *Annal. Chem. Pharm.*, cxxiv. 1865, pp. 177 to 211. Obolensky, "Ueber Mucin aus der Submaxillardrüse," *Pflüger's Archiv*, vol. iv. p. 336.