

A large suite of fossils has been obtained from this group. The sponges are represented by *Sphærospongia*, *Acanthospongia*, and other genera. The graptolites are strongly differentiated from those of the Arenig rocks by the entire absence of *Dichograptidæ* and *Phyllograptidæ*. The *Diplograptidæ*, feebly represented in the Arenig and Lower Llandoilow groups, are now, as Prof. Lapworth points out, the dominant forms, occurring in swarms in every zone. The two genera *Diplograptus* and *Climacograptus* are especially abundant. The following successive zones, each marked by the prevalence of its own species of graptolite, have been observed by Prof. Lapworth in ascending order: (1) Zone of *Climacograptus Wilsoni*, (2) Zone of *Dicranograptus Clin-gani*, (3) Zone of *Pleurograptus linearis*, (4) Zone of *Dicellograptus complanatus*, (5) Zone of *Dicellograptus anceps*. The same observer remarks upon the extraordinary extinction of families, genera, and species of graptolites during the period of the Caradoc-Bala rocks. "The entire families of the *Dicranograptidæ*, *Leptograptidæ*, and *Lasiograptidæ*, disappear from sight altogether. The only families that survive into the Llandovery rocks are those of the *Diplograptidæ* and *Retiolitidæ*, and these only in a very degenerate form." Yet it is remarkable that it was during Caradoc time that the *Dicranograptidæ* and *Leptograptidæ* attained their highest development."

To the conditions that allowed the deposition of limestone bands in this group we doubtless owe the presence of upward of 40 species of corals (Fig. 345) belonging to *Alveolites*, *Cyathophyllum*, *Favosites*, *Halysites*, *Heliolites*, *Monticulipora*, *Omphyma*, *Petraia*, etc. The echinoderms are represented by encrinites of the genera *Actinocrinus*, *Cyathocrinus*, and *Glyptocrinus*, by no fewer than 16 species of cystideans (*Echinosphærites*, *Sphæronites*, *Agelacrinites*, *Hemicosmites*, etc.), and by star-fishes of the genera *Palæaster*, *Protaster*, and *Stenaster*; the annelids by *Serpulites*, and numerous burrows and tracks; the trilobites by species of *Acidaspis* (7 species), *Ampyx* (6), *Asaphus* (6), *Calymene* (5), *Cheirurus* (6), *Cybele* (2), *Encrinurus* (3), *Homalonotus* (4), *Illænus* (9), *Lichas* (5), *Phacops* (15), *Remopleurides*

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General Memoirs of the Geological Survey; Harker's "Bala Volcanic Series of Caernarvonshire," being the Sedgwick Prize Essay for 1888; F. Rutley, Quart. Journ. Geol. Soc. xxxv. 1879, p. 508; W. W. Watts, op. cit. xli. 1885, p. 532; and vol. xlvii. 1891, Presidential Address, p. 117.

<sup>77</sup> Lapworth, Ann. Mag. Nat. Hist. v. 1880, p. 358 *et seq.*