

248. *Radiolarian Quartzes*.—Under the name Radiolarian or Polycystine quartzes are included those hard, siliceous rocks, which consist for the most part of the closely compacted shells of SPUMELLARIA and NASSELLARIA. To these “cryptocrystalline quartzes,” or better, quartzites, belong more especially the pure Radiolarian formations of the Jura, which have been described as flint, chert, jasper, as well as other cryptocrystalline quartzites. Most of the rocks of this nature hitherto examined are from Germany (Hanover, South Bavaria), Hungary, Tyrol, and Switzerland; others are known from Italy (Tuscany). They occur both in the upper and middle, but especially in the lower Jurassic formation (also in the lower layers of the Alpine Lias). A small part of them has been examined in their primary situation (the red jaspers of Allgäu and Tyrol), the greater part, however, only as loose rolled stones in secondary situations (thus in Switzerland in the breccia of the Rigi, in the conglomerate of the Uetli-Berg, and in many boulders of the Rhine, the Limmat, the Reuss, and the Aar). The greatest abundance, however, of Jurassic Radiolaria has been yielded by the silicified coprolites from the Lias of Hanover. These “Radiolarian coprolites” are roundish or cylindrical bodies, which may attain the size of a goose-egg; they probably originated from Fish or Cephalopods, which had fed upon Crustacea, Pteropoda, and similar pelagic organisms, whose stomachs were already full of Radiolarian skeletons. Next to the coprolites the richest is the red jasper, whose colour varies from bright to dark red; it constitutes a true “silicified deep-sea Radiolarian ooze.” The “*Aptychus* beds” also of South Bavaria and Tyrol are very rich, and have furnished about one-third of all the Radiolaria known from the Jura; most of the species too are very well preserved (compare § 243).

Regarding the remarkable composition and manifold varieties of the Jurassic Radiolarian quartz, the very full treatise of Dr. Rüst may be consulted (L. N. 51). The very interesting Radiolarian coprolites, which that author has discovered in the lower and middle Jura of Hanover, occur in astonishing numbers in the iron mines at the village of Gross-Ilse, four and a half miles south of the town of Peine. They constitute from 2 to 5 per cent. by weight of the Liassic iron ore; of this latter, in the year 1883 alone, not less than two hundred and eighty million kilograms were excavated. It is very probable that the careful microscopic examination of thin sections of coprolites, as well as of flints, chert, jasper, and other quartzites, would yield a rich harvest of fossil Radiolaria in other formations also. In Italy Dante Pantanelli has discovered interesting Polycystine jaspers in Tuscany (L. N. 36, 45); these also appear to occur in the Jura (compare § 243, and L. N. 51, pp. 3–10).

249. *Fossil Groups*.—The preservation of Radiolaria in the fossil state is, of course, primarily dependent on the composition of their skeleton. Hence the ACANTHARIA, whose acanthin skeleton although firm is readily soluble, are never found fossil. The same is true of the skeletons of the PHÆODARIA, which consist of a silicate of carbon; here, however, a single exception is found in the Dictyochida, a subfamily of the Cannorrhapida, the isolated parts of whose skeletons appear to consist of pure silica, and