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MOLLUSCA AND A TRILOBITE FROM THE SHUMWAY CYCLOTHEM, MATTOON FORMATION, PENNSYLVANIAN, ILLINOIS

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ABSTRACT

Mollusca and arthropoda from the Shumway Cyclothem include the following: three species of bivalvia in the black fissile shale member; two species of gastropoda, one species of cephalopoda, and one species of bivalvia in the lower limestone member; and five species of gastropoda, three species of cephalopoda, five species of bivalvia, and one species of trilobite in the upper limestone member. Of these, two species of gastropoda, one of cephalopoda, four of bivalvia and the trilobite do not appear on Tucker's (1976b) faunal list and are previously unreported from the Shumway Cyclothem.

INTRODUCTION

The Pennsylvanian fossils of Illinois have received little systematic study since the late nineteenth century, with most reports since that time confined to monographic works dealing with a few stratigraphically significant fossils (Cooper, 1946; Dunbar and Henbest, 1942), a comprehensive faunal list of western Illinois Pennsylvanian fossils (Wanless, 1958) and scattered descriptions of individual organisms. Thus, there are no comprehensive systematic accounts of individual faunal assemblages and, in addition, most of the work has been concentrated on Middle and Early Pennsylvanian rocks. Thus, description and illustration of a substantial portion of the rich fauna occurring in the Shumway Cyclothem has been undertaken to provide documentation of an Early Virgilian faunule of stratigraphic and paleogeographic significance. The Shumway Cyclothem fossils are very nearly the youngest in the Illinois Basin Pennsylvanian sequence. They also are geographically isolated, many miles east of faunas of similar age in eastern Kansas and far west of the sparse assemblages occurring in Ohio.

The Shumway Cyclothem was named by Weller and Newton (1938) and briefly described by Weller and Bell (1941). Later, Kosanke et al. (1960) designated a type locality for the Shumway Limestone member and published a detailed stratigraphic column of the Cyclothem at that

locality. All of this work is based on unpublished notes of S. E. Ekblaw, made in 1951 and on file at the State Geological Survey of Illinois. Ekblaw's section descriptions also are available in Scheihing's (1978) thesis. Kosanke et al. (1960) place the Shumway Cyclothem at the base of the Virgilian in the Illinois Basin, a correlation concurred with by Willman et al. (1975). In addition, Sturgeon and Hoare (1968) have correlated the Shumway Cyclothem with the Iatan Limestone of Kansas and the Gaysport Limestone of Ohio. Faunal studies of the Shumway include description of the fusulinids (Dunbar and Henbest, 1942), the ostracodes (Cooper, 1946) and nautiloids (Tucker, 1976a). Tucker (1976b) provides a faunal list and paleoecologic analysis of the upper limestone member of the Shumway Cyclothem.

The Shumway Cyclothem at its type locality consists of the following lithologic members:

12 - Massive sandstone
11 - Claystone and shale
10 - Fossiliferous, fine-grained, gray limestone: the upper limestone member
9 - Gray, calcareous shale
8 - Black fissile shale: the black shale member
7 - Fossiliferous, argillaceous, grey limestone: the lower limestone member
6 - Fossiliferous, calcareous shale: the 'clod'
5 - Coal--the Shumway Coal
4 - Underclay
3 - Underclay limestone
2 - Gray shale with plant fragments
1 - Interbedded siltstone and sandstone

Members 6 through 10 have supplied the fossils described in this report and the remaining members are considered to be of non-marine origin. All units between the coal and the upper limestone appear to have gradational contacts and, therefore, no hiatus is recognized in their depositional history.

All of the fossils described in this report were obtained from a series of measured sections and from intervening outcrops at the type locality of the Shumway Cyclothem, SE 1/4, SE 1/4, SW 1/4, sec 26, T. 9 N., R. 5 E., Effingham County, Illinois. A complete faunal list for these localities is contained in a thesis by Scheihing (1978) that is principally devoted to consideration of paleoenvironmental succession within the Shumway Cyclothem. Catalog numbers refer to the type collection of the Department of Geology, University of Illinois, Urbana.

SYSTEMATIC PALEONTOLOGY

Phylum Mollusca
Class Gastropoda
Family Sinuitidae Dall in Zittel-Eastman, 1913
Genus Euphemites Warthin, 1930
Euphemites carbonarius (Cox)
Plate 1, Figures 1-3

Comprehensive synonymy: Hoare, 1961, p. 141-142

Critical synonymy: Euphemites carbonarius Hoare, 1961, p. 141, 142, pl. 19, figs. 13, 14.

Description: Shell planospirally coiled. Shell surface smooth with 21 prominent discontinuous revolving lirae on lateral area. Areas between lirae slightly concave.

Specimen about 15 mm long.

Discussion: This weathered, incomplete specimen is assigned to E. carbonarius because of its similarity to specimens described and illustrated by Hoare (1961).

Occurrence: Upper limestone member.

Material: One specimen with incomplete anterior portion. Hypotype X-5586.

Family Eotomariidae Wenz, 1938
Genus Glabrocingulum Thomas, 1940
(?) Glabrocingulum sp.
Plate 1, Figure 4

Description: Shell small, turbinate with planoconvex selenizone. Shell surface bears revolving and transverse lirae forming reticulate pattern.

Discussion: The specimen is assigned to this genus because of its turbinate coiling and reticulate pattern. Poor preservation of the specimen precludes specific assignment.

Occurrence: Upper limestone member.

Material: One weathered steinkern. Hypotype X-5587.

Family Euomphalidae de Koninck, 1881
Genus Straparolus de Montfort, 1810
Straparolus (Amphiscapha) subrugosus (Meek and Worthen)
Plate 1, Figure 5

Comprehensive synonymy: See Hoare, 1961, p. 179

Critical synonymy: Straparolus (Amphiscapha) subrugosus Hoare, 1961, p. 179, 180, pl. 23, figs. 9, 10.

Description: Shell discoid, pseudoplanally coiled, average of three volutions. Inner whorls circular in transverse section, outer whorls subquadrate. Sides of volutions slightly concave. Growth lines sigmoidal on sides of volutions, vertical on outer lateral surface. Nodose carinae occur on ventrolateral shoulders, carinal development irregular.

Mean maximum diameter of 12 mm (range 9 mm to 14 mm); mean height of 4 mm (range 3 mm to 4 mm).

Discussion: The rugose upper and lower carinae and deep, wide umbilicus characterize this species (Hoare, 1961). The well-preserved Shumway specimens closely resemble specimens described and illustrated by Hoare (1961).

Occurrence: Most abundant in the upper limestone member. The species is rare in the lower limestone member.

Material: 11 specimens from the upper limestone member and 1 specimen from the lower limestone member. Hypotype X-5588.

Family Portlockiellidae Batten, 1956
Genus Shansiella Yin, 1932
Shansiella broadheadi (?) (White)
Plate 1, Figures 8,9

Comprehensive synonymy: See Hoare, 1961, p. 160.

Critical synonymy: Shansiella broadheadi Hoare, 1961, p. 160, 161, pl. 23, fig. 7.

Description: Shell orthostropic with abruptly expanding body whorl. Whorl profile is rounded. Distinct selenizone on whorl midheight, bordered by several revolving lirae.

Height of single specimen 13 mm; pleural angle 78°.

Discussion: This individual is tentatively assigned to S. broadheadi on the basis of its resemblance to specimens of S. broadheadi figured and described by Hoare (1961). The specimen is not thought to belong to S. carbonaria (Norwood and Pratten) as conceived of by Hoare (1961, p. 159, 160, pl. 23, fig. 8) because of the larger, body whorl, and pleural angle of S. carbonaria.

Occurrence: Lower limestone member.

Material: One crushed and encrusted specimen. Hypotype X-5589.

Family Subulitidae Lindström, 1884
Genus Ianthinopsis Meek and Worthen, 1886
Ianthinopsis paludinaeformis (?) (Hall)
Plate 1, Figure 6

Comprehensive synonymy: See Knight, 1931, p. 213; and Hoare, 1961, p. 191, 192.

Critical synonymy: Soleniscus (Macrochilina) paludinaeformis Knight, 1931, p. 213-215, pl. 23, figs. 2a-m, pl. 27, fig. 6; Ianthinopsis paludinaeformis Hoare, 1961, p. 191, 192, pl. 23, figs. 14, 15.

Description: Shell of moderate size, ovate in outline. Body whorl large. Shell surface smooth. Total of 5 to 6 whorls including body whorl. Early whorls planoconcave, later ones convex. Pleural angle about 50°; total height about 24 mm; spire height about 9 mm.

Discussion: Hoare's (1961) specimens of I. paludinaeformis are much larger than those from Shumway; a complete specimen being about 66 mm high when restored. Knight (1931), however, figures specimens of about the same size as the single specimen from the upper limestone member. The specimen is thought to be I. paludinaeformis because of size, pleural angle, and ovate outline.

Occurrence: Upper limestone member.

Material: One specimen. Hypotype X-5590.

(?) Ianthinopsis sp.
Plate 1, Figure 7

Description: Large, smooth ovate body whorl.

Discussion: The specimen is assigned to this genus on the basis of its large ovate body whorl and smooth appearance. Size, if complete, might be as large as 60 to 70 mm high. Preservation is too poor to allow reliable specific assignment.

Occurrence: Upper limestone member.

Material: One steinkern with only body whorl and base whorl of spire preserved. Hypotype X-5591.

Class Cephalopoda
Family Pseudorthoceratidae Flower and Caster, 1935
Genus Pseudorthoceras Girty, 1911
Pseudorthoceras knoxense (McChesney)
Plate 2, Figures 1-3

Comprehensive synonymy: See Miller and Youngquist, 1949, p. 18-22

Critical synonymy: Pseudorthoceras knoxense (McChesney) Miller, Dunbar, and Condra, 1933, p. 81-85, pl. 1, figs. 4-9; Shimer and Shrock,

1944, p. 553, pl. 227, fig. 1; Hoare, 1961, p. 129, 130, pl. 16, fig. 4, pl. 17, fig. 1; Unkelsbay, 1962, p. 22-24, pl. 1, figs. 10, 11.

Description: Conch long, smooth, slender, circular in transverse section, expanding adorally. Siphuncle central to slightly off-center, at the adoral end 0.6 mm to 1 mm in diameter. Septa simple, saucer-shaped, convex adorally. Camerae 1 mm thick at apical end, bluntly rounded, slightly asymmetric. Camera 1.5 mm at adoral end. Cameral length/diameter ratio at adoral end 0.3.

Length of 31 mm, minimum diameter of 1 mm, maximum diameter of 4.5 mm for one complete specimen.

Discussion: The Shumway specimens closely conform to Unklesbay's (1962) description of the species. The only exception is that the length of the camerae here is about 0.3 times the diameter of the conch at the mature end whereas Unklesbay's material is about 0.2 times the diameter.

Occurrence: Upper and lower limestone members.

Material: Six specimens, two complete and the rest fragmentary. Hypotype: X-5592, X-5593.

Genus Mooreoceras Miller, Dunbar and Condra, 1933
Mooreoceras normale (?) Miller, Dunbar and Condra
Plate 2, Figure 4

Comprehensive synonymy: See Unklesbay, 1962, p. 25.

Critical synonymy: Mooreoceras normale Miller, Dunbar and Condra, 1933, p. 87-89, pl. 2, figs. 5-7; Shimer and Shrock, 1944, p. 553, pl. 226, figs. 14, 15; Hoare, 1961, p. 128, 129, pl. 16, fig. 5; Unklesbay, 1962, p. 25-27, pl. 1, figs. 14, 15.

Description: Straight, smooth conch gradually expanding adorally, circular to subcircular in transverse section. Septa simple, concave adorally, and straight in longitudinal section. Interseptal distance/diameter ratio at adoral end averages 0.23. Siphuncle 2 mm in diameter, circular, subcentral, closer to the venter. Shell thickness ranges from approximately 0.2 mm to 0.8 mm. Conch diameter ranges from 11 mm to 19 mm.

Discussion: The specimens have been tentatively assigned to M. normale on the basis of interseptal distance/diameter ratio, the smoothness of the shell, size and the gradual expansion of the conch. Shumway M. normale are distinguished from M. tuba by the latter's abrupt adoral expansion, smaller size, and transverse ornamentation. The Shumway specimens differ from those described by Miller et al. (1933) by their slightly thinner shells.

Occurrence: Upper limestone member.

Material: Several fragments of phragmacones, mostly internal molds with some shell matter preserved. Hypotype X-5594.

Family Tainoceratidae Hyatt, 1883
Genus Tainoceras Hyatt, 1883
Tainoceras sexlineatum Tucker
Plate 3, Figures 3-5

Critical synonymy: Tainoceras sexlineatum Tucker, 1976, p. 60, 61, pl. 1, figs. 4, 5.

Description: Shell subrectangular in transverse section, about as wide as high at adoral end. Sutures sinuous. Lateral walls flat, nearly parallel. Each umbilical shoulder bears single row of nodes. Early ventral nodes opposite, become alternate. Ventral nodes elongate, somewhat more oval to rectangular adorally. Ventrolateral nodes hemispherical, spaced from 1.5 to 2 cm apart, distance increasing toward mature part of shell. Ventrolateral nodes much larger and enlarge much faster than umbilical nodes. Umbilical nodes small, form subtle ridges. Space between ventral nodes develops into mid-ventral sulcus.

Umbilical diameter about 1/3 shell diameter. Diameter of one reasonably mature conch 90 mm; umbilical diameter 27 mm.

Discussion: Identification is based on one whole shell and a shell fragment bearing ventral nodes. The specimens in this collection closely resemble those described and illustrated by Tucker (1976a) from Shumway. The specimens described here differ from Tucker's material in having an adoral transverse section that is not much wider than it is high. Also, the ventral nodes do not become hemispherical as described by Tucker (1976a) but are more subrectangular in outline.

Occurrence: Upper limestone member.

Material: One complete specimen and one fragment. Hypotype X-5595.

Class Bivalvia Linne, 1758
Family Nuculanidae H. Adams and A. Adams, 1858
Plate 2, Figure 6

Description: Valves elongate with elongate posterior ventral margin and broadly curved anterior margin. Ventral margin broadly rounded, almost straight. Dorsal posterior margin straight to very slightly curved. Anterior dorsal margin too poorly preserved for description. Beak about 0.7 distance of total valve length from posterior margin. Prominent, irregular growth lines on valve surface.

Dimensions of two specimens are: height 10 mm, length 15 mm; height 8 mm, length 12 mm.

Discussion: Two internal molds from the black shale have the appearance, size, and shape of nuculanid bivalves. Generic and specific classification are precluded by inadequate preservation of morphologic detail.

Occurrence: Black shale member.

Material: Two internal molds. Hypotype X-5596.

Family Mytilidae Rafinesque, 1815
Subfamily Lithophaginae Adams and Adams, 1857
Genus Lithophaga Röding, 1798
(?) Lithophaga subelliptica Sayre
Plate 2, Figure 5

Comprehensive synonymy: See Newell, 1942, p. 44.

Critical synonymy: Lithophaga subelliptica Newell, 1942, p. 44, pl. 4, figs. 3-5.

Description: Shell elliptical, elongate, subcircular in transverse section. Valves smooth except for irregular prominent growth lines. Ventral, dorsal margins subparallel. Beak nonprotuberant, low.

Length of single specimen 10 mm, width 6 mm.

Discussion: The single specimen has been referred to L. subelliptica on the basis of its resemblance to the holotype figured by Newell (1942, pl. 4, fig. 5), especially the shape of the transverse section. The Shumway specimen is apparently immature as Newell (1942) considers the holotype, which is larger, to be immature.

Occurrence: Upper limestone member.

Material: One specimen. Hypotype X-5597.

Genus Volsellina Newell, 1937
Volsellina subelliptica Newell
Plate 2, Figures 7-9

Comprehensive synonymy: See Hoare, 1961, p. 118.

Critical synonymy: Volsellina subelliptica Newell, 1942, p. 43, pl. 1, figs. 14-16; Hoare, 1961, p. 118, 119, pl. 15, fig. 11.

Description: Shell elongate, lenticular, marked by growth lines. Left valve somewhat higher than right valve. Beaks broadly rounded, diverge posteriorly at about 24°. Umbonal ridge, narrow, angular, extending in a very shallow curve from beaks to posterior. Hinge margin 5/9 shell length. Ventral and dorsal margins straight. Posterior margin broadly rounded. Posterior 1/3 shell wedge-shaped with angular junction of ventral and posterior margins.

Length of a single specimen 18 mm, height 9 mm, greatest dimension 18 mm, length/height ratio 2.0, angle alpha 34°.

Discussion: The Shumway specimen agrees well with Newell's (1942) description of the species.

Occurrence: Upper limestone member.

Material: One articulated specimen. Hypotype X-5598.

Family Myalinadae Frech, 1891 (Emend. Newell, 1942)
Genus Promytilus Newell, 1942
(?) Promytilus annosus var. annosus Newell
Plate 4, Figure 1

Comprehensive synonymy: See Hoare, 1961, p. 119.

Critical synonymy: Promytilus annosus var. annosus Newell, 1942, p. 38, 39, pl. 1, figs. 9, 10; Hoare, 1961, p. 119, pl. 15, fig. 17.

Description: Mytilus-like shell obliquely elongate, convex with prominent umbonal ridge. Surface bears irregular growth lines and very fine and faint radial striae visible only in oblique light. Anterior lobe well-developed.

Length about 10 mm, height 12 mm, greatest dimension 17 mm, angle alpha 45°, form ratio (length/height) 0.83.

Discussion: Angle alpha, length, width, and greatest dimension are within the ranges given by Newell (1942) for P. annosus annosus. The form ratio, however, is small for this group. Hoare (1961), however, describes a single specimen of P. annosus annosus having a form ratio of 1.0 (not 1.40 as is stated in Hoare's (1961) description) which compares favorably with that of the Shumway specimen.

Occurrence: Upper limestone member.

Material: One specimen. Hypotype X-5599.

Family Leiopectinidae Krasilov, 1959
Genus Steblochondria Newell, 1937
Streblochondria sp.
Plate 4, Figure 2

Description: Right valve opisthocline, suboval to subcircular, mildly convex, Maximum height at valve midlength. Valve surface bears fine, sharp costellae with interareas greater than width of individual costellae. Priminent filae cross costellae, spaced about 1/2 spacing of costellae within 15 mm from umbo. 5 costellae/mm, about 12 lirae/mm 7mm ventrally from beak. Filae die out 15 mm from beak. Costellae die out 20 mm from beak on median posterior. Costellae continue undiminished to ventral margin along anterior margin. Auricles not preserved.

Height of single specimen 34 mm, length 30 mm, umbonal angle 99°.

Discussion: The single specimen resembles the specimens illustrated and described by Newell (1937) and Hoare (1961) in shape and surface ornamentation. The Shumway specimen, however, is much larger than Newell's (1937) and Hoare's (1961) specimens. Newell's largest specimen

is 15 mm high and 14 mm long and Hoare's largest specimen is only 19.5 mm high and 18.1 mm long. Following Newell (1937, p. 85) the specimen is referred to Streblochondria instead of Strablopteria because the immature region of the valve is cancellate.

Occurrence: Upper limestone member.

Material: One right valve. Hypotype X-5600.

Family Aviculopectinidae Meek and Hayden, 1864
Genus Euchondria Meek, 1874
Euchondria levicula Newell
Plate 4, Figure 3

Critical synonymy: Euchondria levicula Newell, 1942, p. 107, pl. 1, fig. 67, pl. 19, fig. 5, 10, 11, 18.

Description: Shell small, prosocline with pronounced posterior-ventral margin. Posterior margin broadly concave. Anterior margin of front left auricle broadly curved. Auricles costellate. Left valve bears distinct, uniformly-spaced costae crossed by evenly-spaced filae. Filae spaced about 1/2 spacing of costae. Some costae bifurcate.

Dimensions of three specimens:

Umbonal angle	88°	88°	80°
Length	9 mm	9 mm	±7 mm
Height	8 mm	8 mm	7 mm
Costae at height ( )	33 (8 mm)	32 (8 mm)	±31 (7 mm)
Hingeline	4 mm	4 mm	---

Discussion: Specimens in the Shumway collection fit well Newell's illustration, description, and measurements of the species in most respects. The only discrepancy is in the umbonal angle of 80 to 88°, which is in contrast to Newell's report of 91 to 105° for his specimens. The reticulate pattern of ornamentation is diagnostic of the species.

Occurrence: Black shale member.

Material: Internal molds of left valves of three specimens. Hypotype X-5601.

Family Entoliidae Krobkov, 1960
Genus Pernopecten Winchell, 1865
Pernopecten attenuatus (?) (Herrick)
Plate 4, Figure 4

Comprehensive synonymy: See Hoare, 1961, p. 115.

Critical synonymy: Pernopecten attenuatus Newell, 1937, p. 113, pl. 20, fig. 4; Hoare, 1961, p. 115, 116, pl. 15, fig. 14.

Description: Valve subovate in outline. Valve surface smooth except for faint, irregular growth lines. Beak small, pointed. Anterior,

posterior ventral margins broadly rounded. Convexity indeterminate because of crushing. Auricles not preserved.

Height 13 mm, length 12 mm, height/length ratio 1.1, umbonal angle 102°.

Discussion: This specimen agrees well with the description given by Newell (1937) and Hoare (1961) for P. attenuatus. The specimen figured by Newell (1937, pl. 20, fig. 4) has a height/length ratio of 1.2 and that of Hoare 1.1. The umbonal angle of the Shumway specimen is slightly less than that reported by Newell and Hoare. In comparison to the specimens described by Newell and Hoare, the Shumway specimen is apparently immature, being slightly larger than that of Hoare but only 1/2 the size of Newell's (1937) figured specimen. As Hoare comments, immature specimens of P. attenuatus are difficult to identify because they lack the characteristic elongate outline of the species. Therefore, the specimen is tentatively referred to P. attenuatus.

Occurrence: Black shale member.

Material: One specimen, nearly exfoliated and lacking auricles. Hypotype X-5602.

Pernopecten ohioensis Newell
Plate 4, Figures 5-7

Comprehensive synonymy: Hoare, 1961, p. 116.

Critical synonymy: Pernopecten ohioensis Newell, 1937, p. 112-113, pl. 20, figs. 1-3, 5, 6; Hoare, 1961, p. 116, 117, pl. 15, figs. 15, 16.

Description: Valve suboval to subcircular and slightly convex. Hingeline very short. Concentric lirae on posterior end, valve smooth anteriorly. Lirae extend to auricles.

Mean width of specimens 17 mm (range 9 mm to 22 mm); mean length 19 mm (range 10 mm to 23 mm); mean length/width ratio 1.0 (range 0.91 to 1.2).

Discussion: The specimens are assigned to P. ohioensis on the basis of their similarity to individuals described and illustrated by Newell (1937) and Hoare (1961). The size of the Shumway specimens falls well within the ranges quoted by Newell (1937) and Hoare (1961).

Occurrence: Upper limestone member.

Material: Approximately 10 specimens. Hypotypes X-5603, X-5604, X-5605.

Family Limidae Rafinesque, 1815
Genus Lima Beuguiere, 1797
Lima retifer Shumard
Plate 4, Figure 8

Comprehensive synonymy: See Hoare, 1961, p. 117.

Critical synonymy: Lima retifer Hoare, 1961, p. 117, pl. 15, figs. 12, 13.

Description: Shell small, oval. Posterior auricle undeveloped. Anterior auricle reduced, lirate. Maximum width of valve at ventral portion. Beak pointed. Shell surface bears prominent, fasciculate, subangular costae, diminish in prominence toward and absent on beak. Intercostate areas concave.

Height of single specimen 19 mm, length 19 mm, height/length ratio 1.0, thickness 3 mm, umbonal angle 75°.

Discussion: The Shumway specimen differs from those figured and described by Hoare (1961) in its larger size, greater height/length ratio, obsolete posterior auricle, and more pronounced fasciculation of costae. Hoare (fig. 12, pl. 15, 1961) does, however, illustrate a specimen with slightly fasciculate costae, but he does not mention this feature in his description of L. retifer.

Occurrence: Upper limestone member.

Material: One specimen. Hypotype X-5606.

Family Astartidae d'Orbigny, 1844
Genus Astartella Hall, 1858
Astartella concentrica (Conrad)
Plate 4, Figure 9

Comprehensive synonymy: See Hoare, 1961, p. 126.

Critical synonymy: Astartella concentrica, Hoare, 1961, p. 126, 127, pl. 15, fig. 6.

Description: Shell small, oval. Dorsal margin straight to slightly convex. Beak depressed. Posterior, anterior margins form smooth curve up to lunule base on anterior margin. Greatest valve convexity posterior to midlength and midheight. Shell surface bears at least 15, probably 20 to 22 sharp, concentric lirae. Interlirate spaces as great or greater than width of lirae.

Mean height 15 mm (range 12 mm to 18 mm); mean length 20 mm (range 11 mm to 22 mm).

Discussion: Specimens in the Shumway collection compare well with the specimen figured and described by Hoare (1961) in valve outline and ornamentation insofar as these are preserved. They differ primarily in being somewhat larger than the average size cited by Hoare (1961) for this species.

Occurrence: Lower limestone member.

Material: Six specimens of complete and fragmentary valves, none articulated. Hypotype X-5607.

Family Pholadomyidae Gray, 1847
Genus Chaenomya Meek, 1864
Chaenomya sp.
Plate 3, Figure 1

Description: Shell large, biconvex. Shell material 0.3 mm to 1 mm thick. Shell surface bears growth lines, discontinuous ridges, rows of papillae.

Shell height about 27 mm, length more than 40 mm.

Discussion: This individual is assigned to Chaenomya sp. on the basis of size, shape, and transverse papillate ornamentation, which are similar to those of the specimen illustrated by Hoare (1961). Specimen insufficiently preserved to allow specific assignment.

Occurrence: Lower limestone member.

Material: One specimen. Hypotype X-5608.

Phylum Arthropoda
Class Trilobita Walch, 1771
Family Phillipsiidae Oehlert, 1885
Genus Ditomopyge Newell, 1931 (emend. Weller, 1936)
Ditomopyge scitula (Meek and Worthen)
Plate 3, Figure 2

Comprehensive synonymy: See Weller, 1936, p. 711 and Treatise on Invertebrate Paleontology, 1949, p. 0-401.

Critical synonymy: Phillipsia (Griffithides) scitula Meek and Worthen, 1865, p. 270,271, no fig.; Ditomopyge scitula Weller, 1936, p. 711, Treatise on Invertebrate Paleontology, p. 0-401, pl. 307, fig. 5b; Shimer and Shrock, 1944, p. 645, pl. 275, fig. 6.

Description: Pygidium convex, outline semicircular, pronouncedly trilobate. Mesial lobe prominent, lateral lobes less so. Lateral lobes slope abruptly at the margin. Eleven axial segments, 7 pleural segments. Lateral segments directed slightly posteriorly, tapering to their termination on lateral slope. One to 3 minute pustules on pleural segments just before pleural segments pass over lateral slope. Pygidial flange well defined.

Length of 4 mm, width of 5 mm. Cephalon and thorax unavailable for study.

Discussion: Two pygidia in the Shumway collection match well the original description of the genus Ditomopyge by Newell (1931) as emended by Weller (1936), and of the species as described by Weller (1936). The semicircular pygidium, well-defined flange and prominent trilobate

pygidium characterize both the genus and species. The only difference between the Shumway specimens and the published description is the Shumway specimens' lack of granular ornamentation.

Occurrence: Upper limestone member.

Material: Two pygidia. Hypotype X-5609.

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Explanation of Plate 1

Figures

1-3 Euphemites carbonarius (Cox)

Lateral, ventral, and dorsal views of a single specimen. Hypotype X-5586. Upper limestone member, Shumway Cyclothem type locality.

4 (?) Glabrocingulum sp.

Lateral view of steinkern encased in matrix. Hypotype X-5587. Upper limestone member, Shumway Cyclothem type locality.

5 Straparolus (Amphiscapha) subrugosus (Meek and Worthen)

Umbilical view. Hypotype X-5588. Upper limestone Shumway Cyclothem type locality.

6 Ianthinopsis paludinaeformis(?) (Hall)

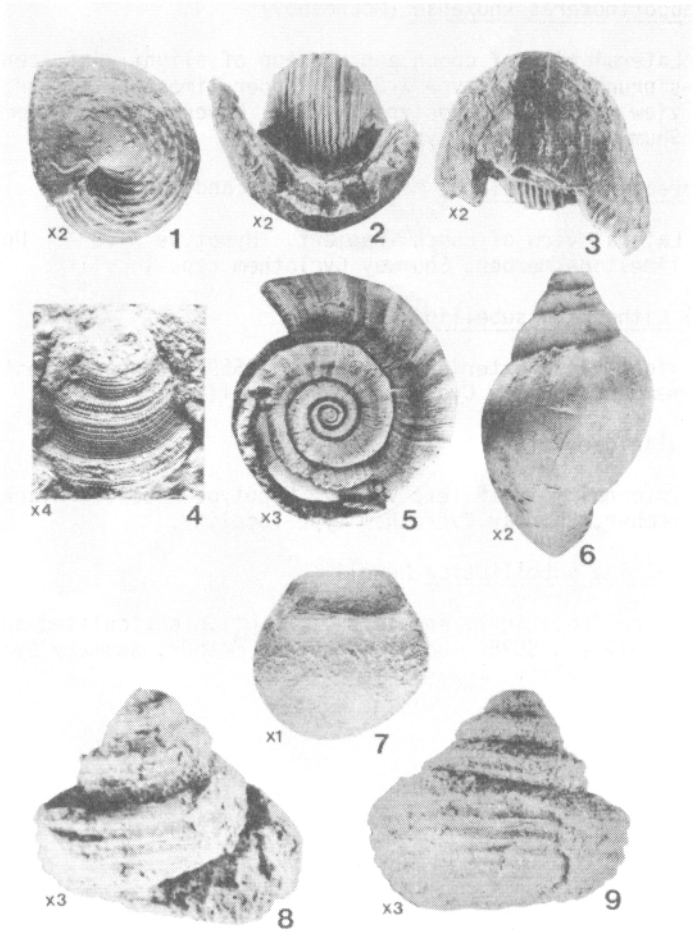
Lateral view. Hypotype X-5590. Upper limestone member, Shumway Cyclothem type locality.

7 (?) Ianthinopsis sp.

Lateral view of a fragmentary specimen. Hypotype X-5591. Upper limestone member, Shumway Cyclothem type locality.

8,9 Shansiella broadheadi(?) (White)

Lateral and apertural views. Hypotype X-5589. Lower limestone member, Shumway Cyclothem type locality.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Explanation of Plate 2

Figures

1-3 Pseudorthoceras knoxense (McChesney)

Lateral view of conch and closeup of slightly off-center siphuncle. Hypotype X-5592. Upper limestone member; lateral view of conch. Hypotype X-5593. Lower limestone member, Shumway Cyclothem type locality.

4 Mooreoceras normale(?) Miller, Dunbar and Condra

Lateral view of conch fragment. Hypotype X-5594. Upper limestone member, Shumway Cyclothem type locality.

5 (?) Lithophaga subelliptica Sayre

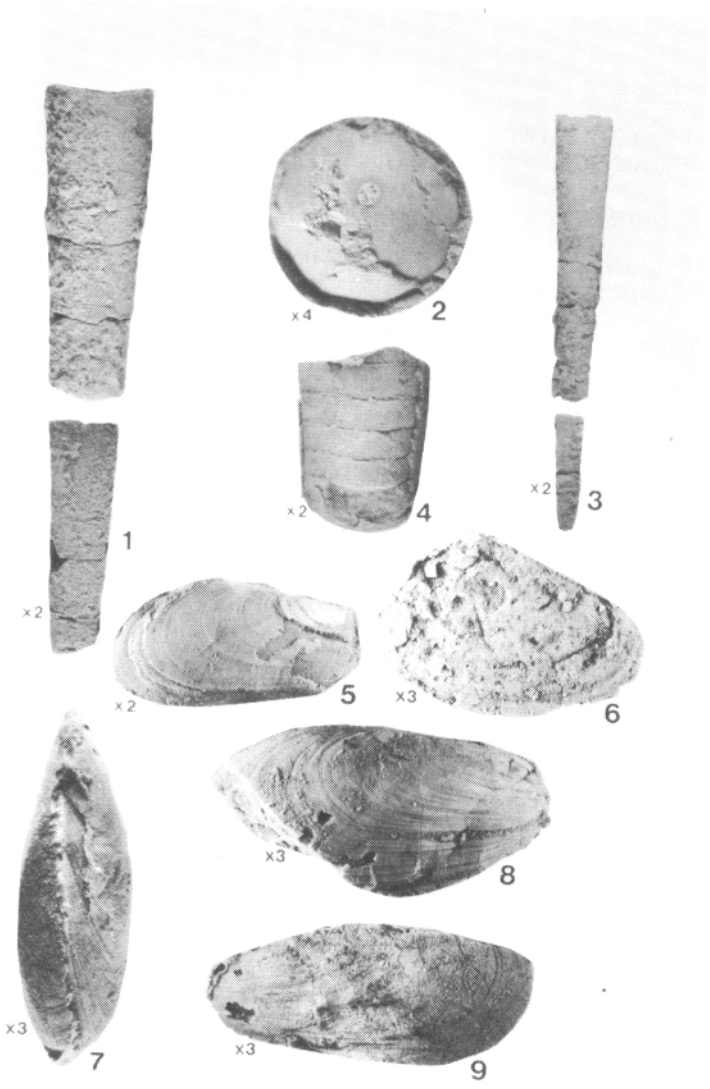
Right valve exterior. Hypotype X-5597. Upper limestone member, Shumway Cyclothem type locality.

6 Nuculanidae

Internal mold of left valve. Hypotype X-5596. Black shale member, Shumway Cyclothem type locality.

7-9 Volsellina subelliptica Newell

Hingeline, right, and left views of an articulated specimen. Hypotype X-5598. Upper limestone member, Shumway Cyclothem type locality.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Explanation of Plate 3

Figures

1 Chaenomya sp.

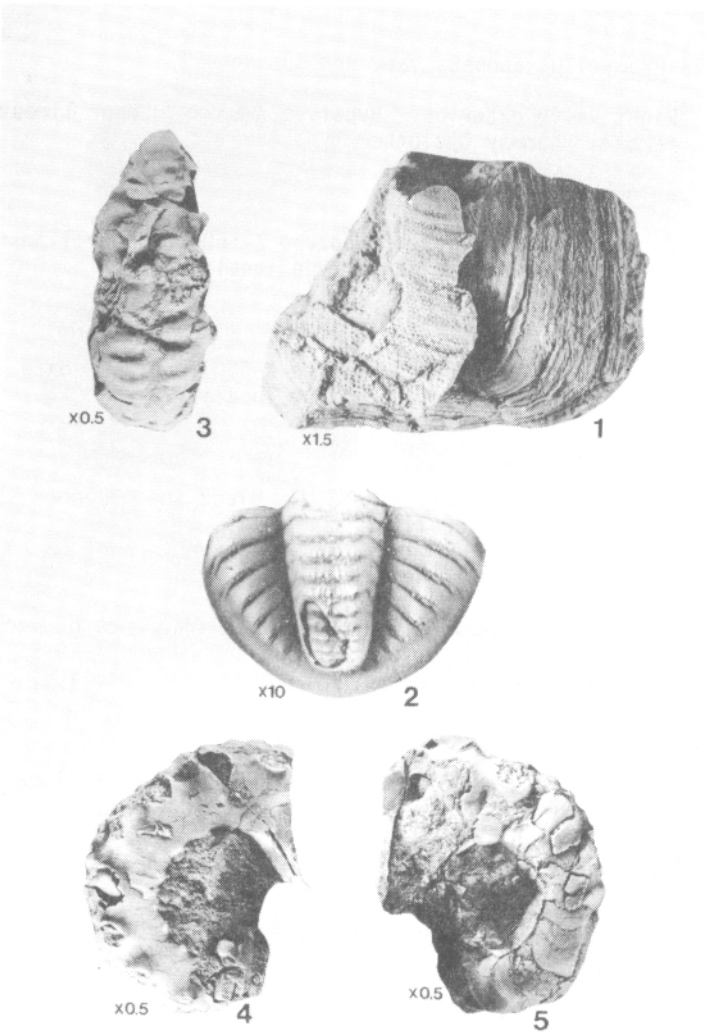
Right(?) valve view. Hypotype X-5608. Upper limestone member, Shumway Cyclothem type locality.

2 Ditomopyge scitula (Meek and Worthen)

Pygidium. Hypotype X-5609. Upper limestone member, Shumway Cyclothem type locality.

3-5 Tainoceras sexlineatum Tucker

Ventral and lateral views. Hypotype X-5595. Upper limestone member, Shumway type locality.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Explanation of Plate 4

Figures

1 (?) Promytilus annosus var. annosus Newell

Right valve exterior. Hypotype X-5599. Upper limestone member, Shumway Cyclothem type locality.

2 Streblochondria sp.

Right valve exterior. Hypotype X-5600. Upper limestone member, Shumway Cyclothem type locality.

3 Euchondria levicula Newell

Left valve exterior. Hypotype X-5601. Black shale member, Shumway Cyclothem type locality.

4 Pernopecten attenuatus(?) (Herrick)

Right valve. Hypotype X-5602. Black shale member, Shumway Cyclothem type locality.

5-7 Pernopecten ohioensis Newell

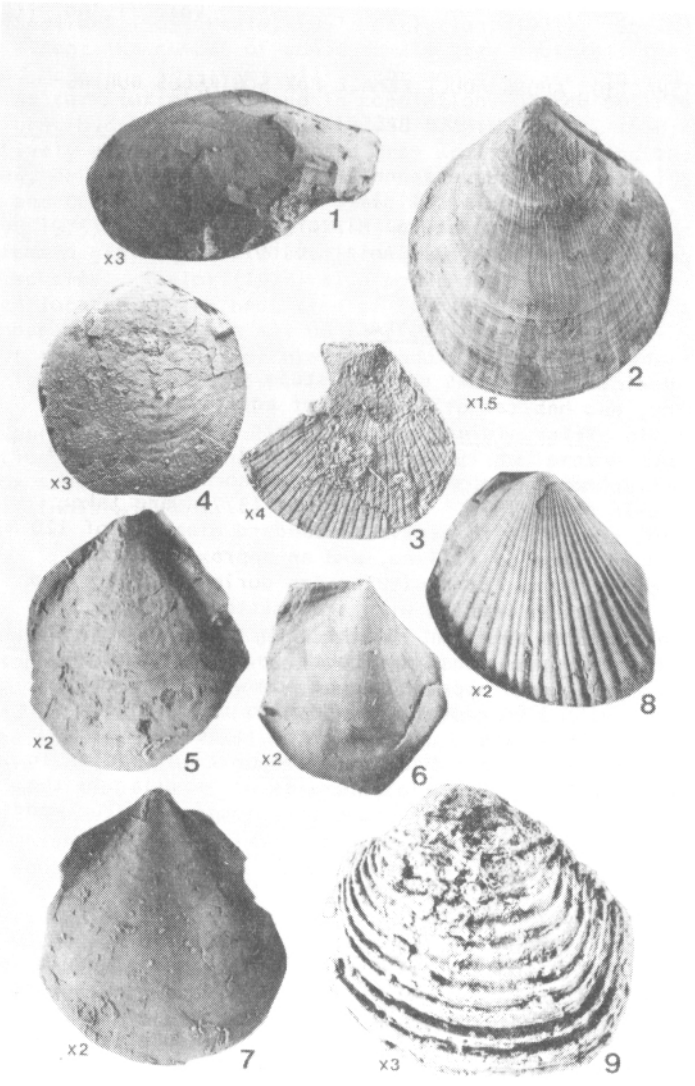
Left valve exteriors encrusted with fragments of encrusting foraminifera. Hypotypes X-5603, X-5604 and X-5605. Upper limestone member, Shumway Cyclothem type locality.

8 Lima retifer Shumard

Left valve exterior. Hypotype X-5606. Upper limestone member, Shumway Cyclothem type locality.

9 Astartella concentrica (Conrad)

Left valve partially encrusted. Hypotype X-5607. Lower limestone member, Shumway Cyclothem type locality.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