# ADDITIONS TO THE LIST OF TASMANIAN FOSSILS OF UPPER PALÆOZOIC AGE.

By Robert M. Johnston, F.L.S.

(Plate.)

The mudstone beds (Upper Palæozoic) in the neighbourhood of Hobart are extraordinarily rich in spirifers. Fourteen species have already been noted in my recent work on the Geology of Tasmania. A number of other interesting forms have been collected by me during the last two or three years; but hitherto I have not had time to study them with that care which is desirable; for any one who has worked long in our rocks must be aware of the many difficulties which are presented when any attempt is made to determine the characters of the Protean-winged spirifers of Tasmania. In the mudstone rocks *casts* alone are generally found; and although these are numerous and sharply marked, the casts present such a wonderful range of variation when large numbers of the same species are subjected to examination that the task of determining the central or most typical representative of each species is extremely puzzling. If attention were confined to a single specimen—as is often the case where odd specimens are despatched to palæontologists at a distance—there would be less perplexity; but it need hardly be stated determinations so made, without the knowledge of local variability, must add greatly to the perplexities of the field worker who may have to determine whatever variety comes to his hand by the aid of descriptions based upon odd types.

All the winged spirifers of Tasmania are extremely variable, and many species among these extreme forms are scarcely separable from similarly variable allied species. *S. convoluta*, *S. bisculcata*, *S. vespertilio*, *S. duodecimocosta*, and *S. avciula* are remarkable for the extreme variability in form and sculpture. Added to the difficulties of the observant field worker are the variety of modes in which they are presented in casts; some showing sharp details of external surface of right valve; some of left; some of more or less blurred surfaces of one or both sides of internal casts. The greater number, again, are curiously distorted. It is not surprising, therefore, that many able authorities have had frequently to revise the classification of many of these forms, when other examples of an abnormal form or type have been submitted to them. The following six species, as determined by me from a series of specimens of each kind, presented all the difficulties referred

to; but after careful comparison I was enabled to account for young and adult forms, and to mark individual variation; and finally I could, with some degree of confidence, select the most typical of each group. By this means I have reduced a large number of variable specimens to six species, all of which I have been able, with some degree of confidence, to refer to types of well-known fossils occurring with many of their associates in rocks of the same age in Europe. Fairly good photographs have been taken of these, and the following are the determinations which I have been able to arrive at.

TASMANIAN BRACHIOPODS.

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| Figs. 1, 4. | Spirifera striata | *Martin* | Huon Road |
| „ 2, 7. | ——— laminosa | *M'Coy* | „ |
| „ 3, 8. | ——— cristata *var.* octoplicata | *I de C. Sow.* | „ |
| „ 9, 10, 12. | ——— duplicostata | | „ |
| „ 5, 6. | ——— alata | *Schl.* | „ |
| „ 11. | ——— triangularis | *Martin* | „ |
| „ 14, 15. | ——— vespertilio | *G. Sow.* | „ |
| „ 18. | Leptæna sp. | | „ |
| „ 16. | Pachydomus sp. | | „ |
| „ 17. | Ditto | | „ |
| „ 19. | Stenopora ovata | Lons | „ |

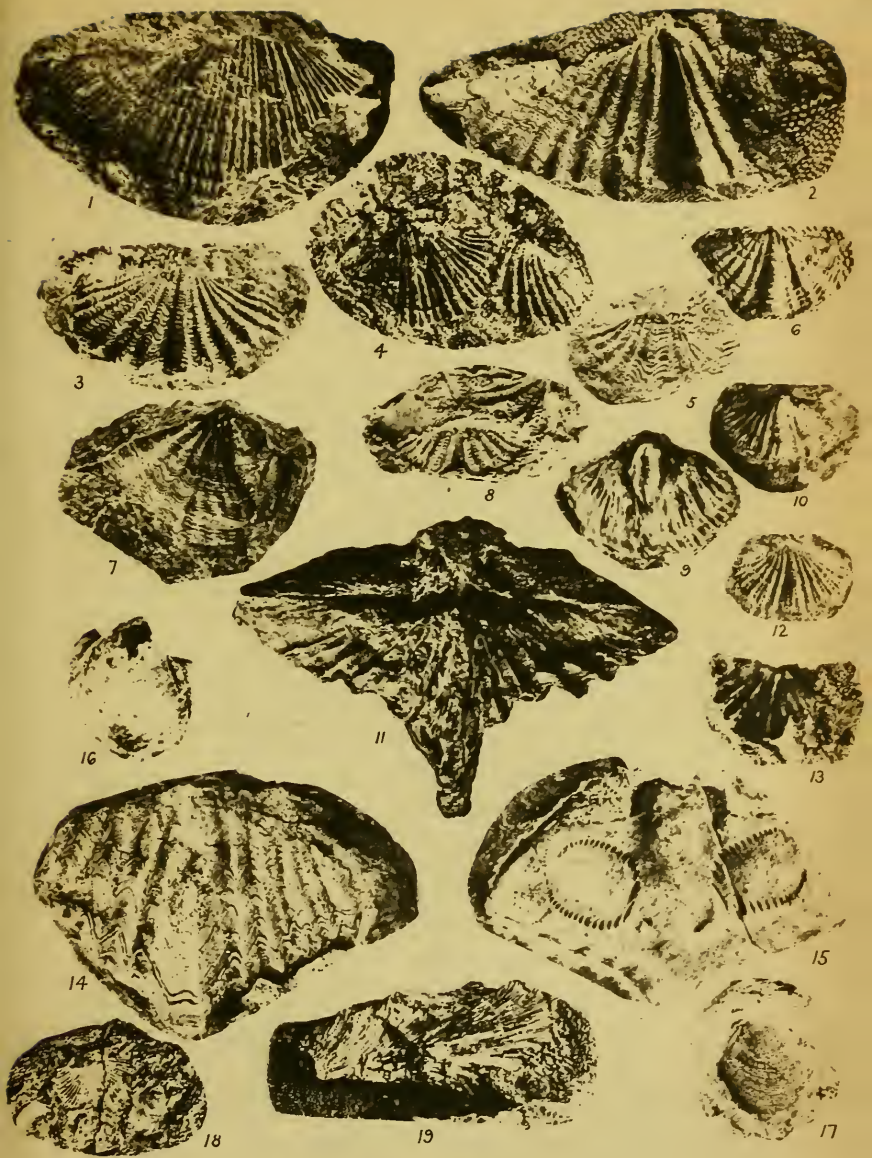
As the descriptions of the same species taken from Davidson's "British Carboniferous Brachiopoda" answer closely to local forms, I have appended descriptive extracts from this eminent authority, for the convenience of local students.

Figures of local forms are taken from select types by photography. I have also to announce the discovery of *Lophophyllum corniculum*, de Konwick. Collected by Capt. Beddome in the mudstone beds near Fingal.

DESCRIPTION OF SPECIES OCCURRING IN EUROPEAN ROCKS. ACCORDING TO T. DAVIDSON, F.R.S.

Spirifera striata, *Martin.*

A very large and variably shaped shell, transversely semicircular, or sub-rhomboidal; valves almost equally convex. In the dorsal valve the mesial fold is of moderate elevation, while the sinus in the opposite one is both variable in its width and depth. The hinge-line is either a little shorter, or as long as the greatest width of the shell, the cardinal angles being more or less rounded in adult individuals. The area is of moderate width, with sub-parallel sides; fissure triangular, and partially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covered by a pseudo-deltidium. The external surface of the shell is ornamented by a variable number of radiating ribs, which augment in number to a greater or lesser extent, from intercalations at unequal distances from the beaks; so that from 70 to 90 may be counted round the margin of each valve in adult individuals. The ribs on the fold and sinus are likewise more flattened than on the lateral portions of the shell. The surface is closely and finely reticulated. In the interior of the dorsal valve, under the extremity of the incurved umbonal beak there exists a small cardinal process or muscular fulcrum, and on either side are situated the dental sockets. The spiral cones which fill the larger portion of the shell are attached to the extremities of the inner socket-walls. The lamellæ, after having converged and given birth to the crural processes, diverge, and form the first of the 20 or 22 convolutions of which each spiral is composed. Four impressions left by the adductor muscle are visible in this valve. In the interior of the ventral valve a strong hinge-tooth is situated on either side at the base of the fissure, and is supported by a vertical shelly plate of much strength, but not advancing to any great length into the interior of the valve. Between these a large portion of the free space at the bottom of the shell is occupied by the adductor and cardinal muscular impressions, which are divided by a blunt, central, longitudinal ridge. The dimensions of one of the largest examples are :—

Length, 4½ in.; width, 6 in. 1 line; depth, 3 in. 1 line.

Spirifera laminosa, *M'Coy*.

Transversely sub-rhomboidal; valves unequally convex, the ventral one by far the deepest. The lateral portions of the shell are regularly curved, forming with the extremities of the hinge-line, acute, but not prolonged cardinal extremities; area large, triangular, more or less elevated, and divided by a fissure of moderate width. Beak small, not much produced above or beyond the level of the area. The mesial fold in the dorsal valve is broad, and more or less elevated without ribs, and corresponding with a deep and rather wide longitudinal sinus in the ventral one. Each valve is ornamented by about 20 or 22 narrow radiating ribs, intersected by closely disposed, sharp, concentric, undulating laminæ. The measurements from two examples have produced—

Length, 12; width, 21; depth, 10 lines.
„ 8 „ 11 „ 6½ „

Spiriferina cristata, *var.* octoplicata, *J. De C. Sowerby*.

Transversely sub-rhomboidal, valves about equally convex, and at times rather gibbous; hinge-line as long as the greatest width of the shell. Cardinal angles acute or slightly rounded; area concave, triangular, and of variable width; fissure partly covered by a pseudo-deltidium; beak small and incurved. The

mesial fold of the dorsal valve is more often composed of a single rib which is much larger than those situated on the lateral portions of the shell; its crest being in general rounded from the umbone to about half its length, when it gradually becomes more and more flattened as it approaches the frontal margin, but at times it remains angular during its entire length, with a tendency to the formation of a rudimentary plait on either of its slopes, so that in these rarer cases the fold assumes towards the front an obscurely triplicated appearance. The sinus in the ventral valve is deep, acute, and generally simple, but also more rarely interrupted by a rudimentary rib, which becomes visible in the proximity of the front. The valves are ornamented by from 8 to 12 angular ribs, which are, as well as the sinus and fold, intercepted by closely disposed, concentric, scale-like laminæ. The surface of the shell is also closely beset by numerous small granular (spinose) asperities; the shell-structure being likewise perforated by minute tubili or perforations.

In the interior of the ventral valve there exists a sharp elevated mesial septum, which rises from the bottom of the valve, and partly divides the spiral cones. Dimensions very variable. Three examples, of which the first two are Sowerby's original types, have afforded the following measurements :—

Length, 9; width, 13; depth, 8 lines.
„ 6 „ 11 „ 6 „
„ 5 „ 8 „ 5 „

Spirifera duplicicosta, *Phillips.*

Transversely sub-rhomboidal when adult, longer than wide, or almost circular when quite young; valves moderately convex, with a more or less produced mesial fold in the dorsal, and a corresponding sinus in the ventral one. The hinge-line is shorter than the width of the shell, the area of moderate breadth, beak incurved. Valves ornamented by numerous radiating ribs, which rapidly augment at various distances from the beaks by intercalation as well as bifurcation. Two examples have afforded the following measurements :—

Length, 16; width, 20; depth, 11 lines.
„ 16½ „ 17½ „ 10½ „

Spirifera alata, *Schlotheim.*

S. alata varies considerably in shape, according to age and individual. When adult or full grown it is transversely fusiform, being twice and even three times as wide as long (Pl. 1, figs. 23 and 27). Valves convex, deepest at a short distance from the umbone; hinge-line as long as the greatest width of the shell, the cardinal extremities being more or less attenuated in different individuals. The area is wide with sub-parallel sides; fissure triangular, and in great measure covered by a convex pseudo-deltidium; a narrow rudimentary area may be seen

likewise in the smaller valve; beak small and incurved. The mesial fold is simple, of variable width, and flattened along its upper surface; while in the ventral valve there exists a shallow sinus, interrupted by the presence of a rounded slightly elevated mesial rib. The valves are likewise ornamented by a variable number of rounded, or but slightly angular, ribs; these are simple, or here or there augmented by an occasional intercalcation. In number they vary from about 8 to 30 on each valve, the larger number occurring on the most adult individuals. The ribs are also at times of unequal width, even on the same example; and the entire surface of the shell is ornamened by close and regular scale-like, concentric, imbricated laminæ. The interior of the ventral valve does not show a trace of that elevated mesial septum which is always present in *Spiriferina cristata*, *Sp. octoplicata*, *Sp. Münsteri*, *rostrata*, *Tessoni*, and other forms composing that sub-genus. The dental or rostral plates in *S. alata* are also much smaller, and I might almost say rudimentary; the muscular impressions are likewise exactly similar to those peculiar to the genus *Spirifera*. In the dorsal valve, under the extremity of the umbone, there exists a small striated cardinal process or boss, but no hinge-plate, and a little lower is seen the quadruple impression left by the adductor (Pl. I., figs. 31, 32, 33A).

Spirifera triangularis, *Martin*.

Triangular, twice as wide as long, with a straight elongated hinge-line, and slightly concave, nearly parallel-sided area, towards the attenuated extremities of which the lateral margins of each valve converge, forming acute angles with the hinge. The fissure is triangular, and partly covered by a pseudo-deltidium. The dorsal valve is less convex than the opposite one with an elevated mesial fold which commonly assumes the character of a single produced and acutely angular cuneiform ridge or rib, at times considerably prolonged beyond the frontal level of the lateral portions of the valve. On either side of this central ridge from 6 to 10 smaller ribs ornament the lateral portions of the valve. The beak of the ventral valve is narrow, produced, and incurved. A shallow mesial sinus commences at the extremity of the beak, and extends to the front, but at a short distance from its origin a mesial or central rib originates, which becomes wider and more elevated and produced as it approaches the front, and corresponds with the central ridge of the dorsal valve. Seven to 11 smaller ribs exist also on the lateral portions of the valve, on either side of the sinus. The dimensions taken from a perfect individual have produced :—

Length, $10\frac{1}{2}$; width, $21\frac{1}{2}$; depth, $6\frac{1}{2}$ lines.