

FIGURE 9—Callavalonia callavei (Lapworth, 1888), Comley Limestone, Branchian Series, Early Cambrian, Comley Quarry, Comley, Shropshire, United Kingdom. 1–4, Horizon Ac2; 1, cephalon, dorsal view, BU 149 (formerly Aa 55), ×1.7; 2, lectotype cephalon, dorsal view, SM A172, ×1.3; 3, paralectotype cephalon, dorsal view, SM A574, ×1.8; 4, paralectotype thoracic pleura, dorsal view, BU 141 (formerly Aa23), ×1.8.

for more complete synonymy); LAKE, 1937, p. 228, pl. 21, figs. 11– 13a; RAW, 1937, p. 581, figs. 4–7; FRITZ, 1972, p. 22. *Callavia hastata* RAW, 1936, p. 259, pl. 19, figs. 1–5. *Callavia* sp. RAW, 1936, p. 265, pl. 19, fig. 6, pl. 23, fig. 16a–c.

*Types.*—The original types of the species are figured in Lapworth (1891, pl. 14, figs. 1–25 and pl. 15). Raw (1936) referred to these as cotypes. To these he added a set of plesiotypes that he used in his re-description of the species. The latter cannot serve as valid types, and a lectotype for the species is needed, based on the original cotypes. Lapworth's (1891, pl. 14, fig. 1), SM A172, illustrated herein as Figure 9.2 is designated the lectotype. All other

specimens figured by Lapworth (1891) become paralectotypes. Of these, the best preserved are SM A572, A574 (Fig. 9.3), A582, A7066 and BU 141 (formerly Aa 23) (Fig. 9.4).

Other material examined.—BMNH J13838, J13852, J14533; BU Aa 54, Aa 55 (holotype of *Callavia hastata*); SM A574 (2 specimens), A15536.

Occurrence.—Early Cambrian, United Kingdom: Shropshire, Comley Quarry, in the Green Callavia Sandstone, horizon Ac1, the Red Callavia Sandstone, horizon Ac2; and Dryton Brook, near Rushton (for additional localities see Raw [1936]). According to Landing (1996) these are equivalent to the upper part of the Lower Comley Sandstone and the lower part of the Lower Comley Limestone, both of which are within the Branchian series.

Discussion .- Raw (1936) described Callavia hastata and suggested that it was closely related to Callavalonia callavei. In fact, he claimed (Raw, 1936, p. 259) that the cephalon of C. hastata was indistinguishable from C. callavei except in the condition of its occipital spine, which he suggested was considerably longer (sag.) in C. hastata. However, in most specimens of C. callavei the spine is broken off so its length is generally difficult to ascertain, and where adequately preserved, the occipital spine appears to be comparable in relative size to that of C. hastata. Similarly, Raw (1936) suggested that the thoracic axial spines were relatively much larger in C. hastata than in C. callavei but again, this does not appear to be the case. Because of the morphological near identity of these two taxa, they are treated as conspecific, with C. hastata representing a junior subjective synonym of C. callavei. Raw's (1936) Callavia sp., defined on the basis of small, poorly preserved pygidial material, appears to be morphologically indistinguishable from pygidia of C. callavei, and thus it is referred to that species.

Raw (1936) suggested that *C. callavei* was conspecific with *C. crosbyi*. Herein, *C. crosbyi* was treated as a junior synonym of *C. broeggeri* because they are morphologically indistinguishable. *Callavalonia callavei* is very similar to *C. broeggeri* but they differ in the condition of a few characters which are discussed above under the heading of *C. broeggeri*.

# Genus SDZUYOMIA new genus

*Type species.*—*Callavia? lotzei* Richter and Richter, 1941. *Included species.*—None (monotypic).

Diagnosis.—Frontal lobe of glabella (LA) does not contact anterior border furrow; L4 (LA) moderately long (sag.), length equal to length (sag.) of L0 and L1; lateral margins of L4 (LA) directly anterior to lateral margins of L0; ocular lobes contact anterior and posterior parts of frontal lobe (LA); ocular lobes of constant dorso-ventral elevation between axial furrows and mid-point of ocular lobes; anterodistal margins of L3 formed by axial furrows; distal margins of L3 straight; S0 not conjoined medially; glabellar furrows weakly incised; intergenal spine not developed; thoracic pleural furrows extend only half width of inner pleural region, boundary between thoracic pleural furrow and anterior pleural band sharp; posteriormost segments of thorax merge with pygidium.

*Etymology.*—Named after K. Sdzuy, who has done much important work with Cambrian trilobites.

Discussion.—The type species of the genus Sdzuyomia was originally questionably described as a species of Callavia. Sdzuyomia lotzei bears many similarities to the types of the genera Callavia and also Callavalonia; however, it differs in the condition of some phylogenetically informative characters which map to nodes on the tree shown in Figure 1. Specifically, S1 is not conjoined medially in S. lotzei, it is in C. broeggeri; and the thoracic pleural furrows extend only about one-half of the width of the inner pleural region in S. lotzei whereas they extend about four-fifths of the inner pleural region in C. broeggeri. Sdzuyomia

lotzei differs from C. broeggeri and C. callavei in the condition of the following phylogenetically informative characters: in S. lotzei the frontal lobe of the glabella does not contact the anterior border furrow, in the other taxa it does; in S. lotzei the lateral margins of L4 (LA) are directly anterior of the lateral margins of L0, in the other taxa they are proximal to the lateral margins of L0; in S. lotzei the glabellar furrows are weakly incised, in the other taxa they are prominently incised; in S. lotzei the intergenal spine is not developed, in the other taxa it is; and in S. lotzei the boundary between the thoracic pleural furrow and the anterior band is much less sharp than it is in the other two taxa. Sdzuyomia lotzei differs from C. callavei in having the last segments of the thorax merging with the pygidium (the state of this character is indeterminate in C. broeggeri). Sdzuyomia lotzei also differs from C. broeggeri and C. callavei in having the following character states: 4(1) as opposed to 4(0); 16(1) as opposed to 16(0); and 18(0) as opposed to 18(1). On the basis of these and other characters it is necessary to assign S. lotzei to a new genus.

### SDZUYOMIA LOTZEI (Richter and Richter, 1941)

*Callavia? lotzei* RICHTER AND RICHTER, 1941, p. 34, pl. 3, figs. 36–40, pl. 4, fig. 66; SDZUY, 1962, p. 193, pl. 19, figs. 6–14, pl. 22, fig. 11 (see for more complete synonymy).

Type.—Holotype Senckenberg Museum X 1226d.

Occurrence.—Lower Cambrian, Herrerias Marl, Cañaveral, W. El Rincón, S. Sierra El Buje, Cala, Spain (see Sdzuy [1962]).

## Genus JUDOMIA Lermontova, 1951

Discussion.---Nelson (1976) figured several specimens on his plate 2 which appear referable to the genus Judomia. In particular, the three specimens in the lower left hand corner and the specimen in the upper right hand corner appear to comprise a single species and have the following cephalic features characteristic of the genus Judomia (see Table 1 and the list of characters above): 1(1); 2(0); 8(1); 9(2); 10(2); 11(0); 13(1); 14(1); 15(1); 16(0);17(1); 18(1); 22(1); 23(1); 24(0); 27(2); 31(1); 33(1); 34(1);40(1); 41(0). (Not all cephalic features for Nelson's figured specimens could be determined because of poor preservation.) Unfortunately, based on a thorough examination of Nelson's collections at the White Mountain Research Station, University of California, these specimens appear to be lost. Therefore, they are not described as a new species, nor were they subjected to phylogenetic analysis. However, they reflect clear evidence that the genus Judomia occurred in western Laurentia. Nelson (1976) referred several other specimens on plate 2 (in the middle and right hand part of the plate) to the genus Judomia, but these appear to belong somewhere within the "fallotaspidoid" grade, based on their failure to possess the characters of the Olenellina, and also their possession of the characters typical of that grade, which are described earlier in this paper. McMenamin (1987) described the species Judomia orbis McMenamin from the Lower Cambrian Puerto Blanco Formation of Sonora, Mexico. The specimens this species is based on, albeit poorly preserved, appear to be very similar to the "fallotaspidids" in the middle part of Nelson's (1976) plate 2. Thus, they are probably not referable to the genus Judomia, nor to the Olenellina. Judomia rossea Jell and Repina, 1992 is clearly referrable to the genus Judomia but unfortunately could not be obtained in the present study for the purposes of phylogenetic analysis.

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