

between twenty and thirty of the small black spherules, with or without metallic nuclei, and five or six of the brown magnetic spherules with crystalline structure. In the same deposits in which these spherules occur in greatest abundance, there were always found associated with them many manganese nodules, numerous sharks' teeth, and bones of Cetaceans, highly altered volcanic lapilli, and usually crystals of phillipsite. If the coatings of manganese, formed around nuclei of sharks' teeth, volcanic lapilli, fragments of earbones of Cetaceans, or other substances, be separated and reduced to a fine powder in a large mortar, and the magnetic particles be then extracted by means of a magnet, it will be found that, in addition to crystals of magnetite evidently derived from volcanic rocks, there are always a few of the black spherules above described; but our observations have not detected the presence of the chondritic spherules in the manganese nodules.

If, however, manganese nodules from a Globigerina Ooze, or any of the shallower depths, as, for instance, from Station 3, 1525 fathoms, North Atlantic, and Station 297, 1775 fathoms, South Pacific, be treated in a similar manner, it is generally impossible to detect any of the black magnetic spherules among the magnetic particles extracted from the manganese powder.

Again, if a quart of Globigerina Ooze, Pteropod Ooze, Diatom Ooze, Blue Mud, or other terrigenous deposit, be examined in the same way as a Red Clay or Radiolarian Ooze from the deep region of the Central Pacific, as a general rule no, or at most only one or two, magnetic spherules will be observed among the magnetic particles. It is evident, however, that the cosmic spherules are not absent from these deposits, for if a diligent search be made with the magnet through a large quantity of the deposit, one or two can usually be detected; for instance, the spherule represented in Pl. XXIII. fig. 11 was procured in the residue of a Globigerina Ooze after dissolving away a very large quantity of the calcareous matter by dilute acid, and it may be mentioned that no spherules were obtained during the examination of a large quantity of the deposit from the same station before the removal of the carbonate of lime.

The general conclusion forced upon us as to the distribution of these magnetic spherules in marine deposits, after a careful examination of a large number of samples, is that, while they are universally distributed, they are more abundant in regions where the accumulation of the deposit is relatively slow, and most abundant where the rate of deposition is reduced to a minimum, viz., in the deepest water far removed from continental land.

(d.) *Cosmic Dusts in General.*

It will be gathered from what has been said in the preceding paragraphs, that we believe ourselves justified in attributing a cosmic origin to some of the magnetic particles found in marine deposits, and that we have been led to this interpretation from a careful