

without scutellar striae. Metathoracic episterna a little longer than broad. Thorax nearly twice the width of the head, transverse, cordate, base on each side bisulcate; sides arcuated; hind angles prominent, acute. Elytra with one puncture on the third interstice.

I have seen no species agreeing with Motschulsky's description.

Cerabilia maori, Castelnau, *l. c.* p. 202.

Dunedin.

Belongs to the *Feronia* group, according to the author; but the mentum is described as without tooth, and the palpi as pointed. The species is $4\frac{1}{2}$ lines long, brown, and elytra feebly striated.

Rhabdotus reflexus, Chaud. Bull. Mosc. 1865, iii. p. 94.

Notwithstanding the almost invariable accuracy of M. de Chaudoir, I suspect an error in the locality he gives to this species. The specimens I have seen are all from Tasmania.

[To be continued.]

BIBLIOGRAPHICAL NOTICE.

The Naturalist in Nicaragua. By THOMAS BELT, F.G.S.
London: Murray.

THIS is another addition to that pleasant class of books of travel the type of which is Darwin's 'Journal of a Naturalist,' and which have acquired increased interest since the appearance of the 'Origin of Species.' Mr. Belt's special line of study appears to be mining geology, his mission in Nicaragua being the management of the gold-mines of Chontales, situated about midway between the Atlantic and Pacific sea-boards; but his observations range over other departments of geology and physical geography, and a taste for natural history, especially its philosophical side, led him to devote much of his leisure time to collecting and observing the plants and animals of the districts he visited. The result is a volume full of original observation and vigorous reasoning. Some of the reasoning, in fact, is likely to be considered too bold; but it displays the working of an original mind, well stored with accurate knowledge, and endeavouring to explain some of the knottiest problems in physical science. As a narrative of travel the book is agreeable reading, without, perhaps, having that fascination which other works of the same class, containing more exciting personal experience and dealing with regions of more intrinsic interest, are found to possess. There are not

wanting, however, descriptive passages of considerable power and truthfulness ; and many of the general observations and reflections scattered throughout the work are instructive and sound.

The mode in which Mr. Belt handles the subject of the glacial epoch, and the influence it had upon the distribution of plants and animals, may be selected as an illustration of the above remarks. In the course of a journey he took to the mountainous district near Ocotul, on the northern frontier of Nicaragua, he discovered an extensive deposit of unstratified gravel with boulders, which, he had no doubt, formed the moraine of a huge glacier, at an altitude of not more than 2000 to 3000 feet above the present sea-level. The deposit had been worn through by streams, in some places to the depth of 200 feet, exposing numerous vertical sections ; and, with the single exception of striated surfaces, he observed all the same signs of glacial action which he had studied in Wales, Scotland, and Nova Scotia. Reasoning from this and other evidence which he adduces, he first states the grounds on which he thinks it must be concluded that the phenomena were due to glacier ice and not to icebergs ; and he then draws the inference that the whole of the high land between the tropics must have been, during the glacial epoch, covered with snow and ice. A similar conclusion, as is well known, had been arrived at before by other writers ; but no one had hitherto offered a satisfactory explanation of the non-extinction, in that state of things, of the vast host of peculiar forms of plants and animals still existing in the equatorial lowlands. Mr. Belt, in accounting for this, adopts and extends an hypothesis of Mr. Alfred Tylor, to the effect that the quantity of water locked up in the polar ice-cap lowered the level of the sea to the extent of 600 feet. He believes the depression would exceed 1000 feet, and that the tracts of sea-bottom thereby laid bare would form a refuge for the equatorial fauna and flora. The hypothesis is not fully worked out ; and it would be necessary, before it can be seriously dealt with, to explain the climatal conditions of the lowlands between the tropics at a time when all the elevated land was subject to arctic rigour. One obvious consideration he has certainly omitted to note, viz. that a lowering of the sea by 1000 feet would act on climate chiefly by making all the land virtually 1000 feet higher, as the atmosphere, being constant in total amount, would descend with the lowering of the sea-level. This would produce a train of consequences in a high degree favourable to the state of things Mr. Belt supposes to have existed.

With regard to its other effects on the distribution of plants and animals, he ingeniously points out how the laying bare of shallow seas, such as those separating Borneo and the neighbouring islands from continental Asia, would account for the present existence of so many species and genera of terrestrial animals in lands now separated from each other. He goes, however, too far in reviving the fabled Atlantis. Whatever we may think of this hypothesis in the form too briefly sketched out by Mr. Belt, there can be no doubt of its great suggestiveness, and of the justness of his view in requiring

that any such theory shall fit the known facts of biology as well as those of geology and physics.

Some of the most interesting of Mr. Belt's zoological observations relate to ants, of whose habits he was evidently a close observer. Thus with regard to the *Ecodomæ*, or leaf-cutting ants, he is the first to record any thing of the internal economy of their vast subterranean dwellings. He had to do battle with these fearful depredators in his attempts to cultivate various useful and ornamental plants in his garden, and gives an amusing description of his endeavours to extirpate them by pouring buckets-full of diluted carbolic acid down the broad passages which lead to their cavernous abodes. But the most extraordinary thing he relates of them is that their habitual food is a fungus, which they sedulously grow in their underground chambers. In fact, it is for this purpose, he found, that they require the vast quantity of pieces of leaves which the workers spend nearly all their lives in cutting from young trees and carrying to their abodes—the leaves not being used as food, nor as a thatch for their nests, as had been surmised by other writers, but being stored in chambers, where, in decaying, they produce a minute fungus, on which the larvæ and small workers seem to feed. He gives also many interesting details regarding the various species of *Eciton*, or foraging ant, which hunt through the Tropical-American forests in large armies, and states a fact which is entirely new, viz. that they construct no formicarium, but have only temporary abodes. The facts cited in illustration of the reasoning-powers of ants are numerous throughout the volume; it is a subject on which he tried many experiments with curious results. The best case he gives is that of a marauding procession of *Ecodomæ* tunnelling under the rails of a tramway to avoid being crushed by the passing waggons. One day when the waggons were not running, Mr. Belt stopped up their tunnel with stones; but although great numbers were thus cut off from their nest, they would not cross the rails, but set to work making fresh tunnels underneath them. It is impossible to do more than allude to the vast store of suggestive facts and reasoning on this subject contained in the volume.

The relations of insects to flowers in regard to cross-fertilization form the subject of many original observations, recorded and argued out to definite conclusions with great keenness and circumspection. The same may be said with reference to another less-worked phase of insect- and plant-relationship, viz. the special adaptations of leaves to attract pugnacious ants as defenders of the plants against defoliation by leaf-cutting ants, caterpillars, and other phytophagous animals. This subject is dealt with in a series of observations on the bull's-horn-thorn *Acacia*, on species of *Melastoma* having glandular swellings at the bases of their leaves containing a sweet fluid to attract ants, and on the *Cecropia* trees, which invite protecting ants to dwell in their hollow chambered stems. The ants thus attracted form, as Mr. Belt expresses it, a most efficient standing army for the plant.

Mimetic resemblances come in for a large share of Mr. Belt's

attention. He had commenced his observations in Nicaragua with the advantage of some previous knowledge of the subject, and was therefore prepared to direct his inquiries to many points that required elucidation before the Darwinian explanation of these phenomena can be said to be established. Thus we find recorded his experiments on living insects which are the objects of mimicry by other forms, as to their distastefulness as food to insectivorous animals. Whenever he observes an instance of mimetic resemblance, he reasons out its causes and conditions instead of merely stating it. One of the most striking cases he mentions is that of a green leaf-like locust, which almost alone of all other living things stood its ground amid a destroying host of foraging ants. It stood immovable whilst the ants ran over its legs, and allowed him to pick it up and replace it amongst the ants without making an effort to escape. It might easily have flown away; but it would then only have fallen into as great a danger; for the numerous birds that accompany the army-ants are ever on the outlook for any insect that may fly up. Another case is that of a Longicorn beetle, belonging to a genus the species of which resemble various other objects: those members of the genus which live on dead wood are coloured so as to resemble lichen-stained bark; but one species (*Desmiphora fasciculata*) resembles a brown hairy caterpillar; and this he found only on leaves.

Mr. Belt's numerous observations on birds, as well as those on the few mammals he met with, are marked by the same originality and suggestiveness. His charming descriptions of the habits and haunts of humming-birds will attract many readers besides ornithologists. The use of the expanded white tail of the *Florisuga mellivora* in courtship (p. 112), which he fortunately had opportunities of observing, will be a welcome fact to the partisans of the Sexual Selection hypothesis. The volume, besides, contains abundant contributions to the general physical geography of the country (his remarks on the retrocession of the frontier of the virgin forest being especially worthy of attention) and to the ethnology of Nicaragua and neighbouring countries.

PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL SOCIETY.

June 19, 1873.—William Spottiswoode, M.A., Treasurer and Vice-President, in the Chair.

“On the Structure and Development of the Skull in the Pig (*Sus scrofa*).” By W. K. PARKER, F.R.S.

I have for some years past determined to concentrate my attention on some one type of Mammalian Skull, so as to be able to present to the Royal Society a paper similar to those which have



1874. "Bibliographical notice." *The Annals and magazine of natural history; zoology, botany, and geology* 13, 246–249.

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