

The systematic study and morphology of the Pelmatozoa was greatly advanced by J. S. Miller's *Monograph of the Crinoidea*, which masterly work constructed a secure basis for all future inquiry into the morphology of the group. Miller made application of the architectural arrangement of the plates in the calyx as a basis of classification, and recent researches have frequently found it advantageous to revive leading features in Miller's classification.

Goldfuss and Münster added a number of new specific descriptions to the knowledge of Crinoidea, but made no attempt to elucidate the structural relations. Three important memoirs were contributed by the anatomist, Johann Müller, on the structure of *Pentacrinus* (1841), on *Comatula* (1847), and on the structure of Echinoderms generally (1853). These memoirs were published in the Transactions of the Berlin Academy, and for several decades formed the groundwork of further zoological investigations in this group. Müller included the study of fossil forms in his researches, and he sub-divided the known Crinoidea into three sub-orders—Tesselata, Articulata, and Costata.

Almost simultaneously with Müller's works there appeared in England a monograph of fossil and recent Crinoids by the two Austins (1843). But in spite of many new and valuable observations, this work was unsuccessful, on account of its sub-division of Crinoids into stalked and unstalked groups. This sub-division was regarded as quite artificial, seeing that the gifted zoologist, Vaughan Thomson, had in 1836 demonstrated the development of the genus *Comatula* from a larval stage resembling a stalked *Pentacrinus*.

The anatomical structure of the living *Pentacrinus* was described by Lütken (1864), and that of the Comatulids was elucidated by the researches of Wyville Thomson (1865) and W. B. Carpenter (1866). The deep-sea explorations off the coast of Norway led to the discovery of *Rhizocrinus*, and the detailed investigation of this interesting genus, carried out by Sars (1868) and Ludwig (1877), met with a cordial reception in palæontological circles.

Numerous monographs and shorter papers on Palæozoic Crinoidea were meanwhile being published; among the more voluminous writers on this subject were De Koninck and Le Hon (1854), Hall (1847-72), Roemer (1860), Ludwig Schulze (1866), Meek and Worthen (1866-75); Mesozoic Echino-