

“ Such are the objections which present themselves when it is proposed to pronounce upon the origin of particles which are regarded as cosmic, and of which a short description will be here given. Many of these doubts will be at once removed by a statement of the circumstances under which cosmic spherules are found in deep-sea deposits, and it will be found also that all the objections are disposed of by showing the association of metallic spherules with the most characteristic bodies of undoubted meteorites.

“ In the first place, the considerable distance from land at which cosmic particles are found in greatest abundance in deep-sea deposits, eliminates at once objections which might be raised with respect to metallic particles found in the neighbourhood of inhabited countries. On the other hand, the form and character of the spherules of extra-terrestrial origin are essentially different from those collected near manufacturing centres. These magnetic spherules have never elongated necks or a cracked surface like those derived from furnaces with which they have been carefully compared. Neither are the magnetic spherules with a metallic centre comparable either in their form or structure to those particles of native iron which have been described in the eruptive rocks, especially in the basaltic rocks of the north of Ireland, of Iceland, &c.

“ Having referred to the objections, what can now be said in support of the hypothesis that many of the magnetic particles from the bottom of the sea, which are especially abundant in those regions where the rate of accumulation of the deposit is exceedingly slow, are of cosmic origin? If a magnet be plunged into an oceanic deposit, specially a red clay from the central parts of the Pacific, particles are extracted, some of which are magnetite from volcanic rocks, and to which vitreous matters are often attached; others again are quite isolated, and differ in most of their properties from the former. The latter are generally round, measuring hardly 0·2 mm., generally they are smaller, their surface is entirely covered with a brilliant black coating having all the properties of magnetic oxide of iron, often there may be noticed upon them cup-like depressions clearly marked. If these spherules are broken down in an agate mortar, the brilliant black coating easily falls away and reveals white or grey metallic malleable nuclei, which may be beaten out by the pestle into thin lamellæ. This metallic centre, when treated with an acidulated solution of sulphate of copper, immediately assumes a coppery coat, thus showing that it consists of native iron. But there are some malleable metallic nuclei extracted from the spherules which do not give this reaction. Chemical reaction shows that they contain cobalt and nickel; very probably they constitute an alloy of iron and these two metals, such as is often found in meteorites, and the presence of which in large quantities hinders the production of the coppery coating on the iron. G. Rose has shown that this coating of black oxide of iron is found on the periphery of meteorites of native iron, and its presence is readily understood when their cosmic origin is admitted. Indeed, these meteoric particles of native iron in their transit through the air must undergo combustion, and, like small portions of iron from a smith's anvil,