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NOMENCLATURE OF SOME CAMBRIAN TRILOBITES

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INTRODUCTION

After many years devoted to intensive study of Cambrian stratigraphy and paleontology, the author hopes soon to submit for printing a complete summary of available information on the subject. During the course of this research many interesting facts have been brought to light, and it becomes clear that much of the paleontology is not up to date. To include the necessary nomenclatural changes in the bibliographic portion of the summary would be to bury them; hence it is planned to publish, from time to time, separate papers embodying necessary changes.

Dr. Charles D. Walcott's intention to monograph the Cambrian trilobites as he did the brachiopods was repeatedly stated in his writings and discussed in conversation over a period of many years. He finally came to realize that this would be more than a life-long work, since, while brachiopod species are numbered by hundreds, the trilobites comprise thousands. Unfortunately, just as he was well started on the description of the many new species in hand, matters pertaining to the World War robbed him of his research time. Although he accomplished much in this line, his assemblage of trilobites was so vast that many of the species remained unstudied and undescribed.

With the study of the new material generic relationships formerly obscure become apparent, and a more satisfactory classification emerges. However, monographic studies of many more groups must be made before families or other groupings above generic rank can be attempted. For this reason the genera discussed in this paper are not referred to families.

The data here presented do not lend themselves to precise systematic arrangement, for time is not available to properly monograph the genera or families discussed; wherefore the information is given in a condensed form, and is arranged alphabetically by genera. However, occasionally rather lengthy descriptions are presented, particularly when important generic questions are involved. Usually incom-

plete bibliographies are given, but they include references to all papers that add information. Care has been exercised to conform strictly to the rules of the International Commission on Zoological Nomenclature. For the sake of lowering publication cost illustrations are omitted from this article, even though they would be desirable, particularly since most papers describing Cambrian fossils are now out of print. New genera and species which require illustration to conform to the rules will be placed in a separate series of papers. Few foreign species are given consideration because several reports either in press or about to be printed care for many of them.

ACROCEPHALITES Wallerius, 1895

Acrocephalites Wallerius, Unders zonen med *Agnostus levigatus* i Vestergötland, Sweden, p. 52, 1895.

Acrocephalites Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 174, 1916.

Much confusion exists respecting this genus, as many different trilobites have been referred to it simply because they possess a median boss. In fact, the genus was not understood until Westergaard[1] published photographs of the type species. From his studies it is evident that the North American forms cannot even belong to the same family, and consequently fall into other genera. Restricting the genus to species congeneric with the genotype, only three very rare forms remain, viz., *Acrocephalites stenometopus* (Angelin) and *A.* ? *rarus* Westergaard, from Sweden, and *A. vigilans* Walcott and Resser from Novaya Zemlya.

Diagnosis.—Cranidium alone known. Viewed vertically the facial suture converges forward from the posterior margin, but in side view it rises sharply from the basal plane of the head to the eyes and then drops off equally rapidly to the anterior angles. Cranidium keeled.

Glabella large, about two-thirds as long as the head, tapering forward, but truncated anteriorly; two pairs of glabellar furrows turn sharply back; occipital furrow and ring well defined; sharp occipital spine. Brim with a well-defined rim about one-third the width of the preglabellar area; rim thickened and extended forward into a blunt spine medially. Fixed cheeks half as wide as the glabella; palpebral lobes strongly curved, elevated, and entirely beyond the rather straight course of the facial suture. Surface granulose.

Genotype.—Solenopleura? stenometopa Angelin.

Range.—The genus is confined to Upper Cambrian strata in the Atlantic Province.

[1] Sveriges Geol. Unders., ser. Ca, no. 18, p. 123, pl. 1, figs. 20, 21, 1922.

Species formerly referred to *Acrocephalites:*

A. americanus = *Alokistocare*
A. aoris = *Alokistocare*
A. aster = *Deiracephalus*
A. glomeratus = *Modocia*
A. haynesi = *Bolaspis*
A. insignis = *Acrocephalops*
A. majus = *Alokistocare*
A. multisegmentus = *Deiracephalus*
A. tutus = *Acrocephalops*
A. vulcanus = *Billingsaspis*

ACROCEPHALOPS Poulsen, 1927

Acrocephalops Poulsen, Meddels. Grønland, vol. 70, p. 275, 1927.

Numerous species formerly referred to *Acrocephalites* belong to this genus. At present all forms so identified are confined to the Appalachians and Greenland.

Diagnosis.—Cranidium with tapering glabella, furrowed; fixed cheeks wide, sometimes upturned from the well-defined dorsal furrow; eyes moderately small; eye lines heavy; brim wide, with median boss (usually) and a narrow thickened rim of even width. Free cheeks with no peculiar characteristics. Surface granulated or lined.

Thorax and pygidium not known.

Comparisons.—*Acrocephalops* differs from *Alokistocare* primarily and chiefly in the presence of a thickened rim, narrow and of even width nearly to the anterior angles. From *Bolaspis* it is less clearly separated, the distinguishing criteria being the flatter shield, wider fixed cheeks, eyes apparently never stalked.

Genotype.—*A. gibber* Poulsen.

Range.—Possibly confined to the Middle Cambrian of the Appalachians and Greenland.

DESCRIBED SPECIES REFERRED TO ACROCEPHALOPS

Acrocephalops tutus (Walcott)

Acrocephalites tutus Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 181, pl. 24, figs. 6, 6*a*, 1916.

Middle Cambrian, Conasauga; (loc. 141) near Cave Spring, Georgia.

Cotypes.—U.S.N.M. nos. 61566, 61567.

Acrocephalops insignis (Walcott)

Acrocephalites insignis Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 179, pl. 25, fig. 1 (only), 1916. (Not figs. 1*a*, 1*b* = *A. nitida.*)

Again, several species were included under one name and must, therefore, be separated. The name *insignis* is retained for the forms with the strongest sculpturing.

Middle Cambrian, Conasauga; (loc. 112) 5 miles southeast of Center, Alabama.

Lectotype and plesiotypes.—U.S.N.M. no. 61568.

Acrocephalops nitida, n. sp.

Acrocephalites insignis Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 179, pl. 25, figs. 1*a*, 1*b*, 1916. (Not fig. 1 = *A. insignis.*)

Acrocephalites americanus Walcott, idem, pl. 24, fig. 3a. (This poor specimen may represent the species.)

Unfortunately, none of the illustrated specimens is well preserved, and that shown in figure 1*a* has been damaged since it was photographed. However, this form clearly has weaker eye lines and other sculpturing than *A. insignis.*

Occurrence same as preceding.

Cotypes.—U.S.N.M. nos. 61569, 61570, and possibly 61560.

ALOKISTOCARE Lorenz, 1906

Alokistocare Lorenz, Zeitschr. deutsch. Geol. Gesell., vol. 58, no. 1, p. 62, 1906.
Alokistocare Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 182, 1916.
Amecephalus Walcott, idem, vol. 75, no. 2, p. 53, 1924.
Amecephalus Walcott, idem, vol. 75, no. 3, p. 65, 1925.

If the rules of nomenclature did not require recognition of *Alokistocare* because Lorenz named a described species as its type, the original description would remain meaningless. Furthermore, the choice of *A. subcoronatum* as the genotype is unfortunate because only cranidia of the species are definitely known, and hence uncertainty prevails as to whether the tail was small or large, which in turn prevents final determination of generic limits. This problem is further complicated by the fact that cranidia similar to that of the genotype occur in entire specimens with both small and large pygidia. However, a search among the scores of cranidia of *A. subcoronatum* from Blacksmith Fork, Utah, reveals the presence of two pygidia which can represent the species, as they are small and similar to those of other species here referred to the genus.

Much confusion exists between *Alokistocare* and *Acrocephalites* as well as among species of several other genera, because many strongly bossed trilobites which appear to belong rightly to *Alokistocare* have been assigned to the Atlantic Province genus *Acrocephalites,* and, as discussed above, their removal leaves no North American species in that genus. On the other hand, certain species must also be removed from *Alokistocare* to new genera.

Owing to the confusion of species, *Alokistocare* has not been properly understood, although in 1916 Walcott presented a diagnosis, evi-

dently based on other than the type species, which is correct in most essential points. Furthermore, it now appears that *Amecephalus* was not well founded and is congeneric with *A. subcoronatum*. The relationship between *A. subcoronatum* and *A. piochensis* is apparent in the cranidium, and if the pygidium mentioned above represents *A. subcoronatum,* this part also conforms. In addition several entire individuals belonging to undescribed species prove this relationship. A new generic diagnosis based on the enlarged group is given below.

Diagnosis.—Entire many-segmented trilobite tapering from a wide cephalon to a small pygidium.

Cephalon semicircular, and usually with considerable convexity. Facial suture diverges only slightly in front of the eyes and is intramarginal for perhaps one-third the distance to the center. Behind the eyes it diverges rapidly, forming short, blunt posterolateral limbs. Glabella marked off by well-defined dorsal furrow; tapers slightly and has three or four usually short glabellar furrows; length usually slightly more than half the length of the cranidium. Occipital furrow developed; neck ring thickened. Brim wide; rim usually defined but sometimes by only a faint furrow; preglabellar area equal to or wider than the rim; and in common with many wide-brimmed trilobites usually has a more or less well developed median boss; brim striated vertically, anterior to the eye lines. Fixed cheeks wide, with large, strongly bowed palpebral lobes. Eye ridges usually strong; eyes small, situated about the middle of the glabella. Free cheeks fairly large, concave toward the margin and with flat, sometimes concave genal spines.

Thorax with approximately 20 segments, which are directed rather straight out, bending downward at the fulcrum and ending bluntly.

Pygidium small, not exceeding in width the diameter of the glabella at the occipital furrow. Axis usually highly arched, as are also the pleural portions. Pleura fused; rim usually not demarcated.

Surface striated vertically on the brim; some species are pustulose or granulose, sometimes with both a fine and a coarse set.

Genotype.—Conocephalites subcoronatus Hall and Whitfield.

Range.—Chiefly in the Middle Cambrian, but also late Lower Cambrian.

Species formerly referred to *Alokistocare:*

A. labrosum = *Bolaspis*
A. linnarssoni = *Eldoradia*
A. prospectense = *Eldoradia*
A. ticida = *Bolaspis*

DESCRIBED SPECIES REFERRED TO ALOKISTOCARE

Alokistocare americanum (Walcott)

Acrocephalites americanus Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 177, pl. 24, figs. 2, 2*b*, and possibly fig. 3, 1916. (Not 2*a* = *A. georgense;* 3*a* = *Acrocephalops nitida?*.)

Two and perhaps three species are included in the original cotypes, and a brief examination of the nontype specimens from the locality indicates that perhaps twice that number of species occur. Consequently, the species must be carefully discriminated and restricted to the specimens conspecific with the lectotype.

Middle Cambrian, Conasauga; (loc. 89) Livingston, Georgia.

Lectotype.—U.S.N.M. no. 61557; paratype, no. 61559.

Alokistocare georgense, n. sp.

Acrocephalites americanus Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 177, pl. 24, fig. 2*a*, possibly also 3*b*, 1916. (See *A. americanum.*)

Compared with *A. americanum,* this species has more granules, particularly on the brim, and the rim is less thickened but upturned more sharply than shown in the illustrations.

Occurrence same as preceding.

Holotype.—U.S.N.M. no. 61558.

Alokistocare althea Walcott

Alokistocare althea Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 184, pl. 25, figs. 3, 3*a*, 4, 5*a*, 1916.

Middle Cambrian, Bright Angel: (loc. 74) Nankoweap Valley, and (loc. 74e) near Indian Garden Springs, Grand Canyon, Arizona.

Cotypes.—U.S.N.M. nos. 61571-61574.

Alokistocare subcoronatum (Hall and Whitfield)

Concephalites subcoronatus Hall and Whitfield, U. S. Geol. Surv. Expl. 40th Parallel, vol. 4, p. 237, pl. 2, fig. 1, 1877.

Ptychoparia subcoronata Walcott, U. S. Geol. Surv. Bull. 30, p. 205, pl. 28, fig. 4, 1886; idem, 10th Ann. Rep., p. 652, pl. 96, fig. 6, 1891.

Alokistocare subcoronatum Lorenz, Zeitschr. deutsch. Geol. Gesell., vol. 58, no. 1, p. 62, fig., 1906.

Alokistocare subcoronatum Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 187, pl. 25, fig. 2, 1916.

Middle Cambrian, Ute; Blacksmith Fork Canyon, east of Hyrum, Utah.

Cotypes.—U.S.N.M. no. 15442.

Alokistocare aoris (Walcott)

Acrocephalites aoris Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 178, pl. 26, figs. 3, 3*b*, 1916.

Middle Cambrian, Pleasant Hill; (loc. 107d) 1 mile northwest of Henrietta, Pennsylvania.

Cotypes.—U.S.N.M. nos. 61579, 61580.

Alokistocare pomona

Alokistocare pomona Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 186, pl. 25, fig. 6, 1916.

It is not altogether certain that this species can remain in *Alokistocare* because of the narrow cranidium, but without additional specimens it cannot be determined how much of this is due to distortion of the soft shale matrix.

Middle Cambrian, Park: (loc. 159f) Near Sixteen, Montana.

Holotype.—U.S.N.M. no. 61577.

Alokistocare majus (Walcott)

Acrocephalites ? majus Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 180, pl. 26, fig. 1, 1916.

It appears that the median boss has been compressed laterally into a ridge.

Middle Cambrian, Meagher; (loc. 4g) North of Gallatin River, east of Logan, Montana.

Holotype.—U.S.N.M. no. 61578.

Alokistocare piochense (Walcott)

Ptychoparia piochensis Walcott (part), U. S. Geol. Surv. Bull. 30, p. 201, pl. 26, 2*b;* pl. 28, figs. 1, 1*a, b, e,* 1886. (Not pl. 26, 2*a,* nor pl. 28, 1*c,* 1*d* = *A. packi:* pl. 26, fig. 2 = *Glyphaspis nevadensis.*)

Ptychoparia piochensis Pack (part), Journ. Geol., vol. 14, p. 297, pl. 2, fig. 4*a* (only), 1906: (For other figures see below.)

Liostracus piochensis Lorenz, Zeitschr. deutsch. Geol. Gesell., vol. 58, no. 1, p. 61, fig., 1906.

Amecephalus piochensis Walcott, Smithsonian Misc. Coll., vol. 75, no. 2, p. 53, pl. 9, 1924.

Amecephalus piochensis Walcott, idem, vol. 75, no. 3, p. 65, pl. 15, figs. 8-10, 1925.

As originally set up this species was a mixture of specific and generic forms. As used by Walcott in 1886, plate 26, figure 2*a,* and plate 28, figures 1*c* and 1*d,* represent another species, *A. packi;* plate 26, figure 2, represents *Glyphaspis,* which may be the same as that described by Pack under the name *Ptychoparia kempi.* Of Pack's figures, only 4*a* can possibly belong to *Alokistocare;* however, if this figure is correctly drawn, it is not *piochensis,* but an undescribed species. Figure 4 appears to be *A. packi,* 4*b* belongs to *Glossopleura packi,* and 4*c* to *Clavaspidella howelli.*

At first glance this species, which was made the genotype of *Amecephalus,* is quite distinct from *Alokistocare.* Closer examination shows conclusively that it is congeneric with *A. subcoronatum* and must therefore be referred to it as the older genus. Because the specimens are considerably flattened, *A. piochensis* appears somewhat different from *A. subcoronatum,* but if several specimens are carefully examined and variations due to preservation noted, generic distinctions are wanting.

Description.—Entire shield tapers from a wide cephalon to a small pygidium; but because of the fewer thoracic segments, this feature is less pronounced than in other, longer, undescribed species.

Cephalon semicircular in outline and apparently of moderate convexity. Cranidium about equally broad as long. Anterior facial suture diverges about 14°, to rather square anterior corners; intramarginal possibly one-half the distance to the center; posterior portion diverges rapidly, forming long, narrow postero-lateral limbs. Glabella well defined by dorsal furrow, which, as usual, is shallower across the front and anterior to the eye lines; tapers considerably and is a little over half as long as the cephalon. Three pairs of glabellar furrows traceable in some specimens. Occipital furrow shallow in the middle portion, separating a ring of even width. Brim wide, strongly striated vertically, anterior to the eye lines; a slight median boss usually discernible. When the free cheeks are retained, a narrow rim is apt to be present. In most individuals the doublure is pressed through so that its inner edge shows on the upper side as a ridge, with the consequence that many photographs seem to show a broad rim; doublure much wider in the center than toward the anterior angles, owing to the intramarginal course of the facial suture on the under surface. Fixed cheeks wide, eyes small, strongly bowed; eye ridges strong and, when undistorted, apparently fairly straight. Free cheeks also wide, with a concave border; sometimes with a narrow rim; genal spines concave and sharply pointed.

Thorax with 19 segments. Pleura straight; fulcrum far out; furrows in a central position extending to the fulcrum.

Pygidium small, with well-defined axis extending its full length. Pleura well fused, with pleural furrows showing only faintly on certain moulds.

Comparisons.—Confusion of this species with described forms is not likely because of its broad brim and widely placed fulcrum.

Middle Cambrian, Chisholm; (loc. 31) 3 miles northwest of Pioche, Nevada.

Lectotype and paratypes.—U.S.N.M. no. 15434b.

Alokistocare packi, n. sp.

Ptychoparia piochensis Walcott, U. S. Geol. Surv. Bull. 30, p. 201, pl. 26, fig. 2*a*, pl. 28, 1*c*, 1*d*, 1886. (See *A. piochensis.*)

In the narrowness of the cranidium this species is like *A. pomona.* Occurrence same as preceding.

Holotype and paratype.—U.S.N.M. no. 90171.

Alokistocare charax (Walcott)

Ptychoparia charax Walcott, Smithsonian Misc. Coll., vol. 67, no. 2, p. 31, pl. 6, fig. 1, 1917.

Ptychoparia pylas Walcott (part), idem. pl. 6, fig. 4*b*.

This trilobite seems to belong to *Alokistocare* even though the fixed cheeks are somewhat narrow and eyes slightly large, in which respects it recalls *Glyphasis,* but since it fails to go far enough in that direction, reference to that genus does not seem to be warranted. In the published illustrations the eye lines are drawn too heavy.

Middle Cambrian, Gordon; (loc. 4q, 4v) between Gordon and Youngs Creeks, Lewis and Clarke Range, Montana.

Holotype.—U.S.N.M. no. 63736; paratype, no. 63742.

Alokistocare agnesensis (Walcott)

Olenopsis ? agnesensis Walcott, Smithsonian Misc. Coll., vol. 57, no. 8, p. 242, pl. 36, fig. 2, 1912; idem (part), vol. 67, no. 3, p. 75, pl. 13, fig. 5, 1917. (Not 5*a-c* = *A. stephenensis.*)

Middle Cambrian, Ptarmigan; (loc. 35m) 3 miles southwest of head of Lake Louise, Alberta.

Holotype.—U.S.N.M. no. 58363.

Alokistocare stephenensis, n. sp.

Olenopsis ? agnesensis Walcott (part), Smithsonian Misc. Coll., vol. 67, no. 3, p. 75, pl. 13, figs. 5*a-c*, 1917. (Not 5, see preceding.)

Middle Cambrian, Ptarmigan; (loc. 58k) north shoulder Mount Stephen, 3 miles east of Field, British Columbia.

Alokistocare cleora (Walcott)

Olenopsis cleora Walcott, Smithsonian Misc. Coll., vol. 67, no. 3, p. 74, pl. 13, fig. 3, 3*a*, 1917.

Lower Cambrian, Mount Whyte; (loc. 62w) Gog Lake, Wonder Pass, British Columbia.

Holotype.—U.S.N.M. no. 64396.

Alokistocare stator (Walcott)

Agraulos stator Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 173, pl. 36, fig. 6, 1916; idem, vol. 67, no. 2, p. 28, pl. 6, fig. 6, 1917.

This species is not quite typical of the genus because the tips of the thoracic pleura are blunt, but this feature is hardly a generic criterion.

Middle Cambrian, Ptarmigan; (loc. 35c) Mount Bosworth, British Columbia; (loc. 35m) 3 miles southwest of head of Lake Louise, Alberta.

Holotype.—U.S.N.M. no. 61729.

ANORIA Walcott, 1924

Anoria Walcott, Smithsonian Misc. Coll., vol. 75, no. 2, p. 54, 1924; idem, no. 3, p. 67, 1925.

Genotype.—Dolichometopus tontoensis Walcott.

Range.—Middle Cambrian.

DESCRIBED SPECIES REFERRED TO ANORIA

Besides the genotype *A. tontoensis,* several other described species are now referred to the genus.

Anoria bantius (Walcott)

Bathyuriscus bantius Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 336, pl. 49, figs. 2-2c, 1916.

Raymond suggested that this species might go into *Athabascia,* (=*Clavaspidella*), but it will be observed that, except for the extension of the pleural furrows to the margin of the pygidium, it has no feature in common with *Clavaspidella.*

Middle Cambrian, Rutledge; (loc. 12b) McAnnallys Ridge, 12 miles northeast of Knoxville, and (loc. 11) 1 mile east of Post Oak Spring, Tennessee.

Cotypes.—U.S.N.M. nos. 62661-4.

Anoria bessus (Walcott)

Dolichometopus ? bessus Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 362, pl. 51, figs. 3-3c, 1916.

Middle Cambrian, Park; (loc. 62i) near Sixteen, Montana.

Lectotype.—U.S.N.M. no. 62699; paratypes, nos. 62700-62701.

Anoria baton (Walcott)

Dolichometopus baton Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 362, pl. 51, figs. 2-2b, 1916.

Middle Cambrian, Gordon; (loc. 3j) 6 miles northwest of Scapegoat Mountain, Powell County, Montana.

Lectotype.—U.S.N.M. no. 62696; paratypes, nos. 62697-98.

Anoria utahensis, n. sp.

Bathyuriscus productus Walcott (part), U. S. Geol. Surv. Bull. 30, p. 217, pl. 30, figs. 1*a*, 1*g*, 1*h*, 1886.

Sorting of the material from this locality identified as *Bathyuriscus productus* in 1886 and referred to *B. anax* in 1916, revealed the fact that neither mentioned species was present but that two other forms represented species referable to two other genera.

Besides the illustrated head and pygidia, many other cranidia are in hand as well as pygidia typical of *Anoria*.

Middle Cambrian, Ophir; (loc. 30a) 1 mile below Argenta Cottonwood Canyon, Wasatch Range, Utah.

Holotype and paratypes.—U.S.N.M. no. 15458.

APHELASPIS, n. gen.

A very abundant trilobite characterizing the upper beds of the Cap Mountain formation was described by Shumard as *Conocephalites depressus*. Recently, the genus has been found in beds of corresponding age in Wisconsin and possibly in the western United States.

Diagnosis.—Cranidium rather long and narrow; rather flat. Facial suture diverges anterior to the eyes. Glabella narrow, slightly tapered; glabellar furrows very faint; occipital furrow shallow but distinct. Brim wide; rim well defined, flat, usually somewhat upturned; preglabellar area more than twice width of rim; usually rather convex. Fixed cheeks only about one-third width of glabella; eye lines clearly developed, eyes moderate in size, situated about center of head; palpebral lobes strongly bowed, palpebral furrow distinct. Free cheeks rather large, long, with long genal spines; ocular platform swollen, elongate.

Pygidium short, wide; axis arched high above pleural lobes, extending to rear margin; three axial furrows clearly defined; pleural furrows less well developed.

Genotype.—*Conocephalites depressus* Shumard.

Name.—Αφελες = neat; ασπις = shield.

Range.—Upper Cambrian. Above Crepicephalus zone and below Ironton.

Aphelaspis depressa (Shumard)

Conocephalites depressus Shumard, Amer. Journ. Sci. 2d ser., vol. 32, p. 219, 1861.

Ptychoparia depressa Miller, North Amer. Geol. Pal., 1889, p. 565, (gen. ref.).

Inasmuch as Shumard's types were not illustrated and were later destroyed by fire, the propriety of recognizing his species may be questioned, but Walcott long ago set aside specimens as the species, and since they agree with Shumard's description, little doubt of their identity remains.

Upper Cambrian, Cap Mountain (Aphelaspis depressa zone); (loc. 67) Potatotop, 7 miles northwest of Burnet, Texas.

Plesiotypes.—U.S.N.M. no. 90172.

ASAPHISCUS Meek, 1873

Asaphiscus Meek, 6th Ann. Rep. U. S. Geol. Surv. Terr., p. 485, 1873.
Asaphiscus Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 381, 1916.

Asaphiscus was made in a footnote, without illustrations of the type species. Subsequently, the type and other species were well illustrated, but as now constituted several distinct genera are included in *Asaphiscus.*

Diagnosis.—Entire trilobite subelliptical. Cephalon semicircular in outline. Glabella wide, subconical, with only faint traces of glabellar furrows; occipital furrow also almost obsolete. Brim wide; rim wide, slightly thickened, flat, suture intramarginal for a short distance. Fixed cheeks narrow; postero-lateral limbs triangular; palpebral lobes moderately bowed. Free cheeks small, simple, without or with short genal spines.

Nine thoracic segments in genotype.

Pygidium nearly as large as cephalon. Pleural furrows weak; when doublure shows, it appears to have a wide rim.

Genotype.—*A. wheeleri* Meek.

Range.—Middle Cambrian.

Species formerly referred to *Asaphiscus:*

A. agatho = Genus undet.
A. anaxis = Genus undet.
A. bradleyi = (new genus—Canadian age)
A. calanus = *Coosia*
A. calenus = *Glyphaspis*
A. camma = *Glyphaspis*
A. capella = *Glyphaspis*
A. duris = Genus undet.
A. florus = Genus undet.
A. granulatus = *Weeksina*
A. minor = *Cedaria*
A. unispinus = *Weeksina*

DESCRIBED SPECIES REFERRED TO ASAPHISCUS

At present *Asaphiscus iddingsi* Walcott (part) from Manchukuo is the only described species besides the genotype, remaining in the genus, but other new species are at hand.

Asaphiscus wheeleri Meek

Asaphiscus wheeleri Meek, 6th Ann. Rep. U. S. Geol. Surv. Terr., p. 485, 1873.
Asaphiscus wheeleri White, Rep. U. S. Geogr. Surv. West 100th Meridian, vol. 4, p. 43, pl. 2, figs. 1*a-f*, 1877.
Asaphiscus wheeleri Walcott, U. S. Geol. Surv. Bull. 30, p. 220, pl. 31, figs. 3, 3*a*; pl. 25, fig. 9, 1886.
Asaphiscus wheeleri Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 390, pl. 58, figs. 1-1*g*, 1916.

Meek did not figure this species when he described it. Later White figured six specimens, stating that they were those used by Meek. White's figure 1*f* is the tail of an almost entire individual. The specimen shown in figure 1*e* is lost, and it is possible that several other unmarked specimens were used by Meek. In 1886 Walcott presented two figures, the entire shield being a composite of Meek's original cotypes. The head shown in figure 3*a* cannot be located. Walcott (1916) figured eight specimens. Figure 1 is an individual found by G. K. Gilbert and is unusually large and complete. Figure 1*e* is one of Meek's original cotypes, whereas 1*a* is again a composite. The small head shown in 1*d* is from locality 10*y* near Marjum Pass, several miles from Antelope Springs. Unfortunately, this head was not prepared, and hence the figure is of little worth. All published figures show the rim as thickened, which it is not.

Middle Cambrian, Wheeler; (loc. 4) Antelope Spring, House Range, Utah.

Cotypes.—U.S.N.M. no. 8576 (6 specimens); *plesiotypes,* nos. 62754-62760.

BATHYURISCUS Meek, 1873

Bathyuriscus Meek, 6th Ann. Rep. U. S. Geol. Surv. Terr., p. 484, 1873.
Bathyuriscus Walcott, U. S. Geol. Surv. Bull. 30, p. 215, 1886.
Bathyuriscus Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 330, 1916.
Bathyuriscus Raymond, Amer. Journ. Sci., 5th ser., vol. 15, p. 310, 1928.

If the genus is restricted to the forms agreeing with the genotype, only a few described species remain, but many new species will be described from the more recent collections. As the genus is herein described, the species fall into two groups: those with two marginal spines at the anterior corners of the pygidium; and the typical group, which lacks them. Inasmuch as all other characters appear to agree, this feature is not regarded as of generic value.

Genotype.—Bathyuriscus ? haydeni Meek

Range.—Middle Cambrian.

Species formerly referred to *Bathyuriscus:*

B. anax = *Clavaspidella*, etc.
B. bantius = *Anoria*
B. belesis = *Glossopleura*
B. belus = *Clavaspidella*
B. bithus = *Clavaspidella*
B. dawsoni = *Kootenia*
B. howelli = *Clavaspidella*
B. lodensis = *Glossopleura*
B. ornatus = *Klotziella*
B. productus = *Glossopleura*
B. parabola = *Glossopleura*
B. pupa = *occidentalis* = *Poliella*
B. rossensis = *Ptarmingia*
B. senectus = *Bonnia*

Reed's species from India, *B. ? stolickai* is not *Bathyuriscus,* and most, if not all, of the Chinese forms are in the same category. *B. batis* Walcott, which may come from Lower Cambrian strata has a cranidium much too wide to remain in the genus, but the material is so poor that a new name is not now suggested.

DESCRIBED SPECIES REFERRED TO BATHYURISCUS

Besides the species discussed below, *B. rotundatus* (Rominger) belongs to the typical group of the genus.

TYPICAL, NONSPINED GROUP

Bathyuriscus haydeni (Meek)

Bathyurus ? haydeni Meek, 6th Ann. Rep. U. S. Geol. Surv. Terr., (1872) p. 482, 1873.

Bathyuriscus haydeni Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 341, pl. 46, figs. 2-2*b*, 1916.

Meek had very fragmentary material and but little has been found since, but the species is apparently correctly understood.

Middle Cambrian, Meagher; north of the Gallatin River, east of Logan, Montana.

Cotypes.—U.S.N.M. no. 7863.

Bathyuriscus powersi Walcott

Bathyuriscus (*Poliella*) *powersi* Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 351, pl. 46, fig. 1, 1916.

Middle Cambrian, Meagher; Pole Creek, Madison Range, Montana.

Bathyuriscus obrutchevi (Lermontova)

Proetus sculptus Korovin (not Barrande) 1924. (Reference not available.)

Olenoides obrutchevi Lermontova, Bull. Com. Geol. Leningrad, vol. 44, no. 8, p. 764, pl. 18, figs. 1-10, 1926.

Middle Cambrian; Tcheremkhova, Irkutsk, Siberia.

Bathyuriscus piedmontensis, n. sp.

Bathyuriscus sp. undet. Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 348, pl. 49, fig. 3, 3*a*, 1916.

It is possible that the illustrated pygidium does not belong to the species.

Middle Cambrian, Conasauga; (loc. 16e) 1 mile southwest of Piedmont, Alabama.

Holotype.—U.S.N.M. no 62665; paratype (?), no. 62666.

SPINED GROUP OF BATHYURISCUS

It may prove desirable to separate these forms as a distinct genus.

Bathyuriscus adaeus Walcott

Bathyuriscus adaeus Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 334, pl. 47, figs. 3-3*c*, 1916.

In most respects this species is much like *B. rotundatus,* but the anterior pygidial segment is extended beyond the margin into spines. The published illustrations fail to show correctly the full length or direction of the spines, which turn backward and reach about to the posterior end of the axis. Further, this spine interrupts the rim and does not arise from it.

The specimen from locality 61j identified as this form represents another species.

Middle Cambrian, Stephen; (loc. 58j) Mount Stephen, near Field, British Columbia.

Cotypes.—U.S.N.M. nos. 62631-4.

Bathyuriscus atossa Walcott

Bathyuriscus atossa Walcott, Smithsonian Misc. Coll., vol. 64, no 5, p. 336, pl. 48, figs. 2-2*b*, 1916.

Middle Cambrian, Spence; (loc. 55c) Liberty Canyon, west of Montpelier, Idaho.

Lectotype.—U.S.N.M. no. 62642; paratypes, nos. 62643-4.

Bathyuriscus marjumensis, n. sp.

Bathyuriscus ? sp. undet. Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 348, pl. 65, fig. 5, 1916.

Presumably this form falls within the spined group of *Bathyuriscus.* If it rightly belongs here, it is apparently the youngest species of the genus known.

Middle Cambrian, Marjum; (loc. 11p) 2½ miles southeast of Marjum Pass, House Range, Utah.

Holotype.—U.S.N.M. no. 62845.

BILLINGSASPIS, n. gen.

Several Lower Cambrian species referred with a query to *Acrocephalites* constitute a distinct generic group. Since the genotype is a species described by Billings, the hybrid name *Billingsaspis* seems appropriate.

Diagnosis.—Cranidium on the whole truncate-conical in shape; facial suture converging slightly, but because the anterior angles are considerably depressed this feature is accentuated in dorsal view. Glabella tapers considerably; in limestone specimens three pairs of reflexed glabellar furrows traceable. Brim consists of a depressed preglabellar area and a raised and thickened rim; some specimens have a small median boss. Eyes small, eye lines present. Fixed cheeks rather wide and rising from the dorsal furrow to the angular palpebral lobes.

Comparisons.—Superficially, *Billingsaspis* resembles *Bolaspis,* except for the depression where the latter has the great boss in the preglabellar area. Further study is necessary to show whether this resemblance indicates genetic relationship.

Genotype.—*Conocephalites vulcanus* Billings.

Range.—Possibly confined to Lower Cambrian.

Billingsaspis vulcanus (Billings)

Conocephalites vulcanus Billings, Rep. Geol. Vermont, vol. 2, p. 952, fig. 357, 1861; repeated Geol. Canada, p. 286, fig. 296, 1863; original republished, Pal. Fossils Canada, vol. 1, p. 14, fig. 17, 1865.

Ptychoparia vulcanus Walcott, U. S. Geol. Surv. Bull. 30, p. 198, pl. 26, fig. 4 (not 4*a*), 1886 U. S. Geol. Surv. 10th Ann. Rep., p. 653, pl. 96, fig. 4 (not 4*a* = "*Ptychoparia*" *miser?*), 1891.

Acrocephalites ? vulcanus Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 182, pl. 26, fig. 2, 1916.

Lower Cambrian, Parker; (loc. 25) Parkers quarry, Georgia, and (loc. 26) Corman farm, east of Highgate Springs, Vermont.

Cotypes.—U.S.N.M. no. 15437.

BLAINIA Walcott, 1916

Asaphiscus (*Blainia*) Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 393, 1916.

This undoubtedly deserves full generic rank; in fact, it is doubtful whether it is even closely related to *Asaphiscus.*

Genotype.—*Asaphiscus* (*Blainia*) *gregarius* Walcott.

Range.—Middle Cambrian.

Species formerly referred to *Blainia:*

B. glabra = *Blountia* *B. paula* = Genus undet.

DESCRIBED SPECIES REFERRED TO BLAINIA

Blainia gregaria (Walcott)

Asaphiscus (*Blainia*) *gregarius* Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 394, pl. 62, figs. 1, 1*b*-1*i* (not 1*a* = *B. centerensis*), 1916.

It is possible that, even with the specimen figured as 1*a* eliminated because it has 10 instead of 9 segments, more than one species still remains.

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

Lectotype and paratypes.—U.S.N.M. nos. 62797 and 62791, 62793-6, 62798-62801.

Blainia centerensis, n. sp.

Asaphiscus (*Blainia*) *gregarius* Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 394, pl. 62, fig. 1*a*, 1916.

This form has 10 instead of 9 thoracic segments.

Occurrence same as preceding.

Holotype.—U.S.N.M. no. 62792.

BOLASPIS, n. gen.

A rather large group of Cambrian trilobites, usually referred to *Acrocephalites* and *Alokistocare* because of the highly developed boss in the center of the preglabellar field, has long needed a generic name.

Diagnosis.—Cranidium characterized by a conical glabella, with one or more pairs of rather sharply reflexed furrows; fixed cheeks wide and tumid; eyes small and sometimes stalked; large rounded or triangular elevation in preglabellar field; rim usually flat and erect, particularly in the middle; neck ring heavy, sometimes extended into a spine. Thorax and pygidium unknown.

Comparisons.—When *Acrocephalites* was first described from fragmentary specimens, which fail to give a true concept of the genus, the conical glabella and the boss in the preglabellar area were the sole generic features apparent. However, after the genus came to be understood, it was apparent that the American species have only a few superficial resemblances and are not related to it.

Comparing *Bolaspis* with *Alokistocare,* we find little similarity except in the possession of the median boss. *Bolaspis* has a much more tapering glabella, its preglabellar area is reduced to triangular form by the down-turned anterior angles, and it lacks the vertical striations crossing the brim.

Genotype.—*Alokistocare ? labrosum* Walcott.

Name.—Βολος = lump, and ασπις = shield.

Range.—Apparently confined to the Middle Cambrian.

DESCRIBED SPECIES REFERRED TO BOLASPIS

Bolaspis labrosa (Walcott)

Alokistocare ? labrosum Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 184, pl. 25, fig. 5 only, 1916. (Not 5*a* = *B. neihartensis.*)

Several hundred cranidia permit the selection of specimens showing all features.

Description.—Glabella conical, with deeply impressed occipital furrow; two and sometimes three pairs of sharply recurved glabellar furrows are distinguishable on certain individuals; neck ring drawn out into a heavy and probably fairly long spine; brim diamond-shaped, separated from the fixed cheeks by rather heavy, deep furrows which pass forward and outward from the glabella; rim somewhat thickened, highly arched in middle and nearly erect; frontal furrow strong; preglabellar area triangular, rising into a high boss in the middle; fixed cheeks tumid, rising considerably higher than the glabella, the abrupt slope into the preglabellar area at times serving as an eye ridge; eyes small, situated about the middle of the cranidium, and usually stalked.

The surface is granulose; the granules are fairly large and scattered, and are most numerous on the glabella.

At present the free cheeks and pygidia are not located.

Middle Cambrian, Meagher; (loc. 5f) 11 miles south of Neihart, Montana.

Lectotype and plesiotype.—U.S.N.M. no. 61575.

Bolaspis neihartensis, n. sp.

Alokistocare ? labrosum Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 184, pl. 25, fig. 5*a* only, 1916.

Among the cotypes of *B. labrosa* is a much shorter and more compact form, to which the name *B. neihartensis* is given.

Comparisons.—Compared with *B. labrosa,* the brim is reduced in width, with the consequent loss of the prominent boss. Furthermore, the dorsal furrows are more shallow and the fixed cheeks less elevated, so that the whole cranidium is rather evenly convex in cross-section. Finally, the surface of the new species appears to be smooth.

Occurrence same as preceding.

Holotype and paratype.—U.S.N.M. no. 61576.

Bolaspis haynesi (Walcott)

Acrocephalites haynesi Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 179, pl. 24, fig. 4*b* (upper figure only), 1916. (Not 4, 4*a* = *B. errata.*)

Three species were illustrated as *B. haynesi,* which fact vitiates this as an example of a variable form, and it is necessary to restrict the

name to one of them. Furthermore, among the new collections there are at least four additional species.

The upper of the figures on the slab shown in figure 4*b* agrees most closely with the description and becomes the lectotype of *B. haynesi.* This specimen evidently carried a large occipital spine and not simply a thickened neck ring as in the picture.

Middle Cambrian, Meagher; (loc. 20k) Pole Creek, Madison Range, Montana.

Lectotype.—Cast U.S.N.M. no. 61503 (one specimen). (Original in Mus. Comp. Zoöl.)

Bolaspis raymondi, n. sp.

Acrocephalites haynesi Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 179, pl. 24, fig. 4*b* (lower specimen), 1916.

This species differs from *B. haynesi* in being less granulose; wider across the fixed cheek, particularly at the anterior angles; and in possessing a stronger boss.

Occurrence same as *B. haynesi.*

Holotype.—Cast U.S.N.M. no. 61562. (Original in Mus. Comp. Zoöl.)

Bolaspis errata, n. sp.

Acrocephalites haynesi Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 179, pl. 24, figs. 4, 4*a*, 1916.

B. errata has almost completely lost the median boss, so that the consequently narrower preglabellar area gives it an aspect different from more typical forms of the genus.

Occurrence same as *B. haynesi.*

Holotype.—Cast U.S.N.M. no. 61562. (Original in Mus. Comp. Zoöl.)

Bolaspis ticida (Walcott)

Alokistocare ticida Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 187, pl. 26, figs. 6, 6*a*, 1916.

Until better preserved material becomes available, we can tentatively refer this species to *Bolaspis.*

Middle Cambrian, Bloomington; (loc. 55s) Blacksmith Fork, 15 miles east of Hyrum, Utah.

Cotypes.—U.S.N.M. nos. 61589, 61590.

CEDARIA Walcott, 1924

Cedaria minor (Walcott)

Asaphiscus minor Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 388, pl. 61, figs. 3-3*b*, 1916.

Upper Cambrian, Weeks; (loc. 30o) Weeks Canyon, House Range, Utah.

Lectotype and Paratypes.—U.S.N.M. nos. 62778-80.

CLAVASPIDELLA Poulsen, 1927

Clavaspidella Poulsen, Meddels. Grønland, vol. 70, p. 277, 1927.
Athabascia Raymond, Amer. Journ. Sci., 5th ser., vol. 15, no. 88, p. 311, 1928.

This genus differs from the others of the group formerly referred to *Bathyuriscus* in having a more rapidly expanding glabella anterior to the eyes, and in its large tail in which the pleural furrows extend to the margin, increasing in width toward their extremities.

Genotype.—*C. sinupyga* Poulsen.

Range.—Middle Cambrian.

Poulsen was uncertain as to the age of the Cape Frederick VII formation, but it seems clearly to represent a portion of the Stephen formation and is therefore Middle Cambrian.

DESCRIBED SPECIES REFERRED TO CLAVASPIDELLA

Poulsen described three species:

Clavaspidella sinupyga *Clavaspidella platyrrhina*
Clavaspidella quinquesulcata

Raymond also referred to *Athabascia:*

Athabascia ostheimeri Raymond *Athabascia belus* (Walcott)
Athabascia glacialis Raymond

Clavaspidella howelli (Walcott)

Bathyuriscus howelli Walcott, U. S. Geol. Surv. Bull. 30, p. 216, pl. 30, figs. 2, 2*a*, 1886. Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 343, pl. 47, figs. 1-1*b*, 1916.

Middle Cambrian, Chisholm: (loc. 31) 3 miles northwest of Pioche, Nevada.

Lectotype and paratypes.—U.S.N.M. no. 15457.

Clavaspidella bithus (Walcott)

Bathyuriscus ? bithus Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 340, pl. 47, figs. 4, 4*a*, 1916.

Unfortunately, only pygidia of this species have yet been located. When a study of the large quantity of material from this locality is undertaken, heads will likely be found.

Middle Cambrian, Spence; (loc. 55c) Liberty Canyon, West of Montpelier, Idaho.

Lectotype.—U.S.N.M. no. 62635; paratype, no. 62636.

Clavaspidella anax (Walcott)

Bathyuriscus anax Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 335, pl. 48, figs. 1, 1*a*, 1*c*, 1*d* (not 1*b*), 1916.

A mere glance at the illustrations shows that the forms from Cottonwood Canyon referred to this species belong to *Glossopleura*.

Middle Cambrian, Ophir; (loc. 55e) Wasatch Range, north of Brigham City, Utah.

Lectotype.—U.S.N.M. no. 62637; paratypes, nos. 62638-40.

Clavaspidella sylla (Walcott)

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

This species approaches the extreme limits of the genus, but until more forms become available it seems inexpedient to make another genus.

Middle Cambrian, Marjum; (loc. 110) 4 miles southeast of Antelope Springs, House Range, Utah.

Cotypes.—U.S.N.M. nos. 62837-8.

COOSIA Walcott, 1911

Coosia calanus (Walcott)

Asaphiscus calanus Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 384, pl. 61, figs. 8, 8*a*, 1916.

Upper Cambrian, Nolichucky; (loc. 47h) Wolf Creek, Bland County, Virginia.

Cotypes.—U.S.N.M. nos. 62789-90.

DEIRACEPHALUS, n. gen.

Several Upper Cambrian forms previously referred to *Acrocephalites* may be descendants of Middle Cambrian forms but are generically distinct.

Diagnosis.—Cranidium quadrate in general outline. Sutures diverging slightly anteriorly. Glabella tapering, rather conical, somewhat over half as long as the cranidium; no glabellar furrows visible on available specimens. Brim wide with a narrow rim of even width; preglabellar area crossed by a vertical median ridge, beginning at the dorsal furrow and widening out to join the brim. Eye lines strong; palpebral lobes small, situated a little behind the middle of the cranidium. Occipital furrow separating the neck ring, which bears a spine. A beautiful compound eye has been preserved on a free cheek. Surface richly ornamented by pustules, or pustules and lines.

Comparisons.—Compared with the somewhat older species of *Alokistocare* and *Acrocephalops,* this genus resembles both in certain features. Features of the rim as well as the median ridge, which replaces the boss, distinguish it from *Acrocephalops,* and the less expanded brim and the well-defined rim separate it from *Alokistocare.*

Genotype.—*Acrocephalites ? aster* Walcott.

Name.—Δειρας = ridged, κεφαλος = head.

Range.—Possibly confined to the Upper Cambrian Crepicephalus zone.

DESCRIBED SPECIES REFERRED TO DEIRACEPHALUS

Deiracephalus aster (Walcott)

Acrocephalites ? aster Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 178, pl. 26, figs. 9*b*, 9*c*, 1916. (Not figs. 9, 9*a* = *L. buttsi.*)

Upper Cambrian, Conasauga; (loc. 22y) opposite car barn, Birmingham, Alabama.

Holotype.—U.S.N.M. no. 61594.

Deiracephalus buttsi, n. sp.

Acrocephalites ? aster Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 178, pl. 26, fig. 9, 9*a*, 1916.

This form is similar to *L. aster* but differs in having fewer pustules and a heavier occipital spine.

Upper Cambrian, Nolichucky; (loc. 107c) west base Copper Ridge, 11 miles northwest of Knoxville, Tennessee.

Holotype.—U.S.N.M. no. 61593.

Deiracephalus multisegmentus (Walcott)

Acrocephalites multisegmentus Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 180, pl. 24, figs. 5, 5*a*, 1916.

Upper Cambrian, Weeks; (loc. 30n or 30o) 2 miles south of Marjum Pass, House Range, Utah.

Cotypes.—U.S.N.M. nos. 61564-5.

DOLICHOMETOPUS Angelin, 1852

Dolichometopus Angelin, Pal. Scandinavica, pt. 1, Crustacea formationis transitionis Lipsiae, p. 72, 1852. Idem, Pal. Scandinavica, 3d ed. Holmiae, p. 72, 1878.

Dolichometopus Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 355, 1916.

Numerous trilobites belonging to many genera have been referred to *Dolichometopus, Corynexochus,* and *Bathyuriscus* simply because their glabellae tended toward a rectangular form and expand forward. Angelin referred the first two genera to his family Corynexochidae.

No doubt the family is valid, but it must be confined to *Dolichometopus* and *Corynexochus,* which occur only in the Atlantic Province; hence all other American and Asiatic forms must go into other genera. Properly restricted, *Dolichometopus* contains the species *D. acadicus* Matthew and *D. suecicus,* the genotype.

The following list shows the generic position of the North American forms not belonging to the Atlantic Province:

D. baton = *Anoria*
D. bessus = *Anoria*
D. bion = *Glossopleura*
D. boccar = *Glossopleura*
D. expansus = (Not determined)
D. lodensis = *Glossopleura*
D. occidentalis = *Poliella*
D. productus = *Glossopleura*
D. tontoensis = *Anoria*
D. varro = *Housia*

The Oriental species ascribed to the genus all belong elsewhere. Their revision is now under way.

DUNDERBERGIA Walcott, 1924

Dunderbergia Walcott, Smithsonian Misc. Coll., vol. 75, no. 2, p. 56, 1924; idem, no. 3, p. 85, 1925.

Several species from Nevada, other than the genotype, *D. nitida,* appear to belong to the genus. Undescribed species from other regions also appear to belong to *Dunderbergia.*

Genotype.—*Crepicephalus* (*Loganellus*) *nitidus* Hall and Whitfield.

Range.—Upper Cambrian beds representing the Pterocephalia zone.

DESCRIBED SPECIES REFERRED TO DUNDERBERGIA

Dunderbergia maculosa (Hall and Whitfield)

Crepicephalus (*Loganellus*) *maculosus* Hall and Whitfield (part), U. S. Geol. Expl. 40th Parallel, vol. 4, p. 215, pl. 2, figs. 24, 25?, 1877. (Not fig. 26 = *D. halli.*)

Ptychoparia maculosus Walcott, U. S. Geol. Surv. Monogr. 8, p. 269, 1884.

Upper Cambrian, Secret Canyon; (loc. 62a) opposite Jackson Mine, Eureka District, Nevada.

Holotype.—U.S.N.M. no. 90670.

Dunderbergia halli, n. sp.

Crepicephalus (*Loganellus*) *maculosus* Hall and Whitfield (part), U. S. Geol. Expl., 40th Parallel, vol. 4, p. 215, pl. 2, fig. 26, 1877. (See *D. maculosa.*)

This figured pygidium is not from the same locality as the head of *D. maculosa,* and further, since the cranidia associated with this tail are also distinct, the logical procedure is to combine the two as a new species.

Upper Cambrian, Secret Canyon; (loc. 60) near Richmond Mine, Eureka District, Nevada.

Holotype and paratypes.—U.S.N.M. no. 24617.

Dunderbergia simulator (Hall and Whitfield)

Crepicephalus (*Loganellus*) *simulator* Hall and Whitfield, U. S. Geol. Expl. 40th Parallel, vol. 4, p. 218, pl. 2, figs. 16-18, 1877.

Inouyia simulator Walcott, Smithsonian Misc. Coll., vol. 64, 1916.

Upper Cambrian, Secret Canyon; Eureka District, Nevada.

Lectotype.—U.S.N.M. no. 24575; paratypes, no. 24573.

Dunderbergia granulosa (Hall and Whitfield)

Crepicephalus (*Loganellus*) *granulosa* Hall and Whitfield, U. S. Geol. Expl. 40th Parallel, vol. 4, p. 214; pl. 2, figs. 2, 3, 1877.

Ptychoparia granulosa Walcott, U. S. Geol. Surv. Monogr. 8, p. 57, 1884.

Inouyia granulosa Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 204, 1916.

Upper Cambrian, Secret Canyon; (loc. 61) near Hamburg Mine and other localities, Eureka District, Nevada.

Holotype.—U.S.N.M. no. 24573.

Dunderbergia pustulosa (Hall and Whitfield)

Ptychaspis pustulosa Hall and Whitfield, U. S. Geol. Expl. 40th Parallel, vol. 4, p. 223, pl. 2, fig. 27, 1877.

Upper Cambrian, Secret Canyon; Pogonip Mountain, White Pine District, Nevada.

Holotype.—U.S.N.M. no. 24579.

Dunderbergia suada (Walcott)

Ptychoparia suada Walcott, Proc. U. S. Nat. Mus., vol. 13, p. 274, pl. 21, fig. 9, 1890.

Upper Cambrian, Wilberns; (loc. 70) Baldy Mountain, near Morgans Creek, 8 miles northwest of Burnet, Texas.

Holotype.—U.S.N.M. no. 23860.

EHMANIA, n. gen.

Many Middle Cambrian species characterized by a peculiar pygidium have been referred to various genera during the past 55 years. When they are gathered together and their features noted, a definite, clear-cut genus emerges. To this is assigned the name of Philip Ehman, of Logan, Montana, who has been of material assistance in restudying the classic region along the north side of the Gallatin Valley.

Diagnosis.—Cranidium of a very common type. Glabella tapered, rounded in form, distinctly demarcated by dorsal furrow; glabellar

furrows usually very faint. Brim variable in width, with a convex preglabellar area and a flat, upturned rim. Eyes moderate in size, not much bowed, situated about the middle of the cranidium. Fixed cheeks about half as wide as the glabella. Free cheeks show suture intramarginal for some distance and have a stout, short genal spine.

Thorax has 12 to 14 segments in the specimens observed.

Pygidium wide; axis well defined except at rear; up to six or more axial rings are marked out. Pleural lobes very distinctive because both the pleural furrows and grooves are distinctly impressed to the very margin.

Genotype.—Ehmania weedi, n. sp.

Range.—Middle Cambrian.

DESCRIBED SPECIES REFERRED TO EHMANIA

Ehmania gallatinensis (Meek)

Conocoryphe (Ptychoparia) gallatinensis Meek, 6th Ann. Rep. U. S. Geol. Surv. Terr., p. 485, 1873.

Unfortunately this species is not illustrated, and it is necessary to restrict it to one of the three or more species present in the type lot.

Middle Cambrian, Meagher; north of Gallatin River, near Logan, Montana.

Holotype.—U.S.N.M. no. 7862.

Ehmania walcotti, n. sp.

Ptychoparia antiquata Walcott (part) (not Salter), U. S. Geol. Surv. Monogr. 32, pt. 2, p. 456, pl. 65, fig. 7*a*, 1899. (Not fig. 7 = *E. weedi.*)

This species was described as a variety. Many fine cranidia and pygidia occur among the specimens not illustrated.

Middle Cambrian, Meagher; (loc. 151d) south of Gallatin River, Crowfoot Ridge, Yellowstone National Park, Wyoming.

Cotypes.—U.S.N.M. no. 90667.

Ehmania weedi, n. sp. **Genotype**

Ptychoparia antiquata Walcott (part) (not Salter), U. S. Geol. Surv. Monogr. 32, pt. 2, p. 456, pl. 65, fig. 7 (not 7*a*), 1899.

This species has more strongly developed glabellar furrows than the other described species.

Occurrence same as preceding.

Holotype.—U.S.N.M. no. 35234.

Ehmania oweni (Walcott)

Ptychoparia oweni Walcott (not Meek and Hayden), U. S. Geol. Surv. Mongr. 8, p. 55, pl. 10, figs. 3, 3*a*, 1884. (Probably also fig. 18, which is placed with *Eteraspis laeviceps;* and fig. 22.)

Middle Cambrian, Eldorado; east side Secret Canyon, Eureka district, Nevada.

Cotypes.—U.S.N.M. no. 24610.

Ehmania smithi (Walcott)

Anomocarella smithi Walcott, Smithsonian Misc. Coll., vol. 57, no. 4, p. 92, pl. 17, figs. 3-3*a*, 1911. Research in China, vol. 3, Carnegie Inst. Publ. 54, p. 203, pl. 19, figs. 16-16*b*, 1913.

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

Cotypes.—U.S.N.M. nos. 58296, 58298.

ELDORADIA, n. gen.

Still another group formerly referred to *Alokistocare* deserves a separate generic name, and since it seems to reach its best development in the Eldorado limestone of the Eureka District, Nevada, may appropriately be named for the formation.

Diagnosis.—Cranidium generally rectangular in outline, with a tapering glabella about half as long as the cranidium; usually well defined by shallow dorsal furrows; glabellar furrows faint or absent. Brim wide, usually with a large median boss; rim not sharply separated owing to the poor development of the anterior furrow. Fixed cheeks usually wide, with small, sometimes stalked eyes about opposite the anterior end of the glabella.

Comparisons.—Compared with *Bolaspis* and *Acrocephalops,* this genus lies between the two but nearer to the former. From this it differs in greater width of fixed cheek, less clearly defined rim and shallower furrows.

Genotype.—*Ptychoparia ? linnarssoni* Walcott.

Range.—Presumably confined to the Middle Cambrian.

DESCRIBED SPECIES REFERRED TO ELDORADIA

Eldoradia linnarssoni (Walcott)

Ptychoparia ? linnarssoni Walcott (part), U. S. Geol. Surv. Monogr. 8, p. 47, pl. 9, fig. 18*a*, 1884. (Not 18 = *E. lata.*)

Alokistocare linnarssoni Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 185, pl. 25, fig. 7, and possibly the cheek inset in fig. 7*a*, 1916. (Not 7*a* = *E. lata.*) The best cranidium was not figured.

Middle Cambrian Eldorado; (loc. 58) east side of New York Canyon, Eureka District, Nevada.

Cotypes.—U.S.N.M. no. 24611.

Eldoradia lata, n. sp.

Ptychoparia ? linnarssoni Walcott (part), U. S. Geol. Surv. Monogr. 8, p. 47, pl. 9, fig. 18, 1884.

Alokistocare linnarssoni Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 185, pl. 25, fig. 7*a* (heads only), 1916.

This species differs from *E. linnarssoni* in its wider fixed cheeks. Occurrence same as *E. linnarssoni* (loc. 58a).

Cotypes.—U.S.N.M. no. 90669.

Eldoradia prospectensis (Walcott)

Ptychoparia ? prospectensis Walcott, U. S. Geol. Surv. Monogr. 8, p. 46, pl. 9, fig. 20, 1884; U. S. Geol. Surv. Bull. 30, p. 202, pl. 27, fig. 5, 1886.

Alokistocare prospectense Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 186, pl. 25, fig. 8, 1916.

Middle Cambrian, Eldorado; (loc. 52a) Prospect Mountain, Eureka District, Nevada.

Holotype.—U.S.N.M. no. 15441.

ELRATHIA Walcott, 1924

Elrathia Walcott, Smithsonian Misc. Coll., vol. 75, no. 2, p. 56, 1924; idem, no. 3, p. 87, 1925.

Already species have been referred to *Elrathia* improperly, as they formerly were to *Ptychoparia,* consequently great care must be exercised to prevent this name also becoming a "dumping ground." These forms have what might be called the "median" structure of the trilobite, consequently many genera are close to one another.

Genotype.—*Conocorphe* (*Conocephalites*) *kingii* Meek.

Range.—Likely confined to the Middle Cambrian.

ADDITIONAL SPECIES REFERRED TO ELRATHIA

Elrathia candace (Walcott)

Ptychoparia candace Walcott, Smithsonian Misc. Coll., vol. 67, no. 2, p. 28, pl. 6, figs. 3, 3*a*, 1917.

Middle Cambrian, Gordon; (loc. 4v) Gordon Creek, Powell County, Montana.

Cotypes.—U.S.N.M. nos. 63738, 63739.

Elrathia pylas (Walcott)

Ptychoparia pylas Walcott (part), Smithsonian Misc. Coll., vol. 67, no. 2, p. 33, pl. 6, figs. 4, 4*a*, 1917. (Not 4*b* = *Alokistocare charax;* 4*c* = *A. gordonensis.*)

Middle Cambrian, Gordon; (loc. 4q) between Gordon and Youngs Creeks, Powell County, Montana.

Cotypes.—U.S.N.M. nos. 63740, 63741.

Elrathia haguei (Hall and Whitfield)

Crepicephalus (*Loganellus*) *haguei* Hall and Whitfield, U. S. Geol. Expl. 40th Parallel, vol. 4, p. 210, pl. 2, figs. 14, 15, 1877.

Ptychoparia haguei Walcott, U. S. Geol. Surv. Bull. 10, p. 36, pl. 6, fig. 6, 1884.

Species must be confined to the locality given below.

Middle Cambrian, Eldorado; Pogonip Mountain, White Pine District, Nevada.

Holotype.—U.S.N.M. no. 24660.

EUREKIA Walcott, 1924

Eurekia Walcott, Smithsonian Misc. Coll., vol. 75, no. 2, p. 56, 1924; idem, no. 3, p. 90, 1925.

Genotype.—*E. granulosa* Walcott.

Range.—Late Upper Cambrian.

Previously the genus contained five species:

Eurekia granulosa Walcott
Eurekia angustifrons (Walcott)
Eurekia dissimilis (Walcott)
Eurekia eos (Hall)
Eurekia binodosa (Hall)

ADDITIONAL SPECIES REFERRED TO EUREKIA

Eurekia denticulata (Meek)

Proetus (*Phaeton*) *denticulatus* Meek, Rep. U. S. Geol. Expl. 40th Parallel, vol. 4, pt. 1, p. 49, pl. 1, fig. 10, 1877.

Originally assigned to the Devonian.

Upper Cambrian, Hamburg; drift west side of Steptoe Valley, Nevada (float).

Holotype.—U.S.N.M. no. 14579.

Eurekia finkelnburgi (Clark)

Bayfieldia finkelnburgi Clark, Bull. Amer. Pal., vol. 10, no. 41, p. 32, pl. 4, fig. 7, 1924.

Upper Cambrian, Norwalk sandstone; Osceola Mills, Wisconsin.

Holotype.—M.C.Z. no. 1712.

ETERASPIS, n. gen.

Diagnosis.—Cranidium strongly arched longitudinally. Glabella poorly defined; without furrows. Neck ring thickened; occipital furrow very shallow. Brim about one-third length of glabella; wide rim separated by shallow anterior furrow. Eyes moderate in size and moderately bowed, situated about middle of cranidium.

Pygidium flat. Axis defined by shallow dorsal furrow, but chiefly by arching above pleural lobes; extends to border. Pleural furrows faintly outlined. Border flattened.

Genotype.—*Ptychoparia laeviceps* Walcott.

Range.—Middle Cambrian.

Name.—Ετερος = another; ασπις = shield.

Eteraspis laeviceps (Walcott)

Ptychoparia laeviceps Walcott, U. S. Geol. Surv. Monogr. 8, p. 54, pl. 10, fig. 17, 1884. (Not 18 = *Ehmania oweni?*.)

Middle Cambrian, Eldorado; (loc. 58) east side Secret Canyon, Eureka District, Nevada.

Holotype and paratypes.—U.S.N.M. no. 24614.

GLOSSOPLEURA Poulsen, 1927

Glossopleura Poulsen, Meddels. Grønland, vol. 70, p. 268, 1927.

Diagnosis.—Cephalon and pygidium large, of about equal size. Glabella wide, extending to anterior margin, where a narrow upturned brim may sometimes be present; glabella sometimes expands somewhat forward of the eyes; four faint pairs of glabellar furrows usually traceable. Fixed cheeks small; eyes large, situated well back. Free cheeks rather wide with a broad rim when the wide doublure is impressed on them, otherwise sloping smoothly to margin.

Thorax has seven segments.

Pygidium usually has the axis well defined. Axial furrows often faint; pleural furrows faint but clearly traceable in some species to outer edge; wide rim sometimes definite, when doublure is impressed on test.

Genotype.—*Dolichometopus boccar* Walcott.

Comparisons.—*Glossopleura,* as pointed out by Poulsen, resembles *Anoria* in the number of thoracic segments and the extension of the glabella to the front margin, but differs in having longer eyes. However, his observation that *Glossopleura* lacks the macropleural development of the fifth thoracic segment does not hold if the present specific references are all correct.

From the other members of the family *Glossopleura* it is distinguishable by its less developed furrows, the absence of a brim on the cephalon, and the large size and posterior position of the eyes.

Range.—Apparently confined to the Middle Cambrian of Greenland, the Appalachians, and the Rocky Mountains. Frequently the species of this genus constitute the entire fauna, except that an *Alokistocare* may go with it.

DESCRIBED SPECIES REFERRED TO GLOSSOPLEURA

The four species from Greenland described by Poulsen appear to be typical of the genus.

Glossopleura boccar (Walcott)

Dolichometopus boccar Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 363, pl. 52, fig. 1*a*, 1*c*, 1*e*, 1916. (Not fig. 1 = *G. stephenensis;* fig. 1*b* = *G. bosworthensis;* figs. 1*d*, 1*f* = *G. nitida.*)

Glossopleura boccar Poulsen, Meddels. Grønland, vol. 70, p. 268 (gen. ref.), 1927.

It appears that four species are represented among the figured specimens of *D. boccar,* consequently one form must be chosen as the species, in order that the genotype of *Glossopleura* can be understood. Keeping in mind Walcott's habit of always writing the type locality first, and the statement he makes on page 363 that *D. boccar* is from the Mount Bosworth section, we may at once conclude that the latter is the type locality and hence choose the types of *D. boccar* from the illustrated specimens of locality 57g. This leads us to use figures 1*a*, 1*c*, 1*e*, as the cotypes of *G. boccar.* Figure 1*a* shows the cranidial features imperfectly, first, because in the specimen the frontal extension of the glabella is bent down by rock folding, and second, the photograph was cut off too short. Examination of the specimen, however, reveals that its glabella is essentially like that of Figure 1*c*.

The specimens not illustrated from other localities referred to the species with more or less reservation represent new forms. Numerous unworked collections have been made from this zone, and it is possible that the species may be found in them, but a cursory study indicates that most belong to new forms.

Description.—Head and tail of even size, semicircular in outline. Glabella nearly rectangular, but slightly constricted behind the center; glabellar furrows faint. Fixed cheeks practically confined to the palpebral lobes; none in front of the eyes. Eyes long and situated far back.

Thorax with seven segments.

Pygidial axis rather high and well marked by the dorsal furrow. Five or six axial furrows distinguishable. Doublure wide, and when pressed against test, makes a well-defined border; otherwise the pleural lobes slope rather steeply down to the margin all around. Pleural furrows traceable but not deep.

Middle Cambrian, Stephen; (loc. 57g) Mount Bosworth, British Columbia.

Cotypes.—U.S.N.M. nos. 62703, 62705, 62707.

Glossopleura bosworthensis, n. sp.

Dolichometopus boccar Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 363, fig. 1*b* only, 1916. (See preceding, *G. boccar.*)

Several cranidia and a hypostoma appear to constitute another species. Compared with *G. boccar,* the glabella is even more nearly rectangular, the eyes slightly longer and directed more outward.

Occurrence same as *G. boccar.*

Holotype.—U.S.N.M. no. 62704.

Glossopleura nitida, n. sp.

Dolichometopus boccar Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 363, pl. 52, figs. 1*d* and 1*f* only, 1916. (See preceding, *G. boccar.*)

Cranidia of this species are much shorter than the others formerly referred to *G. boccar.* The hypostoma is placed with the illustrated pygidium because its surface ornamentation is similar.

Occurrence same as *G. boccar.*

Holotype.—U.S.N.M. no. 62708; paratype, no. 62706.

Glossopleura stephenensis, n. sp.

Dolichometopus boccar Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 363, pl. 52, fig. 1 only, 1916. (See preceding, *G. boccar.*)

Only this one impression representing the genus has been found among the thousands of specimens collected from the Mount Stephen fossil bed. Unfortunately, it is not well preserved.

Comparisons.—Compared with *D. boccar,* to which it had been referred, this species has a shorter glabella without glabellar furrows, and the dorsal furrow is more curved, causing greater expansion of the glabella at both ends. In the tail axial and pleural furrows are practically absent.

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

Holotype.—U.S.N.M. no. 62702.

Glossopleura producta (Hall and Whitfield)

Ogyia producta Hall and Whitfield, U. S. Geol. Expl. 40th Parallel, vol. 4, p. 244, pl. 2, figs. 31-34, 1877.

Bathyuriscus productus Walcott (part), U. S. Geol. Surv. Bull. 30, p. 217, pl. 30, fig. 1*f* and composite from two localities, 1*i*, 1886. (Not 1*c*, 1*d* = *G. piochensis;* 1 = *G. parabola;* 1*a*, 1*g*, 1*h* = *Anoria utahensis;* 1*b* = *G. utahensis.*)

Dolichometopus productus Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 369, pl. 53, figs. 2-2*c* only (all copies of originals), 1916.

Many species have been referred to this form. Every occurrence except unquestioned Ophir shale can be eliminated without examination.

Middle Cambrian, Ophir, East Canyon, and (loc. 3c) Ophir, Oquirrh range, Utah.

Cotypes.—U.S.N.M. nos. 15456, 15459.

Glossopleura parabola (Hall and Whitfield)

Ogygia parabola Hall and Whitfield, U. S. Geol. Expl. 40th Parallel, vol. 4, p. 245, pl. 2, fig. 35, 1877.

Bathyuriscus productus Walcott (part), U. S. Geol. Surv. Bull. 30, p. 217, pl. 30, fig. 1*e* only, 1886. (See *G. producta.*)

Dolichometopus productus Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 369, pl. 53, figs. 2*d* only (copy of original figure), 1916.

This is a good species and should not have been included with *G. producta.*

Occurrence same as preceding.

Holotype.—U.S.N.M. no. 15456d.

Glossopleura packi, n. sp.

Bathyuriscus productus Walcott (part), U. S. Geol. Surv. Bull. 30, p. 217, pl. 30, figs. 1*c*, 1*d* only, 1886. (See *G. producta.*) Figures copied in Smithsonian Misc. Coll., vol. 64, no. 5, pl. 53, figs. 3-3*b*, 1916.

Bathyuriscus productus Pack, Journ. Geol., vol. 14, p. 297, pl. 2, figs. 3-3*b*, 1906. (Also 4*b* which he assigned to *Alokistocare piochensis.*)

The cranidium of this species differs from *G. producta* in having slightly smaller eyes and a wider glabella. On the other hand the pygidium of *G. packi* is close to *G. parabola* and if we had the cephalon of the latter, it also might be very similar. From *G. parabola,* the new species differs chiefly in a more circular outline, a slightly wider axis, and a relatively narrower doublure.

Middle Cambrian, Chisholm; (loc. 31) 3 miles northwest of Pioche, Nevada.

Holotype and paratypes.—U.S.N.M. no. 15455.

Glossopleura belesis (Walcott)

Bathyuriscus belesis Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 338, pl. 50, figs. 1-1*i*, 1916.

Middle Cambrian, Gordon; (loc. 4v) 6 miles up Gordon Creek, Lewis and Clarke County, Montana.

Cotypes.—U.S.N.M. nos. 62667-76.

Glossopleura bion (Walcott)

Dolichometopus bion Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, pl. 52, figs. 2-2*c*, 1916.

There is some hesitation to placing this form in *Glossopleura,* but the pygidium is altogether typical as are also the eyes and palpebral lobes. The difference lies in the slightly concave brim and expanding glabella.

Middle Cambrian, Spence; (loc. 55c) Liberty Canyon, west of Montpelier, Idaho.

Cotypes.—U.S.N.M. nos. 62709-62712.

Glossopleura utahensis, n. sp.

Bathyuriscus productus Walcott (part), U. S. Geol. Surv. Bull. 30, p. 217, pl. 30, figs. 1, 1*b*, 1886.

Bathyuriscus anax Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 335, pl. 48, fig. 1*b*, 1916.

Besides the figured head and cheek numerous other cranidia as well as pygidia are on hand.

Middle Cambrian, Ophir; (loc. 30a) 1 mile below Argenta, Cottonwood Creek, Wasatch Range, Utah.

Holotype and paratypes.—U.S.N.M. no. 62641.

Glossopleura mckeei, n. sp.

Dolichometopus productus Walcott (not Hall and Whitfield), Smithsonian Misc. Coll., vol. 64, no. 5, p. 369, pl. 53, figs. 4, 4*a*, 1916.

Dolichometopus tontoensis Walcott (part), idem, pl. 51, figs. 1*d'*, 1*d''*, 1*h* (others *Anoria tontoensis*).

Compared with *G. producta,* this species has a wider glabella, which expands forward somewhat faster and the pygidium lacks the pleural furrows and has much weaker axial furrows. In this respect it is more like *G. parabola.*

The specific name is in recognition of the splendid work the present Park Naturalist Edwin D. McKee is doing at the Grand Canyon.

Middle Cambrian, Bright Angel; (loc. 74e) Indian Garden Springs and (loc. 74) Nankoweap Basin, Grand Canyon, Arizona.

Glossopleura buttsi, n. sp.

Dolichometopus ? productus Butts (not Hall and Whitfield), Geol. Surv. Alabama, Spec. Rep. 14, pl. 5, figs. 8, 12, 17, 18, 1926.

This species differs from *G. producta* in having shorter cranidium and pygidium.

Middle Cambrian, Conasauga; Aldrich, Alabama.

Cotypes.—U.S.N.M. no. 90169.

Glossopleura alabamensis, n. sp.

Dolichometopus ? productus Butts, Geol. Surv. Alabama, Spec. Rep. 14, pl. 5, figs. 6, 7, 10, 11, 13-16, 1926.

Compared with *G. buttsi,* this species has a smaller eye and less fusion of the pleura in the tail.

Middle Cambrian, Conasauga; 3 miles west of Talladegea, Alabama.

Cotypes.—U.S.N.M. no. 90170.

Glossopleura lodensis (Clark)

Bathyuriscus howelli lodensis Clark, Univ. California Publ., Bull. Dep. Geol Sci., vol. 13, p. 6, 1921.

Dolichometopus ? lodensis Resser, Smithsonian Misc. Coll., vol. 81, no. 2, p. 10, pl. 3, fig. 9, 1928.

Middle Cambrian; Marble Mountains, Mohave Desert, California.

Holotype.—U.S.N.M. no. 78400.

Glossopleura mohavensis, n. sp.

Dolichometopus ? productus Resser, Smithsonian Misc. Coll., vol. 81, no. 2, p. 10, pl. 3, fig. 9, 1928.

Occurrence same as preceding.

Holotype.—On U.S.N.M. no. 78400.

GLYPHASPIS Poulsen, 1927

Glyphaspis Poulsen, Meddels. Grønland, vol. 70, p. 273, 1927.

Poulsen described a species from Greenland, which may have to be referred to another genus.

Comparisons.—As stated by Poulsen this genus differs from *Asaphiscus* in having genal spines, long-pointed pleura, and a broad, furrowed pygidium, the pleural furrows of which are continued into the concave border.

Genotype.—*Asaphiscus? capella* Walcott.

Range.—Middle Cambrian.

DESCRIBED SPECIES REFERRED TO GLYPHASPIS

Glyphaspis capella (Walcott) **Genotype**

Asaphiscus ? capella Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 385, pl. 59, figs. 2-2*c*, 1916.

Glyphaspis capella Poulsen, Meddels. Grønland, vol. 70, p. 273, 1927.

Middle Cambrian; (loc. 54z) Half Moon Pass, Big Snowy Mountains, Montana.

Cotypes.—U.S.N.M. nos. 62761-4.

Glyphaspis calenus (Walcott)

Asaphiscus calenus Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 384, pl. 60, figs. 1-1*c*, 1916.

Middle Cambrian, Meagher; (loc. 5f) 11 miles south of Neihart, and Dry Creek, East Gallatin River, Montana.

Cotypes.—U.S.N.M. nos. 62765-62768.

Glyphaspis camma (Walcott)

Asaphiscus camma Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 384, pl. 60, figs. 2-2*c*, 1916.

Middle Cambrian, Meagher; (loc. 4g) 5 miles northeast of Logan, Montana.

Cotypes.—U.S.N.M. nos. 62769-62772.

Glyphaspis ? montanensis (Whitfield)

Crepicephalus (Loganellus) montanensis Whitfield, Ludlow's Rep. Recon. Yellowstone Nat. Park, War Dep., p. 141, pl. 1, figs. 1, 2, 1876.

Specimen too poor to be sure of generic position.

Middle Cambrian, Meagher; near Fort Logan, 18 miles northwest of White Sulphur Springs, Montana.

Holotype.—U.S.N.M. no. 90668.

IDAHOIA WALCOTT, 1924

Idahoia Walcott, Smithsonian Misc. Coll., vol. 75, no. 2, p. 58, 1924; idem, no. 3, p. 94, 1925.

Genotype.—I. serapio Walcott.

Range.—Middle Upper Cambrian.

ADDITIONAL SPECIES REFERRED TO IDAHOIA

Idahoia wisconsinensis (Hall)

Conocephalites wisconsinensis Hall, 16th Ann. Rep. New York State Cab. Nat. Hist., p. 164, pl. 7, figs. 39, 41; pl. 8, figs. 22-24, 27, 28, 1863.

Saratogia wisconsinensis Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 198, pl. 34, figs. 5-5*c*, 1916.

Upper Cambrian, Franconia; Trempealeau and other localities in Wisconsin.

Cotypes.—A.M.N.H.

Idahoia latifrons (Hall)

Conocephalites latifrons Hall, 16th Ann. Rep. New York State Cab. Nat. Hist., p. 122, pl. 7, fig. 40, 1863.

This form is a good species.

Upper Cambrian, Franconia; Trempealeau, Wisconsin.

Holotype.—Presumably lost.

Idahoia hamulus (Owen)

Lonchocephalus hamulus Owen, Rep. Geol. Surv. Wisconsin, Iowa, Minnesota, p. 576, pl. 1A, figs. 8, 12, 1852.

Conocephalites hamulus Hall, 16th Ann. Rep. New York State Cab. Nat. Hist., p. 166, pl. 7, figs. 43, 44; pl. 8, figs. 25, 26, 1863.

Saratogia hamulus Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 196, 1916.

Upper Cambrian, Franconia; Minneiska, Minnesota; Trempealeau and other localities in Wisconsin.

Cotypes.—Original types destroyed; plesiotypes, A.M.N.H. no. 315.

Idahoia hera (Walcott)

Saratogia hera Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 197, pl. 35, figs. 3-3*b*, 1916.

Upper Cambrian, Franconia; Marine Mills, Minnesota.

Cotypes.—U.S.N.M. nos. 61715-6.

INGLEFIELDIA Poulsen, 1927

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

This genus is closely allied to *Kochiella,* differing chiefly in having a wider rim and lacking the doublure impression. The rim in turn has the backward expansion opposite the center of the glabella. Pygidium unknown.

Genotype.—*I. porosa* Poulsen.

Range.—Upper portion of Lower Cambrian. At present no Middle Cambrian species have been determined.

Inglefieldia porosa Poulsen
Inglefieldia planilimbata Poulsen
Inglefieldia groenlandica Poulsen
Inglefieldia inconspicua Poulsen
Inglefieldia discreta Poulsen
Inglefieldia venulosa (Poulsen), described as *Chancia*
Inglefieldia thia Poulsen (not Walcott's species)
Inglefieldia affinis Poulsen = new genus.

KOCHASPIS, n. gen.

Numerous species referred to several genera, particularly to *Crepicephalus,* when the pygidia were known, appear to be closely allied to *Kochiella.*

Diagnosis.—Cranidium wide. Glabella wide, tapering, clearly defined, with two or more pairs of furrows. Brim wide, divided into two subequal parts by anterior furrow which is shallow in the center; rim clearly defined. Fixed cheeks two-thirds width of glabella; eye lines heavy; eyes rather small, situated at about the mid point of cranidium. Free cheeks extended into long genal spines.

Pygidium with large prominent axis. Pleural furrows strong; pleural lobes drawn out into spines.

Surface granulose, lined or both.

Genotype.—*Crepicephalus liliana* Walcott.

Range.—Late Lower and Middle Cambrian.

DESCRIBED SPECIES REFERRED TO KOCHASPIS

Kochaspis liliana (Walcott)

Crepicephalus liliana Walcott (part), U. S. Geol. Surv. 30, p. 207, pl. 28, figs. 3, 3*a*, 1886. (Not 3*b*, 3*c* = *K. highlandensis*); 10th Ann. Rep. U. S. Geol. Surv., p. 653, pl. 96, figs. 7, 7*a*, 1890; Smithsonian Misc. Coll., vol. 64, no. 3, p. 209, pl. 29, figs. 5, 5*a*, 1916.

Careful separation of the specimens identified as this and other species according to locality necessitates a realignment.

Lower Cambrian, Pioche; (loc. 31a) Panaca Road, southeast of Pioche, Nevada.

Cotypes.—U.S.N.M. no. 15428.

Kochaspis augusta (Walcott)

Crepicephalus augusta Walcott (part), U. S. Geol. Surv. Bull. 30, p. 208, pl. 28, fig. 2*a*, 1886. (Not 2 = *K. nevadensis; 2b* = another genus.)

Locality same as preceding.

Holotype.—U.S.N.M. no. 15430.

Kochaspis nevadensis, n. sp.

Crepicephalus augusta Walcott (part), U. S. Geol. Surv. Bull. 30, p. 207, pl. 28, fig. 2, 1886. (See preceding.)

Published figures exaggerate the narrowness which characterizes this species.

Lower Cambrian, Pioche formation; (loc. 30) 8 miles north of Bennetts Spring, Highland Range, Nevada.

Holotype.—U.S.N.M. no. 61643.

Kochaspis highlandensis, n. sp.

Crepicephalus liliana Walcott (part), U. S. Geol. Surv. Bull. 30, p. 208, pl. 28, figs. 3*b*, 3*c*, 1886. (See preceding.)

Rim on published figure drawn too concave. Pygidium like *K. augusta* but with narrower axis.

Occurrence same as preceding.

Cotypes.—U.S.N.M. nos. 61640-1.

Kochaspis cecinna (Walcott)

Crepicephalus cecinna Walcott, Smithsonian Misc. Coll., vol. 67, no. 3, p. 99, pl. 11, figs. 1, 1*a*, 1917.

Lower Cambrian, Mount Whyte; (loc. 63a) Ptarmigan Peak, 5½ miles northeast of Lake Louise, Alberta.

Cotypes.—U.S.N.M. nos. 64365-6.

Kochaspis celer (Walcott)

Crepicephalus celer Walcott, Smithsonian Misc. Coll., vol. 67, no. 3, p. 101, pl. 11, fig. 2, 1917.

Ptychoparia clusia Walcott, idem, pl. 11, fig. 3.

Middle Cambrian, Ptarmigan; (loc. 58k) Mount Stephen, 3 miles east of Field, British Columbia.

Holotype.—U.S.N.M. no. 64367; paratype, no. 64368.

Kochaspis chares (Walcott)

Crepicephalus chares Walcott, Smithsonian Misc. Coll., vol. 67, no. 2, p. 35, pl. 6, figs. 5-5*c*, 1917.

Cranidium may belong to another species.

Middle Cambrian, Ptarmigan; (loc. 63d) east base Ptarmigan Peak, 5½ miles northeast of Lake Louise, Alberta.

Cotypes.—U.S.N.M. nos. 63744-6.

Kochaspis ? gogensis (Walcott)

Ptychoparia gogensis Walcott, Smithsonian Misc. Coll., vol. 67, no. 3, p. 88, pl. 12, figs. 4, 4*a*, 1917.

Lower Cambrian, Mount Whyte; (loc. 62w) above Gog Lake, Wonder Pass, British Columbia.

Holotype.—U.S.N.M. no. 64386.

Kochaspis carina (Walcott)

Ptychoparia carina Walcott, Smithsonian Misc. Coll., vol. 67, no. 3, p. 80, pl. 13, fig. 6, 6*a*, 1917.

Middle Cambrian, Ptarmigan; (loc. 35m) 3 miles southwest of head of Lake Louise, Alberta.

Holotype.—U.S.N.M. no. 64400.

Kochaspis upis (Walcott)

Crepicephalus upis Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 218, pl. 33, figs. 4-4*d*, 1916.

Middle Cambrian, Gordon Mountain; (loc. 150b) Chinese Wall, South Fork, White River-Indian Creek Pass, Montana.

Lectotype.—U.S.N.M. no. 61697; paratypes, nos. 61695, 61696, 61698.

Kochaspis unzia (Walcott)

Crepicephalus unzia Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 3, p. 217, pl. 34, fig. 7*a*, 1916. (Not 7 = undescribed genus.)

Occurrence same as preceding.

Holotype.—U.S.N.M. no. 61706.

KOCHIELLA Poulsen, 1927

Kochiella Poulsen, Meddels. Grønland, vol. 70, p. 259, 1927.

We are here dealing with a group of trilobites which developed greatly in late Lower Cambrian time, continuing into the Middle Cambrian. Aside from the two genera made by Poulsen, this group has long needed complete revision. Even now the final word cannot be said.

Diagnosis.—Trilobites with wide cranidia. Glabella clearly defined, with three pairs of furrows usually developed. Brim wide flat or concave, with a narrow rim faintly outlined; conspicuous feature of brim is impression of doublure on upper surface, which simulates a

wide rim bent back toward the glabella at the middle. Fixed cheeks wide, eye lines heavy; eyes moderate in size and situated rather far back. Free cheeks greatly expanded at genal angles, flat or concave in the outer portion and with long, wide genal spines.

Pygidium with wide axis. Pleural furrows well defined and pleural lobes extended into spines.

Surface usually with scattered granules often of more than one size.

Owing to the width of the fixed cheeks, some species were referred to *Olenopsis,* while those for which the pygidium was known were placed in *Crepicephalus.*

Genotype.—*K. tuberculata* Poulsen.

Range.—Later Lower Cambrian, extending into Middle Cambrian.

DESCRIBED SPECIES REFERRED TO KOCHIELLA

Besides the species discussed below, there are *K. propinqua* Poulsen, *K. arcana* Poulsen, and *K. gracilis* Poulsen.

Kochiella tuberculata Poulsen

Kochiella tuberculata Poulsen, Meddels. Grønland, vol. 70, p. 259, pl. 15, figs. 7-13, 16, 1927.

Crepicephalus cf. *cecinna* Poulsen, Meddels. Grønland, vol. 70, p. 267, pl. 16, figs. 17, 18, 1927.

There can be but little doubt that this pygidium represents a species of *Kochiella.*

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

Cotypes.—Min. Mus. Copenhagen.

Kochiella crito (Walcott)

Olenopsis crito Walcott, Smithsonian Misc. Coll., vol. 67, no. 3, p. 75, pl. 11, fig. 6-6*b*, 1917.

Lower Cambrian, Mount Whyte; (loc. 60e) Ptarmigan Lake Pass, Alberta.

Lectotype.—U.S.N.M. no. 64371; paratypes, nos. 64372-3.

KOCHINA, n. gen.

Certain Middle Cambrian species resemble *Kochiella,* but all differ in the same manner and therefore are regarded as a distinct genus.

Comparisons.—*Kochina* differs from *Kochiella* in three respects: First, the brim is narrower so that the preglabellar area is practically eliminated; second, the converging course of the anterior facial suture greatly reduces the area of brim at the anterior angles; and third, the eyes have a more anterior position.

Genotype.—*Olenopsis americanus* Walcott.

Range.—Thus far confined to the Albertella zone of the Middle Cambrian.

DESCRIBED SPECIES REFERRED TO KOCHINA

Kochina americana (Walcott)

Olenopsis americanus Walcott, Smithsonian Misc. Coll., vol. 57, no. 8, p. 243, pl. 36, figs. 8-11, 1912.

Middle Cambrian, Gordon; (loc. 4v) Gordon Creek, Montana.

Cotypes.—U.S.N.M. nos. 58368-71.

Kochina bosworthensis, n. sp.

Olenopsis cf. *americanus* Walcott, Smithsonian Misc. Coll., vol. 67, no. 2, p. 37, pl. 6, fig. 8-8*b*, 1917.

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

Lectotype.—U.S.N.M. no. 63749; paratype, nos. 63450-1.

MACELLOURA, n. gen.

Diagnosis.—Cranidium quadrate, facial sutures diverge anterior to eye, making sharp, salient, down-turned anterior angles; posterolateral limbs short. Glabella quadrate, tapering but slightly; extends to anterior margin; without glabellar furrows; wide. Fixed cheeks one-fourth width of glabella; eyes rather small.

Pygidium spade-shaped with anterior pleural furrows making upturned sides; dorsal furrow marked only by change in slope; axial and pleural lacking; axis tapering rapidly, half as long as pygidium.

Free cheeks and thorax not known.

Genotype.—*Illaenurus ? dia* Walcott.

Name.—Μακελλα = spade; ουρα = tail.

Range.—About middle Upper Cambrian, or somewhat younger.

Macelloura dia (Walcott)

Illaenurus ? dia Walcott, Proc. U. S. Nat. Mus., vol. 13, p. 277, pl. 20, fig. 6, 1890.

Nileus ? dia Walcott, Smithsonian Misc. Coll., vol. 57, no. 13, p. 359 (gen. ref.), 1914.

Upper Cambrian, Wilberns; (loc. 70a) Morgans Creek, Burnet County, Texas.

Cotypes.—U.S.N.M. no. 23865.

METEORASPIS, n. gen.

Diagnosis.—Cranidium but little larger than glabella. Glabella large; dorsal furrow well defined; without glabellar furrows. Occipital

furrow and rim well developed. Brim about one-third as wide as glabella is long; heavy, thickened, up-turned rim separated by strong anterior furrow; preglabellar area almost obsolete in front of glabella. Fixed cheeks narrow, consisting entirely of the strongly arched palpebral lobes and apparently narrow straps. Eyes rather large.

Genotype.—*Ptychoparia ? metra* Walcott.

Range.—Middle Upper Cambrian.

Name.—Μετεορος = high; ασπις = shield.

Meteoraspis metra (Walcott)

Ptychoparia ? metra Walcott, Proc. U. S. Nat. Mus., vol. 13, p. 273, pl. 21, fig. 7, 1890.

Upper Cambrian, Wilberns; (loc. 67) Potatotop, 7 miles northwest of Burnet and (loc. 68) Packsaddle Mountain, 11 miles southeast of Llano, Texas.

Holotype.—U.S.N.M. no. 23858.

MODOCIA Walcott, 1924

Modocia Walcott, Smithsonian Misc. Coll., vol. 75, no. 2, p. 59, 1924; idem, no. 3, p. 106, 1925.

Genotype.—*Arionellus* (*Crepicephalus*) *oweni* Meek and Hayden.

Range.—Upper Cambrian.

DESCRIBED SPECIES REFERRED TO MODOCIA

Modocia oweni (Meek and Hayden)

Arionellus (*Crepicephalus*) *oweni* Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 436.

Modocia oweni Walcott (part), Smithsonian Misc. Coll., vol. 75, no. 2, p. 59, pl. 12, figs. 1, 2, 1924; idem, no. 3, p. 106, pl. 16, figs. 1, 2, (not 3 = *M. centralis*), 1925. (Not *Ptychoparia oweni* Walcott = *Ehmania oweni.*)

This trilobite was referred by various authors to *Agraulos, Ptychoparia,* and *Crepicephalus.* Also several other species were included under this name. Study of the types shows that the species occurs only at the locality given below.

Upper Cambrian, Deadwood; head of Powder River, Big Horn Mountains, Wyoming.

Holotype.—U.S.N.M. no. 1180.

Modocia centralis (Whitfield)

Crepicephalus (*Loganellus*) *centralis* Whitfield, Prelim. Rep. Pal. Black Hills, U. S. Geol. Surv., p. 10, 1877; Rep. Geol. Res. Black Hills, U. S. Geogr. and Geol. Surv., p. 341, pl. 2, figs. 21-24, 1880.

Modocia oweni Walcott (part), Smithsonian Misc. Coll., vol. 75, no. 2, p. 59, pl. 12, fig. 7, 1924; idem, no. 3, p. 106, pl. 16, fig. 3, 1925.

Upper Cambrian, Deadwood; Castle Creek, Black Hills, South Dakota.

Cotypes.—U.S.N.M. no. 24581.

Modocia berkeyi, n. sp.

Agraulos convexus Berkey, Amer. Geologist, vol. 21, p. 288, pl. 20, figs. 9-11, pl. 21, figs. 3, 7, 1898.

Agraulos convexus var. A. Berkey, idem, pl. 20, figs. 1, 2, pl. 21, fig. 5.

Ptychoparia calymenoides Berkey, idem, pl. 20, figs. 3, 4, pl. 21, fig. 4.

It appears that variety A and the other specimens assigned to the species are alike except for size. However, critical work will have to be done to settle this point. Variety B of Berkey belongs to another genus.

Upper Cambrian, Ironton; Taylors Falls, Minnesota.

Holotype.—Columbia Univ. no. 22283; paratypes, nos. 22286, 22307.

Modocia glomerata (Walcott)

Acrocephalites ? glomeratus Walcott, Smithsonian Misc. Coll., vol. 64, no. 3, p. 179, pl. 26, figs. 7, 7*a*, 1916.

This specimen is typical of the genus *Modocia,* departing only in the development of the median boss.

Upper Cambrian, Deadwood; (loc. 340c) near Rawlings, Wyoming.

Holotype.—U.S.N.M. no. 61591.

Moosia Walcott is a synonym of *Elvinia* Walcott (Smithsonian. Misc. Coll., vol. 75, no. 3, p. 88, 1925).

PLAGIURA, n. gen.

Diagnosis.—Cranidium large, smooth, rather flat; facial suture converges slightly anterior to eyes; behind the eyes it diverges rapidly, forming wide, blunt postero-lateral limbs. Brim about one-third as wide as the glabella is long; no rim separated. Fixed cheeks about half width of glabella; eyes small, situated opposite anterior third of the glabella. Free cheeks simple curved bands, with rounded genal angles.

Pygidium triangular, broad, with anterior angles somewhat drawn out; axis wide, well separated by change in slope and extends nearly to rear margin; axial and pleural furrows present.

Genotype.—*Ptychoparia? cercops* Walcott.

Range.—Upper Lower Cambrian, Canadian Rockies.

Name.—πλαγιος = slanting; ουρα = tail.

Plagiura cercops (Walcott)

Ptychoparia ? cercops Walcott, Smithsonian Misc. Coll., vol. 67, no. 3, p. 81, pl. 12, figs. 1-1*d*, 1917.

Lower Cambrian, Mount Whyte; (loc. 63c) 1½ miles northeast of Lake Louise, Alberta.

Cotypes.—U.S.N.M. nos. 64377-64381.

POLIELLA Walcott, 1916

Poliella Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 349, 1916.

This genus was established as a subgenus of *Bathyuriscus,* with the statement that the pygidium was different. Even a cursory revision of the trilobites referred to *Bathyuriscus* and related genera shows the necessity of making this a full genus. Evidently, Walcott first intended to use the form from Pole Creek, *Bathyuriscus powersi,* as the genotype, but since he designated the Spence shale form, it becomes the genotype, and the genus is not represented at the Pole Creek locality.

Diagnosis.—Cephalon much larger than pygidium. Glabella quadrate, expanded anteriorly; two pairs of glabellar furrows usually clearly defined, others very faint or absent. Eyes long, moderately bowed. Brim when present narrow and simple.

Thorax with 7 to 9 segments.

Pygidium with wide, well-defined axis; pleura usually fused; two to four pleural furrows extend to the margin; rim absent.

Comparisons.—Compared with *Bathyuriscus, Poliella* is distinguished by its fewer thoracic segments, larger eyes, and much smaller tail.

Genotype.—*Bathyuriscus* (*Poliella*) *anteros* Walcott.

Range.—Middle Cambrian.

Species formerly referred to *Poliella:*

P. powersi = *Bathyuriscus* *P. sylla* = *Clavaspidella*
P. probus = *Clavaspidella*

DESCRIBED SPECIES REFERRED TO POLIELLA

Besides the species discussed below, the following belong to the genus.

Poliella anteros Walcott *Poliella chilo* Walcott
Poliella balus Walcott

Poliella occidentalis (Matthew)

Dolichometopus occidentalis Matthew, Trans. Roy. Soc. Canada, 2d ser., vol. 5, sec. 4, p. 49, pl. 2, fig. 2, 1899.

Bathyuriscus pupa Matthew, idem, p. 51, pl. 2, fig. 5.

Bathyuriscus occidentalis Walcott, Smithsonian Misc. Coll., vol. 53, no. 2, p. 41, 1908. Walcott, Canadian Alpine Journ., vol. 1, pt. 2, pl. 3, fig. 2, 1908.

Bathyuriscus (Poliella) occidentalis Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 351, pl. 46, fig. 3, 1916.

Owing to the poor preservation of the holotype, this species would be inadequately represented except that two excellent carapaces have just been discovered in our collections. It seems that the pygidium fits *Poliella*. The published figures are restored more than warranted.

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

Holotype.—Royal Ontario Museum (casts U.S.N.M. no. 62621).

Poliella prima (Walcott)

Bathyuriscus (Poliella) primus Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 352, pl. 46, figs. 6, 6*a*, 6*b*, 1916. (Not 6*c*, *d* = *P. castlensis*.)

This is described as a Lower Cambrian species but belongs to the Ptarmigan formation.

Middle Cambrian, Ptarmigan; (locs. 35m, 35e) 3 miles southwest of the head of Lake Louise, Alberta.

Lectotype.—U.S.N.M. no. 62624; paratype no. 62623.

Poliella castlensis, n. sp.

Bathyuriscus (Poliella) primus Walcott (part), Smithsonian Misc. Coll., vol. 64, no. 5, p. 352, pl. 46, figs. 6*c*, *d*, 1916.

It is necessary to separate this head from *P. prima* because of its wider brim and eyes which have a more divergent position.

Middle Cambrian, Ptarmigan; (loc. 58t) Castle Mountain, Alberta.

Holotype.—U.S.N.M. no. 62626.

Poliella caranus (Walcott)

Bathyuriscus (Poliella) caranus Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 350, pl. 46, fig. 5, 1916.

This form barely remains within the genus because of its greatly reduced brim.

Middle Cambrian, Spence; (loc. 55c) Liberty Canyon, west of Montpelier, Idaho.

Holotype.—U.S.N.M. no. 62628.

STROTOCEPHALUS, n. gen.

Diagnosis.—Cranidium alone available. Facial suture diverges anteriorly to rather sharp anterior angles; glabella tapering with faint furrows; occipital furrow shallow; occipital ring slightly thickened. Brim wide, concave, and without a rim, striated vertically; eye lines developed; palpebral lobes of moderate size, situated far back.

Comparisons.—Differs from *Alokistocare* in two points, viz, sharper anterior angles and more posterior position of the eyes.

Genotype.—*S. gordonensis,* n. sp.

Name.—Στροτος = spread, κεφαλος = head.

Range.—At present confined to Middle Cambrian.

Strotocephalus gordonensis, n. sp.

Ptychoparia pylas Walcott (part), Smithsonian Misc. Coll., vol. 67, no. 2, pl. 6, fig. 4*c*, 1917. (Other figs. *Elrathia.*)

Middle Cambrian, Gordon; (locs. 4q, 4v) Gordon and Youngs Creeks, Ovanda quadrangle, Montana.

Holotype.—U.S.N.M. no. 63743.

WEEKSINA, n. gen.

Two species from the Upper Cambrian of the House Range referred to the Middle Cambrian genus *Asaphiscus* are distinct in many respects.

Diagnosis.—Entire trilobite ovate; convexity not determinable. Facial suture diverges anterior to the eyes and is intramarginal two-thirds of the distance to the center so that the anterior angles are strongly rounded. Glabella wide, rounded in front; glabellar furrows short, but fairly deep. Brim of moderate width; rim thickened and, owing to course of the suture, sharply narrowed toward anterior angles. Fixed cheeks narrow; eyes fairly large; palpebral lobes strongly bowed. Free cheeks with well-defined rim and blunt genal angles.

Thorax with 10 or 12 segments; tips of pleura blunt; long spine on axis of next to last or third from last pleuron.

Pygidium half the size of the cephalon; axis well defined, rather wide, and extending nearly to rear margin; axial and pleural furrows distinct.

Surface granulose.

Genotype.—*Asaphiscus ? unispinus* Walcott.

Range.—Presumably early Upper Cambrian.

DESCRIBED SPECIES REFERRED TO WEEKSINA

Weeksina unispina (Walcott)

Asaphiscus ? unispinus Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 389, pl. 61, fig. 1, 1916.

Upper Cambrian, Weeks; (loc. 30n) Weeks Canyon, House Range, Utah.

Holotype.—U.S.N.M. no. 62775.

Weeksina granulata (Walcott)

Asaphiscus ? granulatus Walcott, Smithsonian Misc. Coll., vol. 64, no. 5, p. 385, pl. 61, figs. 2, 2a, 1916.

Number of thoracic segments uncertain.

Occurrence same as preceding.

Cotypes.—U.S.N.M. nos. 62776-7.