TIN ORES, 1919. Monographs on Mineral Resources. By G. M. DAVIES. pp. 111. Imperial Institute. 3s. 6d. net.

THIS monograph is one of a series which is being issued by the Mineral Resources Committee of the Imperial Institute. It is only in recent years that geologists have taken more than a passing interest in economic geology, but with the increased attention paid to it by eminent scientists the subject has assumed an academic importance not hitherto known, and one may recall the early days when it was treated as a mere accessory to mining instruction. The result is that the literature of mineral economics has improved, and this monograph is an excellent example of the way in which such a monograph should be prepared. It maintains a just balance of treatment between the statistical and scientific aspects, a feature often lacking in economic papers. On the whole this monograph is rather more economic than geological, and in this we discern that there is a difference between "mineral resources" and "economic geology".

Although the occurrences of tin ore in the British Empire receive the chief attention, the foreign statistics and geology are adequately dealt with, while the exports and imports of different countries give an excellent idea of the tin trade as a whole. Some of the information is of transient interest only and need hardly have been embodied, e.g. the price of metallic tin in London.

To English geologists the most interesting original contribution is that of Professor Cronshaw, who describes the structures of the Cornish and Devon lodes at various places, and we quote a passage relating to the lodes of Camborne. "The mineral contents show a definite arrangement within the lode fissures, and, moreover, display well-defined mutual relationships. This definite arrangement is the outcome of a definite order of intrusion, which, for the Camborne district—and it very probably admits of a wider application—has been found to be as follows :—

- I. Large-grained and considerably brecciated quartz.
- II. Small-grained quartz, cassiterite, tourmaline, and chlorite.
- III. (a) Brown, finely crystallized tourmaline and chlorite, or 'brown peach' with minute grains of cassiterite and a certain amount of arsenopyrite.
(b) 'Blue peach' with cassiterite and some arsenopyrite.
- IV. (a) Fluorspar, and to a less extent, secondary quartz veins containing a little copper pyrites and occasional recrystallized cassiterite.
(b) Calcite veins.
(c) Veins of hæmatite, iron pyrites, quartz, etc.
(d) Veins of galena, zinc-blende, quartz, and copper pyrites.

The bulk of the cassiterite made its appearance in stage III (a)."

It is interesting to note that Professor Cronshaw confirms the view of apparent connexion between the cassiterite and the lead ores, as a similar sequence of mineralization has frequently been

noticed in other districts during the last decade. By early geologists this close genetic connexion was not credited, but its acceptance has led to the enunciation of theories which have yet to be developed on physico-chemical lines as a branch of the petrogenesis. There is no field of research which affords such scope for original work as the origin of lodes in their connexion with a consolidating magma, and particularly this question of the definite order of arrival of the minerals as an accessory function of it. As a whole the monograph is a complete treatise on the occurrence and production of tin ore as far as it is possible to make it in a few pages, and it is the best resumé of the subject yet published, the brief geological accounts being particularly good.

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MARINE BORING ANIMALS INJURIOUS TO SUBMERGED STRUCTURES.

By W. T. CALMAN. British Museum (Natural History).
Economic Series, No. 10. London, 1919. Price 1s.

THIS work, issued as a guide to an exhibit in the British Museum of the more important marine animals which are so destructive to timber and stone, will be of considerable interest to geologists.

Of the Molluscs which bore into wood a full and valuable account is given of the shipworm *Teredo navalis*, in which the boring is done by means of rows of fine sharp-pointed teeth on the front of the valves. Brief mention is made of other wood-boring lamellibranchs—*Pholas*, *Martesia*, *Xylophaga*. Next in importance to the shipworm as a destroyer of timber is the small Isopod Crustacean, known as the Gribble (*Limnoria lignorum*); other Crustacea which bore into wood are the Amphipod *Chelura terebrans* and the Isopod *Spharoma terebrans*.

Animals which bore into rocks are more numerous than those which bore into wood, and include Sponges, Echinoderms, Worms, Molluscs, and Crustacea. *Pholas* is believed to make borings mainly by the rasping action of the shell which is provided with rows of spines or teeth towards the front edges. *Petricola pholadiformis*, although belonging to quite a different family (the Veneridæ), is remarkable for the close resemblance of its shell to *Pholas candida*. *Lithophaga* (*Lithodomus*) bores in calcareous rocks by chemical means, an acid secretion being formed by a gland in the mantle. *Saxicava rugosa* is found mainly in limestones, and the boring is probably effected by chemical means. The principal Crustacean which bores into rocks is the Isopod *Spharoma quoyana*, found on the coasts of Australia and New Zealand, where it burrows in soft sandstone and claystone. Other rock-boring animals described are the Polychæte worm *Polydora* and the Sponge *Cliona celata*.

In connexion with rock-boring organisms attention may be called to a recent paper by Professor T. J. Jehu, dealing with the subject from the point of view of coast erosion (*Scottish Geogr. Journ.*, xxxiv, January, 1918).