

## NEW EARLY LATE CRETACEOUS (CENOMANIAN) MOLLUSKS FROM OREGON

RICHARD L. SQUIRES AND LOUELLA R. SAUL

Department of Geological Sciences, California State University, Northridge 91330-8266, <richard.squires@CSUN.edu>, and  
Invertebrate Paleontology Section, Natural History Museum of Los Angeles County, 900 Exposition Boulevard,  
Los Angeles, California 90007, <lousaul@earthlink.net>

**ABSTRACT**—Four new molluscan species, a bivalve and three gastropods, are named from shallow-marine, lower Upper Cretaceous (Cenomanian Stage) strata in Oregon. The laterulid bivalve *Cercomya* (*Cercomya*) *hesperia* new species is from the Bernard Formation in east-central Oregon and from the Osburger Gulch Sandstone Member of the Hornbrook Formation in southwest Oregon. It is the first Cenomanian record of this genus.

The iteriid gastropods, *Vernedia pacifica* new species and *Sogdianella oregonensis* new species, are from unnamed Cenomanian strata in east-central Oregon and represent the first records of these genera in western North America. The actaeonellid gastropod *Trochactaeon* (*Neocylindrites*) *allisoni* new species from these same deposits represents the first record of this genus in Oregon.

The new species of *Cercomya* sensu stricto, *Vernedia*, and *Neocylindrites* are very similar to western European species, and the new species of *Sogdianella* is most similar to a Peruvian species.

### INTRODUCTION

GASTROPODS AND bivalves of lower Upper Cretaceous (Cenomanian Stage) marine rocks of Oregon are poorly documented in the literature. Most molluscan studies of these rocks have focused on ammonites, and the bivalves and gastropods present are usually mentioned only in faunal lists, with fewer gastropods than bivalves. This paper describes one new species of bivalve and three new species of gastropods, all from cratonic, shallow-marine Cenomanian rocks of Oregon. The new bivalve is a laterulid and belongs to a warm-water cosmopolitan genus. Two of the gastropods are nerineacean iteriids and the third is an actaeonellid. All are indicative of warm-water Tethyan or marginal Tethyan faunas, and the discovery of these gastropods in Oregon significantly extends their paleobiogeographic ranges.

Abbreviations used for catalog and locality numbers are: LAC-MIP, Natural History Museum of Los Angeles County, Invertebrate Paleontology Section, Los Angeles; UCMP, University of California, Museum of Paleontology, Berkeley; USGS, United States Geological Survey at Menlo Park, California, Mesozoic localities (collections now stored at UCMP).

### STRATIGRAPHY AND GEOLOGIC AGE

**Bernard Formation.**—The holotype of the laterulid bivalve *Cercomya* (*Cercomya*) *hesperia* n. sp. was found at LACMIP locality 15800, within the Bernard Formation, located in the Supple area. This formation, which is part of the John Day inlier of pre-Tertiary rocks in the Blue Mountains province of east-central Oregon, was named by Dickinson and Vigrass (1965). Following a period of exotic terrane accretion, Albian to Turonian Cretaceous seas spread broadly over wide expanses of Oregon, and the Bernard Formation was one of these in situ Cretaceous deposits (Jones, 1960a; Dickinson and Thayer, 1978; Orr et al., 1992). The formation is nearly 500 m thick and consists predominantly of yellowish-brown, calcareous and limonitic pebbly sandstone that grades locally to sandy conglomerate (Dickinson and Vigrass, 1965). These strata were deposited in a forearc basin and represent a shallow-marine environment, perhaps on a submerged-delta margin (Dickinson and Thayer, 1978). The provenance for the detrital material in the general region was to the east, in the continental arc, where magmatic and deformed lower Mesozoic rocks were exposed (Nilsen, 1986).

The assemblage of ammonites and other mollusks at the LAC-MIP locality 15800 of the Bernard Formation is indicative of an early Cenomanian age. Jones (1960b) reported that the ammonite

*Desmoceras* (*Pseudouhligella*) *barryae* (Anderson, 1958) was found at USGS Mesozoic locality M-321, which is within a few meters of LACMIP locality 15800. *Pseudouhligella* Matsumoto, 1938, is known with certainty only from Cenomanian strata (Matsumoto and Obata, 1955). Jones (1960b) also reported that Anderson's species is probably of early Cenomanian age. Popenoe et al. (1960) reported the Cenomanian ammonites *Turrilites oregonensis* Gabb, 1869 [= *Turrilites acutus* Passy, 1832, fide Matsumoto (1959)], and *Desmoceras* (*Pseudouhligella*) *japonicum* Yabe, 1904, from the Andrew Bernard Ranch of Beaver Creek [= Crooked Creek], which is the general vicinity of LACMIP locality 15800. According to Dickinson and Vigrass (1965), the occurrence of *Turrilites oregonensis* Gabb and *Desmoceras* (*Pseudouhligella*) sp., as well as the crassatellid bivalve *Anthonya cultriformis* Gabb, 1864, in the lower 150 to 180 m of the Bernard Formation indicates that the basal part of the formation is of early Cenomanian age. Although Dickinson and Vigrass (1965) listed invertebrates from this locality, which is the same as their locality V171, they did not list *Cercomya*.

Dickinson and Vigrass (1965) listed a total of 19 species of invertebrates (ammonites, gastropods, bivalves, scaphopod, and an irregular echinoid) from the Bernard Formation. Inspection of fossils in the LACMIP collections from this formation revealed that their *Calva varians* (Gabb, 1864) is actually *Calva* (*Egelicalva*) *nitida* (Gabb, 1864), a species considered by Saul (1992) to be of late Albian to Cenomanian age. Jones' (1960b) study of *Pterotrigonia* indicates that *Trigonia evansana* Meek, 1858, of Dickinson and Vigrass (1965) is *Pterotrigonia oregana* (Packard, 1921) and is of late Albian to early Cenomanian age. Furthermore, the type locality of *P. oregana* is in the immediate vicinity (Jones, 1960b:434) of the type locality of *Cercomya* (*C.*) *hesperia* new species. The gastropod? *Natica allisoni* (Murphy and Rodda, 1960) and the bivalve *Yaadia leana* (Gabb, 1877) can also be added to Dickinson and Vigrass' species list. Popenoe et al. (1987) reported that? *Natica allisoni* is of Cenomanian age, and Saul (1978) reported that *Yaadia leana* is of Cenomanian to early Turonian age. The presence of thick-shelled bivalves, such as *Yaadia*, "*Exogyra*," and "*Ostrea*," in this formation suggests a wave-washed, shallow, upper neritic marine environment (Dickinson and Vigrass, 1965; Orr and Orr, 1981).

**Osburger Gulch Sandstone Member of Hornbrook Formation.**—The paratype of *Cercomya* (*C.*) *hesperia* n. sp. is from LACMIP locality 25426 near Dark Hollow in the Hornbrook Formation, which was named by Peck et al. (1956). In the Dark



Hollow and Jacksonville areas, south and west, respectively, of Medford, southwest Oregon, there are isolated outcrops of this formation and more than 600 m of sandstone and siltstone is represented in composite sections (Sliter et al., 1984). Nilsen (1984) assigned these outcrops to the transgressive shoreline and shelf deposits of the Osburger Gulch Sandstone Member of the Hornbrook Formation. He reported that although this member ranges in age from Cenomanian to early Coniacian, in the Dark Hollow and Jacksonville areas it is of Cenomanian age. Popenoe et al. (1960) reported the Cenomanian ammonite *Desmoceras* (*Pseudouhligella*) sp. from strata at Dark Hollow. Sliter et al. (1984) also considered the presence of *Desmoceras* (*Pseudouhligella*) sp. and the crassatellid bivalve *Anthonyia cultriformis* in these beds in the Dark Hollow area to be of early Cenomanian age. These same taxa are present in the Bernard Formation where the holotype of *Cercomya* (*C.*) *hesperia* n. sp. was found, and the beds at the two localities are lower Cenomanian. Nilsen (1984) reported that the basin, within which the Hornbrook Formation was deposited, originally was part of a complex forearc basin situated west of the active Late Cretaceous magmatic arc in the Idaho batholith that extended northeastward across most of central Oregon and included, along its eastern margin, the Suplee area (i.e., the type locality for *Cercomya* (*C.*) *hesperia* n. sp.). Nilsen (1984) also concluded that the Hornbrook Formation has not undergone any major post-depositional tectonic rotation or latitudinal displacement.

*Unnamed Strata near Dayville, Oregon.*—The type locality of the three new gastropod species is LACMIP locality 9936, which is about 9.5 km southeast of Dayville, east-central Oregon, and about 40 km northeast of the Suplee area. Locality 9936 is within a small and isolated outcrop of unnamed Upper Cretaceous rocks depicted on Thayer and Brown's (1966) geologic map as unit "Ks," consisting of Cretaceous sandstone and sandy conglomerate with thin beds of pebble conglomerate and a few thin, highly fossiliferous sandstone beds. In the LACMIP collections, slabs of rock from LACMIP locality 9936 show that most of the fossils are fragments. All the bivalves are disarticulated specimens, and there are concentrations of iteriids and actaeonellids. The broken and concentrated condition of the fossils strongly suggests post-mortem reworking.

Although Thayer and Brown (1966) indicated fossil localities from this isolated outcrop of unit "Ks," they did not mention any taxa nor did they discuss how they determined their geologic age. Popenoe et al. (1960, fig. 4), however, showed an isolated outcrop of Cretaceous strata in the vicinity of LACMIP locality 9936 (i.e., 10 km southeast of Dayville). This isolated outcrop and several others (including the Suplee area) in this part of Oregon were referred to as strata of "column 54" and assigned, by means of ammonites, to the lower Cenomanian by Popenoe et al. (1960, chart 10e). The rocks at LACMIP locality 9936, therefore, are approximately the same age as those which supplied the holotype of *Cercomya* (*C.*) *hesperia* new species. Saul (1978) reported the Cenomanian to early Turonian bivalve *Yaadia leana* (Gabb, 1877) from both the Jacksonville area and the Dayville areas. Saul (1992) reported the late Albian-Cenomanian bivalve *Calva* (*Egicalva*) *nitida* from these same two areas. During this present

study, abundant specimens of this latter bivalve were found at LACMIP locality 9936.

#### SYSTEMATIC PALEONTOLOGY

Phylum MOLLUSCA Linné, 1758

Class BIVALVIA Linné, 1758

Subclass ANOMALODESMATA Dall, 1889

Order PHOLADOMYOIDA Newell, 1965

Superfamily THRACIOIDEA Stoliczka, 1870

Family LATERNULIDAE Hedley, 1918

*Discussion.*—The superfamilial classification of family Laternulidae [=Anatinidae Gray, 1840] is not by any means agreed upon (Morton, 1985). This present report follows the classification employed by Yonge and Morton (1980). Until fairly recently, family Laternulidae had been placed by most workers (e.g., Morton, 1976) in superfamily Pandoroidea Rafinesque, 1815.

The living Laternulidae consists solely of *Laternula* Röding, 1798, with eight species typically found on sand and mud flats throughout the Indo-Pacific. These bivalves are burrowers and most are intertidal, but some are shallow sublittoral (no deeper than 20 m). The genus ranges today from the Japanese Islands in the north to the subantarctic Pacific in the south, and also as far west as the Persian Gulf (Morton, 1976).

Genus CERCOMYA Agassiz, 1843

*Type species.*—*Cercomya* (*Cercomya*) *pinguis* Agassiz, 1843, by original designation; Middle Jurassic (Bajocian), Switzerland.

CERCOMYA (CERCOMYA) HESPERIA new species

Figure 1.1–1.4

*Diagnosis.*—*Cercomya* with very elongate, slightly upcurved, very tapered posterior end; posterior umbonal ridge well defined; anterior end of shell low and moderately projected.

*Description.*—Shell medium large, elongate (up to 77 mm long, with height of 20 mm), subequivalve, very inequilateral, very rostrated and tapering posteriorly, slightly upcurved; dorsal margin gently concave, ventral margin convex; anterior end low and moderately projected; umbones somewhat inconspicuous, anteriorly situated from mid-point of length, opisthogyrous and with internal plate represented by slit on internal mold; umbones not projecting above or only slightly above posterodorsal margin; posterior umbonal ridges well defined, essentially paralleling postero-dorsal margin and bifurcating near posterior end; shell thin, prismatic outer layer, subnacreous layers internally; shell surface with numerous, closely spaced growth lines; central part of shell ventral to umbones crossed by numerous microscopic rows of punctate radial striae with interspaces about four times as wide as striae; growth lines with irregularly spaced swellings, becoming coarser on anterior end; swellings more obvious where outer shell missing; dentition and muscle-scar pattern unknown.

*Etymology.*—Named for *Hesperia*, one of the Hesperides or Nymphs of the Setting Sun who lived in the extreme west near the ocean.

*Types.*—Holotype, LACMIP 12888, type locality LACMIP loc. 15800; paratype, LACMIP 12889, LACMIP loc. 25426.

*Measurements.*—LACMIP 12888, height 20 mm, length 77

FIGURE 1—New Late Cretaceous (Cenomanian) bivalve and gastropods from Oregon. Specimens coated with ammonium chloride. 1–4, *Cercomya* (*Cercomya*) *hesperia* n. sp., holotype, LACMIP 12888, LACMIP loc. 15800,  $\times 1.25$ ; 1, right valve; 2, left valve; 3, dorsal view; 4, close-up view of umbones. 5–10, *Vernedia pacifica* n. sp., LACMIP loc. 9936, 5–6, holotype, LACMIP 12890,  $\times 3.3$ ; 5, apertural view; 6, right-lateral view; 7, paratype, LACMIP 12891, abapertural view,  $\times 3.3$ ; 8, paratype, LACMIP 12892, abapertural view,  $\times 4.2$ ; 9, paratype, LACMIP 12893, left-lateral view,  $\times 4$ ; 10, paratype, LACMIP 12894, interior view, height 13 mm,  $\times 5.4$ . 11–15, *Sogdianella oregonensis* n. sp., LACMIP loc. 9936. 11–12, holotype, LACMIP 12895; 11, apertural view,  $\times 1.5$ ; 12, oblique view of left-lateral side,  $\times 1.7$ ; 13–14, paratype, LACMIP 12896,  $\times 1.6$ ; 13, apertural view; 14, abapertural view; 15, paratype, LACMIP 12897, interior view,  $\times 3.2$ .

mm, thickness of both valves at umbones 11.4 mm. LACMIP 12889, height approximately 19 mm, length 62 mm.

**Occurrence.**—Lower Cenomanian; Bernard Formation near Suplee, Crook County, east-central Oregon, and Osburger Gulch Member of Hornbrook Formation in Dark Hollow area near Medford, Jackson County, southwest Oregon.

**Discussion.**—The holotype of the new species is a closed-valved specimen, whereas the paratype is a weathered, left-valve specimen.

The new species is remarkably similar to *Cercomya* sp. Woods (1909, p. 239–240, pl. 39, fig. 5a, 5b) from the Cretaceous Upper Greensand of the Isle of Wight, southern England. These strata were assigned to the Lower Cretaceous (upper Albian) by Rawson et al. (1978). This bivalve is known from only a single specimen, and Keen and Cox (1969, p. N845, fig. 7c, 7d) identified it as *Cercomya* (*Cercomya*) sp. aff. *C. (C.) gurgitis* (Pictet and Campiche, 1865). The new species from Oregon differs from Wood's specimen by having the beak and the anterior dorsal margin at about the same height, rather than having the anterior end upturned, and by having microscopic radial striae. Woods (1909) did comment, however, that imperfect preservation is probably the reason his specimen does not show any radial striae.

The new species is also very similar to *Cercomya (C.) gurgitis* (Pictet and Campiche, 1865, p. 105, pl. 107, figs. 6–8) that Woods (1909) reported from the Lower Cretaceous (Aptian) of Perte-du-Rhône of southeastern France and the Lower Greensand (Crackers) of Atherfield, England. The latter strata were also assigned to the lower Aptian by Rawson et al. (1978). According to Hayami (1966, 1975), *C. (C.) gurgitis* has a geologic range of Aptian to Albian and also occurs in Japan. Nagao (1934, p. 216–217, pl. 32, fig. 2) reported a *Cercomya* [as *Anatina (Cercomya)* sp.] from Japan, and Hayami (1966) found better specimens and identified them as *C. (C.) gurgitis*. *Cercomya (C.) hesperia* n. sp. differs from *Cercomya (C.) gurgitis* by having the anterior of the shell lower and less projected, and by having much more widely spaced radial striae with no small, pointed projections.

The new species is similar to *Cercomya cymbula* (Pethö, 1906, p. 314–315, pl. 26, fig. 9) from Maastrichtian strata in Hungary. *Cercomya (C.) hesperia* differs from *C. cymbula* in being smaller in size and in having a much less projected anterior end, lower umbones, umbonal ridges parallel to the postero-dorsal margin rather than making a 45 degree angle with the ventral margin, no vertical ribs on posterior rostration, and more widely spaced and punctate radial striae.

Runnegar (1974) suggested that *Cercomya*, which first appeared in the Late Triassic, might be the earliest laterulid.

Class GASTROPODA Cuvier, 1797  
Subclass HETEROBRANCHIA Gray, 1840  
Order HETEROSTROPHA Fischer, 1885  
Superfamily NERINEOIDA Zittel, 1873  
Family ITIERIIDAE Cossmann, 1896

**Discussion.**—The diagnostic morphologic features of itieriids are the small projecting beak at the base of the body whorl, the hollow or partly hollow columella, and the central pillar of the columella. The pillar was originally the anterior canal of the whorls, and its presence supports the exclusion of itieriids from the Actaeonellidae, whose members share a very close morphologic similarity with itieriids (Kollmann and Sohl, 1980).

Genus VERNEDIA Mazeran, 1912

**Type species.**—*Vernedia laurenti* Mazeran, 1912, by original designation; Late Cretaceous (Turonian?), Gard Province, France.

**Discussion.**—According to Kollmann and Sohl (1980), many species of *Vernedia* were formerly assigned to the genus *Itruvia* Stoliczka, 1867. As thoroughly reviewed by Kollmann and Sohl

(1980), the generic name *Vernedia* was proposed by Mazeran (1912) because the type species of *Itruvia* [= *Pyramidella cancellulata* d'Orbigny, 1843] comprised two different species of gastropods. The majority of species formerly placed in *Itruvia* are now assigned to *Vernedia*.

VERNEDIA PACIFICA new species  
Figure 1.5–1.10

**Diagnosis.**—Small *Vernedia* with high-spined almost biconic shell, noded spiral ribs with nodes strongest on spire, and internally with sharp columellar fold and stout rectangular parietal fold.

**Description.**—Shell small (up to 19 mm high), almost biconic but becoming slightly globose with maturity, maximum diameter approximately 42–53 percent of total height; maximum diameter at medial part of body whorl; spire very high, up to 11 whorls and forming approximately 60 percent of total height; suture impressed; whorls slightly convex and with narrow subsutural ramp and tabulate shoulder; spire sculpture of two spiral ribs with nodes, becoming opisthocline-elongate on some specimens; body whorl covered by numerous and closely spaced, beaded spiral ribs; anterior portion of body whorl with narrow depression; calulus can be present over top of sculptured ridge around base of body whorl; aperture narrow; columella short with one sharp fold, extending transversely or obliquely bent upward; parietal fold strong and rectangular.

**Etymology.**—The species is named for the Pacific Ocean.

**Types.**—Holotype, LACMIP 12890, type locality LACMIP loc. 9366; paratypes, LACMIP 12891–12894, all from LACMIP loc. 9936.

**Measurements.**—LACMIP 12890, height 15 mm, diameter 7.5 mm. LACMIP 12891, height 17.5 mm, diameter 7.2 mm. LACMIP 12892, height 12.4 mm, diameter 6.3 mm. LACMIP 12893, height 12.8 mm, diameter 7.4 mm. LACMIP 12894, height 13 mm, diameter 6 mm.

**Other material examined.**—Forty-seven specimens, all from LACMIP loc. 9936.

**Occurrence.**—Lower Cenomanian; unnamed strata approximately 9.5 km southeast of Dayville, Grant County, east-central Oregon.

**Discussion.**—Many of the specimens are poorly preserved, with either the shell missing or the shell deeply weathered (e.g., Fig. 1.6, 1.7), and none has the protoconch present. These poorly preserved specimens have a more turreted appearance than those with their shells intact. Many also show the effects of compaction due to burial. Because of recrystallization, it cannot be determined whether the columella is partly hollow or has a central pillar.

*Vernedia pacifica* n. sp. is most similar to *Vernedia marianii* (Alessandri, 1899, p. 178, pl. 16, fig. 1), especially in terms of the interior morphology. Kollmann (1987, p. 49–50, pl. 3, figs. 35–38) gave a synonymy and description of this species, several illustrations of it, and reported it from upper Cenomanian rocks of Greece and Turonian rocks of Russia. The new species differs from *V. marianii* by having sculpture (spiral ribs and nodes) and a consistently stronger parietal fold. In *V. marianii*, the parietal fold ranges from very weak to well developed.

The only other species of *Vernedia* known from the Western Hemisphere is *Vernedia freisi* Kollmann and Sohl (1980, p. A6, A9, figs. 4b, 4c, 5a–e) from strata of late Cenomanian or early Turonian age in the State of Colima, southern Mexico. The new species differs from *V. freisi* by having a biconic rather than a globose shell, more whorls, higher spire, and a well developed parietal fold.