satisfactory basis, concurrently with or subsequent to the field determination of the true relative positions of a number of points in the several districts.

6. Former triangulation useless.—This assertion, even if established, in no way detracts from the advantages of a trigonometrical survey honestly done, and reliable as a basis of detail operations. Nor is there anything in the nature of such a survey to make it a matter of uncertainty or speculation. If funds are forthcoming, the result ought not to be problematical.

7. Field inspection.—It would be interesting to learn what extent of surveys were rejected or condemned "in the days of field inspection." As the "severest tests" recognised a limit of error of 32 links in the mile, the standard of accuracy can hardly be considered high. To keep within the limit specified was one of the conditions of each surveyor's work, and it is obvious, therefore, that only those surveys which were found on traverse inspection to exceed this limit could be condemned. But, further, as there was no triangulation by which to test the surveys on inspection, the inspector's own work would have to be discounted somewhat, and allowing that officer a limit of error of 8 or 10 links in the mile, as it would only be a traverse inspection, it is not beyond the bounds of possibility to assume that he might pass work which was erroneous to the extent of something like 40 links in the mile, or 4in. in every chain.

Apart from general considerations as to the wisdom and propriety of establishing an accurate system of survey, the fact that under the Real Property Act titles are issued for certain pieces of lands, the boundaries whereof are defined in the certificates and guaranteed, renders it not only desirable but essential that the methods of survey and of record should be such as to effectually guard against overlaps of boundaries and consequent future claims and litigation.

A DESCRIPTION OF THE REMAINS OF TRILOBITES FROM THE LOWER SILURIAN ROCKS OF THE MERSEY RIVER DISTRICT, TASMANIA.

By R. Etheridge, Jun., F.G.S. (of the Museum of Natural History, London.)

[*Read* 13*th June*, 1882.]

I am indebted to the kindness of Mr. T. Stephens, M.A., F.G.S., for an opportunity of examining the fossils which form

the subject of the present communication to the Society. They represent two localities and two horizons, geologically speaking. The first and largest parcel, consisting almost wholly of Trilobite remains, is from the Mersey River District, North Tasmania, whilst the other fossils are from a Conglomerate of unknown age at Table Cape. It will perhaps be best to consider the two as distinct from one another; I shall therefore describe them under separate headings.

1. TRILOBITES AND OTHER FOSSILS FROM THE MERSEY RIVER DISTRICT.

Plates 1 and 2.

Mr. Stephens recorded the discovery of the beds "containing casts of Trilobites," as long ago as 1874, in a short verbal notice on the subject.* It appears that a number of these specimens were forwarded to Europe and America through the late Rev. W. B. Clarke, and casually examined by my father and Professor L. Lesquereux. In the verbal notice referred to, Mr. Stephens says, quoting from a letter received from Mr. Clarke, "Both Mr. Etheridge and Mr. Lesquereux had identified the genera *Phacops*, *Ogygia*, *Calymene*, and *Conocephalites*, and considered the rock to be the equivalent of the Potsdam Sandstone."

Trilobites do not appear to have been found to any great extent in the Palæozoic rocks of Tasmania. Mr. Charles Gould, some years ago, found impressions of them in the rocks of the Mersey River District,† but I am not aware that any description of these has appeared. In his remarks on the Gordon Limestones, a set of beds probably distinct from those now under consideration, Mr. Gould particularly refers to the absence of Trilobites,‡ although he speaks of certain others, as the "*Calymene* beds of Tasmania."

The matrix consists of a fine-grained, friable, and much decomposed grit, in hand specimens of a bright ochreous colour. The mass is almost exclusively composed of the comminuted remains of Trilobites, in the form of casts, from which the whole of the integument and external parts have disappeared. Mr. Stephens writes me, "It is only in this one spot in Tasmania that Trilobites have been found at all, and here they are only obtainable from this friable jointy matrix, which passes into a hard metamorphic sandstone with brecciated bands, either barren of fossils or utterly refractory." He adds, "I have named this formation the 'Caroline Creek beds,' to prevent any mistake as to locality."

The forms I have been able to distinguish amount to four only, or perhaps five, and this has not been accomplished without considerable difficulty, owing to the comminuted and

* Papers and Proc. R. Soc. Tas. for 1874, p. 27.
† Fide Stephens, *ibid* for 1873, p. 38. ‡ *Ibid* 1866, p 27.

fragmentary nature of the remains. Not a single instance of an entire specimen has occurred, and only one in which one of the free cheeks was attached to other portions of the cephalic shield. The parts of the body usually recognisable are the glabella, the pygidium, occasionally an hypostome, and several free cheeks, with eyes attached. No trace of a complete, or even partially complete, thorax has been observed, and the dismembered thoracic segments are not sufficiently well preserved to admit of description. Under these circumstances, it may be imagined with what difficulty the piecing together of these fragments has been attended.

The genus *Asaphus* is certainly represented by two tails, probably indicative of distinct species. No other portions referable to this genus have been noticed. We meet with portions of a fine head, chiefly the glabella, which I cannot do otherwise than refer to *Conocephalites*, and numerous examples of a free cheek, with eye attached, and long genal spines, which, perhaps, belong to the same genus. A fine pygidium occurs in about equal abundance with the glabella just referred to, possessing all the characters of the peculiar genus *Dikelocephalus*. Now, by their size and association, these two portions, the glabella and tail, should belong to one individual, but we cannot definitely unite them in the face of the different characters appertaining to the respective genera to which they belong. It is strange that out of the large number of specimens examined, no proper tail of a *Conocephalites*, or head of a *Dikelocephalus*, has been observed to complete the two forms. Lastly there are a series of small head shields, all more or less of the same type, but whose generic affinity, owing to their fragmentary condition, must be left an open question for the present. They clearly belong to the Conocephaloid type, and appear to have affinities with certain American genera of Trilobites.

Description of the Species.

Genus CONOCEPHALITES (*Zenker*, 1833). *Barrande.* 1852.

Obs. This genus includes Trilobites possessing a semicircular head shield, with a very distinct neck, segment, and furrows. The glabella is conical, attenuates forwards, and is divided by three to four short furrows. The axal grooves are deep and broad; the eyes present or absent, and placed either at the anterior part of the head, beside the angles of the glabella, or near the centre of the side lobes of the head. The course of the facial suture is simple; it commences at the anterior margin of the head shield far out, turns inwards with a curve towards the eye, and then curves towards the post angle and cuts the margin. The pygidium is semicircular, with a 2-8 jointed axis, and slight furrows at the sides.

The best descriptions of *Conocephalites* are those by

Barrande and Burmeister. According to their definitions, a very simple and natural group of Trilobites are retained together, two of the essential points being the division of the glabella by three to four short furrows on each side, and the entire margin to the pygidium. In 1863 Professor James Hall re-defined *Conocephalites*,* much enlarged it, and introduced a number of species differing greatly from the European types. In some of these the glabella is quite undivided, in others there are two furrows on each side, whilst again the border of the tail is produced in some into a spine on each side as in *Dikelocephalus*, besides other modifications of structure.

It would be more appropriate, I think, to retain such forms separate from *Conocephalites*, as represented by the European types of the genus *C. Sulzeri* and *C. striatus*. Indeed, Professor Hall admits a difficulty in referring all his species to *Conocephalites;* perhaps the difficulty might be solved by the institution of a new genus for their reception.

A well marked, and not often dwelt-upon character in *Conocephalites*, is the presence of the ocular ridge or eye line. This appears to be present more commonly in those species in which the eyes are placed wide apart, as in *C. striatus*. Emmrich. Burmeister describes it in the last-named species thus, "A sharp ridge extends itself towards them" (*i.e.*, the eyes), "from the angles of the glabella."† This ridge is well displayed in some of the American Trilobites referred by Professor Hall to *Conocephalites*, for instance, *C. Eos*, *C. diadematus*, etc. Accepting Barrande's definition of the genus as the correct and most satisfactory one, we have a cephalic shield from the Mersey deposit, which appears to correspond generally with it, although not absolutely identical.

CONOCEPHALITES ? STEPHENSI (sp. nov.),
(Figs. 1—3.)

Sp. char.—Cephalic shield, broad, semicircular, with a prominent anterior, and rather flattened margin, glabella elongate, enlarging somewhat towards the front; neck segment, broad, and well marked, without a tubercle. Glabella furrows, four in number on each side, short, and becoming more pit-like towards the front; the basal pair are rather obliquely directed, and are the longest; the most anterior pair are situated in the angle formed by the glabella, front margins, and fixed cheeks; a fifth short, and faint depression exists exactly in the centre of the anterior margin of the glabella. The neck furrow is very deep (in casts), and pit-like at the sides, at the junction of the axal furrows. The latter are deeply excavated, but the marginal furrow in front the glabella is faint. Fixed cheeks broad, of a much less convexity than the glabella, and sub-

* 16th Annual Report, State Cabinet, N. York, 1863, p. 147.
† Organisation of Trilobites, p. 73.

divided into two almost equal parts by a strong double eye-line, or ocular ridge, proceeding diagonally across them from the third glabella pit, on each side. Facial sature cutting the posterior margin far out; posterior margin of the free cheeks broad like the neck segment. Thorax unknown. Free cheeks small, elongately triangular, with a strong broad striate border, and a similar long genal spine; surface granular; eye large, semilunar.

Obs. An entire head shield of *C. Stephensi* is not present in the Collection, all that is usually seen being the glabella and fixed cheeks. The position of the eyes is, however, apparent, just at the termination of the ocular ridge, a point where the shield is always broken away.

The abrupt termination of the short glabella grooves, especially the two basal ones, width of the fore cheek, and presence of the ocular ridge, are characters which clearly separate our fossil from *Dikelocephalus;* neither is it a *Lonchocephalus*, from the absence of the backward cervical spine, shape of the glabella, and increased number of furrows on the latter. *C. Stephensi* has many of the characters of *Conocephalites*, as defined by Hall, but I have already pointed out how this definition departs from that of M. Barrande, and other well-known writers. *C. Stephensi* in no way possesses the facial suture of *Bathyurus* or *Bathyurellus*, whilst it has glabella furrows, which would entirely separate it from the former, and partly from the latter. Barrande has remarked on the resemblance of *Conocephalites* to *Cybele* in some of its features. The expanding glabella pit-like furrows at the sides, diagonal eye line, prominent front margin, and large fixed cheeks of *C. Stephensi* appear to bear out this view. The present species is quite distinct from either of the typical European *Conocephalites*, and so far as I can gather, from any of the American forms referred to this genus. At the same time, it must not be forgotten that we are dealing with casts of the interior, from which the crust has been removed; and, therefore, some allowance has to be made in defining the various proportions of the parts described. The axal furrows of the head do not appear to be anything like so deep as in the European species, or even so broad, neither is there any trace of a cervical principle in *C. Stephensi.* It approaches nearest to *C. striatus*, Emmrich* in which the eyes are widely separated, and the ocular ridges present, but there is a great difference between the two species in the form of the glabella, and its grooves. Equally distinct are *C. Sulzeri*, Schl.† and *C. coronatus*, Barr.‡ the position of the

* See Barrande, Syst. Sil. Bohême, I. Atlas, pl. 14, Figs. 1—7.
† *Ibid*, pl. 14, F. 8—23. ‡ *Ibid*, pl. 13, F. 20—26.

eyes and form of the glabella in both at once separating them.

The presence of the eye-line or ocular ridge allies the Tasmanian Trilobite to Hall's *C. minutus*,§ from the Potsdam Sandstone, but they do not otherwise agree. Again, another American species, *C. diadematus*, Hall,‖ possesses an ocular ridge, and other characters noticeable in *C. Stephensi*. I suspect that, whatever may be the ultimate systematic position of *C. Stephensi*, the latter will prove to be congeneric with it.

I have appended to the description of the cephalic shield named in honour of Mr. Stephens, that of a free cheek, constantly associated with the former. In one case only has any appearance of a free cheek in contact with other portions of the head represented itself, and although in a bad state of preservation, it appears to demonstrate the unity of the parts in question.

Genus DIKELOCEPHALUS. *D. D. Owen.*

DIKELOCEPHALUS TASMANICUS (sp. nov.)

(Fig. 4.)

Sp. char.—Pygidium semi-elliptical, moderately convex, and strongly facetted at the anterior angles. Axis tapering gradually, extending almost to the posterior margin, and of six distinguishable segments and a terminal appendage, more than half the width of the pleuræ at its anterior or wider end. Side lobes, or pleuræ, of about eight coalesced and bent down segments, the first broader than any of the others. Limb broad, produced on each side, opposite the fifth segment, into a strong tapering, diverging, and slightly curved spine, extending beyond the posterior limit of the tail for a distance equal to more than half its entire length, exclusive of the spines.

Obs. The segmentation, broad border or limb, and single lateral spines, leave no doubt of the relation of this tail to the genus *Dikelocephalus*. The spines, however, are much longer than in the generality of *Dikelocephali*, and in this particular resemble some of the North American Trilobites, referred by Hall to *Conocephalites*. For instance, *C. Jowensis* has a pair of long curved spines, but the other characters do not coincide with the Tasmanian tail. Another species, named by Hall simply *Dikelocephalus* has similar spines, but is otherwise distinct.

The remains of no other Trilobite have been met with in these Caroline Creek beds, at all comparable in size to the present fossil, except the head previously described as *Conocephalites? Stephensi*. The latter has been shown not to

§ 16th Annual Report, State Cabinet of N. York, 1863, Pl. 8, F. 5.
‖ *Ibid*, Pl. 7, Figs. 36—38.

possess the characters of *Dikelocephalus*, and we cannot, therefore, with the evidence at our command, justly consider these as parts of one and the same Trilobite. Should future researches show them to be so, then we possess a form with a cephalic shield resembling that of *Conocephalites*, more or less, and a tail almost undistinguishable from *Dikelocephalus*. Such a combination of characters would clearly demand the creation of a new genus for their fossils in question.

Genus ASAPHUS *Brongniart*, 1882.
(Hist. Nat. Const. Foss., P. 17.)
ASAPHUS. sp. *a. (Fig.* 6.*)*

Obs. A pygidium, measuring sixteen lines by eleven, is preserved in so far that the central axis, one entire wing, and a portion of the other, with the concave margin are present. The latter bears very faint indications of the concentric striæ usually seen around the tail of *Asaphus*. The full width of the tail would probably have been about eighteen lines.

ASAPHUS. sp. *b.* (*Fig.* 5.)

Obs. A pygidium with a convex surface, and a generally robust appearance. The axis is large, and shows traces of numerous broad segments. It is a squarer and less oval form than in the last species, and the limb is wider and more concave.

It is possible from the general contour and appearance of these specimens that they represent distinct species.

With remains so fragmentary, it is unnecessary to attempt a comparison with known species.

The remaining Trilobites are in too fragmentary a condition to determine satisfactorily. I shall, therefore, merely describe them as far as the material will allow, and indicate the direction in which their affinities probably lie.

1. A head shield with an oblong roundedly-convex glabella, ornamented with granules, rounded in front, and reaching far forward almost to the anterior margin of the head. The furrows are two in number, the anterior pair very faint (in the cast), and almost transverse, the hinder pit-like and rather more oblique; the axal furrows are deep, but gradually become shallower forwards. The fixed cheeks are broad towards the posterior part of the head, and appear to narrow forwards, forming a limited space of demarcation between the anterior part of the glabella and the front margin; the latter is strong and well marked. No definite description can be given of the facial suture, unless what appears to be a defined margin on the right-hand side of the head is it. (Figs. 8 and 9.)

I am unable to satisfactorily refer this Trilobite to any known genus, and I suspect it will constitute a new form, possessing some of the characters used in Hall's definition of

Conocephalites. The glabella, however, does not decrease in width forwards, and the fixed cheek is too broad; neither can it be placed in *Dikelocephalus.* On the other hand, the Trilobite in question may have some relation with *Loganellus,* Devine* ; but here again there is a discrepancy between their respective facial sutures, if the line visible in the Tasmanian form may be so construed.

2. Fig. 10 represents another species (?), apparently congeneric with the last, and to differ simply in the form of the glabella, which is pear-shape and less robust, and proportionately narrower. I take this to be a second species of the genus to which the former Trilobite belongs.

3. The next form to be referred to is represented by Fig. 11. We observe here much the same outline and convexity of the glabella, but apparently only one furrow on each side. It is in a wretched state of preservation, and too much reliance should not be placed on it.

4. The last specimen (Fig. 12) is a fragmentary head shield exhibiting an almost quadrate glabella, without any trace of a furrow. It is short, convex, and almost square, blunt in front, with the axal and neck furrows strong and deep (in casts). Without committing oneself to a definite opinion, the strong resemblance to Billings' genus *Bathyurus* may be pointed out.

A few words may now be said as to the probable age of the Caroline Creek beds, geologically speaking. In the Lower Silurian Rocks of Great Britain, *Conocephalites* ranges from the Lower Lingula Flags to the Menevian Group, but is chiefly characteristic of the former. *Dikelocephalus,* similarly, is confined to the Lingula Flags in Britain. The genus *Asaphus* has a wider range in time, being known as low as the Tremadoc, and as high as the Llandeilo, but it may be said to be representative of the Caradoc and Llandeilo. In Bohemia, according to M. Barrande's tables, † *Conocephalites* is found exclusively in Etagé *C.*, the equivalent of our Lower Lingula Flags, whilst *Asaphus* possesses very much the same range as in Britain. According to Miller's excellent Catalogue of "American Palæozoic Fossils," *Conocephalites* is confined without exception either to the Potsdam or St. John's Groups. The same authority restricts *Dikelocephalus* to the Potsdam and Quebec Groups of the American Geologists. Now, the Potsdam Group, and in part the St. John's, corresponds in age to our Lingula Flags, and to a portion of M. Barrande's Etagé *C.* The Quebec Group is about the equivalent of the British Arenig Series, or Lower Llandeilo. Accepting, therefore, the determination of the foregoing Trilobites as approximating to the truth, it appears more than probable that the age assigned to the fossils from the Caroline Creek

*See Billings, Pal. Foss., Canada, p. 200. †Syst. Sil. Bohême. 1. Suppl. p. 276.

beds, by Messrs. Etheridge and Lesquereux, is correct, and that this may be looked upon as that of the Lingula Flags or Menevian beds of Great Britain, and the Potsdam Sandstone of North America.

Associated with the Trilobitic remains just described, are those of small discoidal, or planorbicular Univalves. (Pl. 2, Fig. 13 and 14.) The specimens are mere casts, but they present all the appearance of the genus *Ophileta*, Vanuxem, one (Fig. 13) more especially than the other. As a rule, the side of the shell visible in the present specimens is the upper or concave, showing the sunk spire. The whorls are truncate and biangular exteriorly. *Ophileta*, which is chiefly an American genus, occurs commonly in the Quebec Group beds, somewhat higher in the series than the Potsdam Sandstone. On the whole, it strongly corroborates the deduction drawn from the Trilobites, as to the stratigraphical position of the beds in question. There are also the internal casts of a very peculiar bivalve. This I am at present unable to refer to any genus, and must defer an opinion on it to some future occasion. In the meantime it is simply figured. (Pl. 2, Fig. 15.)

2. BRACHIOPODA FROM THE CONGLOMERATE OF TABLE CAPE.
(Plate 2.)

Mr. T. Stephens has described the geological features of portions of the North Coast of Tasmania in a very interesting paper, "Remarks on the Geological Structure of Part of the North Coast of Tasmania," etc. According to his observations, there exist along the line of coast, westward from the River Tamar, beds of conglomerate in a series which is possibly of Silurian age.* Between Port Sorell and Table Cape, and above the former, he describes horizontally bedded conglomerates and breccias, unconformably underlying the Tertiary freestone of the Cape, said by Prof. McCoy to be of Miocene age. The conglomerate in question consists of rolled pebbles, and angular fragments of the primary rocks of the neighbourhood, and the Plutonic rocks associated with them. Mr. Stephens adds, "It contains boulders derived from rocks which are not older than the Lower Carboniferous or Devonian period."†

Mr. R. M. Johnston has likewise described ‡ this deposit, forming, as he states, the floor of the Tertiary beds at the locality in question, and containing here and there highly fossiliferous blocks, in one of which Brachiopoda were abundant. Mr. Johnston believes the Table Cape conglomerate to be identical with that of the Dial Range, which is considered by Mr. Gould to be of Silurian age. The remarks of the

* Papers and Proc. 1869, p. 17. † *Ibid*, p. 18.
‡ Further Notes on the Tertiary Marine Beds at Table Cape. *Papers and Proc. R. S. Tas.* for 1876, p.p. 79—90f.

former, in connection with the Brachiopoda, quite coincide with the specimens forwarded by Mr. Stephens, who gives the locality and horizon as "boulders in a conglomerate of unknown age, near Table Cape, North Tasmania."

The limited number of fossils from the blocks forming the conglomerate of Table Cape are presented to us wholly as internal casts, and are very difficult to decipher. The matrix, as exhibited in hand specimens, varies to some extent. Certain of the masses are from a bluish-grey fossiliferous limestone, whilst other specimens, equally organic-bearing, are of a yellow or drab colour when weathered, and appear to be more arenaceous, almost passing at times into a grit.

With few exceptions, the remains are those of Brachiopoda, and, as the most numerous, will claim our attention first. The others are the impressions of a *Tentaculites*, accompanied by fragments of Crinoid stems.

The commonest, and at the same time the most interesting fossil met with in the specimens under description, is undoubtedly a *Pentamerus* (Pl. 2, Figs. 1, 3, 4, 5, 6, 7, and 8), although at first sight its affinities were certainly obscure. There are several specimens in various stages of preservation, some with portions of the shelly matter remaining; but as the best examples are obtained by fracture of the blocks, entire specimens are seldom seen. The present species have externally a more or less triangular outline, like some varieties of *Pentamerus Knightii*, Sby.*, narrowed towards the beaks and expanded towards the front; but, unlike Sowerby's species, the ventral valve of the Tasmanian shell is very much deflected at the sides and front. The latter becomes almost cuboidal, and, as it were, geniculated, thus producing a perpendicular front to the valves. In this character the shells resemble some Rhynchonellæ, but not otherwise. The surface was covered by radiating ribs, as in *P. Knightii*, but in the casts the umbonal or visceral region is almost smooth, or only bearing traces of the muscular impressions, the ribs commencing to show at a little more than one-third from the beak. This is a very characteristic point, and enables us to identify the species throughout the hand specimens, whether in fragments or partially crushed examples. In Pl. 2, Fig. 3 and 4, are illustrated a characteristic ventral valve, showing the triangular outline and much deflected sides and front. From the beak forwards proceeds the cavity left by the elongated, strong septum, to which would be attached internally the dental plates, and extending for fully one-third the length of the valve. On each side of it, immediately in the umbonal region, is a more or less smooth space, on which are visible the delicate impressions of the

* See Davidson's Mon. Sil. Brachiopoda, T. 17, F. 6 and 7.

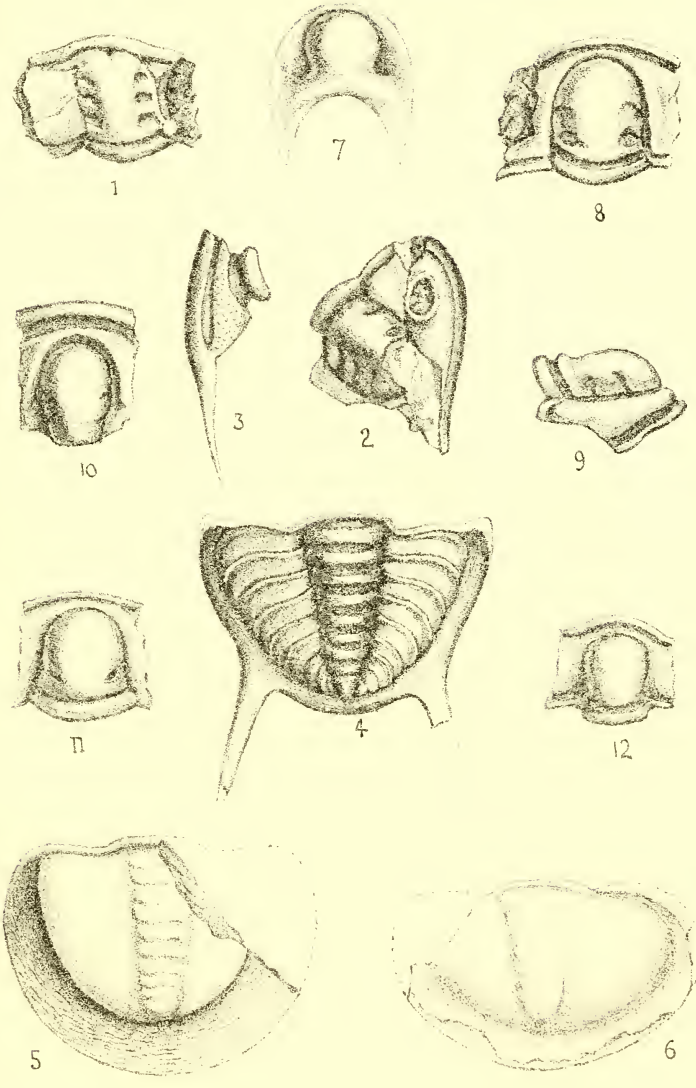
great muscles. In another specimen, only a fragment (Fig. 6), the septal cavity is again seen, and similar muscular scars. This was the first example which led me to conceive that this shell might be a *Pentamerus*, for its resemblance to one well-known cast of the May Hill Sandstone at once caught the eye.

In Pl. 2, Fig. 1, is represented a dorsal valve, in which may be seen the casts of the two septa, enclosing between them a portion of the V-shaped, or fifth chamber, so characteristic of the genus *Pentamerus*. This is again shown on a more striking scale in Fig. 5, in which we meet with the same characters as to general shape, deflected sides, and front of the shell. It is, however, on one side of the larger hand-specimens that the strong confirmation of the *Pentamerus* nature of these shells displays itself. We there observe a number scattered about possessing all the features above described, and also one shell split open with the fifth chamber exposed to view, and its sides of that glistening nature so often met with in British examples. (Pl. 2, Fig. 7 and 8.) I propose to call this shell *Pentamerus Tasmaniensis*.

A fossil, at first sight of a most remarkable nature, may be referred to here. It is an internal cast of two different shells, the *Pentamerus* just described (Pl. 2, Fig. 1), and a *Spirifer* or an *Orthis*, probably the latter, a valve of each placed in apposition as if belonging to one individual. On one side may be seen the dorsal valve of the *Spirifer* or *Orthis* (Pl. 2, Fig. 2), possessing the usual radiating ribs and a smooth medial fold. On the other is what I believe to be a modification of the *Pentamerus* (Pl. 2, Fig. 1), previously referred to. It has a smoother umbonal region, but there is the deflected front sides, the large fifth chamber, and the coarse ribbing.

On another block is a cast of a well-marked *Orthis*, a ventral valve with but few ribs, and those coarse and strong. (Pl. 2, Fig. 16). In all probability it is the opposite valve of the same species we observed accidentally in apposition with the *Pentamerus*. It is not unlike *Orthis biforata*, Schlotheim, a Middle and Upper Silurian form in Europe. Again, it resembles some varieties of *Orthis lynx*, Eichwald, a species met with in the Trenton Group of North America. The Tasmanian shell has about seven ribs on each side the medial fold of the ventral valve.

Another piece of matrix, bearing the number six, has scattered over it numerous small casts of the forms of *Spirifera*. One is very finely striated, with a wide sulcus, and has all the appearance of the Upper Silurian *Sp. plicatella*, Linn., (Pl. 2, Fig. 9 *a* and *c*), or in some points it resembles the young of a Devonian species, *Sp. Verneuilii*. The second species, although small, possesses strong ribs, like *Sp. elevata*, Dalm., or



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TASMANIAN TRILOBITES

perhaps *Sp. Crispa* Hisinger (Pl. 2, Fig. 9 *b*). Lastly, two small pieces of matrix (marked E) have a *Spirifer* similar to the coarsely-ribbed form just mentioned, and what I believe to be several fragmentary casts of a small *Strophomena* (Pl. 2, Fig. 11).

On opening these remarks, I alluded to a *Tentaculites*. It consists simply of impressions of the exterior, apparently representing a simple ridged form (Pl. 2, Fig. 12).

A few words may now be said as to the probable age of the blocks, or at least some of those forming the Table Cape Conglomerate. In British rocks, *Pentamerus* first makes its appearance in the Lower Llandovery, and ascends to the Aymestry Limestone. The genus is again met with in the Middle Devonian. It is, however, particularly characteristic of the Upper Llandovery beds, or May Hill Sandstone. In America it occupies very much the same stratigraphical position, and is particularly characteristic of the Niagara Group. The latter forms the base of the Upper Silurian, just as the May Hill Sandstone does in Britain. The other determinations, being open to criticism, need not have too much stress laid upon them. It may, however, be pointed out that both *Spirifera elevata* and *S. plicatella* are Upper Silurian forms, whilst *Orthis biforata* has a more extended range.

Next to the *Pentamerus* in importance are the impressions of the *Tentaculites*. This genus of Pteropod Mollusca ranges from the Caradoc upwards, but attains its maximum development in the Upper Silurian, although it does extend into the Devonian.

On the whole, it may be said, with a fair amount of probability, that at least some of the Table Cape boulders are of Upper Silurian age, the stratigraphical sub-division of the May Hill Sandstone putting in a very strong claim for recognition.

I have to express my hearty thanks to my friend, Mr. T. Davidson, F.R.S., for his assistance in the provisional determination of the foregoing species of Brachiopoda. Mr. Davidson's assistance is always the more valuable from the hearty manner in which it is rendered.

DESCRIPTION OF THE FIGURES.

Plate I.

Fig. 1. Conocephalites Stephensi. *R. Eth., Junr.* The glabella and remains of one fixed cheek; the former shows the four pit-like furrows on each side, and the central indentation in the front; across the latter is visible the ocular ridge, or eye-line.

Fig. 2. Another example of the same, with lying on it a free cheek and remains of the eye.

Fig. 3. Another free cheek, probably belonging to this

species, showing a portion of the eye, the long genal spine, and the granular surface

Fig. 4. Dikelocephalus Tasmanicus. *R. Eth., Junr.* A tail exhibiting in an exceedingly fine manner the characters of the species, including the long tail spines.

Fig. 5. Asaphus, sp. *b.* Larger portion of a pygidium or tail, with a wide limb, or border, delicately striated.

Fig. 6. Asaphus, sp. *a.* A similar, but smaller and much more oval tail.

Fig. 7. Labrum.

Fig. 8. Glabella and portion of the fixed cheeks of a Trilobite, which would perhaps fall within Hall's definition of *Conocephalites.*

Fig. 9. Side view of the same.

Fig. 10. Another form nearly allied to Fig. 8, but having a more pear-shaped glabella, and wider frontal margin.

Fig. 11. Another glabella, of a squarer form than in either of the preceding, and with only one pit-like furrow on each side.

Fig. 12. Fragmentary head-shield, with an almost quadrate glabella, and no visible furrows.

Plate II.

Fig. 1. Pentamerus Tasmaniensis, *R. Etheridge, Junr.* Internal cast of the dorsal valve, showing the cavities of the two septa, enclosing between them a portion of the V-shaped or fifth chamber.

Fig. 2. Spirifer sp., dorsal valve, perhaps, of Fig. 16.

Fig. 3. Pentamerus Tasmaniensis, an internal cast of the ventral valve, exhibiting the cavity left by the large septum.

Fig. 4. Side view of the same specimen, with the deflected sides and front of the shell.

Fig. 5. Another dorsal valve of the same species.

Fig. 6. Portion of another ventral valve, showing the septal character and muscular scars.

Fig. 7. Portion of a slab, with portions of three individuals, and part of another, in which the fifth or V-shaped chamber is exposed by fracture.

Fig. 8. The fractured portion removed from No. 7.

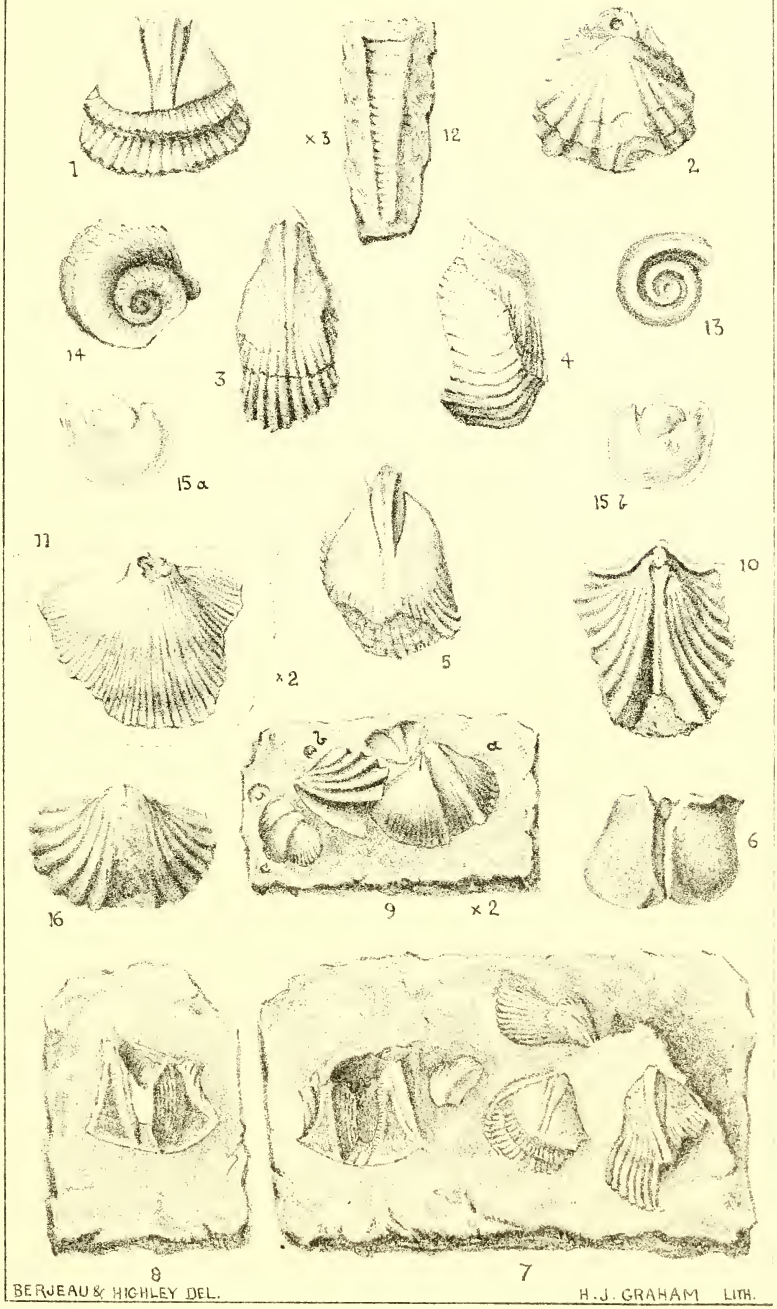
Fig. 9. Portion of a slab with *(a & c) Spirifer,* resembling *S. plicatella,* Linn. (*b*), another *Spirifer,* not unlike *S. crispa,* His. or *S. elevata.* Dalman. x 2.

Fig. 10. Portion of another form of *Spirifer* (*?*) or perhaps an *Atrypa.*

Fig. 11. Fragment of a shell, with the appearance of a *Strophomena.* x 2.

Fig. 12. Cast of a small *Tentaculites.* x 3.

Fig. 13. Small Univalve, in all probability an *Ophileta,* from a wax cast.



TASMANIAN SILURIAN MOLLUSCA

Fig. 14. Another Univalve, a different species to the last.
Fig. 15. Internal casts of a Bivalve (?) undetermined.
Fig. 16. Orthis sp., resembling *Orthis biforata*. Schlotheim.
N.B.—The originals of Figs. 13, 14, and 15 are from the Caroline Creek beds; the remainder are from the Table Cape conglomerate.

ECONOMIC VALUE OF THE AQUATIC PLANT *TYPHA LATIFOLIA.*

By James Barnard.

[*Read* 17*th July*, 1882.]

Actuated by a philanthropic spirit, Signor C. A. de Goyzueta, Italian Consul at Melbourne, recently addressed a communication to the Government of Tasmania in reference to this aquatic plant, and dwelling upon certain valuable properties which it possesses. The following is an extract from that communication:—

"The commander of the royal transport *Europa* when in this port (Melbourne) offered the Victorian Humane Society of Melbourne a sample of the buoyant mattresses used on board the Italian vessels for their efficiency as a life-saving apparatus in maritime disasters.

"The same society tested that mattress, and found that it can easily support two persons on the water; so that, deeply convinced of their utility, they came to the decision to promote the introduction into the colony of the plant those mattresses are stuffed with.

"By direction of His Excellency the Minister of Marine, I communicated to the said society, in answer to a relative question, that this plant, known in botany by the name of Typha latifolia, is an aquatic one, spontaneously growing in marshes and other stagnant waters in the southern as well as in the northern provinces of Italy; wherefore there is ground to believe that it might be introduced under every climate. It is very far lighter than water, hygienic, and lasts not less than any other vegetable used in stuffing mattresses.

"I thought it my duty, for humanitary interests, to bring the above under notice, in the opinion that many lives would be spared were the Typha latifolia generally employed in preference to other vegetable or animal substances for the mattresses used at sea."

Duly estimating the importance of bringing under public notice a plant of this useful character, the hon. Colonial