

canthus (Claypole). The telson in Fig. 797 is half too short; it was partly buried in the rock when drawn, and has been recently uncovered by C. E. Beecher.

The Tentaculite limestone has afforded *Camarocrinus stellatus* H. (a form found also in Bohemia), *Stropheodonta varistriata* Con., *Spirifer Vanuxemi*, *Tellinomya nucleiformis* H., *Modiolopsis* (?) *dubia* H., *Avicula obscura* H., *Holopea subconica* H., *H. antiqua* H., *H. elongata* H., *Murchisonia extenuata* H., *M. minuta* H., *Oncoceras ovoides* H., *Cyrtoceras subrectum* H., *Spirorbis laxus* H., *Beyrichia trisulcata* H.

3. THE LOWER HELDERBERG PERIOD.

ROCKS—KINDS AND DISTRIBUTION.

The preceding Onondaga formation has been described as extending far eastward, as well as westward, but as having its greatest thickness in central New York, central Pennsylvania, and Ohio. The Helderberg beds not only extend far eastward, but, in contrast with the preceding, have their greatest thickness to the eastward, and thin out in western New York. They are doubtfully recognized in Ohio, 20 feet being the greatest thickness reported. The representative rocks over the Central Interior Sea have not been made out.

East of Hudson River the beds constitute the low, isolated elevation called Becrafts Mountain, near Hudson, excepting its basal layer (the Water-lime) and the upper stratum, which is of the Oriskany sandstone with the Cauda-galli grit; also the smaller and similar Mount Bob, not far distant to the north. Each of these hills is all that is left of a great formation after ages of denudation. Logan was probably right in his conclusion that it once extended northward, along the Hudson River and Lake Champlain valleys, to Montreal; for similar beds occur on the island of St. Helens in the St. Lawrence, opposite Montreal, resting on Utica shale of the Lower Silurian. Hence the waters of the Eastern Interior Sea during this Lower Helderberg era had resumed their deep connection with the waters of the St. Lawrence region about Montreal.

The beds are 300 to 400 feet thick in eastern New York, 350 feet in central Pennsylvania (Perry County), and 600 in eastern (in Monroe County), and in New Jersey. They occur also in the Appalachians in Virginia, but not in eastern Tennessee. They are 20 to 100 feet thick in western Tennessee, and 175 feet thick in Missouri, but are not distinct in Illinois or Wisconsin. In other words, the beds are either thin or wanting over the Central Interior region.

The St. Lawrence tidal waters of this period must have extended westward to the borders of Vermont and Montreal and southward along the Connecticut valley. In Canada, in the line of the Connecticut valley, Lower Helderberg fossils occur in Dudswell and near Lakes Massawipi and Aylmer. They are also found in northern New Brunswick, northern Maine, near Square Lake, and along the Gaspé-Worcester trough. They also occur in southern New Brunswick and near the coast in Pembroke, Me., with many fossils, and in northern Nova Scotia, within the limits of the Acadian trough.