THE TYPE SPECIES OF CALYMENE (TRILOBITA) FROM THE SILURIAN OF DUDLEY, ENGLAND

by DEREK J. SIVETER

ABSTRACT. The type material of Calymene blumenbachii Bronnigart in Desmarest, 1817 (type species of Calymene Bronnigart, 1822) and C. tuberculata (Brünnich, 1781) has been revised, with that of the latter being figured for the first time. The nomen dubium status accorded to C. tuberculata by Shirley (1933) can no longer be upheld as the syntype specimens of Silurian age are, on preparation, very well preserved and identifiable, though this species is now recognized as a senior (subjective) synonym of C. blumenbachii. In consequence application is being made to the International Commission on Zoological Nomenclature to retain the junior name in the interest of stability.

DURING recent work on the Calymenidae in preparation for the second edition of the Treatise on Invertebrate Paleontology (Triobita), nomenclatural problems have resurfaced regarding the conservation of the generic name Calymene Bronnigart in Bronnigart and Desmarest, 1822, type genus for the family, and the right of Milne Edwards (1840) to stand as the author of the family name. These uncertainties prompted Whittington (1983) to petition the International Commission on Zoological Nomenclature (ICZN) in favour of both claims. Subsequent study by the present author has further shown that C. blumenbachii Bronnigart in Desmarest, 1817, the type species of Calymene, is a junior (subjective) synonym of Trilobus tuberculatus Brünnich, 1781. The purpose of this paper is to give evidence of this synonymy by providing new data on the type material of both species. Additionally, the paper is a prerequisite to an application to the ICZN (Whittington and Siveter, in press) by way of a rider to Whittington’s 1983 proposals, to use its plenary powers to suppress the senior name tuberculata in favour of blumenbachii, on the grounds that only the latter name has been used for the species by various authors during the last fifty years.

The terminology and photographic and preparation techniques are those previously employed by Siveter (1977, 1979, 1980, 1983). Repositories holding material used in this revision are: Université P. et M. Curie, Laboratoire de Paléontologie des Invertébrés, Paris (UPMC); Geologisk Museum, Københavns Universitet (MGUH).

THE TYPE SPECIES OF CALYMENE

The type material of Calymene blumenbachii Bronnigart in Desmarest, 1817

No material of C. blumenbachii was figured by Desmarest (1817) but Bronnigart in Bronnigart and Desmarest (1822) illustrated two syntype specimens, one (ibid., pl. 1, fig. 1a, b) a partially enrolled example, the other (ibid., pl. 1, fig. 1c, d) an extended incomplete individual; Dudley was indicated (ibid., pp. 9, 11, and 143) as the type locality (and I can confirm that this name appears on the specimen label accompanying the enrolled form). Shirley (1933) relocated this material in the Sorbonne, Paris, together with a third specimen ‘which probably belonged to Bronnigart’ but which Shirley left out of his account because of its uncertain curatorial history. Shirley also selected the enrolled syntype to stand as ‘the type’ (that is lectotype) for the species, and figured it (ibid., pl. 1, figs. 1–3), though not the second (now paralectotype) specimen. Since this time the type suite of specimens has remained unstudied.

Dr Francoise Bigey (Université P. et M. Curie, Laboratoire de Paléontologie des Invertébrés, Paris) subsequently rediscovered the lectotype in the collections of her institute, the Sorbonne.
Geology Collection having been 'removed to new buildings' (pers. comm. 5 February 1974); I have since fully prepared this specimen and it is refixed herein (Pl. 90, figs. 1–5), but the paralectotype was reported by Dr Bigey as missing. Further, Brongniart's material has 'been shared in the past between the Museum National d'Histoire Naturelle and Paris University' (pers. comm. Dr Bigey, 23 November 1983), though Dr J.-C. Fischer, sub-director of this museum, informs me (1 September 1984) that the paralectotype is not in their collections, and it does not appear in the recently published catalogue of type and figured trilobites housed there (Carriol 1984). For the present it is missing.

The type material of Trilobus tuberculatus Brunnicht, 1781

Four specimens comprised the syntype suite of this species, the type locality of which was indicated by Brunnicht (1781, p. 391) as 'Rensnens' (= Wren's Nest), 'Dudley'. Shirley (1933, p. 63) examined this material of C. tuberculata and concluded that the specimens which he referred to as the 'third' and 'fourth' were, respectively, the pygidium of an undescribed Ordovician calymenid from Shropshire and an almost complete asaphid from the Ordovician of Scandinavia or the eastern Baltic. He claimed that the 'first' specimen, 'a cranidium more than half buried in matrix and six attached thoracic segments... is impossible to refer to any of the species... occurring at Dudley' and that the 'second' specimen, 'twelve thoracic segments and an attached pygidium... cannot be identified with certainty'. Shirley did not name the 'first' or 'second' specimens in his paper but in a letter (23 June 1933) to Dr J. P. J. Ravn, the then Curator of the Geologisk Museum, Københavns Universitet (where the material is housed) he writes: 'I cannot identify specimens one and two further than Calymene sp. (at Dudley I have recognised at least four species). They have a matrix which is similar to other specimens from Dudley and there seems to be no doubt that they came from that locality.'

Dr. S. Floris, the present Curator, has loaned me (18 January 1984) the first two (MGUH 16.805, 16.806) and fourth (MGUH 16.807) of the syntypes, the third one (Shropshire Ordovician calymenid) being reported as missing. The 'Rensnens' locality information given by Brunnicht in his paper is also written on the original labels of all these three syntypes, including that of the Ordovician asaphid. However a Wren's Nest origin is corroborated for at least one of the two syntypes which are of Silurian age, that referred to by Shirley as the 'first' specimen (MGUH 16.805) and which is selected below as the lectotype for the species, by evidence from ostracodes recovered from the surrounding matrix (Pl. 90, figs. 6 and 7). Dr David Siveter has kindly supplied the following comments on these:

'The ostracodes are an almost complete female right valve of the bryichiancean Osmotoxotes phalacra Siveter, 1980, a left valve of the thilpsuracean Thilpsura t-scripta Jones and Holl, 1869, and two other indeterminate non-palaeocean specimens. T. t-scripta is known from the Homarian Stage and possibly the upper part of the Shinswoodian Stage, Wenlock Series to the lower Gorstian Stage, Ludlow Series of the West Midlands and the Welsh Borderland, and from at least the Wenlock Series on Gotland (Siveter 1978). O. phalacra is unknown outside the Homarian Much Wenlock Limestone Formation of the West Midlands and the Welsh Borderland; it has been recorded (Siveter 1980) from Mayhill, the Malverns, Ledbury, and the type and other localities at the Wren's Nest. The figured O. phalacra specimen (Pl. 90, fig. 6) is only the fourth female of the species known from the Wren's Nest and it shows exceptional preservation, having a sculpture of fine reticulo-striation and sparse tubercles not previously observed in females from this locality.' Ostracodes have not been recovered from the matrix around the 'second' specimen of Shirley but there is no reason to doubt that it, too, came from the Wren's Nest.

Photographs of the two Dudley syntype trilobites were taken before (Pl. 91, figs. 7, 10, 12) and after (Pl. 91, figs. 1–6, 8, 9, 11, 13) preparation, so that the nature of the specimens as seen by Shirley and Brunnicht is on record; also casts were made of the specimens before they were prepared. Both syntypes were found to have one more thoracic segment, that is seven (Pl. 91, fig. 9) and thirteen (Pl. 91, fig. 1), than the number given by Shirley. In order to fix the concept of Trilobus tuberculatus in keeping with the previously held notion of this species as a Silurian Calymene from Dudley, the specimen illustrated herein on Plate 91, figs. 3, 6, 8, 9, 11–13 is now selected as lectotype (MGUH 16.805).
The question of synonymy

As Shirley (1933) noted, on priority grounds many Scandinavian and continental authors (e.g. Lindström 1885) used the senior name C. tuberculata rather than C. blumenbachii for late Wenlock calymenids of this type. Shirley nevertheless effectively declared C. tuberculata a nomen dubium because of 'inadequate description and types', and said that 'the name tuberculata for any species of Calymene must be allowed to fall'. After preparing the Silurian material of Brännich I am convinced that there are no significant morphological differences from that of Bronnierni and that they are conspecific (see discussion below and Pls. 90 and 91). All the material is from the Dudley area, though it is unknown in the case of C. blumenbachii whether its type locality is specifically the Wen's Nest, as for C. tuberculata, there being two other Silurian inliers (Dudley Castle Hill and Hurst Hill; Butler 1939) in the district. The type horizon for all the material is indisputably the Much Wenlock Limestone Formation, of late Homerian age, considering the ostracode evidence presented above and the fact that I have not noted any specimens of this species from Dudley, of which there are very many, in any other formation.

The type species

The type species of Calymene Bronnierni in Bronnierni and Desmarets, 1822 is C. blumenbachii Bronnierni in Desmarets, 1817, by subsequent designation of Shirley (1933), and not, as stated by Whittington (1983), Calymene blumenbachii Bronnierni in Desmarets, 1817 by original designation. Bassler's (1915) designation of C. tuberculata to stand as the type species pre-dates that of Shirley, but it is invalid (see Whittington and Siveter, in press).

SYSTEMATIC PALAEONTOLOGY

Family CALYMNIDAE Milne Edwards, 1840

GEBUS CALYMENE Bronnierni, 1822

Type species. Calymene blumenbachii Bronnierni in Desmarets, 1817, from the Much Wenlock Limestone Formation, Homerian Stage, Wenlock Series, Dudley, West Midlands, UK, by subsequent designation of Shirley 1933, p. 53.

Calymene blumenbachii Bronnierni, 1817

Plate 90, figs. 1-5; Plate 91

71750 noadscript petrified insect; Lyttleton, p. 105, pl. 1, figs. 9-14; pl. 2 (pars). [From the figures it is probably C. blumenbachii.]

71750 scolepiendrae aquaticae sectatiae; Mortimer, p. 106, pl. 1, figs. 15-18. [From the figures it is possibly C. blumenbachii.]

1781 Triorbis tuberculatus Brännich, p. 389. [Suppression requested, Whittington and Siveter, in press; ICZN pending.]

1816 Le Calymène de Blumenbach; Bronnierni in Desmarets, p. 50.

1817 Calymena blumenbachii. Bronnierni in Desmarets, p. 517. [Suppression of Calymena Desmarets, 1817 requested, Whittington 1983; ICZN pending.]

1822 Calymene blumenbachii; Bronnierni in Bronnierni and Desmarets, p. 11, pl. 1, fig. 1a-d.

1839 Calymene blumenbachii Bronnierni; Murchison, p. 653, pl. 7, figs. 8 and 9, non fig. 5.

1851 Calymene blumenbachii (Bronnierni); M'Coy (pars) in Sedgwick and M'Coy, p. 165.

1852 Calym. blumenbachii. Bronnierni; Barrande, p. 366, pl. 5, fig. 8; non pl. 19, fig. 10; non pl. 43, figs. 46-48.

1859 Calymene blumenbachii Bronnierni; Murchison, p. 235, pl. 18, fig. 10.

1865 Calymene blumenbachii. Bronnierni; Salter, p. 93, pl. 8, figs. 8-10, 12-14, 16, 17; figs. 7, 15, 16, non figs. 9 and 11, pl. 9, figs. 1 and 2.

1869 Calymene ceratophila; Woodward, p. 489, pl. 21, fig. 1 (pars), 7 fig. 2.

1869 Calymene blumenbachii; Woodward, p. 43.

non 1872 Calym. blumenbachii. Bronnierni; Barrande, p. 36, pl. 14, fig. 33.

non 1879 Calymene blumenbachii, Bronnierni; Nicholson and Etheridge, p. 140, pl. 10, figs. 2-6.
non 1906 Calymene blumenbachii, Bronnigliart, 1822; Reed, p. 133, pl. 17, figs. 12 and 13.
non 1933 Calymene blumenbachii Bronnigliart, 1822; Shirley, pp. 52, 59, pl. 1, figs. 1-5.
non 1936 Calymene laxa sp. nov. Shirley, p. 414, pl. 30, figs. 11-13; pl. 31, fig. 4.
non 1957 Calymene (Calymene) blumenbachii blumenbachii Bronnigliart, 1822; Tomczykowa, pp. 97, 135, pl. 3, figs. 3 and 4; text-fig. 6a, b.
1959 Calymene blumenbachii Bronnigliart, 1822; Whittington in Moore, p. O452, fig. 353.1a-c.
1970 Calymene blumenbachii blumenbachii Schrank, p. 135, pl. 9, figs. 5 and 6.
non 1977 Calymene blumenbachii Bronnigliart, 1822; Männik, p. 250, pl. 4, figs. 6 and 7; pl. 5, figs. 1-4.
1980 Calymene blumenbachii Bronnigliart; Chatterton and Campbell, p. 95, fig. 4.
1980 Calymene blumenbachii blumenbachii Bronnigliart, 1822; Siveter, p. 784, pl. 97, fig. 10; pl. 100, figs. 9-11.
1983 Calymene blumenbachii Bronnigliart in Desmarets, 1817; Whittington, p. 177.
1984 Calymene blumenbachii Bronnigliart; Thomas, Owens and Rushton, fig. 23 (pars).

Lectotype. Subsequently designated Shirley 1933, p. 53. A complete, partially enrolled specimen, Collections de Paléontologie de l'Université P. et M. Curie, No. 3409/77, figured Bronnigliart in Bronnigliart and Desmarets 1822, pl. 1, fig. 1a, b; Shirley 1933, pls. 1-3; herein Plate 90, figs. 1-5.

Paralectotype. The more or less complete specimen which formed the basis for Bronnigliart in Bronnigliart and Desmarets 1822, pl. 1, fig. 1c, d. This specimen now appears to be lost (see above).

Type stratum and locality. Much Wenlock Limestone Formation, Homersfield Stage, Wenlock Series, Dudley, West Midlands. Bassett (1976, pp. 211 and 212) regarded at least the base of this formation at Dudley as being of Ludlowian Biozone age, with the upper part being mostly likely of Ludensis Biozone age.

Additional material. All of the major and most provincial museums in Britain have well-preserved material of this species and there is no attempt here to provide a complete list; the total number of specimens is probably several hundred. It is also well represented in the collections of numerous foreign repositories.

Diagnosis. A species of Calymene with a short preglabellar area, about one-tenth as long (sag.) as glabellum. anterior border low relative to dorsal surface of frontal glabellar lobe and steeply to more or less vertically inclined, having a fairly sharp dorsal edge; preglabellar furrow very short (sag. and exsag.), moderately deep. Strongly inflated glabella projects well above and well in front of fixed cheek. Pygidium with strongly convex (tr.) axis, six to eight axial rings, five pleural furrows.

Description. Cephalon is subsemicircular in outline, 2:1 (PL 90, fig. 1) to 2:2 (PL 91, fig. 6) times as wide as long. Glabellum outline is bell-shaped, 1:0 (PL 91, fig. 6) to 1:1 (PL 90, fig. 1) times as long as wide, projects well in front of fixed cheeks. Occipital ring slightly narrower (tr.) than glabellar width at 1p lobes, gently convex in profile, is longest mediad but gradually shortens abaxially and flexes forwards at axial furrow where it is weakly inflated. Occipital furrow moderately long (sag.), not deeply inclined behind central glabellar area, becomes slit-like abaxially. Lobe 1p is fairly large, subquadrate, has a quite strongly convex outer margin, is strongly swollen and separated from median lobe by very shallow posterior extension of furrow 1p. The latter is deep and widest (exsag.) at axial furrow, runs inward and backward between lobes 1p and 2p, bifurcates abaxially, longer posterior branch turning first backward then inward, anterior branch directed forward and inward, continuing very weakly anteriorly across inner side of lobe 2p. Distinct intermediate lobe within fork of furrow 1p. Lobe 2p

EXPLANATION OF PLATE 90
Figs. 1-5. Calymene blumenbachii in Desmarets, 1817. UPMC 3409/77, Much Wenlock Limestone Formation, Dudley; lectotype; complete, partially enrolled specimen. 1, dorsal stereo-pair (cephalon); 2, dorsal (pygidium); 3, oblique (pygidium); 4, lateral; 5, frontal (cephalon); all × 2. Figure Bronnigliart in Bronnigliart and Desmarets 1822, pl. 1, fig. 1a, b; Shirley 1933, pl. 1, figs. 1-3.
Fig. 6. Osmotaxa phalacea in Dudley, right valve, female, lateral view, × 33. MGUH 16,804, Much Wenlock Limestone Formation, Wren's Nest, Dudley; left valve, semimorph, lateral view, × 73. Ostracodes prepared and photographed by Dr David J. Siveter (Leicester).
rather swollen, transversely elongate, papillate. Furrow 2p directed transversely or slightly forward. Lateral lobe 3p longest (exsag.) dorsally, narrow as it runs down side of glabella, confined by shallow though distinct 3p furrow which runs inward and forward. Small 4p lobe present. Frontal lobe with its sides vertically inclined and directed exsagittally or slightly outward posteriorly, in dorsal view anterolateral margins are rounded, anterior outline weakly (PL 90, fig. 1) to strongly (PL 91, fig. 6) convex forward. Frontal lobe is about 9/7 times as wide as glabella at lobe 1p. In lateral profile (PL 90, fig. 4, PL 91, fig. 8) dorsal surface of glabella projects well above fixed check, is gently convex between occipital furrow and furrow 2p, thereafter moderately to strongly convex to anterior face of frontal lobe, which falls very steeply and is undercut by preglabellar furrow.

Axial furrow very shallow at occipital ring, narrowest at base of lobe 1p, becomes progressively wider (tr.) and much more undercut and deeply convex around lobe 1p at undercuts and its abaxial deep convex very steeply downward and inward; it is just continuous under bridge of lobe 2p and genal buttress, from here to preglabellar furrow it is uniformly narrow, deep, and trench like. Anterior pit is below posterior part of frontal lobe. Preglabellar furrow very short (sag. and exsag.), moderately deep. Anterior border is a very short raised rim, in lateral view (PL 90, fig. 4) it curves vertically upward and a little inward, its dorsal surface is quite sharply edged and does not reach far up anterior face of frontal lobe (PL 90, fig. 5); opposite axial furrow it is slightly swollen (PL 91, fig. 3). Anterior margin moderately convex forward (PL 90, fig. 1) and upward (PL 90, fig. 5).

Posterior border becomes considerably wider (exsag.) and less convex abaxially from fulcrum before narrowing (exsag.) slightly near genal angle (PL 91, fig. 3). Posterior border furrow widest opposite fulcrum, has shallow anterior and steep posterior slope. In lateral profile postocular part of fixed check slopes (exsag.) gently to moderately to posterior border furrow, precocular part is rather narrow (tr.), curves steeply downward and forward. Furrow between fixed check and anterior border is shallower than preglabellar furrow. Palpebral lobe is moderately (PL 91, fig. 11) to quite steeply (PL 90, fig. 5) inclined with mid-length opposite anterior part of lobe 2p, it is longer (exsag.) than lobe 2p but not as long as lobe 1p, its outer margin is slightly pointed. At contact of posterior facial suture and ocular suture, palpebral lobes are 1 6 times as wide apart as width of glabella across 2p lobes. Posterior branch of suture runs transversely from palpebral lobe then turns obliquely backward to lateral border where it bends more sharply backward and finally slightly outward to bisect lateral and posterior margins; anterior branch directed forward and slightly inward to anterior border, turns sharply inward on outer face of border to connective suture (PL 91, fig. 11). Visual surface of eye is not preserved, reminiscence in outline, supported by posterior side from which convex main field of free check descends very steeply to distinct, broadly U-shaped lateral border furrow (PL 91, figs. 3 and 8). Lateral border turns sharply over and under; double curved acutely reflexed.

Rostral plate (PL 90, fig. 2; PL 91, fig. 13) composed of border and doublure sectors. Border sector and rostral suture broadly arched; connective suture abaxially convex. Hypostoma apparently missing on figured material.

Thorax has thirteen segments. Gently convex (sag.) axial ring very gradually widens (exsag.) abaxially from median line and is produced into gently inflated node at axial furrow (PL 91, fig. 9). Articulating half-ring about as wide (sag.) as axial ring sagitally, articulating furrow shallow medially, deeper and narrower (exsag.) abaxially. Posterior pleural band strongly convex (exsag.), forms a narrow bounding rim around the flat pleural facet. Dorsally the pleural furrow is relatively wide (exsag.), deep, and U-shaped, reduced to a rill-like slit on pleural facet (PL 91, fig. 1). Anterior pleural band tightly convex (exsag.), narrower, and slightly lower than posterior band.

Pygidium is slightly less than twice as wide as long. Axis is slightly less than half the width (PL 90, fig. 2), reaches well above pleural regions, is strongly convex (sag.), has seven (PL 90, fig. 2) or eight (PL 91, fig. 4) axial rings (other specimens have only six). All axial rings except the last defined posteriorly by complete ring furrows which are weakest medially; last ring furrow discontinuous; terminal axial piece rounded. Axial furrow clearly impressed, weakest posteriorly. Inner part of pleural region falls steeply from axial furrow, outer
part becomes vertically inclined. There are five distinctly impressed pleural furrows which are best marked at their mid-length and almost reach lateral margin (Pl. 90, fig. 3; Pl. 91, fig. 5). Interpleural furrows are slightly longer than pleural furrows, deepest distally, become very faint more proximally though are never completely effaced; are slightly better impressed again immediately adjacent to axial furrow. Fifth interpleural furrow runs on outside of an exagially directed ridge which probably represents anterior pleural band of sixth pleura and confines (abaxially) the postaxial sector. Inside this ridge is a very shallow furrow. In lateral profile there is a break in slope between terminal axial piece and postaxial sector. Border rolls under at lateral margin, is widest (tr.) anteriorly.

Sculpture on glabella and fixed and free cheek inside posterior and lateral borders consists of closely spaced large to small granules. Abundance of granules falls off towards furrows and they are absent in deepest part of axial furrow, preglabellar furrows, lateral and posterior border furrows, and ocipital furrows. Granules are closely packed and more uniform in size on outer side of anterior border, lateral border, rostral plate, central part of pygidial axis, distal posterior margins of pleurae, outer pleural region, and border roll of pygidium; on posterior part of lateral border roll they are more elongate and scale-like, on cephalic and pygidial borders more flattened. Much more widely scattered fine- to medium-sized granules on thorax, except for pleural, axial, and articulating furrows. Pleural facets have very fine granules. Granules are scarce on inner part of pygidial pleural region and abaxial part of pygidial axis.

**Discussion.** The description above is of the three trilobites figured herein, but it can be applied to other specimens of the species. In the lectotype of *C. tuberculata* the glabellar and cephalic width to length ratio and convex outline of the frontal glabellar lobe is slightly greater than that of the *C. blumenbachii* lectotype (cf. Pl. 90, fig. 1; Pl. 91, fig. 6), and the paralecotype of *tuberculata* has an extra, very weak eighth pygidial axial ring furrow compared with the *blumenbachii* lectotype (cf. Pl. 90, fig. 5; Pl. 91, fig. 4), but such variation is considered to be intraspecific. A description of the hypostoma and a comparison with other closely related taxa, for example, *C. clavicula* Campbell, 1968 from the Silurian of Oklahoma or *C. neotuberculata* Schrank, 1970 from the Wenlock of the Baltic, is in preparation by me for publication elsewhere. *C. ceratophylhina* Woodward, 1868 and *C. lata* Shirley, 1936, both from the Much Wenlock Limestone Formation of Dudley, I consider to be junior synonyms of *C. blumenbachii*.

**Occurrence.** Much Wenlock Limestone Formation, West Midlands inliers, England; late Wenlock mudstones and siltstones, Penylan, Rumney inlier, Cardiff area, South Wales.

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