

is no difficulty of determination. The larger size and angular cardinal extremities of *S. murchisoni* are readily distinguished from the smaller size and usually rounded cardinal extremities of *S. cyclopterus*.

*S. murchisoni* is abundantly represented in the Port Ewen,<sup>1</sup> Lower and Upper Oriskany.

#### Summary of the preceding discussion of the Spirifers

*S. vanuxemi* may possibly, as far as external characteristics are concerned, have been derived indirectly from the western species of *S. crispus* (or both from *S. petilus*) and has probably given rise to *S. cyclopterus*.

The young of *S. cyclopterus* could hardly have become modified into *S. concinnus* though they are exceedingly similar, for the finer plications of *S. concinnus* are present even on the youngest shell examined.

*S. cyclopterus* may probably have given rise to *S. murchisoni* for though the young of all the latter examined have a less incurving of the pedicle valve than the former, yet there is an indication of a slightly increased incurving in the younger shells over the older ones. In all other respects the young are apparently similar. Hall and Clarke indicate a close relationship between the above species.<sup>2</sup> They place them all under the *S. crispus* type.

#### *S. arenosus* (Conrad)

One specimen from the Upper Oriskany, a mere fragment of a pedicle valve, is doubtfully referred to this species.

#### *S. macropleura* (Conrad)

Exceedingly abundant in the Lower New Scotland and also in the lower part of the Upper New Scotland. It is found more usually

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<sup>1</sup>The Port Ewen specimens are more or less transitional. They are like *S. murchisoni* in having angular plications and a subangular sinus. They are similar to *S. cyclopterus* in being usually small and having rounded cardinal extremities. The convexity of the pedicle valve is intermediate between the two species.

<sup>2</sup>Pal. N. Y. v.8, pt2, p.19, 36.