The Lower Pentamerus limestone, Delthyris Shaly limestone, Encrinal limestone, and Upper Pentamerus occur in eastern New York. The upper two of these subdivisions are quite distinct in eastern New York, though not separable in the center of the State. They thin out in Cayuga County.

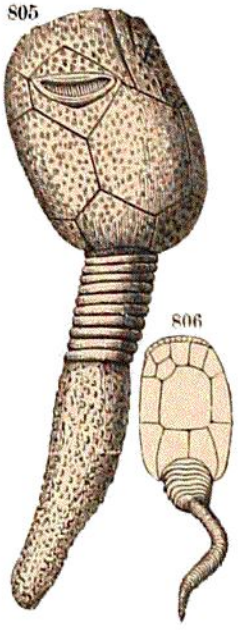
In the Arctic regions, Kennedy Channel, latitude 79°–80°, fossils were obtained by Dr. Hayes, which, according to Meek (*J. Sc.*, 1865), closely resemble those of the Shaly limestone of the Lower Helderberg of New York.

Lower Helderberg. — The *Lower Pentamerus limestone*, overlying the Water-lime, to the eastward, is compact, and mostly in thick layers and about 50′ thick. The *Catskill* or *Delthyris Shaly limestone* (No. 3) consists of shale and impure thin-bedded limestone. An upper part of the formation was called the *Scutella* limestone by Vanuxem in his Annual New York Report, the *Scutella* referred to being the discoidal basal plate of an Encrinite. A bed of limestone corresponding to these two divisions, but without the subdivision, has a thickness of 65′ on Cayuga Lake.

Part of the so-called Upper Pentamerus of eastern New York, in the Hudson valley, according to recent observations of C. E. Beecher, fails of the characteristic fossils of the group, and is referred by him to the lower Oriskany; it includes the impure limestones above the Encrinal limestone at Becrafts Mountain, near Catskill, and southward. The Upper Pentamerus is distinct at Schoharie and westward nearly to the center of the state, where all the subdivisions of the period merge together.

Becrafts Mountain, two miles east of the Hudson, near Hudson, consists below (1) of a thin bed of the Tentaculite limestone of the Water-lime; (2) Lower Pentamerus, 40′ to 50′; (3) Shaly limestone, 50′ to 60′; (4) Encrinal limestone, 40′ to 50′. Over these occur the Oriskany sandstone and the Caudagalli grit.

805–806.



Cystideans. — Fig. 805, Aplocystites Gebhardi, from Hall; 806, Anomalocystites cornutus, from Meek.

In west Tennessee, light-blue limestones of this period, abounding in fossils, occur in Hardin, Henry, Denton, Decatur, and Stewart counties. The maximum thickness is about 100′. In southern Illinois there are beds of siliceous limestone underlying the Clear Creek limestone, the lower part of which Worthen refers to this period. They rest directly upon limestones of the Cincinnati or Hudson age (the Cape Girardeau limestone of the Missouri Report), no Niagara limestone intervening (Worthen).

In the *Appalachian region* in Pennsylvania, the Lower Helderberg, consisting also of impure limestones, has a thickness of 100′ or more in the middle belt, and 200′ to 250′ in the southeastern, which thickness is maintained along the Appalachian chain (Rogers).

In the *Eastern Border region*, at Pembroke, Me., slates and hard sandstones occur with many fossils. In northern Maine the rock is limestone; and to the north they have great thickness, about Lake Temiscouata, and include both Niagara and Lower Helderberg (L. W. Bailey). The formation extends northeastward to Cape Gaspé, where there are 2000′ of limestones, the larger part referred to the Lower Helderberg by Logan, with the upper beds probably Oriskany. They also stretch southwestward toward New Hampshire, in the line of the Gaspé-Worcester trough.

At Arisaig, in northern Nova Scotia, the Lower Helderberg beds have a thickness of 1040′, and overlie nearly 1293′ of Niagara, 500′ of Clinton, and 180′ of Medina beds (H. Fletcher, in an extended report on Nova Scotia, in *Rep. Can.*, 1886).