Lower Ordovician Fossils from Caroline Creek, near Latrobe, Mersey River District, Tasmania

By

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PLATE XII

Since Etheridge (1883) described this fauna, the generic references of the trilobites contained have been discussed by Johnston (1888) and again by Etheridge (1919). In 1936 I revised the fauna with fresh material kept in the British Museum of Natural History at London (Kobayashi, 1936). Recently, Dr. A. N. Lewis provided me with a new collection and this paper deals with the results obtained in studying it. Here I wish to tender my sincere thanks to Dr. Lewis for having given me the opportunity to make this interesting study.

The new collection contains most of the known species apart from a few new forms. The determinations by Etheridge and myself are tabulated below:

Etheridge's Determination.	*My Determination.*
	Brachiopod, gen. et. sp. undt. (2 spp.)
Ophileta (?) sp.	Euomphalidae, gen. et. sp. undt.
	Cryptolites sp. undt.
Conocephalites cfr. *stephensi*)	
Dikelocephalus tasmanicus }	*Tasmanocephalus stephensi* (Etheridge)
Asaphus sp. (*a*)	
Asaphus sp. (*b*)	*Asaphellus lewisi*, n. sp.
Ptychoparia (?) *carolinensis*	*Etheridgaspis carolinensis* (Etheridge)
Ptychoparia (?) *johnstoni*	*Etheridgaspis johnstoni* (Etheridge)
	Carolinites bulbosa, n. sp.
	Carolinites quadrata, n. sp.
Ptychoparia (?) *tasmanicus*	*Carolinites* (?) *tasmanicus* (Etheridge)
	Prosopiscus subquadratus, n. sp.
	Free cheek gen. et. sp. undet.

The Caroline Creek fauna comprises fourteen species which are distributed in two genera of Brachiopoda, two genera of Gastropoda and five genera of Trilobita among which two indeterminable species of brachiopod, *Ophileta* (?) sp., *Cryptolites* sp. and a detached free cheek of trilobite of which little is known may be omitted in this discussion. *Asaphus* sp. (*a*) is not contained in the collection at hand, but if the pygidium with the smooth pleural lobe and concave border in

fig. 5 and the forked hypostoma in fig. 7 (Etheridge 1883) be combined in one species, the acquired form would belong to *Isoteloides* or some other genus in the Asaphinae.

Asaphellus is the characteristic Tremadocian genus. The species *lewisi* described in the present paper is near *Asaphellus* but its exact generic position is uncertain. Nevertheless, it is noteworthy that the species is closely allied to *Asaphellus* (?) *stenocephalus* (Mansuy). *Prosopiscus* (?) *subquadratus* resembles P. (?) *cheirurоides* which occurs at Thanh-hoi in association with a few species of *Asaphopsis* and *Asaphellus* (?) *stenocephalus*. The generic position of the cheirurids is, however, uncertain. *Tasmanocephalus* is allied to *Chosenia* in South Chosen and *Wutingia* in South Manchuria, both Lower Ordovician members.

Carolinites and *Etheridgaspis* are such peculiar trilobites that it is difficult to settle even their family-references. At a glance, the former resembles *Onchonotus*, especially *O. orientalis* from the Tomkolian of South Chosen (Kobayashi, 1934) but the large oblique eye shows that it is a terminal branch of the Komaspidae rather than of the Solenopleuridae. In the pitted furrows of the glabella the latter looks like *Tostonia* and *Moxonia* but disagrees with them in most other features. It resembles also Irvingellids in the lateral view of the cranidium but the eye is not so developed as in the Irvingelloids. In my opinion, it may indicate an aberrant branch probably of the Solenopleuridae. Of the five trilobites, the former two trilobites in addition to the coiled gastropods indicate the Ordovician age of the fauna and the rest of the trilobites which are presumably relics of the Cambrian trilobite families suggest that the age is of the early part of the Ordovician period, the view being upheld by the inclusion of deeply forked hypostoma of the Asaphidae. The palaeontological evidences so far obtained are, however, insufficient to determine the age with any further accuracy. Through "*Asaphellus*" and "*Prosopiscus*", some affinity of this fauna to that of the Dongson sandstone at Thanh-hoa cannot be overlooked and the latter maintains intimate relations with the Caroline Creek fauna through *Asaphopsis*, but not a single species is found in common between the two faunas in Tasmania. The status appears to suggest a difference of fossil zones.

Finally a question remains as to which is the older between the Junee and Caroline Creek faunas, the solution of which naturally depends upon the field relation between the fossil horizons.

Family CRYPTOLITIDAE Ulrich and Schofield

Genus **Cryptolites** Conrad, 1838

Cryptolites, sp.

PLATE XII, FIG. 22

A gastropod is contained in the collection but only the last whorl is preserved. It coils in one plane or near to it and expands very rapidly. The umbilicus is as wide as one-third the diameter of the shell. The last whorl may not overlap the preceding one to a great extent. Its section is laterally compressed and its periphery is produced into a carinate band. Several low ribs run straight across the whorl. The aperture seems to be entire and simple.

This would appear to be a member of the Integridorsata of the Bellerophontacea (Reed, 1918) rather than of *Pelagiella*. It is most probably a *Cryptolites* and the straight ribs which are low and relatively wide are a specific characteristic.

Family DAMESELLIDAE Kobayashi

Genus **Tasmanocephalus** Kobayashi, 1936

Tasmanocephalus stephensi (Etheridge)

PLATE XII, FIG. 1-4

1883. *Conocephalites* (?) *stephensi* Etheridge, Pap. Roy. Soc. Tasm. 1882 (1883), p. 153, pl. 1, figs. 1-3.
1883. *Dikelocephalus tasmanicus* Etheridge, Pap. Roy. Soc. Tasm. ibid. p. 155, pl. 1, fig. 4.
1888. *Conocephalites stephensi* Johnston, Syst. Acc. Geol. Tasm. p. 37, pl. 1, figs. 3, 4, 14.
1888. *Dikelocephalus tasmanicus* Johnston, ibid. p. 37, Pl. 1, fig. 8.
1919. *Crepicephalus tasmanicus* Etheridge, Trans. Roy. Soc. Austr., vol. 43, p. 390.
1936. *Tasmanocephalus stephensi* Kobayashi, Japan. Jour. Geol. Geogr. vol. 13, p. 180.
1936. *Taihungshania tasmanensis* Kobayashi, Japan. Jour. Geol. Geogr vol. 13, p. 179.

In a previous paper, I proposed the new generic name, *Tasmanocephalus* for *Conocephalites* (?) *stephensi* and referred *Dikelocephalus tasmanicus* to *Taihungshania*. Then I could see neither a cephalon of *tasmanicus* nor a pygidium of *stephensi* in the collection in the British Museum. As I failed again to find either one of them in the other collection now at hand, I am inclined to accept Etheridge's view expressed in the following passage: 'Since my paper was written now many years ago, I have examined a quality of the Caroline Creek deposit. One result of this is inability to find any pygidia likely to associate themselves with the *Conocephalites* cephalon other than the *Dikelocephalus* tail or vice-versa. I can, therefore, only conclude they are one and the same.'

Excepting the presence of two posterior spines, the pygidium in question is different from those of *Dikelocephalus* and *Dikelocephalina* while, on the other hand, it resembles closely that of *Taihungshania* as I have suggested. Then how far the pygidia of *Tasmanocephalus* and *Taihungshania* differ from each other becomes a question. Close comparison shows that the pygidium of *tasmanicus* differs from any of the known species of *Taihungshania* in that the pleural groove is much wider than the pleural ridge, the interpleural groove is, although weak in the young stage (see fig. 4), well developed on the pleural ridge in the later stage of growth (see fig. 3), the extremity of the articulating margin is distinctly angulated, and the marginal border is frequently well defined by a groove. In *Tasmanocephalus*, the spines are widely divergent posteriorly whereas they are nearly parallel in *Taihungshania shui* Sun (see Sun, 1931), *T. shui brevica* Sun, *T. miqueli* Bergeron and *T. miqueli landayranensis* Thoral. As *T. miqueli flexuosa* Thoral (see Thoral, 1935) which is represented by the pygidium only is quite distinct from these forms of *Taihungshania* in its broad triangular outline and spines issuing from the antero lateral points, further study is needed on the species, especially its cephalon, to determine whether or not it really belongs to *Taihungshania*.

At any rate, the pygidium of *tasmanicus* may be readily distinguished from that of *Taihungshania* and it probably belongs to *stephensi*. The genus in which the cephalon and pygidium are combined is indeed, more allied to *Chosenia* (Kobayashi, 1934) and *Wutingia* (Endo, 1935) than I formerly thought. All of the three Lower Ordovician genera agree with one another in the broad cranidium, long glabella provided with three pairs of lateral furrows, broad fixed cheek, large posterior eye and free cheek with genal spine on the cephalon and in the depressed marginal border and a pair of spines on the pygidium. The outline of the glabella which is suboviate and bulbous in *Chosenia*, subquadrate, but slightly tapering forward in *Wutingia* and subquadrate but slightly expanding forward in *Tasmanocephalus* is the distinguishing characteristic.

Family CHEIRURIDAE Salter

Genus **Prosopiscus** Salter, 1865

Prosopiscus(?) subquadratus, n.sp.

PLATE XII, FIG. 5

Description:—Glabella square, elevated above the cheek; dorsal furrow very deep; three pairs of lateral furrows short, deep and transversal, but disconnected in the axial part; occipital furrow bent forward in the middle; fixed cheek slightly narrower than the glabella and bent down laterally; palpebral lobe of medium size and opposed to the second lateral furrows; palpebral ridge faintly impressed; facial sutures anterior to the eyes nearly parallel and those posterior to them transverse and cutting the lateral margin at a point in front of the genal angle; frontal rim wire-like and depressed below the glabella; genal spine apparently absent; texture of the carapace unknown.

Comparison:—*Encrinurella insagensis* (Reed, 1906) and *E. martelli* (Reed, 1917) which are common in Southern Asia differ from this species in the outline of the glabella which expands forward in the Asiatic ones and further, in the furrows on the glabella which are disposed in a different manner. *Protopliomerops* has a longer glabella; oblique lateral furrows, more anterior eye and short genal spine. *Prosopiscus minus* (Mansuy, 1920) may be the nearest form but the glabella is longer in *minus*.

Family KOMASPIDAE Kobayashi

Genus **Carolinites** new genus

Diagnosis:—Komaspidae without lateral glabellar furrows and with a narrow fixed cheek, large eyes and a raised frontal rim.

Type—Carolinites bulbosa Kobayashi.

Remark:—This genus can readily be distinguished from irvingellids by its unfurrowed glabella.

Carolinites bulbosa, n.sp.

PLATE XII, FIGS 6 AND 7

Description:—Glabella bulbous, expanded forward; no glabellar furrows except the occipital one which is deep; eye-band long and oblique; no frontal limb; frontal rim straight; marginal furrow deep.

Observation:—A pygidium which presumably belongs to this is semi-circular; axial lobe as wide as half the pygidium, distinctly elevated above the pleural lobe, and composed of three rings and a terminal subtriangular lobe; pleural part narrow, gently convex and faintly ribbed; marginal border of moderate breadth and flat. It is noted that this pygidium is, in the general aspect, allied to the one which I reported from British Columbia and referred to *Irvingellina* (Kobayashi, 1938).

Carolinites quadrata, n.sp.

PLATE XII, FIGS. 8 AND 9

Description:—Glabella convex, subquadrate, slightly expanded forward, highly elevated above the fixed cheek; no furrows on the glabella except a strong occipital one; neck ring narrowing laterally; eye-band, long and oblique; fixed cheek

depressed and bent down to the front and back from the eye; frontal rim straight, wire-like, depressed in front of the glabella and separated from the glabella by a furrow.

Carolinites(?) tasmanensis (Etheridge)

1883. *Bathyurus* (?) sp. Etheridge, Proc. Roy. Soc. Tas. 1882 (1883) p. 157. Pl. I, fig. 12.
1888. *Bathyurus* (?) sp. Johnston, Syst. Acc. Geol. Tas. p. 37. Pl. I, fig. 19.
1919. *Ptychoparia* (?) *tasmanensis* Etheridge, Trans. Roy. Soc. S. Australia, vol. 43, p. 392.

This differs from *Carolinites bulbosa* in the presence of a narrow frontal limb, the anterior outline of the cranidium which is gently convex forward, and broad free cheek. If the illustration is correctly drawn and the eye is small, this does not belong to *Carolinites*.

Family SOLENOPLEURIDAE Angelin

Subfamily *SOLENOPLEURINAE* Kobayashi

Genus **Etheridgaspis** n.gen.

Diagnosis:—Solenopleuridae with long subovate glabella, strong posterior glabellar pits and furrowed pleural ribs on the pygidium.

Type:—*Ptychoparia* (?) *carolinensis* Etheridge.

Remarks:—At a glance, Etheridge's *Carolinensis* in fig. 9 looks similar to the irvingellid in its bulbous glabella, platform-like fixed cheek and the features in the front border, but upon closer study of the collection, I found that the resemblance is not so remarkable. In the irvingellids, the eye is not closely set to the glabella and the fixed cheek is not so narrow. Furthermore, one or more lateral furrows generally run across the glabella in most genera of the Komaspidae except *Dartonaspis*.

As suggested in my previous paper, this genus is certainly more allied to the Solenopleuridae; and especially to *Menocephalites* Kobayashi, 1935, *Hystricurus* Raymond, 1913, and *Lonchocephalus* Owen, 1852. The last mentioned genus is different from *Etheridgaspis* in its triangularly ovate glabella, occipital spine, broader fixed cheek and frontal limb, unfurrowed pleural rib of the pygidium and so forth. These distinctions except the spine applies to distinguish this genus from *Hystricurus* and moreover *Hystricurus* differs from this in its unfurrowed glabella. *Menocephalites* is different from this in the absent frontal limb and broader fixed cheek. Nevertheless it is allied to the three genera of the Solenopleuridae in many respects including the cranidium and pygidium. The narrow fixed cheek, a pair of pits on the posterior part of the glabella and furrowed pleural ribs of the pygidium are the generic characteristics.

Etheridgaspis carolinensis (Etheridge)

PLATE XII, FIG. 10-11

1883. *Conocephalites* sp. Etheridge, Proc. Roy. Soc. Tas. 1882 (1883) p. 156 and 162, pl. I, figs. 8-9 and (?) 11.
1888. *Loganellus* (?) or *Conocephalites* (?) sp. Johnston, Syst. Acc. Geol. Tasm. p. 37, pl. I, figs. 7, 11, & (?) 16.
1919. *Ptychoparia* (?) *carolinensis* Etheridge, Trans. Roy. Soc. S. Australia, vol. 43, p. 361.

Description:—Glabella large, regularly convex, very slightly expanding backward and rounded in front; circum-glabellar and occipital furrows strong; anterior lateral glabellar furrow indicated by a faint pit at about the middle point of the glabellar side and posterior one by an oblique depression which is pitted at a short

distance from the glabellar side; fixed cheek very narrow; but its posterior lateral limb is long and extends laterally; palpebral lobe relatively large and located slightly posterior to the middle of the cranidium; frontal limb narrower than the frontal rim and they are intervened by a groove; facial suture diagonal and cutting the frontal margin in front of the eye; surface granulated.

Free cheek bordered by a narrow furrow and rim; the marginal rim produced into a short genal spine; eye well developed and elevated above the gently convex free cheek.

Comparison:—I fear that Etheridge's illustrations may not be correctly drawn, because one specimen in figures 8 and 9 and the other in figure 11 which are different in the outline of the glabella and the number and direction of the lateral glabellar furrow were referred to one species. The specimen beforehand fits in neither one of the two exactly, but several characters are common between this and either one of Etheridge's. Mine has two pairs of lateral furrows in the glabella as the specimen in fig. 11. The glabellar outline similates that in fig. 8, but is longer and slightly expanded in the posterior, although the expansion is not as wide as seen in fig. 11. It is intermediate between the two, but approaches closer to the one in fig. 8.

Etheridgaspis johnstoni (Etheridge)

PLATE XII, FIGS. 12-14

1883. Second species Etheridge. Proc. Roy. Soc. Tasm. 1882 (1883) pp. 157, 162, Pl. I, fig. 10.
1888. *Loganellus* (?) or *Conocephalites* (?) sp. Johnston, Syst. Acc. Tas. p. 37. Pl. I, fig. 10.
1919. *Ptychoparia* (?) *johnstoni* Etheridge, Trans. Roy. Soc. S. Australia, vol. 43, p. 392.

Description:—Glabella long, conical, gently tapering forward, rounded in front, and distinctly elevated above the fixed cheek; circum-glabellar furrow very deep; anterior lateral furrow shallow and very faint; posterior lateral furrow represented by an oblique deep pit at a short distance from the glabellar side; occipital furrow deep; occipital ring almost uniform in breadth. Fixed cheek very narrow; palpebral lobe relatively large and located at the midlength of the glabella; postero-lateral limb of the fixed cheek extending laterally; frontal limb rudimentary; frontal rim depressed; facial sutures slightly divergent in front of the eyes and widely divergent posterior to them.

Pygidium semicircular, somewhat truncated, even sinuated at the hind; its anterior outline broadly arcuate; axis conical, rounded behind, highly elevated above the pleural lobe which is slightly convex, gently inclined toward the margin and divided by broad furrows into three intrapleural ribs in addition to an articulating one; the rib and furrow almost equally broad; each of the three ribs divided into riblets by an interpleural furrow; the riblet as well as the interpleural furrow run into the marginal border but the intrapleural furrow terminated in the inside of the elevated flat-topped border.

Comparison:—This species differs from the preceding in its narrower and more convex glabella which tapers forward more rapidly. Yet the difference is no more than specific.

At first I thought that Etheridge's *johnstoni* is a different species, insofar as the glabellar outline is concerned. However, as shown in fig. 14, an ill-preserved specimen assumes a similar aspect. Because it is quite probable that his specimen which is incomplete and perhaps incorrectly drawn in his illustration belongs to the same species, I hesitate to establish a new species for mine.

Family ASAPHIDAE Burmeister

Subfamily *OGYGIOCARINAE* Raymond

Genus **Asaphellus** Callaway, 1877

1877. *Asaphellus* Callaway, Q. J. G. Soc. London, vol. 33, p. 663.
1910. *Asaphellus* Raymond, Ann. Carnegie Mus. vol. 8, No. 1, p. 37.
1910. *Asaphellus* Grabau and Shimer, North American Index Fossils vol. 2, p. 290.
1913. *Asaphellus* Raymond in Zittel-Eastman's Text-Book vol. 1, p. 719.
1930. *Asaphellus* Reed, Ann. Mag. Nat. Hist. p. 313.
1934. *Asaphellus* Kobayashi Jour. Fac. Sci. Imp. Univ., Tokyo, Sec. 2, vol. 3, pt. 9.

The association of the detached hypostoma to the dorsal shield of *Asaphellus homfrayi* has been a moot question. Salter's (1866) hypostomata from Garth are distorted. One in fig. 9 which is laterally compressed is parallel-sided; the sides are expanded in the other in fig. 8 which is longitudinally depressed. Both have the elliptical body in addition to the lunate ridge behind. According to Reed (1931) 'the hypostoma which he (Callaway) attributed to *A. homfrayi* more probably belongs to *P. crofti* while that which he referred to the latter should, on the other hand, be assigned to *A. homfrayi*'. Callaway's (1877) hypostoma in fig. 2a shows the maculae divided by a median elevation at the rear. Raymond (1910) noted that the hypostoma of *Asaphellus gyracanthus* is similar to that of *Hemigyraspis colliena*. Only the latter which has the outline tapering backward and rounded at the hind was illustrated. Its macula-bearing ridge appears to be very narrow. Incidentally, *colliena* was later selected for the type of *Bellefontia* by Ulrich (1924). Although those hypostomata of *Asaphellus* differs in minor respects, all agree in the oblong outline, small anterior wings and large central body from which the maculae are distinctly separated. The specimen at hand belongs to this kind of hypostoma.

The isoteliform facial suture precludes this species from *Hemigyraspis* and its unforked hypostoma from *Isotelus*, *Isoteloides* or *Asaphelloides* to one of which it might otherwise belong. At length *Asaphellus*, *Paramegalaspis* and *Megalaspidella* remain for its comparison. When Thoral (1935) established the genus, he overlooked *Asaphellus monticola* Raymond which has been described from the Middle Tremadocian at the Priori near Pierrrerue and L'Chinian, Herault, South France. No mention is, however, given of its hypostoma and with the dorsal shield only its generic separation from *Paramegalaspis* is hardly possible. Thoral compared the hypostoma of the genus with those of *Asaphellus* figured by Callaway (1877) and Matthew (1903) between which Matthew's was later referred to *Asaphellus obtectus* (Raymond, 1924) and Callaway's to *Platypeltis crofti* as mentioned already. The hypostomata of Raymond's *obtectus* as well as Matthew's *A. homfrayi* var. resembles that of *crofti*, instead of *homfrayi* in the subcircular outline. Compared to the hypostoma of *Asaphellus* which is figured out above, that of *Paramegalaspis* is different at least in the size of the anterior wing which is broader in the latter.

When I revised the Cambro-Ordovician shelly fauna of South America (Kobayashi, 1937) I established a new genus, *Megalasphidella*, and *Asaphelloides*, a new subgenus of *Asaphellus*, in the latter of which the hypostoma is slightly forked but the hypostoma of the former was unknown. Recently Harrington (1938) amplified the Lower Ordovician fauna in Argentina in which many asaphids are contained. Among three hypostomata attributed to *Asaphellus jujuanus*, one in figs. 4 and 16 are broad, rounded, and provided with large anterior wings showing the closest alliance to *Paramegalaspis* and then next to *Megalaspidella*.

Judging from their hypostomata, *Megalaspidella* and *Paramegalaspis* are similar but the two can be distinguished from *Asaphellus* s. str. as well as *Asaphelloides* on the dorsal view. *Megalaspidella* is different from the other three in its glabella which is conical, rounded in front, and fairly well defined by the dorsal furrow, and in its pygidium which is segmented as in *Megalaspis*. I do not intend to ignore the classificatory value of the hypostoma, but if the minor difference of it is too highly evaluated, it makes it impossible to determine many of the asaphids. In my opinion, it is most expedient to take *Paramegalaspis* for a subgenus of *Asaphellus*, instead of *Megalaspis*, because there is no distinction of the generic value on the dorsal view, although its hypostoma resembles unforked ones of *Megalaspis*. The difference between *Paramegalaspis* and *Asaphellus* s. str. is in the part where the branching of the posterior into wings begins. Therefore so far as the hypostoma is concerned, *Asaphellus* may stand at about the crossroad whence the three subgenera do not go far astray.

(?)Asaphellus lewisi, n.sp.

PLATE XII, FIGS. 16, 17 (?), 18, AND 19

1883. *Asaphus* sp. Etheridge, Proc. Roy. Soc. Tasm. 1882 (1883) p. 156, pl. I, fig. 6.
1888. *Asaphus* sp. indet. Johnston, Syst. Acc. Geol. Tasm. pl. I, fig. 18.

Description:—Cephalon gently convex with a slightly concave border, glabella occupies three-fourths the cephalic length outlined by a shallow furrow; palpebral lobe located at a point one-third the distance from the posterior margin and opposed to each other at the glabellar contraction by which it is divided into a subovate anterior and triangular posterior parts; a medium tubercle found at a point in the posterior triangle; facial suture, isoteliform.

Pygidium semicircular, frontal margin broadly arcuate; axial lobe flat-topped, tapering backward and terminates at a blunt end; no furrows except one near the articulating margin; marginal border slightly concave.

Observation:—The collection contains a cast of hypostoma which is subquadrate, gently expanding forward. Both sides of the posterior outline are rounded. The lateral edge of the hypostoma is conspicuously elevated. Its central body is oval, behind which a crescent-shaped ridge is located. These elevations are clearly figured out by the furrow which is especially deep on the anterior and posterior sides of the posterior ridge delimiting maculae from the main body. The anterior wings may not be very large, insofar as can be judged from the aspect of their attachment.

Comparison:—A free cheek in fig. 17 belongs to an asaphid, but its specific determination is most uncertain, because I cannot trace the anterior course of the facial suture. It has a concave lateral border which narrows backward and hence I cannot determine whether the genal spine is unpreserved or really absent. Putting aside the dubious free cheek, the other parts of the carapace show most features characteristic of *Asaphellus*, namely, the isoteliform facial suture, unfurrowed glabella, tiny median tubercle, unfurrowed pygidium and concave borders on the cephalon and pygidium. The hypostoma belongs to the kind of *Asaphellus* s. str. Although the relative position of the organs may be more or less changed by the secondary distortion, the eye is located more posteriorly than is usual in *Asaphellus*, and further, the glabellar outline suggests the approach to *Megalaspis*. In Eastern and Southern Asia there are several Lower Ordovician asaphids which are allied to this species and they are *Isotelus stenocephalus* Mansuy, *Asaphus*

gigas Dekey var. *hupeiensis* Sun, *Megalaspis* aff. *hyorhina* Herz. von Leuchtenberg, *Ptychopyge thebawi* Reed, *Ptychopyge* (*Basilicus*) *titanica* Reed, *Asaphellus tomkolensis* Kobayashi, *Asaphellus* (aff.) *gyracanthus* Raymond *Asaphellus* (?) *coreanicus* Kobayashi, and so forth. The pygidium is fairly well segmented in the Burmese form but is obscure in others. In the posterior position of the eye the present species agrees with Sun's species. Mansuy's species agrees with the present species in the form of the axial lobe of the pygidium but differs from it in the position of the palpebral lobe. Although no one can tell what difference will be made out if their hypostomata are discovered, Mansuy's species and probably Sun's species belong to the same kind of Asaphid, as far as the dorsal shield is concerned.

Finally it is noted that Etheridge's *Asaphus* sp. in fig. 6, which was procured from the same locality with the present specimen, most probably belongs to this species so far as I can judge from his illustration.

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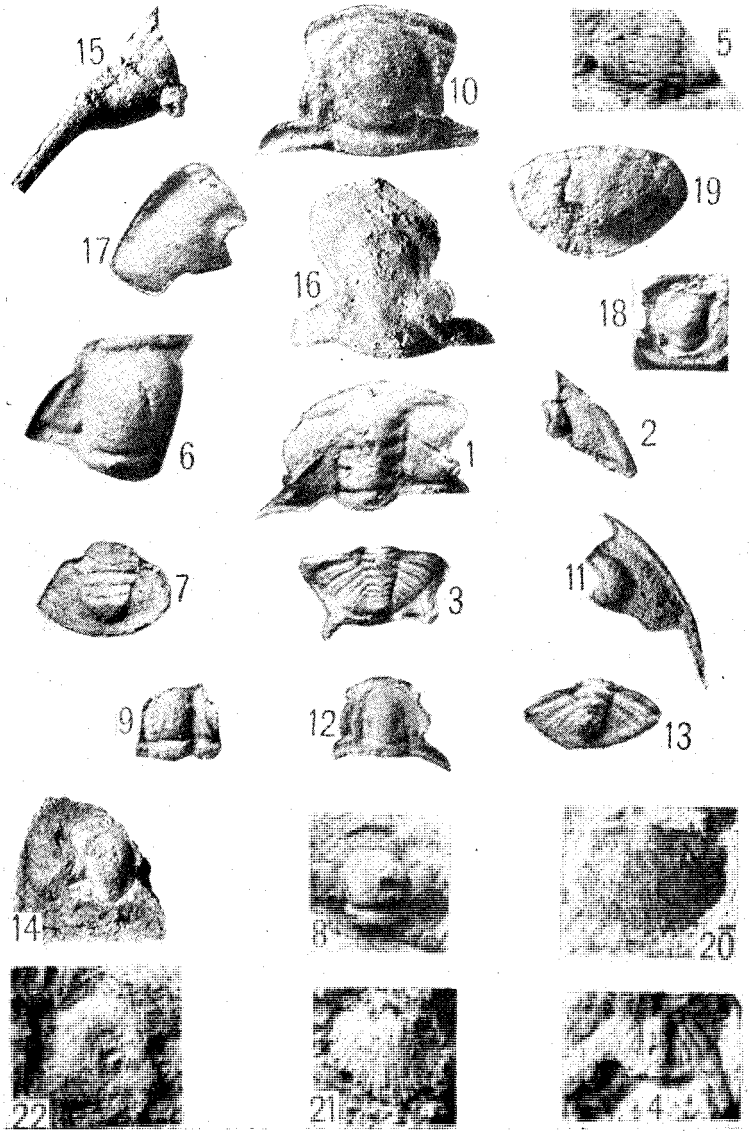
PLATE XII

FIGS. 1-3.—*Tasmanaspis stephensi* (Etheridge), x1½.
FIG. 4.—Ditto, x3.
FIG. 5.—*Prosopiscus* (?) *subquadratus*, n. sp., x1.
FIGS. 6-7.—*Carolinites bulbosa*, n. sp., x3.
FIGS. 8-9.—*Carolinites quadrata*, n. sp., x2.
FIGS. 10-11.—*Etheridgaspis carolinensis* (Etheridge), x2.
FIGS. 12-13.—*Etheridgaspis johnstoni* (Etheridge), x2.
FIG. 14.—Ditto, x1½.
FIG. 15.—Free cheek gen. et sup. undet., x2.
FIG. 16.—*Asaphellus lewisi*, n. sp., x1.
FIGS. 17-19.—Ditto, x1½.
FIG. 20.—Brachiopod, gen. et sp. undet., x1½.
FIG. 21.—Ditto, x3.
FIG. 22.—*Cryptolites* sp., x2.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