

under the name of "Llanvirn," by taking the upper part of the Arenig and lower portion of the Llandeilo rocks, making a total thickness of about 2000 feet of strata near St. David's in South Wales.⁷³ It is in this group of strata that the trilobites *Acidaspis*, *Barrandia*, *Illænus*, and *Phacops* make their earliest appearance. Sir A. C. Ramsay believed that in North Wales there is an unconformable overlap of the Arenig upon the Tremadoc and older beds; but in South Wales there does not appear to be any break.⁷⁴

A remarkable feature in the history of the Arenig rocks in Wales was the volcanic action during their formation, whereby various felsitic or rhyolitic lavas, with abundant discharges of fine ashes and coarser agglomerates, were erupted over the sea-bottom and interstratified with the contemporaneously deposited sediments, while more basic sills were subsequently injected under the volcanic sheets. Some of the more important Welsh mountains consist mainly of these ancient volcanic materials—Cader Idris, the Arans, Arenig Mountain, and others.⁷⁵

2. **Llandeilo Group.**—These dark argillaceous and occasionally calcareous flagstones, sandstones, and shales were first described by Murchison as occurring at Llandeilo, in Carmarthenshire. They reappear near St. David's, on the coast of Pembrokeshire, and at Builth, in Radnorshire. In the lower subdivision of them a seam of limestone occurs, while intercalated igneous rocks are specially noticeable in the upper subdivision. It was at one time believed that graptolites were almost confined to this group. These fossils, now known to range from the Cambrian to the top of the Silurian system, occur abundantly in the Llandeilo rocks, and present there a transitional character between the Arenig types below and those in the Caradoc or Bala rocks above. In the lower portions of the group the most abundant genus is *Didymograptus*, *D. Murchisoni* being the characteristic species (and serving to mark a graptolitic zone) accompanied by many of the Arenig species, together with new forms of *Cryptograptus* and *Glossograptus*. In the middle part of the group the *D. Murchisoni* becomes very rare and is associated with *Diplograptus foliaceus* and *Cli-*

⁷³ Pop. Science Rev. 1881, p. 289.

⁷⁴ "Geology of N. Wales," Mem. Geol. Surv. iii.

⁷⁵ For descriptions of the Arenig lavas and tuffs consult the "Geology of N. Wales" already cited; also G. A. Cole and C. V. Jennings, Quart. Journ. Geol. Soc. xlv. 1889. Geol. Mag. 1890, p. 447; Jennings and G. J. Williams, Quart. Journ. Geol. Soc. xlvii. 1891, p. 374. Op. cit. Presidential Address, p. 105.