

extending out to the extremities of the pleural lobes. The surface of the telson is not preserved so as to show its characters. The test itself is very thin and fragile, and is usually broken away.

The above description is that of what is considered as the normal adult type and omits altogether the phases of this remarkable species that are shown in its various stages of growth and development. The relation of this species to *Olenellus Thompsoni* are very intimate in what I called the normal adult type, but when we study it in all its details it appears best to consider the western form as representing a distinct species.

The form of the pleural lobes of the third segment is frequently like that of the corresponding segment in *Mesonacis Vermontana*; it is there broad and nearly straight from the outer angle to the spinose termination of the pleura; in other individuals it is more narrow, rounded on the genal angle, and curves gracefully outward and backward to the long, slender points, as in some examples of *M. Vermontana*.

The largest head yet observed has a length of 6<sup>cm</sup> and a width of 12<sup>cm</sup>. Comparing this with a smaller entire individual, we find that the animal to which the large head belonged had a length of over 14<sup>cm</sup>, exclusive of the elongate telson, which was from 6<sup>cm</sup> to 8<sup>cm</sup> long if proportionate to that of the smaller individual.

The original specimens upon which the two species *O. Gilberti* and *O. Howelli* were based were collected at Pioche, Nevada, by Mr. Edwin Howell, of the Wheeler Survey.

*Formation and localities.*—Middle Cambrian. The species occurs in limestone and argillaceous and sandy shales, and ranges through from 50 to 300 feet of strata overlying a massive belt of reddish-brown quartzite that is 3,000 feet thick in the Wasatch Mountains. In Nevada *O. Gilberti* has been found at Pioche on both sides of the anticlinal arch of quartzite; on the western side of the Highland Range, 8 miles north of Bennet's Spring; in the Groome District, near the south end of Timpahute Range, on Silver Peak, longitude 117° 20' west, latitude 38° north; and on the summit of Prospect Mountain, Eureka District. In Utah two localities are known: one in the cañon just above Ophir City, in the Oquirrh Range, and the other in Big Cottonwood Cañon, Wasatch Mountains, one mile below Argenta. The specimens brought in from Kicking Horse Lake, British Columbia, by Mr. George M. Dawson, appear to be identical with those from Nevada and Utah.

#### OBSERVATIONS ON OLENELLUS GILBERTI.

Under the title of "Observations on *Olenellus Howelli*" (Monographs U. S. Geol. Survey, vol. viii, p. 32), I have attempted to describe the remarkable series of variations observed in the head of this species during several stages of growth. Additional material has since been obtained, and the principal facts are here brought together.