

HARPIDIUM, A NEW PENTAMEROID BRACHIOPOD GENUS FROM SOUTHEASTERN ALASKA.

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In an earlier paper¹ I described the new genus *Brooksina* from a series of sediments in southeastern Alaska tentatively referred to the upper Silurian. In that paper will be found a brief discussion of the faunal affinities of the series. A more detailed study of the *Brooksina* fauna together with the faunas of lower and higher horizons strengthens the belief that the formations in question should be assigned to the upper Silurian rather than to the lower Devonian. There are certain elements suggestive of the Devonian, but there is little to compel a correlation with the widespread and characteristic lower Devonian or Helderbergian faunas. On the other hand, our scant knowledge of latest Silurian normal marine sediments with their contained faunas leaves a faunal gap into which these Alaskan faunas may well fit. Within this time interval should be placed, I think, those faunas of the Ural Mountains commonly referred to the lower Devonian.

In the limestone series characterized by *Brooksina alaskensis* is another pentameroid of considerable interest. To this genus the name *Harpidium* is here given. The genus is not represented elsewhere than in this restricted zone of the upper Silurian of Southeastern Alaska, so far as known. *Conchidium* (?) *occidentalis* Hall from the Guelph dolomites of Ontario resembles *Harpidium* in general form. Detailed knowledge of the structure of the species is wanting. *C.* (?) *occidentalis* has, however, obscure radial plications that are wanting in the Alaskan species of *Harpidium*. Even so its affinities may prove to be closer to *Harpidium* than to *Conchidium*, to which it was doubtfully referred by Hall and Clarke.

GENERIC DIAGNOSIS

Harpidium may briefly be defined as a nonplicated pentameroid of large size with highly arched valves. The pedicle valve has a

¹ Kirk, E., *Brooksina*, a new pentameroid genus from the upper Silurian of southeastern Alaska: Proc. U. S. Nat. Mus., vol. 60, art. 19, pp. 1-8, pl. 1, 1922.

high strongly incurved beak and is also characterized by long, well-defined cardinal slopes. Well-developed, elevated, convex deltidial plates are present. The brachial valve is also strongly incurved in the apical portion. The valves are either smoothly convex (possibly only in immature individuals) or have well-defined median sinuses. The shell is much thicker than in most pentameroids and is fibrous. The septum of the pedicle valve is relatively very short and supports a spondylium of great length. The septa of the brachial valve are discrete, subparallel in relation to one another, and support crural plates similar to those of *Conchidium*.

Genotype.—*Harpidium insignis*, new species, has been chosen as the type of the genus.

Harpidium resembles *Conchidium* in the general proportions and contours of its valves. The median sinus in each valve is also a character that occasionally is to be found in *Conchidium*. It differs from *Conchidium*, however, in its nonplicated shell and in the shortness of the septum in the pedicle valve. The heavy, convex, elevated deltidial plates are also very different from the deltidial plates of *Conchidium*. The spondylium is of about the size and proportions to be found in *Conchidium*. The genus resembles *Pentamerus* in that the shell is nonplicated. There its resemblance ceases. The highly arched incurving apical portion of the valves, the long well marked cardinal slopes of the pedicle valve, the median sinuses of both valves, and the internal structures set the genus clearly apart from *Pentamerus*. *Harpidium* and *Conchidium* are, I believe, much closer genetically than either is to *Pentamerus*. In this connection it is of interest to note that as yet no true *Pentamerus* has been found in faunas of the north Pacific type. In the Porcupine River region of the interior of Alaska what appears to be a *Pentamerus* has been found. This interior region of Alaska, however, has as a rule closer affinities with the Rocky Mountain Geosyncline and the interior of North America than it has with the true Pacific region. The more or less complete separation of Pacific and interior faunas seems to have held up to the time of the high middle Devonian when there seems to have been fairly free communication between the two faunal regions.

HARPIDIUM INSIGNIS, new species

Plate 1, figs. 1-6; plate 2, fig. 7

This species reaches a fairly large size. The largest fairly perfect individual in the collections gives the following measurements: Length (pedicle valve), 7.5+ cm.; maximum breadth, 6.5 cm.; maximum depth, 7.5± cm. Fragmentary material indicates that the species attained a size perhaps half again as large. Smaller speci-

mens are relatively narrower and less deep, as indicated by the following measurements:

Length	4.0 cm.	5.6 cm.	5.4 cm.
Maximum breadth	3.2 cm.	4.4 cm.	4.7 cm.
Maximum depth	2.9± cm.	4.4 cm.	4.8 cm.

It is to be noted that the disproportion between the size of the valves becomes more marked with age, in the adult specimen the pedicle valve greatly exceeding the brachial valve in size.

The pedicle valve is narrow in its apical portion, highly arched, and with a strongly incurved beak. Anteriorly it remains highly arched, but gradually a flattened median area is developed that changes to a broad, well-defined sinus. The cardinal slopes are long and are as sharply defined as in *Conchidium*, other than as not being differentiated by being smooth as opposed to the plicated remainder of the shell. The delthyrium is large and bordered on either side by a well-developed heavy convex deltidial plat. When the deltidial plates are not present their former lines of attachment can be seen as narrow, sharply incised grooves at the margins of the delthyrium. The brachial valve is highly arched in the younger specimens, becoming relatively less so with increasing age. The apical portion is strongly incurved. As in the pedicle valve the brachial valve develops a broad median sinus. The surface of the shell is marked by fairly strong growth lines. The shell substance is fibrous, with the fibers running longitudinally. When partially exfoliated, under a magnifying glass the fine longitudinal fibrous structure can occasionally be seen.

The septum of the pedicle valve is very short, but deep. It is concave at the anterior wall. The spondylium, supported only in its posterior portion, is a great sickle or scimitar-shaped affair, in proportion to the septum, being much larger than in any other known pentameroid. The septa of the brachial valve lie subparallel or slightly divergent, are low, and support the normal crural structures for *Conchidium*.

Horizon and locality.—From the limestone of the *Brooksina* horizon on the north shore of Heceta Island and the south shore of Kosciusko Island, Southeastern Alaska.

Cotypes.—Cat. Nos. 70228, 70229, U.S.N.M.

HARPIDIUM ROTUNDUS, new species

Plate 2, fig. 8

At a somewhat higher horizon than the main horizon of *H. insignis* occurs another *Harpidium* that seems to be distinct and for which the name *Harpidium rotundus* is here proposed.

As known *H. rotundus* is a smaller species than *H. insignis*, the largest undoubted representative of the species giving the following

measurements: maximum length, 5.2 cm.; maximum breadth, 5.1 cm.; and maximum depth, 4 cm.

The pedicle valve is strongly incurved in its apical portion. Anteriorly the valve widens more rapidly than in *H. insignis*, attaining a maximum breadth approximately equal to the length. This relative proportion of length to breadth holds in moderately small as well as adult individuals. The cardinal slopes are well defined, but relatively smaller than in *H. insignis*. The pedicle valve is moderately and evenly arched. Although larger than the brachial valve there is not the striking disproportion in size between the valves that is characteristic of *H. insignis*. The brachial valve is strongly incurved in its apical portion. In neither valve as seen is a well defined median sinus developed, although there is a slight median flattening and a well marked flexure of the anterior margin of the valves.

The shell is thick and the surface is marked by fine concentric growth lines.

H. rotundus may readily be distinguished from *H. insignis* by its relatively greater breadth, the lack of sharply defined median sinuses in the valves (although this character is developed in a larger crushed specimen that is doubtfully referred to this species), and by the less highly arched and relatively smaller pedicle valve.

Horizon and locality.—The species is known only from the Brooksina-bearing limestone series on the north shore of Heceta Island, Southeastern Island.

Holotype.—Cat. No. 70230, U.S.N.M.

HARPIDIUM LATUS, new species

Plate 2, figs. 1-6

In the *Brooksina alaskensis* zone on Kosciusko Island, Southeastern Alaska, a small species of *Harpidium* is found in fairly large numbers.

This species, here named *Harpidium latus*, differs widely from the younger stages of both *H. insignis* and *H. rotundus*. On the other hand, being fairly common in a zone where hundreds of well preserved brachiopods were collected, it seems highly improbable that the specimens represent immature stages of still another species of large size. Measurements of a series of specimens are here given:

Length	2.7 cm.	2.4+ cm.	2.0 cm.	1.15 cm.	0.9 cm.
Maximum breadth	3.1 cm.	3.0 cm.	2.5 cm.	1.45 cm.	1.14 cm.
Maximum depth	2.1 cm.	1.75 cm.	1.3 cm.	.75 cm.	.6 cm.

The largest specimen seen, which has been badly weathered, has an approximate length of 3. cm., maximum breadth of more than 3. cm., and a maximum depth of about 2.5 cm.

The apical portion of the pedicle valve is incurved but not strongly so. The valve is moderately arched, and there is a suggestion of a median longitudinal flattening. The pedicle valve widens very rapidly, and the cardinal slopes are sharply defined. This gives a structure which so closely simulates the hinge and area of the simpler smooth spiriferoids that as a matter of fact it is often difficult to distinguish between a young *Harpidium latus* and an associated spiriferoid. The apical portion of the brachial valve is sharply incurved. The remainder of the valve is moderately arched. The pedicle valve exceeds the brachial valve in size but not to the extent found in either of the other species. The anterior margin of the shell is gently sinuate. The exterior of the shell is smooth or marked by fine concentric growth lines.

H. latus is readily distinguished from younger specimens of the other species described by its greater proportionate breadth, the nearly straight hinge-like union of the valves, the area-like cardinal slopes, and the less preponderance of the pedicle over the brachial valve.

Horizon and locality.—This species has only been found associated with *Brooksina alaskensis* in the south-central part of Kosciusko Island, Southeastern Alaska.

Cotypes.—Cat. No. 70231, U.S.N.M.

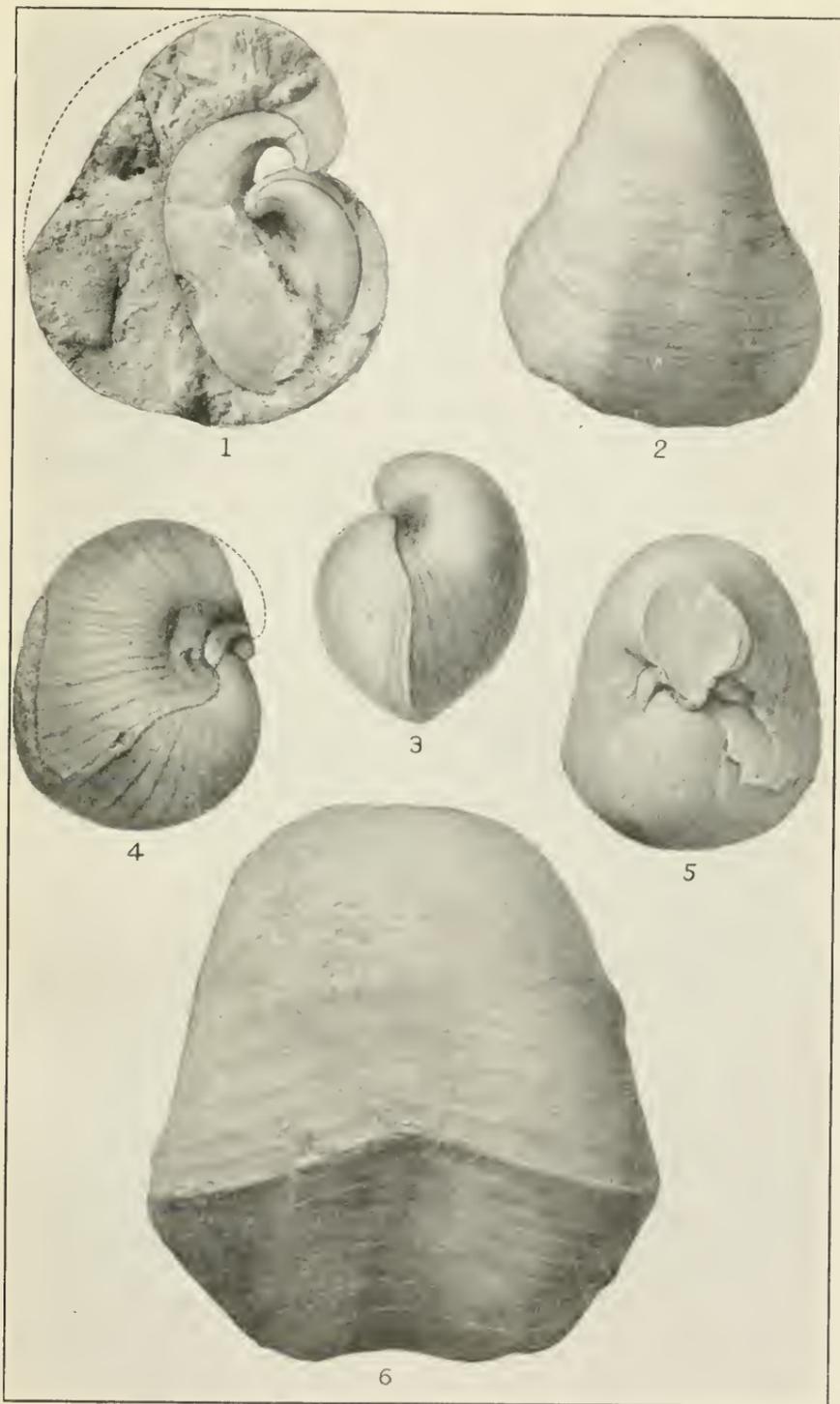
All the type specimens are in the collections of the United States National Museum and were collected by the writer.

EXPLANATION OF PLATES

PLATE 1

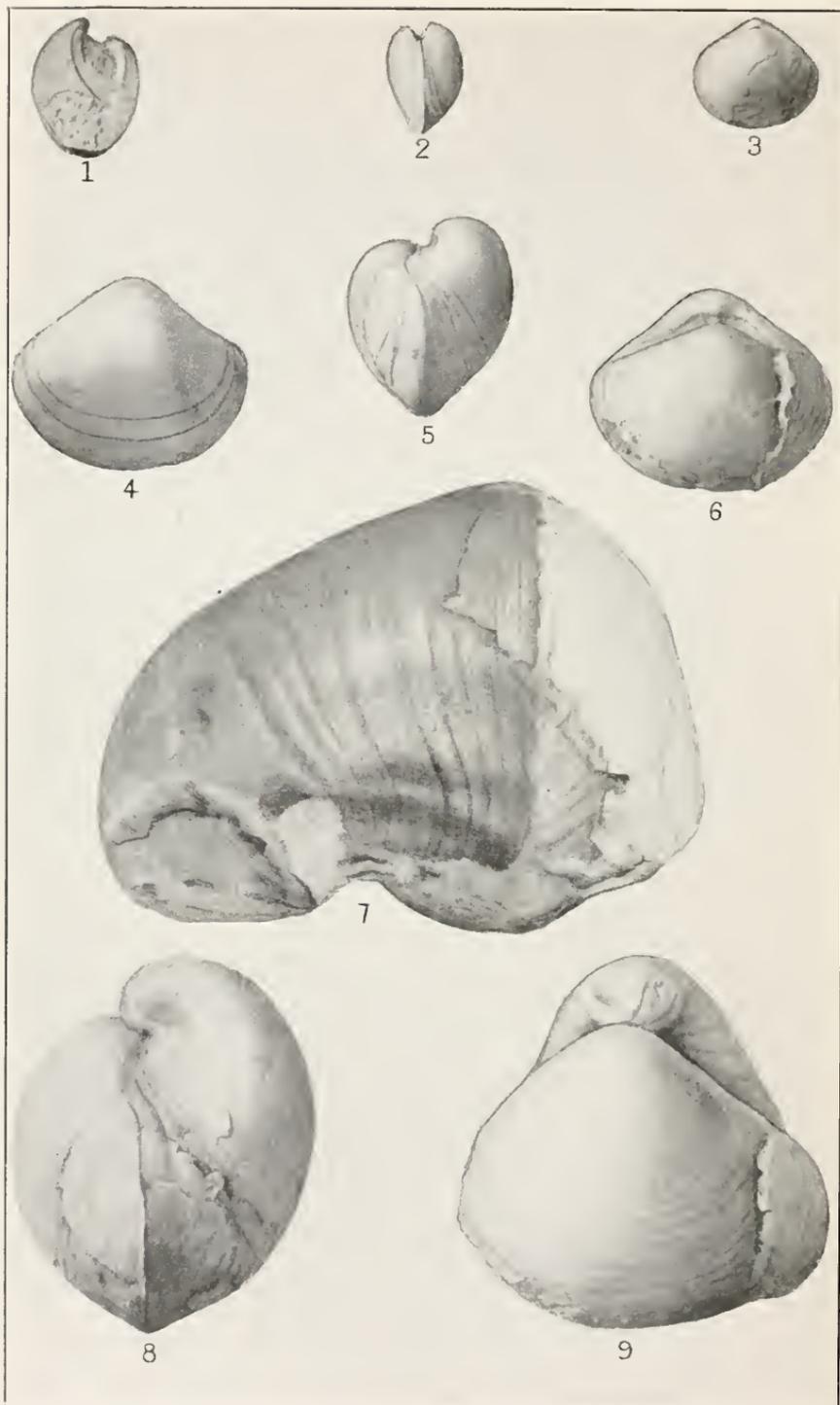
Harpidium insignis, new species

- FIG. 1. Median section of an individual showing septa of the pedicle and brachial valves, and the relatively enormous spondylium.
2. Pedicle valve of a medium sized individual.
 3. Side view of a small individual.
 - 4,5. Side and cardinal views of a small individual showing the deltidial plates.
 6. Anterior view of an adult individual of average size. The side view of this same specimen is shown in plate 2, figure 7.



HARPIDIUM INSIGNIS, NEW SPECIES

FOR EXPLANATION OF PLATE SEE PAGE



HARPIDIUM LATUS, H. INSIGNIS, AND H. ROTUNDUS

FOR EXPLANATION OF PLATE SEE PAGE 7

PLATE 2

Harpidium latus, new species

FIG. 1. Median section of medium-sized specimen showing septa of pedicle and brachial valves and spondylium.

2,3. Side and dorsal views of a medium-sized individual.

4,5,6. Ventral, side, and dorsal views of the largest well-preserved specimen found.

Harpidium insignis, new species

7. Side view of the same individual as in plate 1, figure 6, showing the great disproportion in size between the brachial and pedicle valves.

Harpidium rotundus, new species

8,9. Side and dorsal views of an adult individual.

