

A typical argument runs thus : Certain dated quarry marks are assumed to be on a fixed and not a rotating calendar ; that throws the quarrying into the hot season ; then that proves quarrying to have been done in the hot season ; and that proves that a fixed calendar was used—exactly the assertion made to begin with. The years recorded in Egyptian history are asserted to have been copied from the dimensions of the Great Pyramid in inches, though it is said that “ the compilers of the kings lists added the measurements of radii to the measurements of arcs, horizontal to vertical distances, and totalled measurements in cubits together with measurements in inches.” Such is what the authors have to do to produce their coincidences. All of this is introductory to the prophetic detail of the passages of the pyramid (including the exact length of the recent War), Christian chronology, and innumerable vexed questions, which are all solved by asserted connexions. It is sad to see such labour and expensive publication devoted to confusing the public mind.

Ores as Igneous Rocks.

The Ore Magmas : a Series of Essays on Ore Deposition.

By J. E. Spurr. Vol. 1. Pp. x+430. Vol. 2. Pp. ix + 431-915. (London : McGraw-Hill Publishing Co., Ltd., 1923.) 2 vols., 40s.

THESE two interesting and suggestive volumes consist of essays on ore deposits based on Mr. J. E. Spurr's varied personal experience of American mines, which include so many types that they illustrate the chief phenomena of ore formation. Mr. Spurr shows in this work the clearness of insight, caution, and scientific ability which have made his contributions to economic geology of special value. He was one of the pioneers of the school which attaches predominant importance to igneous action in the formation of ores. He emphatically rejects lateral secretion or the formation of ores by surface waters, and also by the agency of deep-seated hot springs, as no water circulation could explain such facts as the enormous concentration of copper ores in Arizona. He insists, moreover, that ores have been made by processes that do not operate in any accessible zone of the crust, as he has not seen in the deepest mine visited any lode in process of growth.

Mr. Spurr early adopted the view, from his work in Alaska, that there is no sharp line of division between mineral veins and igneous dykes. His “alaskite,” a name now generally adopted in geology for a group of quartz-alkali-felspar dyke rocks, he regards as passing imperceptibly to arizonite, or quartz veins formed as the most acid differentiation product. He calls such intermediate types vein-dykes. He unfortunately has not seen the memoir by Belt, who in 1861 advocated

the igneous origin of many Australian quartz veins. Mr. Spurr knows that work only by the reference to it in Belt's “Nicaragua” ; he quotes A. W. Howitt, however, who temporarily adopted Belt's hypothesis, but took a wrong turning when he abandoned it and became a lateral secretionist. The origin of the injection of the vein-dykes Spurr attributes, not to crustal pressure, but to some force inherent in the material, which he suggests is gas pressure. This force is sufficiently powerful to tear ruptures many miles in length through rocks, as the evidence is clear that many ore veins did not enter pre-existing fissures. He attributes the ultimate origin and distribution of the chief ore deposits to the effects of magmatic migration during sub-crustal flow. He recognises three types of movements : the horizontal pressure around the uprisen molten masses produces overfolds and overthrusts ; the blocks above an intrusion are uplifted by “injection faults” ; and the down-sagging of the areas undermined by sub-crustal flow produces “adjustment faults.” In connexion with the intrusion of igneous rocks he discusses Daly's theory that the great plutonic masses have worked their way upward by overhand stoping, and also the explanation previously adopted that some igneous rocks have replaced an equal bulk of sediment by assimilation. He rejects both explanations, as in his experience the field evidence gives no adequate corroboration for either. The two last chapters deal with injection breccias, and ore-chimneys, which he refers to exceptional earth movements also due to igneous intrusions.

Some geologists may think that the author attributes too great a rôle to igneous activity, as that theory is inapplicable to some types of ore deposits ; but for many of the most important ores the author's conclusions appear sound, if it be understood that his conception of magmatic action lays stress on magmatic waters and not on simple fusion. Many of the author's conclusions have a bearing on wider problems than those of profitable mining. The fore-deeps of the Pacific the author attributes to down-sagging around the uplifted continental blocks, and he remarks the similarity in Kainozoic volcanic activity and ore formation all around the Pacific. This view attributes the existing Pacific basin as a whole to Kainozoic movement, and the author remarks that we are still living in the “Tertiary catastrophic period.” The widespread crustal disturbances are also shown by long fissures which have been proved by mining to cut across the country independent of the mountain folds. They are therefore due to the fault movements that followed the last great epoch of mountain folding.

Mr. Spurr's work illustrates the important light thrown by mining geology on the structure and the physical geography of the earth's crust. J. W. G.