being represented in the London Clay by two species of *Dromilites*, a very nearly allied form."

The addition of another new species, apparently related to this family in the Gault, is extremely interesting as exemplifying the close family similarity, but very clear specific and (I venture to think) in this case even generic distinctness from its congeners. It is hoped that before long other examples may be obtained, offering fuller details of its structure; meantime I publish this interesting little Crustacean, giving it the name of *Mesodromilites* to define its older geological position and also its probable relationship to *Dromilites* of the London Clay, with the specific name of *Birleyi*, in honour of Miss Caroline Birley, to whom I am indebted for the opportunity of describing this new Gault crab.

NOTICES OF MEMOIRS.

I.—The Red Colour of the Salt Lakes in the Wadi Natroun. By J. Dewitz.[1]

In an article published in the *Zoolog. Anzeiger*[2] I have given a report on the biology of the Natron Valley, the Wadi Natroun, in the Libyan desert, about 170 kilometers from Cairo. It seems that my remarks concerning the red colour of the water of the salt lakes of the valley have interested readers of the article. I therefore wish to add here some researches I was able to make on the same subject owing to the kindness of Mr. Prochaska, head of the chemical survey of the soda company.

When I came to the Natron Valley the red water of the lakes excited at once my curiosity, and I tried to ascertain the reason for the redness of the liquid. Most people to whom I spoke about the matter told me that *Artemia* lives in the lakes, and that the red colour of this Crustacean is communicated to the water. During my stay in the Wadi the *Artemia salina* was not to be seen, the animal appearing only at certain periods of the year. It is impossible to believe that the coloured mass of these small creatures is sufficient to stain such immense quantities of water as the Wadi Natroun lakes. These lakes, about fourteen in number, lie rather close to each other and extend over a space of about 40 kilometers.

No number of *Artemia salina* would be great enough to give the water the deep purple colour which it has. If there were frogs in the lakes and those frogs were red, and someone should say that the red colour of the water came from the red colour of the Amphibia, this explanation, I think, would not be much inferior to the *Artemia* theory. Besides *Artemia*, there are other red animals in the lakes. I obtained, for example, a red culicid larva. This shows that animals living in the water may take the colour from it, and not the water from the red animals. Finally, *Artemia salina* disappears in

[1] Reprinted from *Science*, N.S., vol. x (1899), No. 240, pp. 146, 147.

[2] "Das Wadi Natroun in der libyschen Wüste und seine niedern Thiere," Bd. xxii (1899), pp. 53–61.

the lakes for the greater part of the year without causing a change in the coloration of the water.

But, if it is not *Artemia salina*, what is it that gives the red colour to the water? In my investigations I treated the red water with different chemicals, among them acetic acid. When the acid is poured into the red water a powerful development of carbonic acid takes place, and at the same time a red soft mass rises to the surface of the liquid, while the latter loses more and more of its colour. From a large quantity of water I collected the soft red mass swimming on the surface, washed it with distilled water, and shook it in a mixture of ether and absolute alcohol. The red colour left the soft mass, being extracted by the ether. The solution of the colour in ether did not keep the purple tint of the soft mass, but showed a fine brownish coloration, the soft mass itself appearing now as a grey yellowish substance, reminding one of blood fibrine. It could be reduced to ashes, and is, therefore, of organic composition. When the lake water was directly exposed to the mixture of ether and alcohol without having passed through acetic acid no result was obtained. Concerning the osmotic property of the red organic mass, it is to be noted that it did not pass through a membrane of so-called parchment paper, such as is used for covering jars.

The experiments show that the water of the lakes contains an astonishingly great quantity of organic red substance, and that it is this which gives the red colour to the water.

The question now arises what the origin of the red organic substance is. My supposition is that the substance must be the product of bacteria. Each drop of water taken from the lakes will be found full of them. The bacteria in all the lakes are uncoloured, but I found that the cocci exhibit a red colour.

According to "Baedeker" (Egypt, French edition, 1898) there existed another spot in Egypt, near Suez, where red salt water is found. On p. 162 of the guidebook I read the following note: "La couleur rouge des marais salants entre des collines des Bédouins et le canal, provient d'une petite écrevisse (de l'ordre des phyllopodes) presque microscopique qui y fourmille à certains moments. Le matin ils exhalent un parfum semblable à celui des violettes." Unfortunately, when I was at Suez I did not visit the 'marais salants,' and I therefore wish to call this note to the attention of the biologists visiting that part of Egypt. It would be very interesting to ascertain whether the water there contains bacteria and the same red organic mass which I found in the lakes of the Natroun Valley.

II.—Notes on the Minerals of Japan. By Kotora Jimbō. (Reprint from Journ. Sci. Coll. Imp. Univ., Tōkyō, 1899, vol. xi, pp. 213–281.)

A DESCRIPTION is given of 128 mineral species found in Japan, and represented in the collections of Mr. T. Wada, of the Imperial University and the Imperial Museum at Tōkyō. The paper is written in English, and so renders information, which

previously has only been published in Japanese journals, more easily accessible. The subject-matter is mainly confined to the enumeration of occurrences; and for museum curators, puzzled by Japanese locality names, the paper will be very useful. Longer descriptions are given of quartz, topaz, and felspar, these minerals being represented in Japan by specially fine crystals.

REVIEWS.

I.—Dr. Traquair on Silurian Fishes. Report on Fossil Fishes collected by the Geological Survey of Scotland in the Silurian Rocks of the South of Scotland. By Ramsay H. Traquair, M.D., LL.D., F.R.S. Trans. Roy. Soc. Edinb., vol. xxxix, pp. 827-864, pls. i–v. (December, 1899.)

DR. TRAQUAIR'S new memoir on the Upper Silurian fishes of Southern Scotland is the most valuable contribution to our knowledge of Palæozoic Ichthyology which has been made for many years. It is of fundamental importance not only as describing with tolerable completeness the exoskeleton of several organisms which have hitherto been known only by indeterminable isolated fragments; it also records for the first time a series of well-ascertained facts in reference to the primitive mode of development of the dermal armour of the Vertebrata. Moreover, it is a work which could not have been accomplished, or at least have been done in a thoroughly trustworthy manner, by anyone less skilled in the observation and interpretation of Palæozoic fish remains than Dr. Traquair himself. Most of the fossils are very obscure, and can only be understood after long-continued study and repeated comparisons. Any geologist or biologist who casually examines them will feel gratitude to the painstaking author, whose patience and unwearied zeal have enabled him to obtain so much information from them as is contained in the beautiful memoir now before us.

The specimens in question were discovered by Messrs. Macconochie and Tait, collectors to the Geological Survey of Scotland, in the Upper Ludlow and Downtonian beds in the neighbourhood of Lesmahagow, Lanarkshire. The thin bands in which they occur consist of hard, grey, flaggy shale; and in most cases the actual substance of the fossils seems to be preserved.

The two first genera described are considered to be primitive Heterostraci or Pteraspidians, in which the dermal armour consists of isolated shagreen-like granules, not yet fused into plates. They constitute the family Cœlolepidæ of Pander, which was known only by the detached dermal granules until a year ago, when Dr. Traquair published a foretaste of his results in the description of *Thelodus Pagei* from the Lower Old Red Sandstone of Forfarshire. Two new species of *Thelodus* (*T. scoticus* and *T. planus*), from the Upper Silurian, are now described and figured. The head and trunk are completely covered with a dense layer of the little shining, quadrangular granules, which have long been familiar to