

Although in Great Britain pillow-lavas and cherts are widely distributed, there are few records of iron-ore deposits in connection with them. In other parts of the world, however, some of the most important beds of iron ore belong to this association. In Germany the Lahn and Dill districts and the Upper Harz contain beds of iron ore in Middle and Upper Devonian strata; these rest on pillow-lavas and tuffs (schaalsteins), and are not uncommonly interbedded with cherts. For several years it has been clearly realized by German geologists that these deposits are products of the pillow-lava eruptions; and it is considered that they may have originated from emanations of ferric chlorides and other salts arising from the lava-flows during cooling.

The greatest iron-ore field of the present day is the Lake Superior district of the United States. Iron formations consisting of cherts and beds of hæmatite (sometimes siderite, magnetite, or limonite) are there found in pre-Cambrian rocks, principally the Keewatin and the Huronian. According to Van Hise and Leith, they are in all cases attended by eruptions of pillow-lava, and the source of the iron is to be traced to discharges of soluble iron salts proceeding from these lavas during their outflow, or shortly after they had come to rest.

In Northern Sweden and Lapland great masses of iron ore have long been known, and are mined on a very extensive scale. They are principally magnetite, with varying amounts of apatite, and are usually associated with syenitic eruptives, frequently rich in albite. Recently it has been shown that in the Kiruna district these eruptives belong to a suite in which pillow-lavas are strongly represented, and that all the rocks are very commonly albitized. The "syenites" (also described as "keratophyres") are the acid or leucocratic members of a "spilitic" suite. The iron-ore deposits are variously interpreted as stratified beds, magmatic segregations, and contact deposits.

Submarine deposits of iron ore in beds, such as the Noblehouse and Garron Point deposits, resting on or associated with pillow-lavas, are accordingly of worldwide distribution and sometimes of the highest economic importance. Their formation is due to the abundant discharges of vapours and salts from the cooling lava-flows, and, like the albitization and siliceous formations that characterize this group of rocks, they mark the special propensity to pneumatolytic discharges which is one of their distinctive peculiarities.

## CORRESPONDENCE.

### THE YUNNAN CYSTIDEA.

SIR,—Dr. Bather's articles (GEOL. MAG. November and December, 1918) on the Yunnan Cystidea described by me in the *Palæontologia Indica*, n.s., vol. vi, Mem. No. 3, 1917, appear to require some notice, if only to correct some unfortunate mistakes into which he has fallen. But in the first place he may be congratulated on having at last published a clear terminology and definition of the morphological planes of the Cystidea which will avoid subsequent misinterpretation of his descriptions.

With regard to the genera *Sinocystis* and *Ovocystis* which Dr. Bather would unite, it is regrettable that when he had the actual figured specimens to examine his customary accuracy of observation seems to have been wanting, so that he has been led to doubt the presence of certain characters which I described. Indeed, he candidly admits (*Geol. Mag.* for November, p. 513) that he did not notice one of the structures in question till he had read my memoir and sent back the specimens. It must be accordingly concluded that his remarks are partly based on the casts and figures with their unavoidable defects and limitations. Two points may be specially mentioned. (1) *Sinocystis loczyi*. Of the many specimens of this species which were submitted to me for study, of which only a few were figured, it was observed that only in a very few instances was the summit of the tubercles missing and the diplopores exposed, and that this was due to abrasion, as clearly shown by the condition of the rest of the theca. In both large and small specimens the uninjured surface of both species of this genus possessed a thick layer of epistereom covering the tubercles and concealing the openings of the diplopores. In *Ovocystis mansuyi*, on the other hand, the diplopores were always seen to open freely on the surface, whether the specimens were large or small, worn or undamaged. The good preservation of much of the material which passed through my hands seems to render these facts beyond doubt. (2) The runnels on the surface of *Ovocystis mansuyi*, to which I applied the term "food-grooves" with perhaps too easy an assumption of their function, are more or less distinctly seen in a large number of the specimens which I examined, and are frequently quite conspicuous features impossible to confuse with the normal depressions between the plates of *Sinocystis* or *Ovocystis* itself, though Dr. Bather believes that they are of this nature and devoid of significance. It is true that they have not come out well in the collotype reproductions and much less in the casts on which he relies, but there can be no question as to the existence of these strange and often irregular grooves on the surface, whatever view we hold as to their character. If Dr. Bather had had the advantage of studying the large series of specimens which I had, and of observing the different degrees of development of these runnels, he would not have questioned their existence. Whether the differences between *Sinocystis* and *Ovocystis* are sufficient to separate them generically after taking into account these and other points which I mentioned may be a matter of opinion, but the presence and constancy of such characters have to be admitted.

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#### THE GENESIS OF TUNGSTEN ORES.

SIR,—In reply to Mr. J. Coggin Brown's letter in the January number of the *Geological Magazine* on the Genesis of Tungsten Ores I should like to state that my paper on that subject was written in the first two months of 1918. The valuable lecture by Dr. Jones was reprinted in the *Mining Journal* in March, 1918, but