

of T. S. Hunt (page 73), probably indicating, as has been suggested, the presence of much phosphatic material in solution in the seawater.

The Lamellibranchs are the lowest of Mollusks, and the species were very small. The Gastropods were very small, and mostly of the Patella-like symmetrical, non-spiral species; but with these occur species of *Platyceras*, having a short spire, and some of *Pleurotomaria*, a Paleozoic genus of coiled species that continue on through later time.

The Crustaceans are either species of the lower division of the class, the Entomostracans, or are Isopod in relations.

*Smallness of size* is not, however, a universal feature. The Pteropods, among Mollusks, were much larger than the modern species of the tribe. The Trilobites even of the Lower Cambrian comprise species as large as living Crustaceans. The Ostracoids are generally larger than those of recent times.

The most prominent exception to low-grade features in the fauna is that of Trilobites, which have nearly the perfection that belongs to the typical Isopod. Their primitive character is, however, marked in the multiplicate structure of the thorax and its limbs, and in the fact, observed by Beecher, that each of the thoracic legs has a natatory appendage.

*Embryonic precursor lines fail.*—The Lower Cambrian species have not the simplicity of structure that would naturally be looked for in the earliest Paleozoic life. They are perfect of their kind and highly specialized structures. No steps from simple kinds leading up to them have been discovered; no line from Protozoans up to Corals, Echinoderms, or Worms, or from either of these groups up to Brachiopods, Mollusks, Trilobites, or other Crustaceans. This appearance of abruptness in the introduction of Cambrian life is one of the striking facts made known by geology. But, as is often urged, this appearance of abruptness is believed to be due to defective records. In some regions there are thick strata in the Cambrian below the lowest fossiliferous beds representing a long lapse of time, besides others in the Archæan, of whose life nothing is yet known. Again, species without shells or stony secretions make no fossils, and can leave no record; and it is for this reason that we know so little of Cambrian Worms, all that remains being the holes or tracks they made.

Further: the Lower Cambrian rocks are often hard slates and grits, and the heat, or heated moisture, or siliceous solutions, that hardened them would have tended to dissolve away calcareous shells. The shells of phosphatic kinds, as the Lingulæ, Discinæ, and the tests of Trilobites, would have suffered least. From this last fact it follows that resistance to solution, not predominance in number, may, in many cases, have determined the relative proportions of the species of fossils. These are sources of uncertainty demanding consideration.

The Olenellus beds have been made the *Lower Cambrian*. But they are not necessarily the lowest. For if strata should be found containing no Trilobites, but only Worms, the lower types of Brachiopods, Ostracoids among