

## NEVADELLA CARTLANDI Raw in Walcott, 1910

Figure 5.2, 5.4

*Callavia cartlandi* RAW in WALCOTT, 1910, p. 282, pl. 42, figs. 3-4;

COBBOLD, 1910, p. 298; COBBOLD, 1931, p. 370, 379.

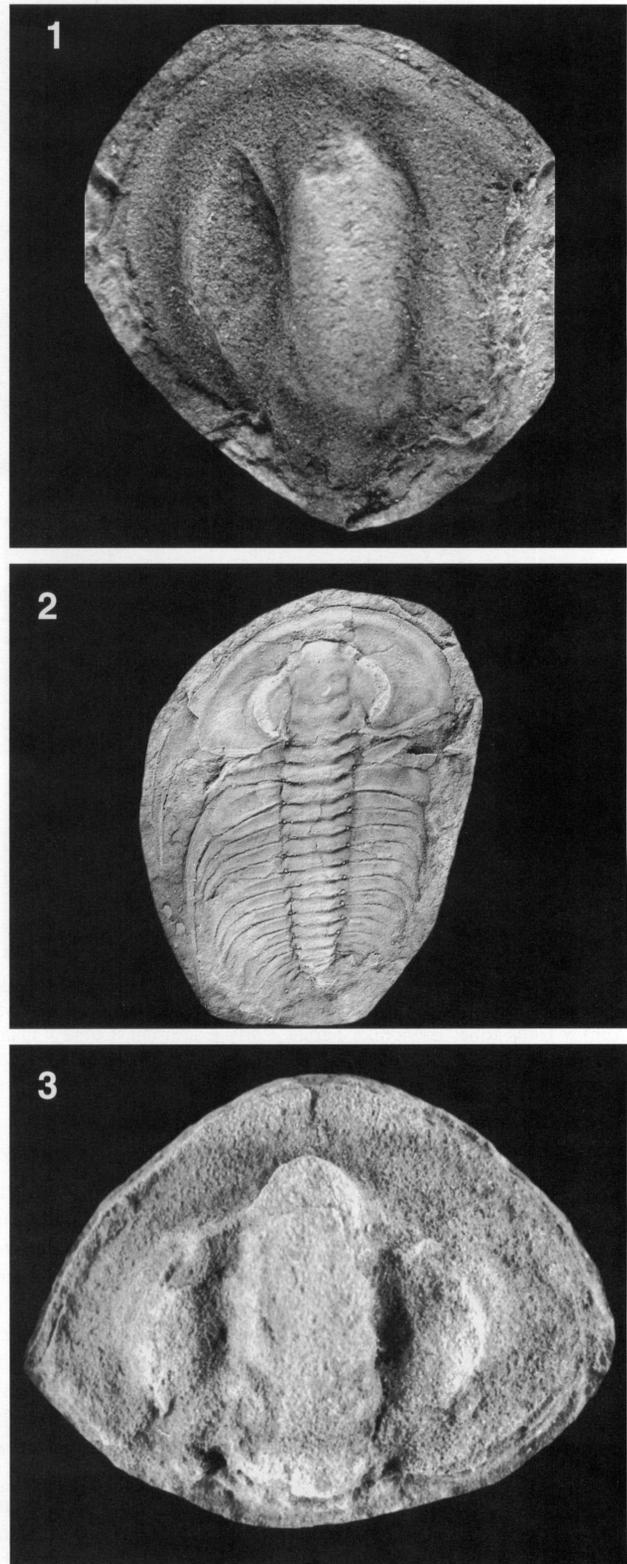
*Nevadella cartlandi* (Raw in Walcott). RAW, 1936, p. 274, pl. 22, figs. 1, 2; FRITZ, 1972, p. 22.*Nevadia cartlandi* (Raw in Walcott). FRITZ, 1992, p. 21.*Callavia* (*Cobboldus*) *cobboldi* RAW, 1936, p. 261, pl. 20, fig. 1a-c.*Callavia cobboldi* RAW. RAW in COBBOLD, 1911, p. 297; LAKE, 1937, p. 232, pl. 33, fig. 6.? *Callavia brevioculata* RAW, 1936, p. 266, pl. 221, fig. 2a, b.**Type.**—Holotype BU 150 (formerly BU Aa 53) (Fig. 5.4).**Other material examined.**—SM A15327 (what was the holotype of *C. cobboldi*).**Occurrence.**—Raw (1936) treated this taxon (originally he believed there were two species) as occurring in the Early Cambrian Red *Callavia* sandstone, and *Eodiscus bellimarginatus* Limestone, horizons Ac2 and Ac3, Comley Quarry, Comley, Shropshire, United Kingdom. According to Landing (1996) these are equivalent to the Lower Comley Limestone, which is within the Early Cambrian Branchian series.**Discussion.**—*Callavia cobboldi*, known from an isolated cephalon, is identical to the cephalon of *Nevadella cartlandi* in every respect, and is treated as conspecific with that species. *Callavia cobboldi* was listed as a species present in certain stratigraphic sections by Cobbold (1911, 1931) but it was not treated as a new species nor described in those publications. It was officially described and figured by Raw (1936). Therefore, the name *Nevadella cartlandi*, officially published in 1910, would have priority and *C. cobboldi* would be a junior synonym. *Nevadella cartlandi* can no longer be referred to the genus *Callavia* because it differs from the type of that genus in several characters (see Table 1 and Fig. 1). Specific evidence for excluding *N. cartlandi* from *Callavia* include the following characters and character states listed above and in Table 1 that define nodes of the cladogram in Figure 1, with *N. cartlandi*: lacking 2(1); lacking 9(2), possessing 9(1); lacking 23(1); lacking 32(2), possessing 32(1); and lacking 39(1). It also has 44(1) whereas *C. broeggeri* has 44(0). *Nevadella cartlandi* is excluded from *Nevadia* because it possesses the characters characteristic of *Nevadella* discussed above. *Callavia brevioculata*, on the basis of its prominent intergenal ridge and the orientation of its eyes may be a specimen of *N. cartlandi* but it is too poorly preserved to ascertain this taxonomic identity with certainty.Genus CIRQUELLA Fritz, 1995  
CIRQUELLA NELSONI new species  
Figure 6.1, 6.3*Daguinaspis* sp. NELSON, 1976, p. 31, pl. 2, upper left hand corner; NELSON, 1978, pl. 123, fig. 2.**Diagnosis.**—Anterior cephalic border developed as narrow rounded ridge, prominently separated from extraocular area by furrow; plectrum present; LA (L4) with length (sag.) roughly equal to length (sag.) of L0 and L1; ocular lobes gradually increase dorsoventral elevation between axial furrows and mid-point of ocular lobes, contact anterior and posterior parts of LA; width (tr.) of interocular area approximately equal to width of ocular lobe; anterior of eyes extraocular area greatly reduced (exsag.); anterodistal margins of L3 formed by axial furrows; S2 not conjoined medially; glabellar furrows weakly incised; width (tr.) extraocular region opposite L1 equal to roughly 35 percent width of glabella at L1; genal spine angle developed opposite medial part of distal margin of L0; intergenal angle developed posterior of lateral margins of ocular lobes.**Description.**—Cephalic length (sag.) 80–90 percent of width

FIGURE 6—*Fallotaspis* zone, Early Cambrian, Montenegro Member, Campito Formation, White-Inyo Range, Inyo County, California. 1, 3, *Cirquella nelsoni* n. sp., upper *Fallotaspis* zone. 1, Partial cephalon, dorsal view, LACMIP locality number 26748, LACMIP 26748,  $\times 8$ ; 3, holotype cephalon, dorsal view, LACMIP locality number 6789, LACMIP 7372,  $\times 6.5$ . 2, *Cambroinyoella wallacei* n. sp.; 2, LACMIP locality number 6749, latex of external mold of nearly complete specimen, dorsal view, LACMIP 7370,  $\times 1.3$ .

Chamber?

(tr.). Anterior cephalic border narrow, rounded ridge, length (exsag.) between lateral margins of LA (L4) and genal spine angle equal to 50 percent length (sag.) of L0. Frontal lobe about 30–40 percent length (sag.) of glabella; frontal lobe does not contact anterior border furrow; plectrum visible; anterior margin of frontal lobe at each side of midline deflected posteriorly at roughly 40 degree angle relative to transverse line; lateral margins of LA proximal to lateral margins of L0; lateral margins of LA convergent anteriorly; ocular lobes gradually increase dorsoventral elevation between axial furrows and mid-point of ocular lobes, contact anterior and posterior parts of LA; extraocular area greatly reduced (exsag.); anterodistal margins of L3 formed by axial furrows; S2 not conjoined medially; L2 and L3 do not merge distally; line from anterior to posterior edge of ocular lobe forms roughly 20 degree angle relative to sagittal line; S1 with medial edge declined posteriorly, not conjoined medially; S0 with medial edge declined posteriorly, conjoined medially; width (tr.) of glabella opposite margins of L1 constricted relative to width at lateral margins of L0; posterior edge of ocular lobe opposite S0 or medial margin of L1; ocular lobes weakly elevated from extraocular area; posterior margin of L0 convex posteriorly, with axial node medially; genal spine not prominently developed; genal spine angle opposite distal margin of L0; intergenal angle developed posterior of lateral margins of ocular lobes; extraocular area opposite L1 narrow, width (tr.) approximately 35 percent width of glabella at L1.

*Etymology*.—Named for Clem Nelson, University of California at Los Angeles, and White Mountain Research Station, who found the material this species is based on and kindly allowed me to study it.

*Type*.—Holotype LACMIP 7372 (Fig. 6.3), from LACMIP locality 6789 in the Early Cambrian upper *Fallotaspis* zone, Montenegro Mbr., Campito Fm., White-Inyo Range, Inyo Co., California.

*Other material examined*.—LACMIP 26748a, 26748 (2 specimens), 26887 (2 specimens).

*Occurrence*.—Early Cambrian, White-Inyo Range, Inyo Co., California: LACMIP locality 6748, *Fallotaspis* zone, Montenegro Mbr., Campito Fm., Blanco Mtn. USGS quad. (1952), SE1/4, NE1/4, sec. 32, T7S, R35E, in small gully just east of north end of Cedar Flat; and LACMIP 6887 *Nevadella* zone, middle part of Poleta Fm., USGS Bullfrog quad. (1954), NW1/4, sec. 36, T13S, R46E, in small gully, just to east of highway immediately north of Daylight Pass.

*Discussion*.—This species is very similar to the other species of *Cirquella* described by Fritz (1993): *C. nummularia* Fritz, 1993 and *C. espinata* Fritz, 1993. These taxa are from the Dogtooth Range of British Columbia, Canada and the southern Canadian Rocky Mountains, respectively. *Cirquella nelsoni* differs, however, from *C. nummularia* in the condition of the following characters: the anterior margins of the frontal lobe are deflected more strongly posteriorly in *C. nelsoni*; the posterior ocular lobes sometimes extend relatively further posteriorly in *C. nelsoni*; S2 is not conjoined medially in *C. nelsoni*; *C. nelsoni* has a relatively narrower extraocular region; the genal spine angle is developed relatively further posteriorly in *C. nelsoni*; and the intergenal angle is developed closer to the axis in *C. nelsoni*. *Cirquella nelsoni* differs from *C. espinata* in the condition of the following characters: S2 is not conjoined medially in *C. nelsoni*; *C. nelsoni* has a relatively narrower extraocular region; and the intergenal angle is developed closer to the axis in *C. nelsoni*. Competing character evidence could not distinguish how the species of *Cirquella* were related to one another, though they do form a clade. However, *C. nelsoni* appears in the fossil record earlier than the other two Canadian taxa. The citation in Nelson (1978) is not an illustration

but rather shows the taxon's position within a stratigraphic column.

#### Genus CAMBROINYOELLA new genus

*Type species*.—*Cambroinyoella wallacei* n. sp.

*Included species*.—None (monotypic).

*Diagnosis*.—Parafrontal band long (exsag.) anterior of anterolateral margins of LA (L4), 50 percent length (sag.) of L0; length (sag.) of LA (L4) equal to length of L0 and L1; outer band of ocular lobe near lateral margin of LA (L4) expands prominently exsagittally; ocular lobes of constant dorso-ventral elevation between axial furrows and mid-point of ocular lobes, contact anterior and posterior parts of LA; ocular lobe between visual surfaces and LA equal to approximately 33 percent width (tr.) of glabella at L1; distal margins of L3 convex outward; S3 jaggedly convex; distal margins of L2 diverge anteriorly; width (tr.) of extraocular region opposite L1 equal to approximately 125 percent width of glabella at L1; genal spine angle developed opposite medial part of distal margin of L0; intergenal angle directed anteriorly at roughly 30 degree angle; anteromedial margin of third thoracic pleural segment parallels transverse line; third thoracic segment macropleural; anteromedial margin of third thoracic pleural furrow directed weakly posteriorly; thoracic pleural spines on segments 5–8 developed as short projections extending three segments back; thoracic pleural furrows extend roughly width of inner pleural region.

*Etymology*.—Named by combining “Cambro,” for the taxon's occurrence within the Cambrian period, and “inyoella,” for its presence in the White-Inyo range of Inyo County, California.

*Discussion*.—The type species of this new genus had previously only been informally illustrated by Nelson (1976) as a species of the genus *Fallotaspis* Hupé, 1953; however, this new taxon differs from the type species of *Fallotaspis* and indeed from other members of the paraphyletic “fallotaspoid” grade in the condition of several characters and can no longer be included within that superfamily. In particular, it has the defining characteristics of the Olenellina including: the relatively long (sag.) LA (L4); and the ocular lobes are of constant dorso-ventral elevation between their mid-point and the axial furrows. Further, *Cambroinyoella* is not a basal member of the Olenellina, but instead appears to be nested well within that suborder. Characters placing this taxon up the tree are given in the caption of Figure 1 and in the list of characters above and in Table 1.

#### CAMBROINYOELLA WALLACEI new species

Figures 6.2, 7

*Fallotaspis* sp. NELSON, 1976, p. 3, pl. 1, upper right hand corner and bottom row second from the right.

*Diagnosis*.—Same as for genus.

*Description*.—Same as *Cirquella nelsoni* except: cephalic length (sag.) 40–50 percent of width (tr.). Anterior cephalic border length (exsag.) between lateral margins of LA (L4) and genal spine angle equal to length (sag.) of L0. Frontal lobe about 25–35 percent length (sag.) of glabella; anterior margin of frontal lobe at each side of midline deflected posteriorly at indeterminate angle relative to transverse line; lateral margins of LA first divergent, then convergent anteriorly; ocular lobes of constant dorso-ventral elevation between axial furrows and mid-point of ocular lobes; anterodistal margins of L3 formed by ocular lobes; extraocular area anterior of eyes not prominently reduced (exsag.); distal margins of L3 convex outward; S2 conjoined medially; line from anterior to posterior edge of ocular lobe roughly parallels sagittal line; S1 with medial edge declined posteriorly, conjoined medially; posterior edge of ocular lobe opposite medial margin of L0; genal spine well developed, of indeterminate