

development, the growth, relations, and geological distribution of the Graptolites. All later writings on Graptolites are based upon the results obtained by Lapworth. During the last few years Holm and Wimann have by means of novel methods of technique determined the finest structural features of different Graptolite genera, and R. Rüdemann (1895) made some fortunate discoveries which threw light on the mode of life and the relationship of these remarkable organisms.

Fossil *Medusas* are of very rare occurrence; well-marked impressions found in the lithographic shales of the Franconian Jura Chain have been carefully described by Beyrich (1849), Haeckel (1865-70), and Ammon (1883). Nathorst in 1881 assigned to the *Medusas* certain casts in the Cambrian sandstone of Sweden, and quite recently (1898) Walcott described a large number of cast structures in the Cambrian deposits of North America as of *Medusa* origin.

*Echinoderms*.—In the eighteenth century Klein had proposed for the sea-urchins the class name of *Echinodermata*. Cuvier united under the same class the *Ophiuridea* or sand-stars, the *Holothuridea* or sea-slugs, and the *Encrinites*, without, however, recognising the *Encrinites* as a separate sub-division. In 1821, J. S. Miller, a native of Dantzic although resident in Dublin, published an excellent monograph on all the fossil Sea-lilies or *Encrinites* then known, and combined them into an independent sub-division or order which he named *Crinoidea*. In 1828, Fleming erected the order of *Blastoidea* for the *Pentremites* which had been discovered in 1820 by Say in the North American Carboniferous Limestone, and in 1845 Buch erected the order of *Cystidea* for a group of fossil Crinoids then very little known. Thus the limits and the chief orders of the *Echinodermata* were definitely established, and at the suggestion of Leuckart in 1848 the class *Echinodermata*, which had hitherto been treated systematically as closely allied with the *Cœlenterata*, was represented as an independent branch of descent in the animal kingdom. In addition to Leuckart's fundamental differentiation of these two animal classes, it was he who first combined the *Crinoidea*, *Cystoidea*, and *Blastoidea* under a common group-name *Pelmatozoa*, and placed it in contradistinction to the other sub-divisions of *Echinodermata*, the *Echinidea*, *Asteridea*, *Ophiuridea*, and *Holothuridea*.