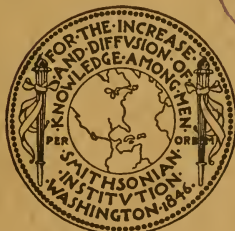


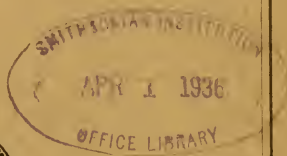
SMITHSONIAN MISCELLANEOUS COLLECTIONS
VOLUME 95, NUMBER 4

SECOND CONTRIBUTION
TO NOMENCLATURE OF CAMBRIAN
TRILOBITES

BY
CHARLES ELMER RESSER
Curator, Division of Invertebrate Paleontology,
U. S. National Museum



(PUBLICATION 3383)



CITY OF WASHINGTON
PUBLISHED BY THE SMITHSONIAN INSTITUTION
APRIL 1, 1936



SMITHSONIAN MISCELLANEOUS COLLECTIONS

VOLUME 95, NUMBER 4

SECOND CONTRIBUTION
TO NOMENCLATURE OF CAMBRIAN
TRILOBITES

BY

CHARLES ELMER RESSER

Curator, Division of Invertebrate Paleontology,
U. S. National Museum



(PUBLICATION 3383)

CITY OF WASHINGTON
PUBLISHED BY THE SMITHSONIAN INSTITUTION
APRIL 1, 1936

The Lord Baltimore Press
BALTIMORE, MD., U. S. A.

SECOND CONTRIBUTION TO NOMENCLATURE OF CAMBRIAN TRILOBITES

By CHARLES ELMER RESSER

Curator, Division of Invertebrate Paleontology
U. S. National Museum

This is the second paper in a series dealing with nomenclatural changes necessary for certain Cambrian species.¹ In this contribution several Atlantic Province genera and species are discussed.

As in the previous paper, only published species are considered because illustrations are not possible. Most of the text is arranged in alphabetical order according to genera, exceptions being made in a few cases where several members of a family are kept together.

ALBERTELLA Walcott, 1908

Four species were described by Walcott as belonging to *Albertella*, viz. the genotype *A. helena*, and *A. bosworthi*, *A. levis*, and *A. pacifica*. The last named, which comes from Asia, is in reality an indeterminate fragment and must await the finding of further material before its proper generic assignment can be made. Several new species of *Albertella* are in hand beside those recognized below in the discussion of the three previously described American species.

Previous mention has not been made in the literature of the close relationship between *Albertella* and *Ptarmingia*. In fact, this is another case where the cranidia of the two genera are indistinguishable generically.

Albertella helena Walcott

Genotype

Albertella helena WALCOTT (part), Smithsonian Misc. Coll., vol. 53, no. 2, p. 19, pl. 2, figs. 1-4, 1908. (Not 5 = *Ptarmingia gordonensis*; 6 = *A. similaris*; 7 = *A. rossensis*; 8, 9 = *A. nitida*.) Idem, vol. 67, no. 2, p. 39, pl. 7, fig. 4, 1917.

Middle Cambrian, Gordon; (loc. 5j) near Scapegoat Mountain, and (loc. 4o) Gordon Creek, Powell County, Montana.

¹Resser, Charles Elmer, Nomenclature of some Cambrian trilobites, Smithsonian Misc. Coll., vol. 93, no. 5, Feb. 14, 1935.

Lectotype.—U.S.N.M. no. 53410; paratypes, nos. 53407, 53409, 53411, 53412.

Albertella bosworthi Walcott

Albertella bosworthi WALCOTT (part), Smithsonian Misc. Coll., vol. 53, no. 2, p. 22, pl. 1, figs. 4, 5, 1908. (Not 6 = *A. similis*; 7 = *A. nitida*). Idem, vol. 67, no. 2, p. 38, pl. 7, figs. 3a, 3b, 1917. (Not 2-2b = *A. robsonensis*; 3, 3c = *A. similis*; 3d = *A. nitida*.)

Much confusion exists among the illustrated specimens assigned to this species because the wide and narrow forms and those in which there is a macropleural development of the fourth or the third thoracic segment were not noted.

Middle Cambrian, Ptarmigan; (locs. 35c, 18a, 63m) Mount Bosworth, and (loc. 63j) Popes Peak, above Ross Lake, British Columbia.

Lectotype.—U.S.N.M. no. 53416; paratypes, nos. 53413, 63763; plesiotypes, no. 85221.

Albertella similis, n. sp.

Albertella bosworthi WALCOTT (part), Smithsonian Misc. Coll., vol. 53, no. 2, p. 22, pl. 1, fig. 6; pl. 2, fig. 6, 1908; idem, vol. 67, no. 2, pl. 7, figs. 3, 3c, 1917 (see *A. bosworthi*).

Albertella helena WALCOTT (part), idem, vol. 53, no. 2, p. 19, pl. 2, fig. 6, 1908.

This species is close to *A. bosworthi*, differing chiefly in its longer pleura, wider pygidium, and striated free cheeks.

Occurrence same as preceding.

Holotype.—U.S.N.M. no. 63762; paratypes, nos. 53414, 53415, 53417.

Albertella rossensis, n. sp.

Albertella helena WALCOTT (part), Smithsonian Misc. Coll., vol. 53, no. 2, p. 19, pl. 2, fig. 7, 1908 (see *A. helena*).

This species is similar to *A. helena* in shape and in the macropleural development of the third segment, but differs in having coarser granules and in lacking both the axial spines on the pygidium and the short interpleural furrows.

Occurrence same as preceding.

Holotype and paratypes.—U.S.N.M. no. 53403.

Albertella nitida, n. sp.

Albertella bosworthi WALCOTT (part), Smithsonian Misc. Coll., vol. 53, no. 2, p. 22, pl. 1, fig. 7, 1908. Idem, vol. 67, no. 2, p. 38, pl. 7, fig. 3d, 1917 (see *A. bosworthi*).

Albertella helena WALCOTT (part), idem, pl. 2, figs. 8, 9, 1908; idem, vol. 67, no. 2, p. 39, pl. 7, figs. 5, 5a, 1917 (see *A. helena*).

This is a rather small form characterized by long, slender pleural and pygidial spines, with a macroleural development of the last thoracic segment.

Occurrence same as preceding.

Holotype.—U.S.N.M. no. 63766; paratypes, nos. 53402, 53404, 53405, 53406, 63764, 63765.

***Albertella robsonensis*, n. sp.**

Albertella bosworthi WALCOTT (part), Smithsonian Misc. Coll., vol. 67, no. 2, p. 38, pl. 7, figs. 2-2b, 1917 (see *A. bosworthi*).

The glabella is long and somewhat more expanded than in the more southern species. The pygidium reflects the same characteristic in its narrowness and long, narrow, prominent axis. Its pleural lobes are very flat, even when compared with *A. similis*.

Middle Cambrian, Chetang; (loc. 61p) Coleman Creek, and (loc. 61w) Terrace Creek, Robson Park, Alberta.

Cotypes.—U.S.N.M. nos. 63759-63761.

AMECEPHALINA Poulsen, 1927

***Amecephalina convexa* (Walcott)**

Anomocare convexa WALCOTT, Smithsonian Misc. Coll., vol. 75, no. 4, p. 87, pl. 17, figs. 2-2d, 1911; Research in China, vol. 3, Carnegie Inst. Publ. 54, p. 187, pl. 18, figs. 3-3c, 1913.

Middle Cambrian, Conasauga; (loc. 90x) 3 miles east of Center, Alabama.

Lectotype.—U.S.N.M. no 57597; paratypes, nos. 57595, 57596.

ANTAGMUS, n. gen.

For many years certain common Lower Cambrian trilobites were referred to various genera, depending on the genus to which the author was comparing them at the moment, or on a particular feature which attracted his attention. Some revision is now possible, but until this genus and its related forms can be studied thoroughly, any suggested realignment of the species must be tentative.

Diagnosis.—Cranidium rather wide and convex in both directions; facial suture diverging anterior to the eyes. Glabella well defined, tapering, about two-thirds the length of the cranidium, with two or three pairs of short glabellar furrows. Brim consists almost entirely of a rim, usually somewhat thickened and particularly characterized by its increased width in the middle, which is due to the backward course of the anterior furrow to meet the dorsal furrow in front of the cranidium.

Available species indicate 15 thoracic segments. These specimens also indicate that the genus had a rather simple and relatively small pygidium in which the dorsal furrow only is well defined.

Comparisons.—Comparisons should be made with *Kochiella* and its allies, the chief distinguishing features being the convexity and reduction in the brim.

Genotype.—*Ptychoparia teucer* Walcott.

Name.—*αἴρω* = meet; *ὄγμος* = furrow.

Range.—Lower Cambrian of the Appalachians and Cordilleran regions.

Antagmus teucer (Walcott) not Billings

Ptychoparia teucer WALCOTT, U. S. Geol. Surv. Bull. 30, p. 197, pl. 26, fig. 3, 1886; 10th Ann. Rep. U. S. Geol. Surv., p. 652, pl. 96, fig. 3, 1891.

Lower Cambrian, Winooski; (loc. 25a) 1½ miles east of Swanton, Vermont.

Holotype.—U.S.N.M. no. 15436.

ARMONIA Walcott, 1924

Armonia WALCOTT, Smithsonian Misc. Coll., vol. 75, no. 2, p. 54, 1924; idem, no. 3, p. 69, 1925.

Confusion of species led to description of the genotype under two specific and generic names. Consequently, the genotype for *Armonia* must rest on the older name.

This genus, like many others, is difficult to determine without whole specimens, for the cranidium of *Armonia* is not easily distinguished from that of *Blainia* or even *Asaphiscus*. However, the respective pygidia differ so much that the retention of the several genera is warranted.

Diagnosis.—Trilobite as a whole ovate. Cephalon semicircular. Glabella wide, tapered, nearly three-fourths the length of the head. Posterolateral limbs wide, blunt. Suture anterior to eyes, which are situated about the middle of the head, diverges moderately; intramarginal for some distance. Glabellar furrows faintly indicated; occipital furrow strong.

Thorax with about 14 segments; bluntly terminated.

Pygidium somewhat triangular with a tendency toward extension laterally of the anterior corners. Axis well defined, extending almost to the rear margin. Pleural lobes well marked by both the pleural furrows and grooves which extend practically to the margin.

Comparisons.—Comparing *Armonia elongata* with *Blainia gregaria*, it will be noted that the glabella of *Armonia* is somewhat longer and

the rim flatter. Also the thorax is somewhat longer, but the chief difference is in the pygidium. *Armonia* has a transverse pygidium, whereas that of *Blainia* is almost quadrate and moreover is more convex. Further comparisons will appear in the discussion of other similar genera.

Genotype.—*Asaphiscus* (*Blainia*) *elongatus* Walcott (part).

Range.—Middle Cambrian of the southern Appalachians.

Armonia elongata (Walcott)

Asaphiscus (*Blainia*) *elongatus* WALCOTT (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 393, pl. 63, figs. 4, 4a, 1916. (Pygidium represents another genus.)

Armonia pelops WALCOTT, Smithsonian Misc. Coll., vol. 75, no. 2, p. 54, pl. 10, fig. 1, 1924; idem, no. 3, p. 69, pl. 17, figs. 28-31, 1925.

When the specimens contained in the chert cobbles were first described, an incorrect pygidium was chosen. Later when the same species occurring in the dark shales containing the nodules was described, new generic and specific names were used.

Middle Cambrian, Conasauga (Rogersville equivalent); (locs. 90x, 95, 92) southeast of Center, Cherokee County, Alabama.

Leclotype.—U.S.N.M. no. 62812; paratypes, no. 62811; plesiotypes, nos. 72276-72279.

BONNASPIS, n. gen.

The Middle Cambrian species from Mount Stephen, British Columbia, on which Walcott evidently planned to base his genus *Karlia*, does not belong to *Corynexochus*, of which *Karlia minor* is a good species. In consequence *K. stephenensis* becomes the type of a new genus for which the name *Bonnaspis* seems appropriate, inasmuch as a relationship with *Bonnia* is evident.

Diagnosis.—Small trilobites oval in shape, with subequal head and tail shields. Glabella of moderate size, expanded forward, with faint furrows. Eyes small, situated at the midpoint. Fixed cheeks moderately wide, with eye lines.

Free cheeks narrow with long and heavy genal spines.

Thorax with seven segments; pleura bluntly terminated.

Pygidium wider than distance between eyes, semicircular, well fused, with axial and pleural furrows shallow. Pleural furrows extend to margin.

Genotype.—*Karlia stephenensis* Walcott.

Range.—Rare in the Middle Cambrian of British Columbia.

Comparisons.—Comparing *Bonnaspis* with *Bonnia*, the outstanding distinction is the expansion of the glabella and the apparent absence of

marginal spines at the anterior angles of the pygidium. Were this a Lower Cambrian form, it is doubtful that a separate genus would be recognized because in *Bonnia senecta* (Billings) and several undescribed species considerable expansion of the glabella takes place.

Bonnaspis stephenensis (Walcott)

Menocephalus salteri? ROMINGER (not Devine), Proc. Acad. Nat. Sci., Philadelphia, pt. 1, p. 16, pl. 1, fig. 6, 1887.

Karlia stephenensis WALCOTT, Proc. U. S. Nat. Mus., vol. 11, p. 445, 1888; Canadian Alpine Journ., vol. 1, pt. 2, p. 224, pl. 3, fig. 4, 1908; Smithsonian Misc. Coll., vol. 64, no. 3, p. 224, pl. 36, fig. 8, 1916.

Corynexochus ræmingeri MATTHEW, Trans. Roy. Soc. Canada, 2d ser., vol. 5, sec. 4, p. 47, pl. 2, fig. 3, 1899.

Corynexochus stephenensis WALCOTT, Smithsonian Misc. Coll., vol. 64, no. 5, p. 324, pl. 55, figs. 5-5e, 1916.

Middle Cambrian, Stephen; (loc. 14s) Mount Stephen, above Field, British Columbia.

Holotype—U.S.N.M. no. 61731; paratypes, nos. 62717, 62718.

BONNIA Walcott, 1916

Corynexochus (Bonnia) WALCOTT, Smithsonian Misc. Coll., vol. 64, no. 5, p. 325, 1916.

Bonnia RAYMOND, Amer. Journ. Sci., 5th ser., vol. 15, no. 88, p. 309, 1928.

Bonnia was proposed as a subgenus of *Corynexochus* Angelin, but it is doubtful whether the two genera can remain in the same family. American species were rather carelessly assigned to the two genera, a relic of the earlier days of paleontology when it was customary to locate an existing genus to receive new forms.

Walcott made *Bathyurus parvulus* Billings the genotype but based his description on specimens from Bonne Bay, which represent several considerably different species. Moreover, hitherto the *Bonnia* species have been studied from a small fraction of available specimens picked out of a tray because they happened to break free of the matrix. This resulted in description of only a fraction of the species represented in this very prolific trilobite genus.

The National Museum of Canada kindly lent the specimens marked as Billings' types, which presumably are the ones restudied by Matthew. Without access to these specimens it would have been impossible to determine exactly what the described species are. Unfortunately Billings' type specimens were not marked by him, and consequently in this case it is not possible to go back of Matthew's 1897 paper, except to distinguish between the specimens available in 1861 and those subsequently collected in 1872 by T. C. Weston, which, of course, could

not have been studied by Billings before his report was published. Fortunately, the two species recognized by Billings are clearly distinguishable among the several species represented by the types sent from Ottawa.

Diagnosis.—Small trilobites characterized by a long and essentially quadrate glabella. Glabella usually quadrate, but sometimes expanded forward; occupying the entire length of the cranidium. Glabellar furrows usually very faint. Brim confined to a narrow concave rim. Fixed cheeks about equal to width of glabella. Eyes rather large, extending somewhat forward of the middle of the head, eye lines present. Free cheeks small, generally with short genal spines.

Pygidium about the same size as cranidium. Segments fused; pleural furrows usually well defined. Axis usually well above level of pleural lobes. One to three marginal spines occur at anterior angles.

Genotype.—*Bathyurus parvulus* Billings.

Range.—Lower Cambrian, North America and Asia.

Species of *Bonnia* not discussed in this paper include: *B. groenlandica* Poulsen, *B. busa* Walcott, *B. brennus* Walcott, and *B. fieldensis* Walcott.

Bonnia parvula (Billings)

Bathyurus parvulus BILLINGS, Pal. Foss., Geol. Surv. Canada, pt. 1, p. 16, fig. 21, November 1861.

Bathyurus senectus BILLINGS (part), idem, fig. 20 (fig. 19 = *B. senecta*).

Bathyurus senectus MATTHEW (part), Trans. Roy. Soc. Canada, 2d ser., vol. 3, sec. 4, p. 196, pl. 4, fig. 4b, 1897 (figs. 4, 4a = *B. senecta*).

Dorypyge parvula angifrons MATTHEW, idem, p. 197, pl. 4, figs. 6, 6a, 1897.

It has been difficult to clear up the confusion of species grouped under the few named forms of *Bonnia*, but with Billings' and Walcott's types in hand solution of the problem is possible. The foregoing synonymy shows how this was accomplished for *B. parvula*, by confining the species to specimens from Labrador available to Matthew in 1897. Inasmuch as *Dorypyge parvula* and Matthew's variety *angifrons* are quite distinct species, an effort was made to retain both names, but since the same specimen was evidently used as the type for both, they must be regarded as synonyms, and a new name must be given to Matthew's *B. parvula*. This conclusion is inescapable when the original labels are read, for they state that the specimen to which Matthew gave the varietal name was collected by Richardson in 1861, whereas the other specimens identified by Billings and figured by Matthew as *D. parvula* were collected by T. C. Weston in 1872. Therefore, Billings' name must be restricted to the fossils he had available when he described his species in 1861. Moreover, applica-

tion of a drop of acid to Billings' holotype causes it to effervesce freely, showing that its brown fine-grained appearance misled Matthew into calling the rock a sandstone and in consequence suggesting Vermont as the possible locality. In fact, Richardson, the collector, was also misled by this appearance, for the original label reads "grey sandstone."

All other specimens, including Walcott's identifications, referred in literature to *B. parvula*, represent new species.

As to the pygidium, Matthew describes none for this species, but both he and Billings figure a pygidium with *B. senecta*, which may be no. 433a of the Billings types available, and which by its features matches the holotype cranidium. Moreover, the matrix has the same peculiar brown sandstone appearance in contrast to the lighter, more crystalline limestone in which the other specimens are preserved.

B. parvula is characterized by its parallel-sided glabella, the absence of glabellar furrows, in short, by simplicity in all its features.

Lower Cambrian, Forteau; L'Anse au Loup, Labrador.

Holotype.—Nat. Mus. Canada no. 433; plesiotype, no. 433a.

***Bonnia matthewi*, n. sp.**

Dorypyge parvula MATTHEW (not Billings), Trans. Roy. Soc. Canada, 2d ser., vol. 3, sec. 4, p. 197, pl. 4, figs. 5-5c, 1897.

Corynexochus (Bonnia) parvulus WALCOTT (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 328, pl. 57, figs. 1, 1b, 1c, 1916.

As explained in the discussion of *B. parvula*, these specimens came into the collections in 1872 and were then identified with Billings' species described in 1861. Matthew's description of *B. parvula* is based on this head and tail, which he illustrates.

Comparisons.—Compared with *B. parvula* this species is much wider. The glabella expands slightly forward, and the rim is both flatter and wider. Moreover, the pygidium is very distinct, owing to its broad rim, to the reduction of the pleural ribs to narrow sloping ridges, and to the larger marginal spines. Above all, the presence of lines on all elevated portions of the test serves to distinguish the species from all others present in Labrador.

Occurrence same as preceding.

Cotypes.—Nat. Mus. Canada nos. 427, 433g.

***Bonnia senecta* (Billings)**

Bathyrurus senectus BILLINGS (part), Pal. Foss., Geol. Surv. Canada, pt. 1, p. 15, fig. 19, November 1861 (see *B. parvula*).

Bathyriscus senectus MATTHEW (part), Trans. Roy. Soc. Canada, 2d ser., vol. 3, sec. 4, p. 196, pl. 4, figs. 4, 4a, 1897 (see *B. parvula*).

Billings' description and illustration are inadequate to identify the species. Subsequently, Matthew restudied the type preserved at Ottawa, concluding that it is not the holotype but a specimen substituted by Billings for it. However, since the figures of both authors clearly indicate a form with expanded glabella, and since this specimen is the only such form among the types, it may be regarded as Matthew's neoholotype.

All specimens from other localities identified as *B. senecta* belong to other species. Those illustrated by Walcott in 1916 from Bonne Bay and Quebec must be studied with the great number of new species in hand from those localities before they can be placed in their proper species.

Comparisons.:—Comparing *B. senecta* with the other species in Labrador, it is at once distinguished by its long, expanding glabella, the rather strong glabellar furrows, and the rounded frontal outline.

Occurrence same as preceding.

Neoholotype.—Nat. Mus. Canada no. 420.

***Bonnia columbensis*, n. sp.**

Corynexochus (Bonnia) senectus WALCOTT, Smithsonian Misc. Coll., vol. 64, no. 5, p. 319, pl. 55, figs. 7-7c, 1916.

Compared with *B. senecta*, this species is very simple. Its outstanding characteristic is the rounded lines in all its parts. Fusion is carried far in the pygidium.

Lower Cambrian, Mount Whyte; (loc. 61d) southwest slope of Mount Shaffer, British Columbia.

Lectotype.—U.S.N.M. no. 62722; paratypes, nos. 62723-62725.

***Bonnia clavata* (Walcott)**

Ptychoparia? (Subgenus?) *clavata* WALCOTT, Amer. Journ. Sci., 3d ser., vol. 34, p. 198, pl. 1, fig. 3, 1887.

Corynexochus clavatus WALCOTT (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 316, pl. 55, fig. 4, 1916 (not fig. 4b = *B. salemensis*; fig. 4a is a worthless composite drawing).

This is a very small trilobite, and the specimens include at least two species. In the first place the composite drawing used in 1887 and subsequently repeated in 1891 and 1916, must be discarded both because it is incorrectly drawn and because it is based on at least two species. Further, figure 4 of the 1916 paper, which is the holotype of the species, needs correction. Carefully made enlarged photographs show no more trace of glabellar furrows than the smooth glabella indicates under a lens. In addition this head is crushed so that the expansion of the glabella is somewhat accentuated. With allowance for this

distortion, the species still has a glabella that expands somewhat more than the extreme in other species, but it does not seem to be enough more to warrant the establishment of a new genus.

Lower Cambrian, Schodack; 2 miles south of North Granville, New York.

Holotype.—U.S.N.M. no. 17454a.

Bonnia salemensis, n. sp.

Corynexochus clavatus WALCOTT (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 316, pl. 55, fig. 4b, 1916 (see *B. clavata*).

This form has strong glabellar furrows, exceeding in this respect as well as in length of glabella the similar features in *B. senecta*.

Lower Cambrian, Schodack; (loc. 43a) 1 mile northeast of Salem, New York.

Holotype.—U.S.N.M. no. 17454b.

Bonnia bubaris (Walcott)

Corynexochus bubaris WALCOTT (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 314, pl. 56, fig. 2, 1916. (Not fig. 2a = *B. bicensis*; 2b = *B. quebecensis*; figs. 3, 3a = *B. wanneri*; figs. 3b-3f = *B. tumifrons*.)

Lower Cambrian; (loc. 20) boulders, Bic, Quebec.

Holotype.—U.S.N.M. no. 62734.

Bonnia bicensis, n. sp.

Corynexochus bubaris WALCOTT (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 314, pl. 56, fig. 2a (only), 1916 (see *B. bubaris*).

This species differs from *B. bubaris* in its greater and more even convexity, longitudinally.

Occurrence same as preceding.

Holotype.—U.S.N.M. no. 62735.

Bonnia quebecensis, n. sp.

Corynexochus bubaris WALCOTT (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 314, pl. 56, fig. 2b (only), 1916 (see *B. bubaris*).

Coarse lined surface ornamentation distinguishes this form from *B. bubaris*.

Occurrence same as preceding.

Holotype.—U.S.N.M. no. 62736.

Bonnia wanneri, n. sp.

Corynexochus bubaris WALCOTT (part), Smithsonian Misc. Coll. vol. 64, no. 5, p. 314, pl. 56, figs. 3, 3a, 1916 (see *B. bubaris*).

Compared with *B. bubaris*, this species is not only larger but lacks glabellar furrows and in side view is seen to be arched only in its anterior third.

Lower Cambrian, Kinzers; (loc. 49) near Emigsville, north of York, Pennsylvania.

Holotype.—U.S.N.M. no. 62737; paratype, no. 62738.

***Bonnia tumifrons*, n. sp.**

Corynexochus bubaris WALCOTT (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 314, pl. 56, figs. 3b-3f, 1916 (see *B. bubaris*).

This is a very distinct species characterized by the shortness, width, and great convexity of its glabella, the presence of glabellar furrows, the blunt thoracic segments and the presence of three lateral spines on the pygidium.

Occurrence same as preceding.

Holotype.—U.S.N.M. no. 62739; paratypes, nos. 62740-72743.

***Bonnia capito* (Walcott)**

Corynexochus capito WALCOTT (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 315, pl. 57, figs. 2, 2a, 1916. (Not 2b = *B. lata*; 2c = *B. swantonensis*; 2d-e = *B. vermontensis*.)

This species must be confined to the York locality.

Lower Cambrian, Kinzers; (loc. 48b) York, Pennsylvania.

Cotypes.—U.S.N.M. nos. 62746-62747.

***Bonnia lata*, n. sp.**

Protypus senectus WALCOTT (part), U. S. Geol. Surv. Bull. 30, p. 213, pl. 31, fig. 2 (only), 1886 (figs. 2a-c = *B. swantonensis*); 10th Ann. Rep. U. S. Geol. Surv., p. 655, pl. 98, fig. 7 (only), 1891.

Corynexochus capito WALCOTT (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 315, pl. 57, fig. 2b (only), 1916 (see *B. capito*).

A similarly wide but relatively longer form as compared with *B. tumifrons*.

Lower Cambrian, Parker; (locality stated to be loc. 25), Parker Quarry, Georgia, Vermont, but the material suggests Swanton.

Holotype.—U.S.N.M. no. 15421a.

***Bonnia swantonensis*, n. sp.**

Corynexochus capito WALCOTT (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 315, pl. 57, fig. 2c (only), 1916 (see *B. capito*).

A small smooth species with a slightly expanded glabella.

Occurrence same as preceding.

Holotype.—U.S.N.M. no. 15421b.

***Bonnia vermontensis*, n. sp.**

Protypus senectus WALCOTT (part), U. S. Geol. Surv. Bull. 30, p. 213, pl. 31, figs. 2a-c (only), 1886 (see *B. capito*); 10th Ann. Rep. U. S. Geol. Surv., p. 655, pl. 98, figs. 7a-c (only), 1891.

Corynexochus capito WALCOTT (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 315, pl. 57, figs. 2d, e (only), 1916 (see *B. capito*).

Compared with *B. lata* this is a narrow form and finer also in its other features.

Occurrence same as preceding.

Cotypes.—U.S.N.M. no. 15421c, d.

CEDARIA Walcott, 1924

Cedaria burnetensis (Walcott)

Ptychoparia burnetensis WALCOTT, Proc. U. S. Nat. Mus., vol. 13, p. 272, pl. 21, fig. 1, 1890.

Two cranidia and a pygidium occur on the single small block containing the holotype.

Upper Cambrian, Hickory; (loc. 67x) Tatur Hill, Burnet County, Texas.

Holotype.—U.S.N.M. no. 23854.

CLAVASPIDELLA Poulsen, 1927

Clavaspidella sylla (Walcott)

Bathyuriscus (Poliella) sylla WALCOTT, Smithsonian Misc. Coll., vol. 64, no. 5, p. 354, pl. 48, figs. 3-3f, 1916.

Clavaspidella sylla RESSER, Smithsonian Misc. Coll., vol. 93, no. 5, p. 21, 1935.

The references to this and the following species were mixed in typing the 1935 report.

Middle Cambrian, Chetang; (loc. 61 o) Coleman Glacier Creek, 7 miles northeast of Robson Peak, Alberta.

Lectotype.—U.S.N.M. no. 62645; paratypes, nos. 62646-62651.

Clavaspidella probus (Walcott)

Bathyuriscus (Poliella) probus WALCOTT, Smithsonian Misc. Coll., vol. 64, no. 5, p. 354, pl. 65, figs. 2, 2a, 1916.

It will be noted that this is the youngest species referred to the genus. Moreover, in several features it is no longer fully typical, and for this reason some question concerning its generic affinities must remain.

Middle Cambrian, Marjum; (loc. 11 o) about 4 miles southeast of Antelope Springs, House Range, Utah.

Cotypes.—U.S.N.M. no. 62837, 62838.

CONOCORYPHIDAE Angelin, 1878

The trilobite species referred to this family need thorough revision, but to do the task properly would require a monographic study of several years duration. However, a hasty review of the literature permits a tentative revision of the group which seems to warrant publica-

tion. Even though all bibliographic references are at hand, which offers an advantage previous students of the group did not have, nevertheless the usual difficulties of working without specimens—with only descriptions and drawings—renders some of the following decisions of doubtful value.

Each described genus is discussed and its validity judged as far as the information available permits. Previous workers often considered chiefly local material, and sometimes the rules of nomenclature were not kept in mind. Therefore, it is hoped that the following discussion will shorten the labors of the person who will monograph this interesting group of trilobites.

Diagnosis.—Eyeless trilobites of ordinary size. Glabella well defined, tapered, with short recurved pairs of furrows. Genal spines usually lacking. Surface granulated or lined, or both. Equivalent of eye lines usually present. Thorax with about 15 segments; pleura blunt. Pygidium small, well fused, with well-impressed dorsal furrow and pleural grooves.

The family is evidently confined to the Middle Cambrian of the Atlantic Province, with three Asiatic incursions.

Synonyms of the various species are listed under the genera to which they were last referred by competent students, but a list of the genera regarded as valid follows. All species which appear referable to the family, with two exceptions, can be cared for by using existing genera.

<i>Conocoryphe</i> Corda, 1847	<i>Holocephalina</i> Salter, 1864
<i>Ctenocephalus</i> Corda, 1847	<i>Dasometopus</i> , new genus
<i>Bailiella</i> Matthew, 1885	<i>Hartshillia</i> Illing, 1915
<i>Bailiaspis</i> , new genus	

Liocephalus Grönwall is evidently a synonym of *Holocephalina*, and *Hartella* is eliminated as a synonym of *Ctenocephalus*.

CONOCORYPHE Corda, 1847

- Conocoryphe* CORDA, Abh. k. bömischen Gesell. Wiss., vol. 5, p. 139, 1847.
Conocoryphe MATTHEW, Trans. Roy. Soc. Canada, vol. 2, sec. 4, p. 103, 1885.
Conocoryphe GRÖNWALL, Danmarks Geol. Unders., vol. 2, no. 13, pp. 82, 84, 213, 1902.

The foregoing bibliography includes only those references which contribute to the understanding of this and related genera. Species belonging to many other families have been referred to *Conocoryphe*, as well as those representing other genera within the family.

Diagnosis.—Eyeless trilobite, oval in outline. Glabella tapered, with several sets of short, recurved furrows; extends nearly to the anterior

furrow. Deep marginal furrow extends all around the cephalon, being interrupted only at the genal angles. Two short diverging furrows cross the preglabellar area, joining the dorsal with the marginal furrow, thus making a distinct lobe anterior to the glabella. Eye ridges faint.

Thorax of 15 segments, with blunt tips. Pygidium fused, transverse.

Comparisons.—Since *Conocoryphe* is the type of family, comparisons of the other genera will be made with it.

Genotype.—*Trilobites sulzeri* Schlotheim.

Range.—Middle Cambrian of the Atlantic Province, associated with *Paradoxides*.

Species formerly referred to *Conocoryphe* are now referred as follows:

- | | |
|---|---|
| <i>C. abdita</i> Salter = <i>Conocephalina</i> | <i>C. homfrayi</i> Hicks = <i>Ptychoparia</i> |
| <i>C. adamsi</i> Miller = <i>Ptychoparella</i> | <i>C. humerosa</i> Salter = <i>Conocoryphe?</i> |
| <i>C. aequalis</i> Linnarsson = <i>Bailiella</i> | <i>C. impressa</i> Linnarsson = <i>Bailiella</i> |
| <i>C. applanata</i> Salter = <i>Solenopleura</i> | <i>C. invita</i> Salter = <i>Conocephalina</i> |
| <i>C. baileyi</i> Hartt = <i>Bailiella</i> | <i>C. kingii</i> = <i>Elrathia</i> |
| <i>C. brachymetopus</i> Linnarsson =
<i>Solenopleura</i> | <i>C. lantenoisi</i> Mansuy = <i>Bailiella</i> |
| <i>C. breviceps</i> = <i>Dasometopus</i> | <i>C. laticeps</i> Angelin = <i>Ctenocephalus</i> |
| <i>C. bucephala</i> Belt = <i>Beltella</i> | <i>C. latifrons</i> Corda = <i>Conocoryphe</i> |
| <i>C. bufo</i> Hicks = <i>Bailiaspis</i> | <i>C. levyi</i> Munier-Chalmas and
Bergeron = <i>Bailiella</i> |
| <i>C. bullata</i> Howell = <i>Bailiella</i> | <i>C. ? longispinus</i> Belt = <i>Olenus</i> |
| <i>C. coronata</i> Barrande = <i>Ctenocephalus</i> | <i>C. lyelli</i> Hicks = <i>Bailiella</i> |
| <i>C. dalmani</i> Angelin = <i>Bailiaspis</i> | <i>C. malvernensis</i> Phillips = <i>Peltura</i> |
| <i>C. cf. dalmani</i> Nicholas = <i>Bailiaspis</i>
<i>nicholasi</i> | <i>C. matthewi</i> Hartt = <i>Ctenocephalus</i> |
| <i>C. cf. dalmani</i> Sjrögren = <i>Bailiaspis</i>
<i>emarginata</i> | <i>C. mutica</i> Corda = <i>Conocoryphe</i> |
| <i>C. elegans</i> Hartt = <i>Bailiaspis</i> | <i>C. perdita</i> Hicks = Undeterminable |
| <i>C. emarginata</i> Linnarsson = <i>Bailiaspis</i> | <i>C. punctata</i> Corda = <i>Conocoryphe</i> |
| <i>C. emarginata longifrons</i> Cobbold =
<i>Bailiella</i> | <i>C. pustulosa</i> Matthew = <i>Caintops</i> |
| <i>C. exsulans</i> Linnarsson =
<i>Ctenocephalus</i> | <i>C. quadrans</i> Miller = " <i>Ptychoparia</i> " |
| <i>C. frangtengensis</i> Reed = <i>Bailiella</i> | <i>C. reticulata</i> Walcott = <i>Atops</i> |
| <i>C. gallatinensis</i> Meek = <i>Ehmania</i> | <i>C. rouayrouxi</i> Munier-Chalmas and
Bergeron = <i>Solenopleura ribeiro</i> |
| <i>C. geminispinosa</i> Miller =
<i>Ctenocephalus</i> | <i>C. tenuicincta</i> Linnarsson = <i>Bailiella</i> |
| <i>C. glabrata</i> Angelin = <i>Bailiaspis</i> | <i>C. teres</i> Grönwall = <i>Bailiella</i> |
| <i>C. granulata</i> Corda = <i>Conocoryphe</i> | <i>C. trilineata</i> Ford = <i>Atops</i> |
| <i>C. heberti</i> Munier-Chalmas and
Bergeron = <i>Bailiella</i> | <i>C. ? variolaris</i> Salter = <i>Solenopleura</i> |
| <i>C. heberti pseudoculata</i> Miquel =
<i>Bailiella</i> | <i>C. (Erinmys) venulosa</i> Grönwall =
<i>Bailiella</i> |
| | <i>C. viola</i> Woodward = Genus
indeterminate |
| | <i>C. walcotti</i> Matthew = <i>Bailiella</i> |
| | <i>C. williamsoni</i> Salter = <i>Beltella</i>
<i>bucephala</i> |

It will be observed that besides the genotype *C. sulzeri*, several species remain in the genus. These include *C. ? humerosa* Salter from England and four species from Bohemia, *C. granulata*, *C. latifrons*, *C. mutica*, and *C. punctata*, differentiated by Corda from *C. sulzeri* with which they were subsequently placed by Barrande; they seem however, to be good species.

C. lantenoisi Mansuy from Tonkin, *C. frangtengensis* Reed from Kashmir, and *C. ulrichi* Resser and Endo from Manchukuo must be referred to *Bailiella*, if they do not constitute a new genus.

BAILIELLA Matthew, 1885

Bailiella MATTHEW, Trans. Roy. Soc. Canada, vol. 2, sec. 4, p. 103, 1885.

Erinnys SALTER, Quart. Journ. Geol. Soc. London, vol. 21, p. 746, 1865.

Erinnys GRÖNWALL, Danmarks Geol. Unders., vol. 2, no. 13, pp. 84, 213, 1902.

Salteria WALCOTT, U. S. Geol. Surv. Bull. 10, p. 31, 1884.

Salter recognized the distinctness of these trilobites from *Conocoryphe*, but the name *Erinnys*, which he assigned to them, proved to be preoccupied; the same situation developed respecting Walcott's substitute *Salteria*. Matthew proposed *Bailiella* as a subgenus of *Conocoryphe* without recognizing the relationship between *B. baileyi* and *B. venulosa* Salter. Moreover, because Miller named *B. baileyi* as the genotype, the genus must rest on that species.

Diagnosis.—Cephalon semicircular; glabella well defined, tapered, with glabellar furrows. Eyes lacking. Fixed cheeks large, apparently extending to the lateral margins. Marginal furrow extends entirely around the cephalon. Rim generally of even width but sometimes slightly expanded in the middle. Preglabellar area always present and exceeds that of *Conocoryphe*.

Thorax and pygidium typical of the family.

Surface rarely smooth but usually pustulose or lined or both. Usually a ridge or vein extends outward across the cheeks from the dorsal furrow, arising near the front of the glabella. This ridge occupies the position of, and resembles, an eye line, but in some species it is more like a vein branching as it advances. Anterior to this ridge the system of surface ornamentation characterizing the species gives way frequently to lines or veins.

Comparisons.—Compared with *Conocoryphe*, *Bailiella* is readily distinguished by its wider preglabellar area and the absence of furrows across it. Its separation from *Bailiaspis* is less sharp because some species of *Bailiella* develop a slight thickening of the rim in the middle of the head.

Genotype.—*Conocephalites baileyi* Hartt.

Range.—Middle Cambrian of the Atlantic Province.

Besides the species presented below, the genus includes *Bailiella venulosa* Salter.

Bailiella baileyi (Hartt)²

Conocephalites baileyi HARTT, in Dawson, *Acadian Geol.*, 2d ed., p. 645, 1868.

Conocoryphe (Salteria) baileyi WALCOTT, U. S. Geol. Surv. Bull. 10, p. 32, pl. 4, figs. 3, 3a, 1884.

Conocoryphe (Bailiella) baileyi MATTHEW, Trans. Roy. Soc. Canada, vol. 2, sec. 4, p. 111, pl. 1, figs. 22, 24, 25, 26, 27, 35, 1885.

Middle Cambrian, St. John (1c) ; Portland and other localities in New Brunswick.

Bailiella arcuata (Matthew)

Conocoryphe (Bailiella) baileyi arcuata MATTHEW, Trans. Roy. Soc. Canada, vol. 2, sec. 4, p. 113, pl. 1, figs. 23, 23b, 1885.

Occurrence same as preceding.

Bailiella walcotti (Matthew)

Conocoryphe (Bailiella) walcotti MATTHEW, Trans. Roy. Soc. Canada, vol. 2, sec. 4, p. 119, pl. 1, figs. 36, 36b, 1885.

Occurrence same as preceding.

Bailiella aequalis (Linnarsson)

Conocoryphe aequalis LINNARSSON, *Sveriges Geol. Unders.*, ser. C, no. 54, p. 25, pl. 4, figs. 12-15, 1882.

Middle Cambrian, Tessini beds ; Andrarum, Sweden. Also identified from localities in Bornholm and England.

Cotypes.—Sveriges G. U. ; plesiotypes, Min. Mus. Copenhagen no. 159, Sedgwick Mus. no. A 47.

Bailiella longifrons (Cobbold)

Conocoryphe emarginata longifrons COBBOLD, *Quart. Journ. Geol. Soc. London*, vol. 67, p. 286, pl. 24, figs. 8-13, 1911.

Middle Cambrian, Comley ; Shropshire, England.

Cotypes.—Sedgwick Mus. nos. A 61-A 65.

Bailiella tenuicincta (Linnarsson)

Conocoryphe tenuicincta LINNARSSON, *Sveriges Geol. Unders.*, ser. c, no. 35, p. 18, pl. 2, figs. 23-25, 1879.

Middle Cambrian, Exsulans limestone ; Andrarum and other localities in Sweden, and Bornholm, Denmark.

Holotype.—Sveriges G. U.

²Hartt's types came to the museum at Cornell University and most of Matthew's to the Royal Ontario Museum at Toronto. Numbers are not now available for the types listed below.

Bailiella bullata (Howell)

Conocoryphe bullata HOWELL, Bull. Amer. Pal., vol. 2, no. 43, p. 87, pl. 3, figs. 10, 11, 1925.

Middle Cambrian, Manuels; Manuels Brook, Conception Bay, Newfoundland.

Holotype.—Princeton Univ. no. 8021; paratype, no. 8026.

Bailiella lyelli (Hicks)

Conocoryphe lyelli HICKS, Quart. Journ. Geol. Soc. London, vol. 27, p. 399, pl. 16, figs. 1-7, 1871.

Conocoryphe (Liocephalus) lyelli GRÖNWALL, Danmarks Geol. Unders., vol. 2, no. 13, p. 84, 1902.

Middle Cambrian, Menevian; Nuns' Well, St. Davids, North Wales.

Cotypes.—Sedgwick Mus. nos. A 765, A 1090, A 1081; Mus. Pract. Geol. nos. 7613, 7614.

Bailiella impressa (Linnarsson)

Conocoryphe impressa LINNARSSON, Sveriges Geol. Unders., ser. C, no. 35, p. 20, pl. 2, figs. 29, 30, 1879.

Conocoryphe (Liocephalus) impressa GRÖNWALL, Danmarks Geol. Unders., vol. 2, no. 13, p. 101, pl. 1, fig. 25, 1902.

Middle Cambrian, Exsulans limestone; Andrarum and other localities in Sweden and Bornholm.

Holotype.—Sveriges G. U.

Bailiella cobboldi, n. sp.

Conocoryphe (Liocephalus) impressa COBBOLD, Quart. Journ. Geol. Soc. London, vol. 69, p. 33, pl. 3, fig. 16, 1913.

This species differs from *B. impressa* in having a wider rim and a less tapered glabella.

Middle Cambrian, Comley; Shropshire, England.

Holotype.—Sedgwick Mus. no. A 50.

Bailiella comleyensis, n. sp.

Conocoryphe aequalis COBBOLD, Quart. Journ. Geol. Soc. London, vol. 69, p. 32, pl. 3, fig. 18, 1913.

The cephalic outline of this species is quite distinct from that of *B. aequalis*; the rim is also more thickened in the middle, the glabella narrower and the test smoother.

Occurrence same as preceding.

Holotype.—Sedgwick Mus. no. A 47.

Bailiella teres (Grönwall)

Conocoryphe (Liocephalus) teres GRÖNWALL, Danmarks Geol. Unders., vol. 2, no. 13, pp. 103, 215, pl. 2, fig. 2, 1902.

Middle Cambrian, Exsulans; Borregaard, Bornholm, Denmark, and Skåne, Sweden.

Holotype.—Danmarks G. U.

Bailiella heberti (Munier-Chalmas and Bergeron)

Conocoryphe heberti MUNIER-CHALMAS and BERGERON, Ann. Sci. Geol., vol. 22, p. 334, pl. 3, figs. 3, 4, 1889.

Middle Cambrian; Montagne Noir, Hérault, France, and localities in Spain.

Holotype.—Presumably at the Univ. Paris.

Bailiella pseudooculata (Miquel)

Conocoryphe heberti pseudooculata MIQUEL, Bull. Geol. Soc. France, 4th ser., vol. 5, p. 474, pl. 15, fig. 6, 1905.

Middle Cambrian; Coulouma, Hérault, France.

Holotype.—Presumably at Montpellier.

Bailiella levyi (Munier-Chalmas and Bergeron)

Conocoryphe levyi MUNIER-CHALMAS and BERGERON, Ann. Sci. Geol., vol. 22, p. 335, pl. 3, fig. 1, 1889.

Occurrence same as *B. heberti*.

Holotype.—Presumably at the Univ. Paris.

BAILIASPIS, n. gen.

Several species that have been referred to *Conocoryphe* or *Ctenocephalus* differ in sufficient degree to warrant separate generic designation. These forms are nearest to *Bailiella*, being separated by the thickening, backward projection, and sometimes upturning of the rim in the middle of the cephalon, for which reason the name *Bailiaspis* is proposed.

Diagnosis.—All features normal for the family. Cephalon and pygidium like *Bailiella* except for the rim of cephalon. Rim thickened and extended backward in the middle, sufficiently in some species to connect the anterior furrow with the dorsal furrow.

Some species were referred to *Ctenocephalus* because the thickened rim simulates a median boss, but examination of the specimens shows at once that the structure is quite different.

Genotype.—*Conocephalites elegans* Hartt.

Range.—Same as for *Bailiella*.

Bailiaspis elegans (Hartt)

Conocephalites elegans HARTT, in Dawson, Acadian Geol., 2d ed., p. 650, 1868.
Conocoryphe elegans MATTHEW, Trans. Roy. Soc. Canada, vol. 2, sec. 4, p. 115, pl. 1, figs. 28-33, 1885.

Middle Cambrian, St. John (1c); Ratcliffe Millstream, St. John, and other localities in New Brunswick.

Holotype.—R. O. M.

Bailiaspis granulata (Matthew)

Conocoryphe elegans granulatus MATTHEW, Trans. Roy. Soc. Canada, vol. 2, sec. 4, p. 116, pl. 1, fig. 34, 1885.

Occurrence same as preceding.

Holotype.—R. O. M.

Bailiaspis dalmani (Angelin)

Conocoryphe dalmani ANGELIN, Pal. Scand., 3d ed. Holmiae, p. 63, pl. 33, fig. 6, 1878.

Middle Cambrian, Exsulans limestones; Andrarum and other localities in Sweden and Bornholm.

Holotype.—Lund Univ.; plesiotypes, Sveriges G. U.

Bailiaspis emarginata (Linnarsson)

Conocoryphe emarginata LINNARSSON, Geol. Foren, Stockholm Förhandl., vol. 3, p. 366, pl. 15, figs. 2-4, 1877.

Middle Cambrian, Ölandicus zone; Stora Frö, Öland, Sweden.

Cotypes.—Sveriges G. U.

Bailiaspis bufo (Hicks)

Conocoryphe bufo HICKS, British Assoc. Rep., p. 285, 1865.

Conocoryphe bufo HICKS, Quart. Journ. Geol. Soc. London, vol. 25, p. 52, pl. 2, fig. 8, 1869.

Conocoryphe bufo ILLING, idem, vol. 71, p. 425, pl. 35, figs. 1-3, 1915.

Bailiella bufo REED, Geol. Mag., dec. 4, vol. 5, p. 493, 1898.

Middle Cambrian, Menevian; Porth-y-rhaw, St. Davids, North Wales.

Holotype.—Mus. Pract. Geol.; plesiotypes, Sedgwick Mus. nos. A 48, A 224.

Bailiaspis glabrata (Angelin)

Conocoryphe ? glabrata ANGELIN, Pal. Scand., 3d ed. Holmiae, p. 72, pl. 37, fig. 8, 1878.

Middle Cambrian, Andrarum; Andrarum and other localities in Sweden and Bornholm.

Holotype.—Riksmus. Stockholm.

CTENOCEPHALUS Corda, 1847

Ctenocephalus CORDA, Abh. k. bömischen Gessell. Wiss., vol. 5, p. 142, 1847.

Ctenocephalus MATTHEW, Trans. Roy. Soc. Canada, vol. 4, p. 103, 1885.

Ctenocephalus GRÖNWALL, Danmarks Geol. Unders., vol. 2, p. 84, 1902.

Elyx ANGELIN, Pal. Scand., 3d ed., Holmiae, p. 4 (1854), 1878. (Misprinted *Eryx*.)

Hartella MATTHEW, Trans. Roy. Soc. Canada, vol. 2, sec. 4, p. 103, 1885.

It is possible that *Elyx* might be established as a distinct genus because of the angular outline, but since otherwise it agrees with *Ctenocephalus*, present usage is continued.

Matthew erected *Hartella* as a subgenus of *Ctenocephalus*, stating that both had a frontal lobe anterior to the glabella but that *Ctenocephalus* had a "wall-like front to the cheeks and frontal lobe," whereas *Hartella* had "a sloping front to the cheeks and frontal lobe." He further characterized both genera as having a small pygidium in contradistinction to *Conocoryphe*. The mentioned difference in the anterior portions of the head might be interpreted as indicating separate genera, but because there seems to be an intergradation in this respect from species to species, it seems wiser to drop *Hartella*.

Genotype.—*Conocephalus coronatus* Barrande.

Range.—Same as *Conocoryphe*.

Species previously referred to *Ctenocephalus*:

C. coronatus (Barrande)

C. latilimbatus (Brögger) [doubtful]

C. exsulans (Linnarsson)

C. tumidus Grönwall

C. laticeps (Angelin)

In addition there are the species previously referred to the subgenus *Hartella*:

C. matthewi (Hartt)

C. perhispidus (Matthew)

C. hispidus (Matthew)

Besides these eight species, several that were suppressed appear to deserve full recognition. They are listed below.

***Ctenocephalus geminispinosus* (Hartt)**

Conocephalites gemini-spinosus HARTT, in Dawson, Acadian Geol., 2d ed., p. 653, 1868.

Ctenocephalus (*Hartella*) *matthewi geminispinosus* MATTHEW, Trans. Roy. Soc. Canada, vol. 2, sec. 4, p. 106, 1885.

Middle Cambrian, St. John (1c); localities in New Brunswick.

Holotype.—Cornell Univ.

***Ctenocephalus hartti*, n. sp.**

Conocoryphe (Subgenus?) *matthewi* WALCOTT (part), U. S. Geol. Surv. Bull. 10, p. 28, pl. 4, fig. 1, 1884 (not 1a = *C. hispida*).

This species is distinguished by the system of veins underlying the scattered granules. Moreover, the veins increase in strength on the anterior portions of the cheeks beyond the raised lines which extend

out from the anterior portion of the glabella or rather the dorsal furrow.

Occurrence same as preceding.

Holotype.—Presumably R. O. M.

Ctenocephalus granulatus (Walcott)

Conocoryphe (Subgenus?) *matthewi granulata* WALCOTT, U. S. Geol. Surv.

Bull. 10, p. 30, pl. 4, fig. 1b, 1884.

Conocoryphe elegans WALCOTT (part), idem, pl. 4, fig. 2a.

Occurrence same as preceding.

Holotype. Cornell Univ.

HOLOCEPHALINA Salter, 1864

Holocephalina SALTER, Quart. Journ. Geol. Soc. London, vol. 20, p. 237, 1864.

Holocephalina ILLING, idem, vol. 71, p. 424, 1915.

Liocephalus GRÖNWALL, Danmarks Geol. Unders., vol. 2, no. 13, pp. 84, 213, 1902.

Grönwall designated *Conocoryphe impressa* Linnarsson as the genotype of his subgenus *Liocephalus*. This species, together with *C. lyelli*, belongs to *Bailiella*, which fact alone would invalidate *Liocephalus*. However, it seems that Grönwall's concept of *Liocephalus* was that of Salter's *Holocephalina*, which, being the earlier name, must be the recognized genus. Moreover, Grönwall described a good species of *Holocephalina* as *L. linnarssoni*.

Diagnosis.—A rather small trilobite with convex cephalon. Glabella distinctly marked by shallow dorsal furrow. Marginal furrow also shallow; thorax and pygidium typical of the family.

Comparisons.—*Holocephalina* needs only to be compared with *Hartshillia* and the new genus *Dasometopus*. Illing has already distinguished the first two, and the features of the last named are presented with its discussion.

Genotype.—*H. primordialis* Salter.

Range.—Same as *Conocoryphe*.

Three species have been recognized previously in the genus, *H. primordialis*, *H. holocephala* Miquel, and *H. incerta* Illing.

Holocephalina linnarssoni (Grönwall)

Conocoryphe (*Liocephalus*) *linnarssoni* GRÖNWALL, Danmarks Geol. Unders., vol. 2, no. 13, pp. 102, 214, pl. 2, fig. 1, 1902.

Middle Cambrian, Exsulans limestone; Borregaard, Bornholm, Denmark.

Holotype.—Min. Mus. Copenhagen.

DASOMETOPUS, n. gen.

This peculiar trilobite was originally referred by Angelin to *Harpides*. Subsequently, Grönwall placed it in the invalid genus *Erinnys*, thus including the species in *Bailiella*. Only a brief examination is necessary to show that this form is not *Bailiella*; consequently, a new genus must be made for it.

Diagnosis.—Cephalon alone known. Cephalon semicircular, eyeless. Glabella well defined, tapered, a little more than half the length of the head. Glabellar furrows present, the rear pair recurved, separating marginal lobes. Cheeks marked by irregular lines radiating from the dorsal furrow. Upturned rim with coarse granules; other scattered granules on cheeks. A depression extends across the preglabellar area.

Comparisons.—*Dasometopus* is similar to *Holocephalina* in many respects. It differs in its greater relative width and particularly in the depression extending from the glabella to the anterior furrow. From *Bailiella* it is also differentiated by this depression.

Genotype.—*Harpides breviceps* Angelin.

Range.—Middle Cambrian of the Atlantic Province.

Name.—*δασνς* = rough, *μετωπον* = forehead.

Dasometopus breviceps (Angelin)

Harpides breviceps ANGELIN, Pal. Scand., 3d ed., Holmiae, p. 87, pl. 41, fig. 8, 1878 (1st ed., 1854).

Conocoryphe (Erinnys) breviceps GRÖNWALL, Danmarks Geol. Unders., vol. 2, no. 13, p. 97, 1902.

Middle Cambrian, Andrarum; Andrarum, Sweden and Bornholm, Denmark.

CORYNEXOCHIDAE Angelin, 1852

CORYNEXOCHUS Angelin, 1852

Corynexochus ANGELIN, Pal. Scand., 3d ed., Holmiae, p. 59, 1878 (earlier editions 1852, 1854).

Corynexochus GRÖNWALL, Danmarks Geol. Unders., vol. 2, no. 13, p. 136, 1902.

Corynexochus WALCOTT, Smithsonian Misc. Coll., vol. 64, no. 5, p. 309, 1916.

Corynexochus RAYMOND, Amer. Journ. Sci., vol. 15, p. 309, 1928.

Corynexochus LAKE, Mon. British Camb. Tril., Pal. Soc., pt. 8, p. 180, 1934.

Karlia WALCOTT, Proc. U. S. Nat. Mus., vol. 11, p. 444, 1880.

Angelin founded *Corynexochus* on a cranidium, but as pointed out by Lake, the specific name of the genotype evidently was based on a spinose tail. Some doubt still remains regarding the pygidium, but Grönwall's assignment of a small pygidium to Angelin's species appears to be correct.

Walcott evidently intended to base his genus *Karlia* on the Mount Stephen species, *K. stephensis*, but according to the rules of nomenclature, because Miller designated Walcott's first species *K. minor* as the genotype, *Karlia* must rest on that species. However, *K. minor* is a real *Corynexochus*; hence *Karlia* becomes a synonym, and the new generic name, *Bonnaspis*, is given to *K. stephensis* because it evidently is related to *Bonnia* and is not to be regarded as belonging to the family Corynexochidae.

Raymond and Walcott confused trilobites of several families with *Corynexochus*. Subsequently, Lake reviewed the group and pointed out the need for rearrangement. In confining the genus to its proper limits, a new diagnosis becomes necessary.

Diagnosis.—Small trilobites with large glabella extending to the anterior edge. Glabella expanded forward so that its width at the front end is about twice that dimension at the neck ring; short, faint glabellar furrows present. Eyes small, situated forward of the midpoint. Fixed cheeks wide in rear, tapering rapidly to extinction at the anterior end of the eyes, except for tiny anterior lobes.

Thorax in *C. minor* has seven segments.

Pygidium small, flat, with segments fused. Axial and pleural furrows present.

Genotype.—*C. spinulosus* Angelin.

Range.—Middle Cambrian of the Atlantic Province.

Besides the genotype *C. spinulosus*, *Corynexochus* then includes the previously assigned species *C. bornholmiensis* Grönwall from Bornholm; *C. cambrensis* Nicholas and *C. pusillus* Illing from England; *C. delagei* Miquel from southern France; and *C. minor* (Walcott) from Newfoundland.

C. stephensis becomes the type of the new genus *Bonnaspis*, and the Lower Cambrian species are to be referred to *Bonnia*.

HOUSIA Walcott, 1924

Housia vacuna (Walcott)

Ptychoparia vacuna WALCOTT, Proc. U. S. Nat. Mus., vol. 13, p. 275, pl. 21, figs. 8, 12, 1890.

Upper Cambrian, Deadwood; (loc. 88a) Spring Creek Canyon, Black Hills, South Dakota.

Holotype.—U.S.N.M. no. 23862.

INGLEFIELDIA Poulsen, 1927

Inglefieldia POULSEN, Meddels. Grønland, vol. 70, p. 261, 1927.

Inglefieldia RESSER, Smithsonian Misc. Coll., vol. 93, no. 5, p. 36, 1935.

Further study of the Appalachian and other Lower Cambrian trilobites shows the necessity of referring additional species to *Inglefieldia*, even after certain groups are separated as new genera. Arbitrary limits must be set to separate *Inglefieldia* from *Kochiella* on the one hand and from *Poulsenia* and *Antagmus* on the other. If the brim increases in width and is flattened, the species passes into *Kochiella*. If, however, the rim thickens and the cranidium becomes more convex in all its parts, the species is referable to *Poulsenia*. Finally, if the thickening of the rim is accompanied by a reduction in width of the preglabellar area with a concomitant increase in the backward projection of the rim in the middle, the species becomes *Antagmus*.

Hitherto *Inglefieldia* contained the following species:

I. porosa Poulsen

I. discreta Poulsen

I. planilimbata Poulsen

I. thia Poulsen

I. groenlandica Poulsen

I. venulosa (Poulsen)

I. inconspicua Poulsen

***Inglefieldia affinis* Poulsen**

Inglefieldia affinis POULSEN, Meddels. Grønland, vol. 70, p. 264, pl. 15, fig. 23, 1927.

This species is on the border of the genus but for the present may be retained in it.

Lower Cambrian, Cape Kent; Cape Kent, northwest Greenland.

KINGSTONIA Walcott, 1924

Kingstonia WALCOTT, Smithsonian Misc. Coll., vol. 75, no. 2, p. 58, 1924; idem, no. 3, p. 103, 1925.

Ucebia WALCOTT, idem, pp. 60, 118.

It is possible that *Stenopilus* Raymond is also synonymous, but further study is necessary to prove this point.

Genotype.—*K. apion* Walcott.

Range.—Apparently in the earlier beds of the Upper Cambrian.

***Kingstonia ara* (Walcott)**

Ucebia ara WALCOTT, Smithsonian Misc. Coll., vol. 75, no. 2, p. 60, pl. 14, fig. 4, 1924; idem, no. 3, p. 118, pl. 17, figs. 7, 8, 1925.

Upper Cambrian, Warrior; (loc. 107k) 1 mile southeast of Warrior Mark, Pennsylvania.

Cotypes.—U.S.N.M. nos. 70257, 70258.

***Kingstonia globosa* (Walcott)**

Agraulos? globosus WALCOTT, U. S. Geol. Surv. Mon. 8, p. 61, pl. 9, fig. 23, 1884.

In this and related species the glabella is more convex than the remainder of the cranidium and hence appears more distinctly separated than in the genotype.

Upper Cambrian, Secret Canyon; (loc. 59) Combs Peak, and (loc. 61) Hamburg Mine, Eureka District, Nevada.

Holotype.—U.S.N.M. no. 24559.

LABRADORIA, n. gen.

A single species among the abundant Lower Cambrian trilobites of the Forteau formation can be referred to no other genus and must, therefore, be given a name. It is likely, however, that additional species will be discovered among the large collections from beds of similar age in the Appalachians.

Diagnosis.—Cranidium alone known. Glabella large, convex, rising above the fixed cheeks and extending forward to the rim. A strong occipital furrow separates a neck ring which is extended into a stout spine. Three sets of glabellar furrows extend across the glabella, sloping backward in the usual manner. Eyes fairly large, situated well back. Eye lines heavy. Brim consists of a thickened rim only. Facial sutures diverge slightly anterior to the eyes.

Genotype.—*Conocephalites miser* Billings.

Range.—Lower Cambrian of the Appalachians.

Labradoria miser (Billings)

Conocephalites miser BILLINGS, Geol. Vermont, vol. 2, p. 950, fig. 354, 1861;

Pal. Foss., Geol. Surv. Canada, pt. 1, p. 11, fig. 14, 1861.

Ptychoparia miser WALCOTT, U. S. Geol. Surv. Bull. 30, p. 199, pl. 27, fig. 2, 1886; 10th Ann. Rep. U. S. Geol. Surv., p. 651, pl. 96, fig. 8, 1891.

Billings described the species, illustrating only the glabella. Subsequently, Whiteaves and Walcott restudied Billings' material, and Walcott published a figure of a more complete specimen, which thus became the neoholotype and on which the species must rest.

Lower Cambrian, Forteau; L'Anse au Loup, Straits of Belle Isle, Labrador.

Neoholotype.—Nat. Mus. Canada; cast, U.S.N.M. no. 15444.

MODOCIA Walcott, 1924

Modocia penfieldi (Walcott)

Ptychoparia penfieldi WALCOTT, U. S. Geol. Surv. Mon. 32, pt. 2, p. 456, pl. 65, figs. 4-4b, 1899.

Upper Cambrian; south side Gallatin Valley, northwestern Yellowstone Park, Wyoming.

Cotypes.—U.S.N.M. no. 35231.

PLETHOPELTIS Raymond, 1913

Plethopeltis levis (Walcott)

Arionellus levis WALCOTT, U. S. Geol. Surv. Mon. 32, p. 462, pl. 65, fig. 1, 1899.

Upper Cambrian; Crowfoot Ridge, northwestern Yellowstone National Park, Wyoming.

Holotype.—U.S.N.M. no. 35230.

POULSENIA, n. gen.

Associated with *Inglefieldia* in Greenland and elsewhere in the Appalachians are many species of a closely related trilobite. Poulsen set these species off by assigning them to *Solenopleura*, whereas Walcott placed the more southerly forms in *Ptychoparia*.

Diagnosis.—Small trilobites of average form. Cranidium rather wide, convex in both directions; facial sutures diverging slightly anterior to the eyes, but owing to the infolding of the anterior angles appear to converge. Glabella well defined, tapering, truncated or rounded in front; two thirds or more of the length of the cranidium. Glabellar furrows two or three short pairs; neck furrow and ring well defined. Eyes small, situated in middle or somewhat back of the middle of the head. Eye lines present, brim consisting of a more or less thickened rim and a preglabellar area of varying relative width.

Judging from somewhat uncertain material, the thorax consists of about 15 segments. Pygidium small, well fused, with axis well defined, and with pleural grooves.

Genotype.—*Solenopleura grönwalli* Poulsen.

Range.—Upper Lower Cambrian of North America.

Comparisons.—Superficially *Poulsenia* resembles the Atlantic Province Middle Cambrian genus *Solenopleura*, but it is doubtful if this resemblance involves any relationship. On the other hand, *Poulsenia* appears simply to be the convex forms of the *Inglefieldia* stock.

Poulsenia grönwalli (Poulsen)

Solenopleura grönwalli POULSEN, Meddels. Grønland, vol. 70, p. 265, pl. 15, fig. 28, 1927.

Lower Cambrian, Cape Kent; Cape Kent, northwest Greenland.

Holotype.—Min. Mus. Copenhagen; cast, U.S.N.M. no. 70980.

Poulsenia similis (Poulsen)

Solenopleura similis POULSEN, Meddels. Grønland, vol. 70, p. 265, pl. 15, fig. 26, 1927.

Occurrence same as preceding.

Holotype.—Min. Mus. Copenhagen; cast, U.S.N.M. no. 70981.

Poulsenia bullata (Poulsen)

Solenopleura bullata POULSEN, Meddels. Grønland, vol. 70, p. 266, pl. 15, figs. 24, 25, 1927.

Occurrence same as preceding.

Holotype.—Min. Mus. Copenhagen; cast, U.S.N.M. no. 70948.

Poulsenia borealis (Poulsen)

Solenopleura borealis POULSEN, Meddels. Grønland, vol. 70, p. 266, pl. 15, fig. 27, 1927.

Occurrence same as preceding.

Holotype.—Min. Mus. Copenhagen.

PTARMINGIA Raymond, 1928**Ptarmingia gordonensis, n. sp.**

Albertella helena WALCOTT (part), Smithsonian Misc. Coll., vol. 53, no. 2, p. 19, pl. 2, fig. 5, 1908 (see *Albertella helena*).

The Montana species has about the same proportions as *P. rossensis*, but the eyes are smaller and the brim reduced.

Middle Cambrian, Gordon; (loc. 4v) Gordon Creek, Lewis and Clark Range, Montana.

Holotype.—U.S.N.M. no. 53408.

STENOCHILINA Ulrich, 1930**Stenochilina matutina (Hall)**

Amphion? *matutina* HALL, 16th Ann. Rep. N. Y. State Cab. Nat. Hist., p. 222, pl. 5a, fig. 6, 1863; Trans. Albany Inst., vol. 5, p. 194, 1867.

Amphion? *matutina* WALCOTT, Smithsonian Misc. Coll., vol. 64, no. 3, p. 219, pl. 26, fig. 8, 1916.

The original description reads as follows:

Glabella gibbous, longer than wide, subovate, rounded and a little wider in front. Occipital ring narrow and straight; occipital furrow narrow. Posterior lobe a little oblique, the furrow deeply impressed and a little expanded at its inner extremity; median lobe with the sides nearly parallel, separated from the anterior lobe by a narrow distinct furrow; anterior lobe broad, the length somewhat less than half the entire length of the glabella, a scarcely defined depression extending obliquely from near the middle of its length to the front.

It seems that this species, which has been unplaced generically for many years, can be definitely put into *Stenochilina*.

Upper Cambrian, Eau Claire; (loc. 84) Trempealeau, Wisconsin. Also reported from Dresbach, Minnesota.

Holotype.—A.M.N.H. no. 349; plesiotype, U.S.N.M. no. 61592.

SYSPACEPHALUS, n. gen.

Diagnosis.—Small trilobites of which the cranium alone is known. Glabella narrow, tapering slightly; truncated, about two-thirds as long as cranium; in some species ill defined on upper surface of test. Glabellar furrows showing on inner side of test. Brim convex with faint frontal furrows extending inward from the anterior angles for varying distances. Facial suture converging anterior to eyes. Eyes small. Occipital furrow developed on the cheeks, but sometimes almost obsolete on the cranium.

Genotype.—*Agraulos charops* Walcott.

Range.—Late Lower Cambrian. Upper Mount Whyte and formations of a similar age.

Name.—συσπαω = contracted; κεφαλος = head.

Syspacephalus charops (Walcott)

Agraulops charops WALCOTT, Smithsonian Misc. Coll., vol. 67, no. 3, p. 72, pl. 13, fig. 2, 1917.

Lower Cambrian, Mount Whyte; (loc. 35f) Mount Stephen, near Field, British Columbia.

Holotype.—U.S.N.M. no. 64395.

Syspacephalus unca (Walcott)

Agraulos? unca WALCOTT, Smithsonian Misc. Coll., vol. 67, no. 3, p. 73, pl. 13, fig. 1, 1917.

Lower Cambrian, Mount Whyte; (loc. 61d) Mount Shaffer and (loc. 35h) Mount Bosworth, British Columbia.

Holotype.—U.S.N.M. no. 64394.

Syspacephalus? redpathi (Walcott)

Agraulos redpathi WALCOTT, 10th Ann. Rep. U. S. Geol. Surv., p. 654, fig. 69, 1891.

Lower Cambrian; Mount Simon, Quebec.

Cotypes.—U.S.N.M. no. 23839; Peter Redpath Mus., McGill University, Montreal.

OLIGOMETOPUS, n. gen.

Diagnosis.—Cranidium only part known. Broad, with wide glabella and fixed cheeks. Glabella wide, rounded in front, apparently with a faint rear pair of joined glabellar furrows. Eyes slightly behind middle of head; eye lines developed. Brim consists of narrow rim only.

Genotype.—*Ptychoparia* (*Solenopleura*?) *breviceps* Walcott.

Range.—Upper Cambrian.

Name.—ολιγος = little ; μετοπον = forehead.

Oligometopus breviceps (Walcott)

Ptychoparia (*Solenopleura*?) *breviceps* WALCOTT, U. S. Geol. Surv. Mon. 8,
p. 49, pl. 10, fig. 9, 1884.

Pagodia breviceps WALCOTT, Smithsonian Misc. Coll., vol. 57, no. 13, pl. 361,
no. 13, 1914.

Upper Cambrian, Secret Canyon (loc. 62) ; near Adams Hill,
Eureka district, Nevada.

Holotype.—U.S.N.M. no. 24577.