LOBOIDOTHYRIDOIDEA
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Superfamily
LOBOIDOTHYRIDOIDEA
Makridin, 1964

Shell of adult small to very large, commonly smooth, rarely costate anteriorly, or capillatte; commonly ventribiconvex, rarely planoconvex; outline commonly subpentagonal to elongate oval; anterior commissure commonly rectimarginate to bilicate or sulciplicate; foramen commonly large; permesothyrid; dental plates absent; no median septum, cardinal process commonly well developed; outer hinge plates well developed; inner hinge plates rare; loop deltoform, commonly long flanged; commonly 0.4 to 0.6 dorsal valve length; transverse band commonly strongly arched; loop ontogeny may be complex; developmental stages unknown for most genera. Triassic–Lower Cretaceous.

Family LOBOIDOTHYRIDAEC
Makridin, 1964

Small to large, rectimarginate to sulciplicate, commonly smooth, rarely capillatte or anteriorly costellate; outer hinge plates dorsally attached to crural bases; terminal points moderately short or weakly developed. Lower Jurassic (Toarcian)–Lower Cretaceous (Valanginian).

Subfamily LOBOIDOTHYRINAE
Makridin, 1964

Smooth or rarely finely capillatte, planoconvex to ventribiconvex, foramen commonly large, permesothyrid, crural bases close to or anterior of midloop. Lower Jurassicic (Toarcian)–Lower Cretaceous (Valanginian).

LOBOIDOTHYRIS
Buckman, 1918, p. 112 (Buckman, 1914, p. 2, nom. nud.) [*L. latovialis; OD] [≡Dundrythrys Alméras, 1971, p. 188 (type, Terebratula perovalis J. de C. Sowerby, 1825 in 1823–1825, p. 51)]. Medium to very large, subcircular to elongate oval, smooth, ventribiconvex, anterior commissure rectimarginate to uniplicate to sulciplicate; beak large, short, foramen large, circular, commonly labiate, permesothyrid; symphytium usually hidden; pedicle collar short; cardinal process low, lobate; outer hinge plates short, narrowly triangular, dorsally attached to crural bases; crural processes anterior of midloop; loop triangular, 0.35 to 0.45 dorsal valve length; transverse band with low arch, flattened medially; terminal points fairly short. Lower Jurassic (Toarcian)–Middle Jurassic (Bajocian): Europe, Asia, South America.—Fig. 1378,4a–c. *L. latovialis, Aalenian, Dorset, England; dorsal, lateral, and anterior views of holotype, BGS GSM 31976, x1 (Muir-Wood, 1965a).—Fig. 1378,Ad. L. perovalis (J. de C. Sowerby), Bajocian, England; interior of dorsal valve, x1 (Cooper, 1983).

Avonothyris
Buckman, 1918, p. 102 [*A. plicatina; OD]. Small to medium size; subtriangular to subpentagonal, smooth, with radial calliie where exfoliated; ventribiconvex, anterior commissure sulciplicate; beak short, suberect, foramen large, permesothyrid, symphytium partly visible; cardinal process small, semielliptical; outer hinge plates very narrow, close to valve floor; loop 0.4 to 0.45 dorsal valve length, widely triangular, transverse band with low arch. Middle Jurassic (Bathonian–Callovian): England, France, Egypt, ?Tunisia, Tibet.—Fig. 1378,La–d. *A. plicatina, Bathonian, England; a–b, dorsal and lateral views of holotype, BGS 51326, x1 (Muir-Wood, 1965a); c, anterior view of holotype, BGS 51326, x1 (Muir-Wood, 1965a); d, interior of dorsal valve, x1 (Cooper, 1983).

Arabatia
Cooper, 1989, p. 70 [*A. concava; OD] [≡Arabicella Cooper, 1989, p. 70 (type, A. subpentagonalis, OD); Anapopleurus Cooper, 1989, p. 74 (type, A. arabicum, OD); Aparothyris Cooper, 1989, p. 74 (type, A. magna, OD)]. Medium to large, subpentagonal to elongate oval, smooth, planoconvex to ventribiconvex, anterior commissure sulciplicate; broad costae may form peripherally; beak erect to incurved; foramen small to medium, mesothyrid to permesothyrid; symphytium usually hidden; cardinal process small, loop 0.4 to 0.5 dorsal valve length. Middle Jurassic (Bathonian–Callovian): Saudi Arabia.—Fig. 1378,2a–d. *A. concava, Callovian; a–c, dorsal, lateral, and anterior...
Fig. 1378. Loboidothyrididae (p. 2082–2084).
Rhynchonelliformea—Rhynchonellata

views of holotype, USNM 380462a; d, interior of dorsal valve, x1 (Cooper, 1989).

**Bihenithyris** Muir-Wood, 1935, p. 110 [*B. barringtoni*; OD]. Medium size, subpentagonal, smooth, ventribiconvex, anterior commissure sulcispicate to bilobed, beak massive, suberect to incurved, symphytium hidden, foramen large, permesothyrid; pedicle collar present; cardinal process short, broad, medially depressed; hinge plates wide, tapers, forming deep U-shape with socket ridge; loop 0.45 dorsal valve length; transverse band almost horizontal, terminal points moderately long. *Middle Jurassic (Callovian)*: Somalia, Egypt, Saudi Arabia, Israel. —Fig. 1379, 3a–d. *B. barringtoni*; a–c, dorsal, lateral, and anterior views of holotype, BMNH B 85648, Somalia, x1 (Muir-Wood, 1965a); d, interior of dorsal valve of specimen, Israel, x1 (Cooper, 1983).

**Charltonithyris** Buckman, 1918, p. 106 (Buckman, 1915, p. 78, nom. nud.) [*Terebratula uptoni* Buckman, 1895, p. 455; OD]. Large, subpentagonal, smooth, planovexin to ventribiconvex, anterior commissure rectimarginate to uniplicate; beak short, foramen large, permesothyrid, symphytium exposed, beak ridges strong; cardinal process small; hinge plates short, triangular, concave, forming V-shaped troughs; loop widely triangular, 0.4 dorsal valve length; transverse band broad, with high, medially horizontal arch. *Middle Jurassic (Bajocian)*: England. —Fig. 1379, 6a–d. *C. uptoni* (Buckman); a–c, dorsal, lateral, anterior views of paratype, x1 (Muir-Wood, 1965a); d, interior of dorsal valve of specimen with slightly damaged loop, x1 (Cooper, 1983).

**Colosia** Cooper, 1983, p. 67 [*Terebratula zieteni* Liorol, 1876–1878, p. 168; OD]. Medium to large, elongate-oval, smooth, ventribiconvex, anterior commissure unispicate in juveniles to sulcispicate in adults, beak erect, foramen large, mesothyrid, symphytium partly exposed; pedicle collar short; hinge plates wide, short; loop 0.25 to 0.45 dorsal valve length, highly variable in juvenile specimens, transverse band broad. *Upper Jurassic (Kimmeridgian)*: Switzerland, Germany. —Fig. 1379, 1a–d. *C. zieteni* (Liorol), Switzerland; a–c, dorsal, lateral, anterior views x1; d, closeup of loop, x1 (Cooper, 1983).

**Dolichobrochus** Cooper, 1983, p. 73 [*Terebratula excavata* Deslongchamps, 1856b, p. 97; OD]. Small, subpentagonal, smooth, ventribiconvex, anterior commissure sulcispicate; foramen small, permesothyrid; crura long, broad; loop long, narrow; 0.45 dorsal valve length. *Middle Jurassic (Callovian)*: France; [Saudi Arabia]. —Fig. 1379, 2a–d. *D. excavata* (Deslongchamps), France; a–c, dorsal, lateral, and anterior views, x1; d, interior of dorsal valve, x1 (Cooper, 1983).

**Ectyphoria** Cooper, 1989, p. 79 [*E. inflata*; OD]. Medium size, subpentagonal, smooth, strongly biconvex, anterior commissure bispicate; foramen small, permesothyrid, ventral umbo carinate, dorsal umbo sulcate, cardinal process bilobed, loop long, transverse band not seen. *Middle Jurassic (Bathonian–Callovian)*: Saudi Arabia. —Fig. 1379, 4a–c. *E. inflata*; dorsal, lateral, and anterior views of holotype, USNM 380413, x1 (Cooper, 1989).

**Pinaxiothyris** Dagys, 1968, p. 86 [*P. campestris*; OD]. Medium size, oval, gently biconvex, smooth, anterior commissure rectimarginate, beak short, foramen large, permesothyrid; symphytium low, partly hidden; pedicle collar short; cardinal process large, outer hinge plate horizontal in section, loop 0.35 dorsal valve length, widely triangular, transverse band arched. *Upper Jurassic (Kimmeridgian)–Lower Cretaceous (Valanginian)*: Asia (Northern Urals, northern Siberia). —Fig. 1379, 5a–d. *P. campestris*, Tithonian, northern Siberia; a–c, dorsal, lateral, anterior views, x1; d, reconstruction of loop, approximately x1 (Cooper, 1983).

**Pseudoglossothyris** Buckman, 1901, p. 234 [240] [*Terebratula cursufrons* Davidson, 1878a, p. 153; OD]. Small, subpentagonal, smooth, planovexin to ventribiconvex, anterior commissure sulcispicate; beak short, foramen large, permesothyrid, symphytium exposed, beak ridges strong; cardinal process large, lobate; loop widely triangular, 0.4 dorsal valve length; transverse band broad, with high, narrow arch. *Middle Jurassic (Bajocian)*: England, France. —Fig. 1380, 5a–d. *P. leckhamptonensis* (Rollier), England; a–c, dorsal, lateral, and anterior views, x1 (Muir-Wood, 1965a); d, interior of dorsal valve, x1 (Cooper, 1983).

**Ptychothyris** Buckman, 1918, p. 101 (Buckman, 1914, p. 2, nom. nud.) [*Terebratula stephani* Davidson, 1877, p. 75; OD] [*=Systeothyris* Cooper, 1983, p. 156 (type, *S. triangulata*, OD)]. Large, subtriangular, smooth, ventribiconvex, with prominent ventral fold, anterior commissure rectimarginate to sulcispicate; beak large, incurved, foramen large, permesothyrid, symphytium partly visible; cardinal process small, hinge plates short, close to valve floor, loop 0.3 to 0.4 dorsal valve length, triangular, transverse band wide, with flattened arch. *Middle Jurassic (Bajocian–Bathonian),? Callovian*: England, France, Egypt. —Fig. 1378, 3a–d. *P. stephani* (Davidson), Bajocian, England; a–c, dorsal, lateral, and anterior views, x1 (Muir-Wood, 1965a); d, interior of dorsal valve, x1 (Cooper, 1983).

**Sphaeroidothyris** Buckman, 1918, p. 115 (Buckman, 1914, p. 2, nom. nud.) [*S. globisphaeroidalis*; OD] [*=Pachythyris Boullier, 1976, p. 154 (type, *Terebratula arduennensis* Douville, 1886, p. 65), non Felder, 1874, Lepidoptera; Pineopleurum Cooper, 1989, p. 83 (type, *P. oseum*). Small to medium size, subcircular, planovexin to ventribiconvex to globose; smooth, anterior commissure rectimarginate to slightly unispicate; beak short, incurved, foramen large, permesothyrid, symphytium hidden;
Fig. 1379. Loboidothyrididae (p. 2084).
Fig. 1380. Loboidothyrididae (p. 2084–2087).
cardinal process prominent, lobate, medially depressed; hinge plates short, triangular, thin, close to valve floor; loop 0.3 to 0.4 dorsal valve length, widely triangular, transverse band with angular arch. *Middle Jurassic (Bajocian–Bathonian)*: England, France, Germany, Saudi Arabia, Tibet.——*F. tumida* (Cooper, 1983).

Esides, transverse band with broad arch. Valve length, widely triangular, with nearly straight permesothyrid; pedicle collar present; cardinal bisulcate; beak suberect to incurved, foramen small, mesothyrid, concavo-convex; smooth, anterior commissure unisulcate; cardinal process small, hinge plates short, narrowly triangular, forming narrow, U-shaped troughs with crural bases; loop 0.4 to 0.5 dorsal valve length, widely triangular; transverse band with high arch. *Middle Jurassic (Bajocian–Bathonian)*: England, Saudi Arabia, *S. tumida* (Davidson). Bajocian, England; a–c, dorsal, lateral, and anterior views, ×1 (Muir–Wood, 1965a); d, interior of dorsal valve, ×1 (Cooper, 1983).

Strithyris Buckman, 1918, p. 109 (Buckman, 1915, p. 78, nom. nud.) [*Terebratula globata var. tumida* Davidson, 1878a, p. 149; OD]. Medium size, concavoconvex, becoming strongly ventribiconvex; smooth, anterior commissure sulciplicate, beak short, curved, foramen large, permesothyrid; cardinal process narrow, bilobed, protuberant, outer hinge plates short, narrowly triangular, forming narrow, U-shaped troughs with crural bases; loop 0.4 to 0.5 dorsal valve length, widely triangular; transverse band with low arch. *Middle Jurassic (Bajocian–Bathonian)*: England, Saudi Arabia, *I. dorenbergi* (Cooper, 1983).

Wattonithyris Muir-Wood, 1936, p. 91 [*W. wattonensis*; OD] [=*Pseudowattonithyris Almérés, 1971, p. 393 (type, *Terebratula circumdata Deslongchamps, 1885 in 1882–1885, p. 131)]. Small to medium size, oval to subpentagonal, smooth, ventribiconvex, anterior commissure sulciplicate to bisulcate; beak suberect to incurved, foramen small, permesothyrid; pedicle collar present; cardinal process small, with shallow median sulcus; hinge plates ventrally concave, clubbed; loop 0.4 to 0.5 dorsal valve length, widely triangular, with nearly straight sides, transverse band with broad arch. *Middle Jurassic (Bajocian–Bathonian)*: England, France, Bulgaria, Poland, Russia, Morocco, Saudi Arabia, Tibet.——*F. tumida* (Cooper, 1983).——*F. tumida* (Davidson). Bajocian, England; a–c, dorsal, lateral, and anterior views, ×1 (Muir–Wood, 1965a); d, interior of dorsal valve, ×1 (Cooper, 1983).

**Subfamily BOTHROTHYRIDINAE** Cooper, 1983

[Bothrothyridinae Cooper, 1983, p. 45]

Large, rhomboidal, smooth, concavo-convex, anterior commissure unisulcate; cardinal processes anterior of midloop. *Middle Jurassic (Callovian)*.

Bothrothyris Cooper, 1983, p. 61 [*B. curiosa*; OD]. Beak short, incurved, foramen small, mesothyrid; cardinal process thick, shafted, bilobed; crural bases round, solid; outer hinge plates narrow; crura long, narrow, descending lamellae long, thin; loop triangular, 0.4 dorsal valve length; transverse band strongly arched. *Middle Jurassic (Callovian)*: Egypt——*F. tumida* (Cooper, 1983).——*F. tumida* (Davidson). Bajocian, England; a–c, dorsal, lateral, and anterior views, ×1 (Muir–Wood, 1965a); d, interior of dorsal valve, ×1 (Cooper, 1983).

**Subfamily CERERITHYRIDINAE** Cooper, 1983

[Cererithyridinae Cooper, 1983, p. 45]

Smooth or anteriorly costate; loops with shorter terminal points than Loboidothyridinae and crural processes close to or posterior of midloop. *Middle Jurassic (Bajocian–Upper Jurassic (Oxfordian))*.

Cererithyris Buckman, 1918, p. 109 (Buckman, 1914, p. 2, nom. nud.) [*Terebratula intermedia* J. Sowerby, 1813 in 1812–1815, p. 48; OD]. Medium to large, ventribiconvex, smooth, anterior commissure rectimarginate to unisulcate or sulciplicate, beak short, foramen large, permesothyrid, symphytium partly visible; cardinal process short, hinge plates short, narrowly triangular, forming short, V- or U-shaped troughs with socket ridges; loop 0.5 dorsal valve length, widely triangular, transverse band with high arch. *Middle Jurassic (Bathonian)*: England, France, Bulgaria, Tibet.——*F. tumida* (Davidson). Bajocian, England; a–c, dorsal, lateral, and anterior views of lectotype, ×1 (Muir–Wood, 1965a); d, interior of dorsal valve, ×1 (Cooper, 1983).

Animonithyris Cooper, 1983, p. 52 [*Terebratula dorenb ergi* Felix, 1891, p. 176; OD]. Medium size, subcircular, smooth, ventribiconvex, anterior commissure rectimarginate to sulciplicate; beak short, erect, foramen large, meso- to submesothyrid, deltoidal plates small, conjunct, pedicle collar short, excavate; cardinal process broad, semieliptical; crural processes at midloop; loop widely triangular, about 0.4 dorsal valve length. *Upper Jurassic (Oxfordian)*: Mexico——*F. tumida* (Davidson). Bajocian, England; a–c, dorsal, lateral, and anterior views, ×1; d, interior of dorsal valve, ×1 (Cooper, 1983).
**Mexicaria** Cooper, 1983, p. 114 [*Parathyridina mexicana* Ochoterena, 1960, p. 24; OD]. Small, subpentagonal, ventribiconvex, anteriorly strongly but variably costate; anterior commissure sulcuplicate, but with 2 or 3 costae on fold; beak short, suberate, foramen large, mesothyrid, loop similar to that of *Animonithyris*. Upper Jurassic (Oxfordian): Mexico.—Fig. 1381, 3a–d. *M. mexicana* (Ochoterena); a–c, dorsal, lateral, and anterior views, ×1; d, interior of silicified dorsal valve, ×1 (Cooper, 1983).
Plectothyris Buckman, 1918, p. 121, nom. Rollier, 1918, p. 252 (Buckman, 1914, p. 2, nom. nud.) [*Terebratula fimbria J. Sowerrby, 1822 in 1821–1822, p. 27; OD]. Medium to large, subcircular, plano- to ventribiconvex, anterior third to half of adult shell strongly costate; anterior commissure rectimarginate; beak short, foramen large, permesothyrid; cardinal process small, bilobed; loop broadly triangular. Middle Jurassic (Bajocian): England, France, ?Saudi Arabia.——Fig. 1381,4a–d. P. fimbria (J. Sowerrby), England; a–c, dorsal, lateral, and anterior views, x1 (Muir-Wood, 1965a); d, interior of dorsal valve, x1 (Cooper, 1983).

Rocheithyris Almérás, 1971, p. 345 [*R. curvata; OD]. Medium size, subpentagonal, smooth, biconvex, anterior commissure sulciplicate; beak short, foramen small, permesothyrid to mesothyrid, symphytium not exposed, pedicle collar present; cardinal process planoconvex, hinge plates in section club shaped, loop 0.5 dorsal valve length. Middle Jurassic (Bajocian–Bathonian): France.——Fig. 1381,6a–k. *R. curvata; a–c, dorsal, lateral, and anterior views of holotype, FSL 47917, x1; d–k, serial transverse sections, 3.8, 5.5, 5.9, 7.5, 8.5, 11.5, 11.8, 13.9 mm from ventral umbo, x1 (Alméras, 1971).

Family PLECTOCONCHIDAE

Dagys, 1974

Medium size, semicostate to costate, beak labiate, anterior commissure rectimarginate to uniplicate, outer hinge plates dorsally attached to crural bases, loop short, wide. Upper Triassic–Lower Jurassic.

Plectococha Cooper, 1942, p. 233 [*Rhynochella aequiplicata Gabb, 1864, p. 35; OD]. Subrounded, strongly ventribiconvex, anterior commissure uniplicate, beak erect, foramen large, permesothyrid, labiate; pedicle collar strong; cardinal process broadly elliptical; outer hinge plates narrow, tapering anteriorly; crural processes close to anterior end of hinge plates; loop wide, transverse band thin, broadly arched. Upper Triassic: USA (Nevada).——Fig. 1382,2a–f. *P. aequiplicata (Gabb); a–d, dorsal, ventral, lateral, and anterior views, x1 (Sandy & Stanley, 1993); e–f, dorsal and lateral views of imperfect loop, x2 (Cooper, 1983).

Merophicus Cooper, 1983, p. 113 [*M. dubari; OD; =Terebratula cf. seminataa Dubar, 1942, p. 63]. Subcircular, ventribiconvex, anterior commissure rectimarginate to uniplicate, beak short, suberect, foramen large, incomplete; outer hinge plates broad, flatly concave, crura not developed, loop short (0.3 dorsal valve length), wide, transverse band thin. Lower Jurassic: Morocco, Greece.——Fig. 1382,1a–d. *M. dubari; a–c, dorsal, lateral, and anterior views, x1; d, dorsal view of imperfect loop, x3 (Cooper, 1983).

Family TRIADITHYRIDIDAE

Pearson, 1977

Medium to large, smooth, biconvex, anterior commissure rectimarginate to biplicate, cardinal process distinct, outer hinge plates narrow, with ventrally directed crural bases; loop about 0.4 to 0.6 dorsal valve length, transverse band high arched, formed of secondary elements that evolved in ontogeny on ventral part of vertical plate; flanges usually long. Triassic–Upper Jurassic (Tithonian).

Triadithyris Dagys, 1963, p. 187 [*Terebratula gregariaformis Ziegmyer, 1880, p. 13; OD]. Medium size, subpentagonal, ventribiconvex, anterior commissure sulciplicate, beak short, suberect, foramen permesothyrid; pedicle collar present; cardinal process large, bilobed, outer hinge plates narrow, horizontal in section, crural bases indistinct; loop about 0.5 dorsal valve length, with diverging, descending lamellae. Upper Triassic (Norian–Rhaetian): Alps, Balkans, Carpathians, Crimea, Caucasus, Pamir.——Fig. 1383,4a–s. *T. gregariaformis (Ziegmyer); a–c, dorsal, lateral, and anterior views, x1; 1–r, serial transverse sections 0.8, 1.6, 2.4, 2.5, 2.7, 3.0, 3.3, 3.6, 3.7, 4.0, 4.5, 5.25, 6.45, 6.6, 6.75 mm from ventral umbo, x1; s, loop reconstruction, x1 (Pearson, 1977).

Inversithyris Dagys, 1968, p. 92 [*I. rhomboidalis Dagys, 1968, p. 93; OD]. Medium size, biconvex, anterior commissure inceptively unisulcate, beak short, foramen mesothyrid; pedicle collar present; cardinal process large, undivided, outer hinge plates horizontal or sloping; crural bases perpendicularly to hinge plates, directed ventrally and dorsally; loop about 0.5 dorsal valve length, with flanges. Middle Jurassic: northeastern Siberia.——Fig. 1383,1a–q. *I. rhomboidalis; a–c, dorsal, lateral, and anterior views, x1; d–q, serial transverse sections 0.0, 2.2, 2.6, 2.8, 3.9, 4.4, 4.7, 5.2, 5.8, 6.9, 8.8, 9.7, 10.2, 11.2 mm from first section, x1 (Dagys, 1968).

Laevithyris Dagys, 1974, p. 198 [*Lobothyris rossochae Dagys, 1965, p. 143; OD]. Medium size, elongate-oval, anterior commissure slightly uniplicate; beak short, permesothyrid; pedicle collar short; cardinal process low, undivided, outer hinge plates narrow, horizontal, crural bases high, directed ventrally, loop 0.4 dorsal valve length, with short flanges. Triassic: northeastern Siberia, Primorye.——Fig. 1383,2a–c. *L. rossochae (Dagys), Norian, Siberia; dorsal, lateral, and anterior views, x1 (Dagys, 1968).

Lenothyris Dagys, 1968, p. 100 [*L. perflexus; OD]. Large, subrounded, juveniles thin, with flattened dorsal valve; adults strongly biconvex, geniculate; anterior commissure rectimarginate; beak short, foramen permesothyrid; pedicle collar short; cardinal process thickened, undivided; outer hinge plate
Fig. 1382. Plectoconchidae and Cheirothyropsidae (p. 2089–2096).
Fig. 1383. Triadithryridae (p. 2089–2092).
subhorizontal in section, crural bases distinct; loop about 0.5 dorsal valve length, with long flanges. *L. perflexus*, Volgian; a–c, dorsal, lateral, and anterior views, ×1 (Dagys, 1968); d, reconstruction of loop, ×1 (Cooper, 1983).

**Viligothyris** Dagys, 1968, p. 89 [*V. orientalis*; OD].
Medium size, biconvex, elongate-oval, anterior commissure uniplicate to paraplicate; beak short, foramen permesothyrid; pedicle collar distinct; cardinal process low, undivided, outer hinge plates narrow, subhorizontal in section; crural bases low, directed ventrally; narrow, inner hinge plates present; loop about 0.6 dorsal valve length, with long, anterior flanges. *Lower Jurassic (Pliensbachian)*; northeastern Siberia.—Fig. 1383,3a–d. *V. orientalis*; a–c, dorsal, ventral, and anterior views, ×2 (Dagys, 1968); d, loop reconstruction, ×1 (Cooper, 1983).

**Family BOREIOTHYRIDIDAE** Dagys, 1968


Large to very large, smooth, rectimarginate to unisulcate; beak short, foramen large, permesothyrid; crural process distinct, crural plates connected with valve floor or enveloping low septum, forming broad septalium; loop about 0.5 dorsal valve length, high arched, with long flanges; transverse band formed from secondary elements that evolve on ventral part of vertical plate during ontogeny. *Lower Jurassic–Lower Cretaceous (Hauterivian)*.

**Boreiothyris** Dagys, 1968, p. 110 [*B. bojarkensis; OD*]. Very large, subtrigonal to elongate-oval, ventribiconvex, anterior commissure rectimarginate; pedicle collar thick; cardinal process massive, undivided, outer hinge plates narrow, crural plates long, inclined to valve floor, enveloping low septum forming septalium. *Middle Jurassic (Callovian)–Upper Jurassic (Kimmeridgian)*; northeastern Siberia.—Fig. 1385,1a–p. *B. bojarkensis*, Kimmeridgian; a–c, dorsal, lateral, and anterior views, ×1; d–p, serial transverse sections 3.6, 4.4, 5.1, 5.5, 5.9, 7.1, 9.1, 10.6, 12.1, 15.1, 17.1, 18.6, 24.6 mm from ventral umbo, ×1 (Dagys, 1968).

**Omolonothyris** Dagys, 1968, p. 132 [*O. inopinatus*; OD]. Large, oval, biconvex, anterior commissure rectimarginate; pedicle collar present; cardinal process low, undivided; outer hinge plates broad, subhorizontal in section, crural plates very short, perpendicular to hinge plates, connected with valve floor some distance from low septum. *Lower Jurassic (Toarcian)*; northeastern Siberia.—Fig. 1386,1a–c. *O. inopinatus*; dorsal, lateral, and anterior views, ×1 (Dagys, 1968).

**Pamirothyropsis** Ovtsharenko, 1979, p. 126, nom. nov. pro Pamirothyris Ovtsharenko, 1975, p. 116, non Dagys, 1974, p. 195 [*Pamirothyris vialovii* Ovtsharenko, 1975, p. 117; OD]. Large, concavo-convex, anterior commissure broadly unisulcate, beak short, hinge teeth massive; cardinal process short, bilobate; hinge plates slightly inclined dorsally, crural plates derived from dorsal ends of crural bases almost perpendicular to valve floor; resting on short septal lamella; ventral ends of crural processes strongly curved laterally. *Middle Jurassic* 

FIG. 1384. Triadithyrididae (p. 2089–2092).
Fig. 1385. Boreiothyrididae (p. 2092).
(Callovian): Tadzhikistan, Pamirs.—Fig. 1386, 3a–i. *P. vialovi (OVTSHARENKO), Pamirs; a–c, dorsal, lateral, and anterior views; d–i, serial transverse sections 2.4, 3.6, 4.1, 4.5, 5.2, 7.1 mm from ventral umbo, ×1 (new).

**Siberiothyris** Dagys, 1968, p. 128 [*S. crassus*; OD]. Very large, planoconvex, anterior commissure broadly unsulcate, beak thick, short, suberect; pedicle collar massive; cardinal process low, undivided, crural plates weakly diverging, connected...
Terebratulida—Loboidothyridoidea

with valve floor; septalium lacking. Lower Cretaceous (Berriasian–Hauterivian): Northern Urals, northern Siberia.—Fig. 1386,2a–c. *S. crassus, Valanginian, northern Siberia; dorsal, lateral, and anterior views, ×1 (Dagys, 1968).

Taimyrothyris DAGYS, 1968, p. 118 [*T. bisulcatus; OD]. Large, biconvex, may have sulcus on both valves; anterior commissure rectimarginate; pedicle collar distinct; cardinal process low, undivided, outer hinge plates narrow, crural plates diverging, attached to valve floor some distance from low median septum. Upper Jurassic–Lower Cretaceous (Tithonian–Valanginian): Northern Siberia.—Fig. 1387a–o. *T. bisulcatus, Tithonian; a–c, dorsal, lateral, and anterior views, ×1; d–o, serial transverse sections 4.7, 7.3, 8.3, 10.0, 12.5, 13.0, 13.8, 14.8, 18.5, 19.3, 21.9, 25.3 mm from ventral umbo, ×1 (Dagys, 1968).

Family CHEIROTHYROPSIDAE
Cooper, 1983

[Cheirothyropsidae Cooper, 1983, p. 45]

Medium size, subpentagonal; both valves with four opposite, ridgelike plications, anterior commissure rectimarginate. Middle Jurassic (Callovian).
Cheirothyopsis Makeirdin, 1964, p. 267 [*Terebratula pseudotrigonella Trautzschold, 1877, p. 102; OD]. Biconvex, ornament reticulate, four radial carinae on each valve; beak short, slightly incurved, foramen large, circular, mesothyrid; symphytium exposed; pedicle collar small; cardinal process bi- or trilobed; hinge plates divided, loop about 0.5 dorsal valve length, with long flanges; transverse band strongly arched. [Homeomorph of the zeilleriid Cheirothyris.] Middle Jurassic (Callovian): Russian Platform, Crimea, Western Europe.—Fig. 1382,3a–p. *C. pseudotrigonella (Trautzschold), Russia; a–c, dorsal, lateral, and anterior views, ×1; d–o, serial transverse sections 2.0, 3.0, 3.3, 3.7, 4.5, 4.9, 6.5, 9.0, 9.1, 9.4, 10.2, 10.8 mm from ventral umbo, ×1; p, loop reconstruction, ×2 (Makeirdin, 1964).

**Family CHENIOTHYRIDIDAE**

**Muir-Wood, 1965**

[Cheiroythyridae Muir-Wood, 1965a, p. 800]

Small, subpentagonal to elongate; ornament of steplike, squamose lamellae with numerous papillae, loop short. *Middle Jurassic* (Bajocian).

**Cheirothyris** Buckman, 1918, p. 128 (Buckman, 1915, p. 79, nom. nud.) [*Terebratula moriieri Eudes-Deslongchamps in Davidson, 1852b, p. 256; OD]. Moderately biconvex, each valve with median depression forming gently bilobate anterior margin; shell folding ligate, anterior commissure rectimarginate, foramen large, permesothyrid, symphytium high; cardinal process low, short, hinge plates in section thick, somewhat trigonal, ventrally directed and concave; loop about 0.3 valve length, with strongly arched transverse band, not fully known. *Middle Jurassic* (Bajocian): England, France.—Fig. 1388,1a–l. *C. moriieri (Eudes-Deslongchamps); a–c, dorsal, lateral, and anterior views, ×2; d–l, serial transverse sections, distances between sections unknown, ×1.4 (Muir-Wood, 1965a).

**Family DICTYOTHYRIDIDAE**

Makeirdin, 1964


Small to medium size, subpentagonal, shell ornament reticulate, anterior commissure plicosulate. *Middle Jurassic—Lower Cretaceous* (Hauterivian).

**Dictyothyris** Douville, 1879, p. 267 [*Terebratulites coarctatus Parkinson, 1811, p. 229; OD]. Ventribiconvex; folding ligate, anterior commissure strongly plicosulate; ornament reticulate with low nodes or spines at point of intersection; beak long, erect; foramen large, mesothyrid, symphytium may be exposed; cardinal process large, bilobed, medially flattened, with posterior umbonal cavity; outer hinge plates small, triangular, thick and flattened, attached ventrally to crural bases; crura short, crural processes long, slender, ventrally directed, anterior of midloop; loop 0.4 dorsal valve length, very wide; transverse band strongly arched, medially flattened, protuberant, with short flanges. *Middle Jurassic* (Bathonian)–Lower Cretaceous (Hauterivian): England, France, Russia, Crimea.—Fig. 1388,3a–d. *D. coarctata (Parkinson), Bathonian, England; a–c, dorsal, lateral, and anterior views, ×1.8 (Muir-Wood, 1965a); d, interior of dorsal valve of specimen, France, ×2 (Cooper, 1983).

**Family DIENOPIDAE** Cooper, 1983

Medium size, elongate-pentagonal, ornament reticulate, anterior commissure para-sulcate, loop very long. *Middle Jurassic* (Callovian).

**Dienope** Cooper, 1983, p. 72 [*Terebratula trigeri Deslongchamps, 1856b, p. 97; OD]. Ventribiconvex, ornament of fine, radial capillae crossed by fine, concentric threads, beak suberect, foramen large, mesothyrid; cardinal process bilobed, protuberant; outer hinge plates welded to socket ridges, moderately convex toward ventral valve; crural processes wide, sharply pointed, loop extremely long, about 0.7 dorsal valve length, descending lamellae narrow, slender, transverse band moderately broad. *Middle Jurassic* (Callovian): France.—Fig. 1388,2a–c. *D. trigeri (Deslongchamps); a–b, dorsal and anterior views, ×1; c–d, ventral and lateral views of loop of another specimen, ×1; e, somewhat idealized loop reconstruction, ×1 (Cooper, 1983).

**Family HESPERITHYRIDIDAE**

Cooper, 1983

[Hesperothyridae Cooper, 1983, p. 42]

Smooth, strongly plicate, outer hinge plates narrow, ventrally attached to crural bases. *Lower Jurassic.*

**Hesperothyris** Dubar, 1942, p. 78 [*Terebratula renierii Catullo, 1827, p. 167, var. rinusa Dubar, 1942, p. 83; OD]. Small to large, strongly ventribiconvex, anterior commissure uniplicate, ornament of broad, subangular plicae, alternating on opposite valves, normally 2 on fold, 1 in sulcus, and 2 bounding sulcus; beak long, protuberant, foramen large, symphytium exposed; cardinal process large, wide, bilobed; outer hinge plates small, fused with crural bases; loop short, not fully known. *Lower Jurassic*: Morocco, Portugal, Alps, Timor.—Fig. 1388,
Fig. 1388. Cheniothyrididae, Dictyothyrididae, Dienopidae, and Hesperithyrididae (p. 2096–2098).
Small to large, smooth, commonly ventrico-convex, commonly rectimarginate, uniplicate or sulciplicate, loop long, variable in width, outer hinge plates dorsally attached to crural bases, crural processes posterior of midloop, terminal points may be very long. Lower Jurassic (Toarcian)–Upper Jurassic.

Subfamily LISSAJOUSITHYRIDINAE

Cooper, 1983

[Liussaithyridinae Cooper, 1983, p. 43]

Transverse band without deep reentrant on posterior side. Lower Jurassic (Toarcian)–Upper Jurassic.

Lissajousithyris Alméras, 1971, p. 164 [*Terebratula matisconensis* Liussajous in Arcelin & Roche, 1936, p. 80; OD]. Medium size, elongate-oval; anterior commissure uniplicate to sulciplicate, sulcus broad; beak short, foramen mesothyrid, symphytium wide, exposed; pedicle collar short; teeth massive; cardinal process small, outer hinge plates short triangular, loop very long, 0.4 to 0.6 dorsal valve length, terminal points very long, webbed, transverse band high, narrow arch, flattened medially. Middle Jurassic (Bajocian).—Fig. 1389, 1a–d. *L. matisconensis* (Liussajous) ; a–c, dorsal, lateral, and anterior views, x1 (Alméras, 1971); d, interior of dorsal valve, x1 (Cooper, 1983).

Apatecosia Cooper, 1983, p. 53 [*Cereithyris nutiensis* Baguer, 1955, p. 219; OD] [=Gyrosina Cooper, 1983, p. 86 (type, *G. rotunda*, OD)]. Medium size, oval, anterior commissure sulciplicate; beak narrow, labiate, foramen mesothyrid, symphytium partly visible; cardinal process small, outer hinge plates short, narrow; loop 0.45 dorsal valve length, transverse band narrowly arched. Middle Jurassic (Callovian).—Fig. 1389, 3a–d. *A. nutiensis* (Baguer), France; a–c, dorsal, lateral, and anterior views, x1; d, dorsal valve interior, x1 (Cooper, 1983).

Arcelinithyris Alméras, 1971, p. 173 [*Terebratula arcelini* Liussajous in Arcelin & Roche, 1936, p. 83; OD]. Medium size, elongate oval; anterior commissure rectimarginate; beak suberect, labiate, foramen large, mesothyrid, symphytium exposed; pedicle collar short, teeth narrow, elongate; cardinal process small, outer hinge plates wide, triangular, flat, loop elongate triangular, 0.5 dorsal valve length. Middle Jurassic (Bajocian).—Fig. 1389, 2a–d. *A. arcelini* (Liussajous); a–c, dorsal, lateral, and anterior views, x1; d, loop, x2 (Cooper, 1983).

Dorsoplicathyris Alméras, 1971, p. 437 [*Terebratula dorsoplicata* Suess, 1855, in Deslongchamps, 1856b, p. 97; OD] [=Pentithyris Cooper, 1983, p. 127 (type, *Terebratula pelagica* Rollier, 1918, p. 233); Stenorina Cooper, 1989, p. 91 (type, *S. parallela*); Tanyothyris Cooper, 1989, p. 94 (type, *T. angustata*). Large, elongate oval, anterior commissure uniplicate to sulciplicate; beak short, labiate, foramen large, mesothyrid; cardinal process small; outer hinge plates long, close to valve floor; crural processes at midloop; loop long, triangular, flanges long, narrow. Middle Jurassic (Bathonian)–Upper Jurassic (Oxfordian).—France, Switzerland, Germany, Turkmenia, Crimea, Saudi Arabia, Nepal, Tibet.—Fig. 1390, 2a–d. *D. dorsoplicata* (Suess), Callovian, France; a–c, dorsal, lateral, and anterior views, x1; d, dorsal valve interior, x2 (Cooper, 1983).

Eristenostia Cooper, 1983, p. 78 [*E. circularis* OD]. Small, nearly circular, anterior commissure rectimarginate, beak short, erect, foramen small, mesothyrid; cardinal process very small, outer hinge plates short, narrow, deeply concave; loop 0.4 dorsal valve length, very narrow, terminal points long, webbed, transverse band very narrow, forming an angular arch. Upper Jurassic (Kimmeridgian).—France.—Fig. 1390, 1a–d. *E. circularis*; a–c, dorsal, lateral, and anterior views, x1; d, dorsal valve interior, x2 (Cooper, 1983).

Monsardithyris Alméras, 1971, p. 198 [*Terebratula ventricosa* Zieten, 1830 in 1830–1833, p. 52; OD]. Large, elongate oval; anterior commissure rectimarginate to broadly uniplicate to sulciplicate; beak short, suberect, labiate, foramen large, mesothyrid; pedicle collar short, excavated, teeth long, narrow; cardinal process small, outer hinge plates short, narrow, triangular, concave, often notched anteriorly, loop long, triangular, 0.5 dorsal valve length, terminal points very long, webbed, transverse band and loop variable. Lower Jurassic (Toarcian)–Middle Jurassic (Bajocian).—France, England, Germany, Algeria, Morocco, Arabia, Tibet.—Fig. 1390, 5a–d. *M. ventricosa* (Zieten), Bajocian; a–c, dorsal, lateral, and anterior views, Germany; x1 (Alméras & Moulan, 1988); d, interior of dorsal valve, France, x1 (Cooper, 1983).

Rouilliera Makridin in Licharew, Makridin, & Rzoncifsksaya, 1960, p. 295 [*Terebratula michalkowi* Frauenkohl, 1856, p. 228; OD]. Large to very large, subcircular to elongate-oval, anterior commissure uniplicate to sulciplicate, beak very short, foramen large, mesothyrid; pedicle collar present, hinge teeth long, narrow; cardinal process broad, thin dorsal septum reaching 0.5 valve length; outer hinge plates broad, crural bases

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Fig. 1389. Lissajousithyrididae (p. 2098–2101).
Rhynchonelliformea—Rhynchonellata

forming lateral umbonal cavities reaching valve floor; loop slender, very long, 0.6 to 0.7 dorsal valve length, terminal points very long, webbed; transverse band narrow. Upper Jurassic: Russian Platform, Urals, Poland, England.——Fig. 1389, 4a–m. *R. michalkowii (FAHRENKOHl), Russia; a–c, dorsal, lateral, and anterior views, ×1; d–l, serial transverse sections 6.8, 8.7, 10.1, 12.6, 16.2, 18.0, 21.0, 29.6, 32.3 mm from ventral umbo, ×1; m, reconstruction of loop, ×1 (Makridin, 1964).

Fig. 1390. Lissajousithyrididae (p. 2098–2101).
**Strongylobrochus** Cooper, 1983, p. 155 [*Terebratula omalogastyr* Zieten, 1830 in 1830–1833, p. 54; OD]. Large, subpentagonal to broadly ovate, planoconvex, anterior commissure rectimarginate to gently uniplicate, beak large, protuberant, foramen large, permesothyrid, symphytium visible; cardinal process thin, narrow, outer hinge plates narrow, close to valve floor; loop 0.6 dorsal valve length, descending branches thin, widely bowed; terminal points long, webbed, bowed inwardly; transverse band broad, flattened arch. *Middle Jurassic (Bajocian): Germany.*——Fig. 1390, 4a–d. *S. omalogastyr* (Zieten); a–d, dorsal, lateral, and anterior views, x1; d, dorsal valve interior, x1 (Cooper, 1983).

**Stroudithyris** Buckman, 1918, p. 111 (Buckman, 1915, p. 78, nom. nud.) [*Terebratula pisolithica* Buckman, 1886, p. 41; OD] [=Saucrobrochus Cooper, 1983, p. 145 (type, *Terebratula whaddonensis* Buckman, 1910, p. 101)]. Medium size, subpentagonal, anterior commissure sulciplicate, beak short, suberect, labiate, foramen large, mesothyrid, symphytium mainly concealed; cardinal process small, no umbonal cavity, outer hinge plates narrow, deeply concave, loop 0.5 dorsal valve length, terminal points long, webbed, transverse band high. *Lower Jurassic (Toarcian)–Middle Jurassic (Bajocian): England, France, Switzerland, Italy, Spain, Portugal, North Africa (Algeria).*——Fig. 1390, 3a–d. *S. pisolithica* (Buckman), Bajocian, England; a–c, dorsal, lateral, and anterior views, x1 (Muir-Wood, 1965a); d, interior of dorsal valve, x1 (Cooper, 1983).

**Uralella** Makridin in Licharew, Makridin, & Rzhonskatskaya, 1960, p. 295 [*Terebratula strogonofii* d’Orbigny, 1845b, p. 483; OD]. Very large, elongate-oval, anterior commissure rectimarginate, beak large, foramen circular,
permesothyrid; pedicle collar well developed; cardinal process large, almost quadrat in section; crural bases thick, may touch valve floor, forming lateral cavities; median septum well developed, especially in juveniles; loop poorly known, apparently long, widely triangular, with long terminal points. Upper Jurassic (Tithonian): Northern Urals, northern Siberia, England. ——Fig. 1391, a–n. *U. strogonofi* (d’Orbigny), Urals; a–b, dorsal and lateral views, ×0.6 (Makridin, 1964); c–n, serial transverse sections, ×1 (Dagys, 1968). ——Fig. 1391, d. *U. gigantea* Makridin; reconstruction of loop, ×1 (Makridin, 1964).

**Vladimirella** Popov, 1994, p. 106, nom. nov. pro *Nalivkinella* Popov in Katz & Popov, 1974a, p. 23, non Soshkina, 1939 [*Terebratula retrorcarinata* Nalivkin, 1910, p. 19; OD; non Rothpletz, 1886, p. 101; *Nalivkinella nalivkini* Popov in Katz & Popov, 1974a, p. 23]. Large, elongate to subpentagonal, anterior commissure slightly unsulcate or bisulcate, beak incurved, foramen large, epithyrid; cardinal process small, outer hinge plates delicate, directed laterally; loop 0.5 dorsal valve length, loop flanges long. Upper Jurassic: Russian Platform, Crimea, Caucasus, central Asia, Western Europe. ——Fig. 1391, a–d. *V. nalivkini* (Popov), Russia; a–c, dorsal, lateral, and anterior views, ×1; d, reconstruction of loop, ×0.5 (Makridin, 1964).

**Subfamily MORRISITHYRIDINAE**

Cooper, 1983

[Morrisithyridinae Cooper, 1983, p. 44]

Transverse band with deep reentrant on posterior side. Middle Jurassic (Bajocian–Callovian).

**Morrisithyris** Alméras, 1971, p. 131 [*Terebratula philipi* Morris in Morris & Davidson, 1847, p. 255; OD]. Large, elongate-pentagonal, anterior commissure strongly sulciplicate; beak long, narrow, labiate, foramen large, permesothyrid; pedicle collar short, excavated, teeth long, narrow; cardinal process small, outer hinge plates long, narrow, triangular, concave, loop triangular, 0.3 to 0.4 dorsal valve length, terminal points long, webbed; loop, transverse band, and terminal points variable. Middle Jurassic (Bajocian–Callovian): Europe, Russia, Caucasus, Crimea, Turkmenistan, South America. ——Fig. 1392a–e. *M. philipi* (Morris), Bajocian, France; a–c, dorsal, lateral, and anterior views, ×1 (Alméras, 1971); d, loop of young specimen, ×1; e, loop of adult specimen, ×2 (Cooper, 1983).

**Family LOBOTHYRIDIDAE**

Makridin, 1964


Small to very large, smooth, crural processes posterior or anterior of midloop, loop 0.3 to 0.6 dorsal valve length; terminal points long to very long, may be webbed. Lower Jurassic–Upper Jurassic (Kimmeridgian).

**Subfamily LOBOTHYRIDINAE**

Makridin, 1964


Medium to very large; rectimarginate to uniplicate or unisulcate, crural processes posterior of midloop, loop 0.4 to 0.6 dorsal valve length, terminal points moderately long to very long, may be webbed. Lower Jurassic–Middle Jurassic (Bajocian).
Lobothyris Buckman, 1918, p. 107 (Buckman, 1914, p. 2, nom. nud.) [*Terebratula punctata* J. Sowerby, 1813 in 1812–1815, p. 46; OD] [=Lobothyris Sučić-Protić, 1971, p. 16 (type, *L. typica*, OD); Miriquinea Sučić-Protić, 1971, p. 38 (type, *Lobothyris punctata clevelandensis* Ager, 1956, p. 2, OD); Pirotothyris Sučić-Protić, 1971, p. 31 (type, *P. forti*, OD); Squamiplana Sučić-Protić, 1971, p. 8 (type, *S. pirotithys*, OD)]. Large to very large; moderately biconvex, rectimarginate, beak suberect to incurved, foramen epithyrid to permesothyrid, symphytium short; pedicle collar present; cardinal process broad, flat, comblike; hinge plates and inner socket ridges in section slightly concave ventrally, clubbed, gently inclined dorsally; crural processes posterior of midloop, loop about 0.4 dorsal valve length, with moderately long terminal points. Lower Jurassic (Sinemurian)–Middle Jurassic (Bajocian): England, Scotland, France, Germany, Spain, Portugal, Sicily, Bulgaria, Romania, Yugoslavia, China, Thailand, Canada (British Columbia), USA (Nevada), Argentina, New Zealand.—Fig. 1393,6a–v. *L. punctata* (J. Sowerby), Plenischbachi, England; a–c, dorsal, lateral, and anterior views of lectotype, BMNH B61522, x1 (Ager, 1990); d, interior of dorsal valve of calcite-encrusted specimen, x1 (Cooper, 1983); e–i, serial transverse sections 0.6, 1.0, 1.2, 2.2, 3.6, 4.0, 4.4, 4.8, 5.0, 5.6, 5.8, 6.2, 7.0, 7.4, 7.6, 7.8, 8.2, 10.0 mm from ventral umbo, x1 (Ager, 1990).—Fig. 1393,6w. *L. subpunctata* Dubar, Lower Jurassic, France; dorsal valve interior, x1 (Cooper, 1983).

Cuersithyris Alemas & Moulan, 1982, p. 32 [*C. cuersensis* OD]. Medium size, thick shelled; elongate oval, strongly ventribiconvex to globose, anterior commissure rectimarginate to slightly unsulcate; pedicle collar short, beak incurred, foramen permesothyrid; loop 0.45 to 0.6 dorsal valve length. Lower Jurassic (Plenischbian–Toarcian): France, England, Spain, Hungary, Yugoslavia, Argentina.—Fig. 1393,1a–l. *C. cuersensis* Plenischbian, France; a–c, dorsal, lateral, and anterior views of holotype, FSL305094, x1; d–l, serial transverse sections 1.8, 3.3, 4.6, 5.4, 6.5, 8.2, 10.3, 11.6, 14.4 mm from ventral umbo, x1 (Alméras & Moulan, 1982).

Exceptothyris Sučić-Protić, 1971, p. 37 [*E. expresa* OD]. Externally similar to Lobothyris, but with crural processes close to hinge plates; loop long (resembling that of *Rioullieria*), 0.6 dorsal valve length, terminal points very long, webbed; transverse band very narrow. Lower Jurassic: France, Italy, Yugoslavia.—Fig. 1393,2. *E. expresa*, Yugoslavia; reconstruction of loop, x1 (Cooper, 1983).

Inaequalis Sučić-Protić, 1971, p. 12 [*I. dubari* OD] [=Pyraeneica Sučić-Protić, 1971, p. 23 (type, *P. numerosa*, OD); Senokosa Sučić-Protić, 1971, p. 28 (type, *S. matura*, OD); Serbothyris Sučić-Protić, 1971, p. 25 (type, *S. medioliasica*, OD)]. Externally similar to Lobothyris, but with narrow transverse band and longer terminal points. Lower Jurassic: France, Germany, Yugoslavia, England.—Fig. 1393,7a–c. *I. dubari*, Yugoslavia; a–b, dorsal and anterior views, x1 (Sučić-Protić, 1971); c, reconstruction of loop, x1 (Cooper, 1983).

Notosia Cooper, 1983, p. 122 [*N. chilensis* OD]. Medium size, oval, ventribiconvex; anterior commissure rectimarginate to slightly uniplicate, foramen permesothyrid; loop widely and roundly triangular, with long terminal points. Lower Jurassic: Chile.—Fig. 1393,4a–d. *N. chilensis* a–c, dorsal, lateral, and anterior views of holotype, USNM 551049a, x1; d, close-up of loop, x1 (Cooper, 1983).

Rhapidothyris Tulweit, 1965, p. 72 [*R. aricifera* OD]. Similar to Lobothyris, but medium size, subcircular, biconvex; anterior commissure rectimarginate to unsulcate. Lower Jurassic (Plenischbian): Germany.—Fig. 1393,5a–c. *R. aricifera*, Germany; dorsal, lateral, and anterior views of holotype, IMGPT Br 1244/13, x1 (Tulweit, 1965).

Telothyris Alemas & Moulan, 1982, p. 136 [*Terebratula jauberti pyrenaea* Dubar, 1931, p. 51; OD]. Similar to Cuersithyris, but subcircular in outline, biconvex, rectimarginate to slightly sulciplicate; shorter loop, 0.39–0.49 dorsal valve length. Lower Jurassic: France, Spain, Romania, Morocco, Algeria, Argentina.—Fig. 1393,6a–c. *T. pyrenaea* (Duba), Toarcian, France; dorsal, lateral, and anterior views, x1 (Alméras & Moulan, 1982).

Subfamily LOPHROTHYRIDINAE

Cooper, 1983

[Lophothyridinae Cooper, 1983, p. 44]

Small to medium size, uniplicate to sulciplicate or biplicate; outer hinge plates dorally attached to crural bases; crural processes anterior of midloop; terminal points of intermediate length. Middle Jurassic (Bajocian)–Upper Jurassic (Kimmeridgian).

Lophothyris Buckman, 1918, p. 114 (Buckman, 1914, p. 2, nom. nud.) [*L. lohus* OD]. Small to medium size, subcircular to subpentagonal, ventribiconvex, anterior commissure strongly uniplicate, rarely sulciplicate; beak short, foramen epithyrid, symphytium narrow; cardinal process small; outer hinge plates short, narrow, dorsally attached; loop broadly triangular, about 0.4 to 0.5 dorsal valve length, with moderately long terminal points; transverse band broad. Middle Jurassic (Bajocian): England, France, China.—Fig. 1393,4a–d. *L. lohus*, England; a–c, dorsal, lateral, and anterior views of holotype, BGS GSM 31990, x1; d, interior of dorsal valve, x2 (Cooper, 1983).

Argovithyris Rollett, 1972b, p. 95 [*Terebratula birmensdorffensis* Moesch, 1867, p. 312; OD]. Small, biconvex, anterior commissure rectimarginate to uniplicate or weakly sulciplicate; beak strongly incurved, may touch dorsal umbo, foramen small, epithyrid, often labiate; pedicle collar
Fig. 1393. Lobothyrididae (p. 2103).
present; cardinal process small, hinge plates thin and flat; loop with subparallel sides, 0.3 to 0.4 dorsal valve length, transverse band broad. *Upper Jurassic* (Oxfordian–Kimmeridgian): France, Germany, Switzerland, Poland.—Fig. 1394,3a–d. *A. birmendorferensis* (Moesch), Oxfordian, Switzerland; a–c, dorsal, lateral, and anterior views, x1; d, reconstruction of loop, x2 (Boullier, 1976).

**Aromasithyris** Almeras, 1971, p. 544 [*Terebratula balinenis* SzaJnocha, 1879, p. 203; OD]. Medium size, pentagonal, biconvex, anterior commissure uniplicate to weakly sulciplicate or paraplicate; beak incurved; pedicle collar present; cardinal process small; hinge plates flat and thin, loop 0.3 to 0.4 dorsal valve length, transverse band very strongly arched. *Middle Jurassic* (Callovian): Poland, France, Germany, Portugal, Russia.—Fig. 1394,2a–d. *A. balinenis* (SzaJnocha), Poland; a–c, dorsal, lateral, anterior views, x1; d, interior of dorsal valve, x2 (Cooper, 1983).

**Odarovithyris** Tchorszhevsky, 1971a, p. 62 [*O. odarovi*; OD]. Medium size, smooth,
ventribiconvex, anterior commissure biciplicate; beak short, incurved; foramen small, permesothyrid; cardinal process low, outer hinge plates wide, thin; loop 0.5 dorsal valve length, transverse band strongly folded, loop flanges long. Middle Jurassic (Bajocian): Transcarpathians.—Fig. 1394.4a–u. *O. odarovi; a–c, dorsal, lateral, anterior views, x1; d–u, serial transverse sections 0.25, 1.4, 2.05, 2.35, 2.85, 4.1, 4.3, 5.1, 5.6, 5.9, 6.55, 6.85, 7.05, 7.2, 8.1, 8.5, 9.2, 9.5 mm from first section, x1 (Tchorszhevsky, 1971a).

**Tubithyris** Buckman, 1918, p. 115 (Buckman, 1915, p. 78, nom. nud.) [*Terebratula wrighti* Davidson, 1855, p. 20; OD] [=Pseudotubithyris *Almeras*, 1971, p. 361 (type, *Terebratula globata* J. de C. Sowerby, 1823–1825, p. 51)]. Small to medium, subcircular, biconvex to spheroidal, anterior commissure uniplicate to sulciplicate, beak short, incurved, foramen tubular, permesothyrid; symphytium narrow, visible; cardinal process bilobed, prominent; hinge plates narrow, triangular, deeply concave; loop 0.5 dorsal valve length, very wide, transverse band moderately arched. Middle Jurassic (Bajocian–Bathonian): England, France, Switzerland, Italy, Morocco, Egypt, Kenya, Saudi Arabia, Turkmenia.—Fig. 1394.5a–d. *T. wrighti* (Davidson), Bajocian, England; a–c, dorsal, lateral, and anterior views, x1 (Muir-Wood, 1965a); d, interior of dorsal valve, x1 (Cooper, 1983).

**Family MIURWOODELLIDAE**

Tchorszhevsky, 1974

[Muirwooodellidae Tchorszhevsky, 1974, p. 51]

Smooth, outer hinge plates well developed; loop long flanged, 0.3 to 0.5 dorsal valve length; transverse band formed from ring arising from ventral margin of vertical plate of acuminate (centronelliform) loop. Middle Jurassic–Lower Cretaceous (Berriasian).

**Subfamily MIURWOODELLINAE**

Tchorszhevsky, 1974

[Muirwooodellae Tchorszhevsky, 1974, p. 51]

Outer hinge plates not supported by crural plates. Middle Jurassic.

**Muirwooodella** Tchorszhevsky, 1974, p. 52 [*M. muirwoodae*; OD]. Medium size, anterior commissure unisulcate or slightly bisulcate; beak incurved; foramen mesothyrid or permesothyrid; cardinal process small, oval; outer hinge plates slightly inclined dorsally; crural processes slightly curved. Middle Jurassic (Bajocian): Carpathians, Transcarpathia, Russia.—Fig. 1395.2a–q. *M. muirwoodae*, Carpathians; a–c, dorsal, lateral, and anterior views, x0.6; d–q, serial transverse sections 0.3, 0.7, 1.9, 2.7, 2.9, 3.7, 4.2, 5.95, 6.7, 7.7, 8.3, 11.4, 13.4, 14.7 mm from first section, x1 (Tchorszhevsky, 1974).

**Goniothyropsis** Ovtsharenko, 1983b, p. 155 [*G. indigena*; OD]. Rounded to subpentagonal, ventribiconvex; anterior commissure biciplicate; beak incurved, foramen large; deltidial plates conjunct; cardinal process short, flattened; crural bases joined dorsally to outer hinge plates, forming small, ventral keels, descending branches and flanges short, loop about 0.3 dorsal valve length. Middle Jurassic: Tadzhikistan, Pamirs.—Fig. 1395.1a–k. *G. indigena*; a–c, dorsal, lateral, and anterior views, x1; d–k, serial transverse sections 2.6, 3.5, 4.3, 4.6, 5.0, 6.3, 6.9, 8.2 mm from first section, x1 (Ovtsharenko, 1983b).

**Subfamily KARADAGITHYRIDINAE**

Tchorszhevsky, 1974

[Karadagithryinae Tchorszhevsky, 1974, p. 56]

Outer hinge plates may be supported by crural plates. Middle Jurassic–Upper Jurassic.

**Karadagithyris** Tchorszhevsky, 1974, p. 55 [*K. babanovae*; OD]. Medium to small, foramen small, mesothyrid, symphytium short, narrow; cardinal process oval, high, undivided; outer hinge plate broad, thin, curved in an arc dorsally; at point of attachment to crura, narrow, ventrally directed, and semicircular in cross section; crura and crural processes thick, broad, slightly convergent ventrally; outer hinge plate processes are well developed, reaching level of transverse band of loop, but resting on valve floor only apically. Middle Jurassic–Upper Jurassic: Crimea, Poland, Hungary, Yugoslavia.—Fig. 1396.2a–u. *K. babanovae*, Bajocian, Crimea; a–c, dorsal, lateral, and anterior views, x1; d–u, serial transverse sections 3.1, 3.2, 3.45, 3.85, 4.35, 4.65, 5.05, 5.25, 6.05, 6.65, 7.3, 8.1, 9.85, 10.25, 10.85, 11.85, 12.75, 13.75, 14.65 mm from ventral umbo, x1 (Tchorszhevsky, 1974).

**Karadagellia** Babanova, 1965, p. 95 [*K. moisseievi*; OD]. Large, oval, strongly ventribiconvex, foramen mesothyrid, crural plates attached to outer hinge plates by ventral ends; in early ontogeny resting on dorsal valve floor, becoming free in later stages; loop with long flanges. Middle Jurassic (Bajocian): Crimea.—Fig. 1396.1a–d. *K. moisseievi*; a–c, dorsal, lateral, and anterior views, x1; d, reconstruction of loop, x1 (Babanova, 1965).

**Subfamily UNCERTAIN**

Dzharithyris Ovtsharenko, 1989, p. 96 [*Inaequalis dzharenensis* Ovtsharenko, 1983b, p. 130; OD]. Medium, rounded to subpentagonal, ventribiconvex, strongly uniplicate, outer hinge plates broad, fused with inner socket ridges; loop about 0.5 dorsal valve length; flanges about 0.3 loop length. Middle Jurassic: Tadzhikistan, Pamirs.—
Fig. 1397, 3a–q. *D. dzharensis* (Ovtsharenko); a–c, dorsal, lateral, and anterior views, ×1; d–q, serial transverse sections 0.2, 1.8, 2.6, 2.8, 3.4, 4.9, 5.1, 5.9, 6.9, 7.3, 8.4, 9.2, 9.6, 10.4 mm from first section, ×1 (Ovtsharenko, 1983b).

**Negramithyris** Prosorovskaja, 1985, p. 114 [*N. negramensis*; OD]. Small to medium size, elongate oval, planoconvex; anterior commissure rectimarginate or slightly uniplicate; beak massive, short, suberect, foramen large, mesothyrid; cardinal process large; outer hinge plates very thin, curved acutely toward dorsal valve, hinge plate processes resting on floor of dorsal valve; loop short (about 0.3 dorsal valve length), transverse band of loop high, narrow; flanges well developed. *Middle Jurassic* (Bajocian): Armenia (Transcaucasia).——Fig. 1397, 2a–k. *N. negramensis*; a–c, dorsal, lateral, and anterior views of holotype, ×1; d–k, serial transverse sections 5.2, 5.3, 5.7, 6.1, 6.7, 8.4, 8.6, 9.0 mm from ventral umbo, ×1 (Prosorovskaja, 1985).

**?Praegoniothyris** Ovtsharenko, 1983b, p. 142 (Ovtsharenko, 1977, p. 38, nom. nud.)
[*P. salangurensis; OD]. Medium size, oval, ventri-biconvex, beak short, rounded, strongly incurved; cardinal process short, no umbalon cavity; outer hinge plates ventrally convex, dorsally inclined with small processes, crural bases on dorsal side of hinge plates; crura short, low, almost parallel, loop less than 0.5 dorsal valve length; low dorsal septum present posteriorly. [Internal structures not fully known.]

Lower Jurassic: Tadzhistan, Pamirs.——Fig. 1397.1a–l. *P. salangurensis; a–c, dorsal, lateral, and anterior views, ×1; d–l, incomplete serial transverse sections 1.0, 1.3, 1.8, 2.2, 2.6, 2.8, 2.9, 3.7, 4.1 mm from first section, ×1 (Ovtsharenko, 1983b).

Svaljavithyris Tchorszhevsky, 1989a, p. 75 (Tchorszhevsky, 1974, p. 54, nom. nud.) [*Terebratula carpathica Zittel, 1870, p. 77; OD]. Small, oval to subtriagonal, beak incurved, foramen small, mesothyrid, umbalon cavity infilled with callus; beak short, symphytium low, planoconvex, cardinal process small, with myophore; outer hinge plates wide, thin, short, or slightly concave dorsally, thin crural plates resting on dorsal valve floor as far as transverse band of loop; loop about 0.5 dorsal valve length, with long flanges. Upper Jurassic (Tithonian)—Lower Cretaceous (Berriasian): Carpathians, Italy.—Fig. 1398a–t. *S. carpathica (Zittel), Tithonian, Ukraine; a–c, dorsal, lateral, and anterior views, ×1; d–t, serial transverse sections, distances between sections not given, ×2 (Tchorszhevsky, 1989a).

2a 2b 2c 2d 1a 1b 1c 1d 2g 2p 2v

Karadagella

Karadagithyris

Fig. 1396. Muirwoodellidae (p. 2106).

Family POSTEPITHYRIDIDAE

Tchorszhevsky, 1974

[Postepithyrididae-Tchorszhevsky, 1974, p. 50] Rectimarginate to strongly biplicate, commonly smooth, rarely capillate or peripherally costate, loop long (0.4 to 0.6 dorsal valve length), outer hinge plates attached dorsally to crural bases, crural processes at or posterior of midloop, flanges of moderate length. Lower Jurassic (Toarcian)—Lower Cretaceous.

Postepithyris Makridin in Licharew, Makridin, & Rzhonsnitskaya, 1960, p. 29 [*Terebratula cincta Cotteau, 1857, p. 137; OD]. Medium size, subcircular, smooth, anterior commissure weakly sulciplicate; beak long, erect, foramen large, permesothyrid, symphytium partly visible; pedicle collar short; cardinal process semicircular, outer hinge plates triangular, short, flatly concave, attached to dorsal part of crural base; loop an elongate triangle, about 0.5 dorsal valve length, terminal points very long, webbed, transverse band highly arched, with flattened bridge. Upper Jurassic (Ox欤dian–Kimmeridgian): Europe, Crimea, Caucasus, Russia.—Fig. 1399.4a–s. *P. cincta (Cotteau), France; a–c, dorsal, lateral, and anterior views, ×1; d, interior of dorsal valve, ×1 (Cooper, 1983); e–s, serial transverse sections 3.4, 4.0, 4.3,
Arceythiris Rollet, 1964, p. 38 [*Terebratula diptycha Oppel, 1856, p. 496; OD]. Medium size, biconvex, anterior commissure uniplicate in juveniles, becoming bisulcate; beak short, slightly recurved, foramen permesothyrid, symphytium hidden; pedicle collar present; cardinal process prominent, may be grooved, hinge plates club shaped, poorly differentiated from socket ridges, loop 0.4 to 0.5 dorsal valve length, transverse band horizontal. Middle
Jurassic (Bajocian–Callovian): France, Germany, Switzerland.——Fig. 1399.3a–d. *A. diptycha* (Opell), Batsonian, France; a–c, dorsal, lateral, and anterior views, x1 (Alméras & Moulan, 1988); d, loop reconstruction, x1 (Contini & Rollet, 1970).

**Conarothyris** Cooper, 1983, p. 62 [*Terebratula saemani* Opell, 1857, p. 272; OD]. Small, smooth, pentagonal, anterior commissure uniplicate; beak short, foramen large, mesothyrid, symphytium partly concealed; pedicle collar present; cardinal process small, bilobed; outer hinge plates triangular, short, thick, concave (may be so thickened as to appear flat); crural processes at midloop, acutely pointed, loop widely triangular, about 0.4 dorsal valve length, transverse band wide, strongly arched, with flattened, protuberant median bridge, terminal points long, webbed. *Middle Jurassic (Bajocian)*: England, France.——Fig. 1399.1a–c. *E. maxillata* (J. de C. Sowerby), England; dorsal, lateral, and anterior views of holotype, BMNH B.61550, x1 (Muir-Wood, 1965a).——Fig. 1399.1d. *E. oxonica* Arkell, England; interior of dorsal valve, x1 (Cooper, 1983).

**Eudiothyris** Buckman, 1918, p. 101 (Buckman, 1915, p. 78, nom. nud.) [*Terebratula eudesiana* Buckman in Davidson, 1884, p. 255, OD; =*E. extensa* Buckman, 1886, p. 218; OD; =*E. maxillata* Cooper, 1983, p. 71; OD] Large, smooth, broadly subpentagonal, biconvex, anterior commissure sulciplicate, foramen large, mesothyrid; cardinal process trilobed, outer hinge plates short, concave, attached to dorsal margin of crural bases, crural processes narrow, acute, transverse band strongly arched, loop wide, about 0.5 dorsal valve length. *Middle Jurassic (Bajocian)*: England, France.——Fig. 1400.1a–d. *E. extensa* Buckman, England; a–c, dorsal, lateral, and anterior views of holotype, x1 (Muir-Wood, 1965a); d, interior of dorsal valve, x1 (Cooper, 1983).

**Ferrothyris** Alméras, 1971, p. 218 [*Terebratulites ferryi* Deslongchamps in Ferry, 1861, p. 27; OD]. Medium size, smooth, rounded triangular to subpentagonal, globose, anterior commissure strongly paraplicate; beak large, foramen large, circular, mesothyrid to epithyrid; symphytium concealed; pedicle collar long; cardinal process long, elevated, grooved; loop similar to that of *Conarothyris*, 0.5 to 0.6 dorsal valve length. *Lower Jurassic (Toarcian)—

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Fig. 1398. Muirwoodellidae (p. 2108).
Fig. 1399. Postepithyrididae (p. 2108–2110).
Fig. 1400. Postepithyrididae (p. 2110–2113).
Middle Jurassic (Bathonian): France, England, Germany, Switzerland, Yugoslavia.—Fig. 1401.1a–c. *F. ferdii* (DESLONGCHAMPS), Bajocian, France; dorso-lateral, and anterior views, x1 (Alméras, 1971).

**Gallienithyris** Rollet, 1966, p. 304 [*Terebratula galienni* D’Observy, 1850 in 1847–1851, p. 377; OD]. Large, elongate oval, ventribiconvex, anterior commissure rectimarginate to sulcicipitate, beak short, foramen small, permesothyrid, symphytium visible; pedicle collar present; cardinal process thin, narrow, semielliptical, medially indented with concave myophore; outer hinge plates flatly concave, narrowly triangular, attached to dorsal edge of crural bases; loop with long terminal points, transverse band narrow, high arched. *Middle Jurassic* (Callorian—Upper Jurassic (Oxfordian): Switzerland, France.—Fig. 1400.2a–d. *G. galienni* (D’Observy), Oxfordian, Switzerland; a–c, dorsal, lateral, and anterior views, x1; d, dorsal valve interior with incomplete loop, x2 (Cooper, 1983).

**Gigantothyris** Seifert, 1963, p. 180 [*G. gigantea*; OD]. Very large, rounded pentagonal, planoconvex to ventribiconvex; anterior commissure uniplicate to sulcicipitate, beak erect, foramen large, permesothyrid; symphytium concealed; outer hinge plates short, loop wide, triangular; about 0.4 dorsal valve length, transverse band broad, moderately arched and medially flattened. *Middle Jurassic* (Bajocian): Germany.—Fig. 1400.4a–c. *G. gigantea; a–b*, dorsal and anterior views of holotype, IMGPT Br 3/49/101, x1; c, interior of dorsal valve, x1 (Seifert, 1963).

**Glyphisaria** Cooper, 1983, p. 83 [*G. uniplicata*; OD]. Large, subpentagonal, ventribiconvex, anterior commissure uniplicate to sulcicipitate, beak erect, foramen large, permesothyrid; symphytium exposed; cardinal process small, elliptical with concave myophore; outer hinge plates very narrow as socket ridges and crural bases unite dorsally to form V-shaped troughs, notched at junction with crural bases; loop widely triangular, about 0.4 dorsal valve length. *Middle Jurassic—Upper Jurassic*; France, Saudi Arabia.—Fig. 1400.3a–d. *G. uniplicata*, Oxfordian, France; a–c, dorsal, lateral, and anterior views of holotype, USNM 551085, x1; d, dorsal valve interior, x1 (Cooper, 1983).

**Habrobrochus** Cooper, 1983, p. 87 [*Terebratula subsellata* Leymerie, 1846, pl. 10, 5; OD]. Externally similar to *Xestosina*, but with a more delicate loop, thinner, flatter transverse band, and shorter terminal points. *Upper Jurassic* (Kimmeridgian); Germany, France, Saudi Arabia, ?Mexico.—Fig. 1401.5a–d. *H. subsellata* (Leymerie), Germany; a–c, dorsal, lateral, and anterior views, x1; d, dorsal valve interior, x1 (Cooper, 1983).

**Heimia** Haas, 1890, p. 87 [*Terebratula mayeri* COIFFAT in HAAS, 1883, p. 254; OD]. Medium size, subtriangular, planoconvex, smooth, anterior commissure unisulcate to paraplicate, beak short, foramen permesothyrid, symphytium concealed; cardinal process short, prominent, outer hinge plates short, crural processes wide angled; loop not fully known, 0.4 dorsal valve length, transverse band strongly arched, with broad, flattened bridge. *Middle Jurassic* (Bajocian): England, France, Switzerland.—Fig. 1401.2a–g. *H. mayeri* (COIFFAT), Switzerland; a–c, dorsal, lateral, and anterior views, x1 (Muir-Wood, 1965a); d–g, incomplete serial transverse sections approximately 1.5, 1.7, 3.0, 4.3 mm from ventral umbo, x1 (Singeisen-Schneider, 1976).

**Holothyris** Buckman, 1918, p. 125 (BUCKMAN, 1915, p. 78, nom. nud.) [*H. angulata*; OD]. Medium size, smooth, finely capillate where exfoliated, subpentagonal, biconvex, anterior commissure unisulcate to paraplicate, beak suberec, foramen possibly permesothyrid, symphytium usually concealed; pedicle collar moderately long; cardinal process bilobate, medially depressed; hinge plates concave ventrally, club shaped posteriorly; loop 0.5 dorsal valve length. *Middle Jurassic* (Bathonian); Burma, China, India, Europe, New Zealand.—Fig. 1401.7a–m. *H. angulata*, Burma; a–c, dorsal, lateral, and anterior views of holotype, x1 (Muir-Wood, 1965a); d–m, serial transverse sections of specimen, France, 2.1, 3.1, 3.5, 4.0, 5.2, 5.8, 7.6, 10.0, 10.5, 10.9 mm from ventral umbo, x1 (Alméras, 1971).

**Juralithyris** Kansaen, 1961, p. 29 [*J. procerus*; OD]. Large, elongate oval, smooth, planoconvex or biconvex, anterior commissure rectimarginate to gently uniplicate; beak elongate, straight to subect; foramen large, permesothyrid; symphytium high, exposed (externally homeomorphic with *Rectithyris*); pedicle collar present; cardinal process prominent, medially depressed; crural bases ventrally directed from hinge plates; loop triangular, strongly arched, with flattened bridge, 0.4 dorsal valve length. *Upper Jurassic* (Oxfordian–Kimmeridgian); Germany, France, Switzerland, Russia, Caucasus, Crimea, Malaysia, ?Morocco.—Fig. 1401.4a–b. *J. procerus*, Kimmeridgian, Crimea; dorsal and lateral views of holotype, x1 (Muir-Wood, 1965a);—Fig. 1401.4e–d. *J. cervicula* Rollier, Upper Jurassic, Germany; c, dorsal view; d, ventral view of dorsal valve interior, x1 (Cooper, 1983).

**Karakulithyris** Ovtsharenko, 1991, p. 63 [*Terebratula bokkovi* MOISSEEV, 1938, p. 225–226; OD] [=Klunkenkoithyris Ovtsharenko, 1991, p. 91 (type, *Terebratula klunkenkovi* MOISSEEV, 1938, p. 235, OD)]. Medium to large, oval to subpentagonal; beak short, foramen large, mesothyrid; cardinal process small; loop triangular, 0.35 to 0.5 dorsal valve length, transverse band strongly arched. *Upper Jurassic*; India (Pamirs).—Fig. 1401.3a–c. *K. bokkovi* (MOISSEEV); a–b, dorsal and lateral views, x1; c, reconstruction of loop, x1 (Ovtsharenko, 1991).

**Kutchithyris** Buckman, 1918, p. 113 (BUCKMAN, 1915, p. 78, nom. nud.) [*Terebratula acutiplicata* KITCHIN, 1897, p. 9; OD] [=Eurythyris Ovtsharenko, 1983b, p. 117 (type, *Terebratula euryptycha* KITCHIN, 1900, p. 25, OD)]. Medium size,
Fig. 1401. Postepithyrididae (p. 2110–2115).
subpentagonal; strongly ventribiconvex, smooth, or rarely finely capillate, with two broad plicate developing, anteriorly; anterior commissure uniplicate to sulcuplicate, beak short, incurved, attached; foramen large, mesothyrid to epithyrid; symphytium hidden; cardinal process prominent, grooved; hinge plates wide, concave, flattening anteriorly, not well demarcated from inner socket ridges; crural bases low where attached to hinge plates, passing into high, thin, slightly flanged crural processes; hinge plates and crural processes clubbed; descending lamellae thin; loop not fully known; transverse band high arched, loop 0.4 to 0.5 dorsal valve length, with sharp angle inclined to hinge plates; crural processes clubbed, hinge plates wide, flat to concave, permesothyrid; pedicle collar present; cardinal process short, trilobed; foramen planoconvex to ventribiconvex, smooth, anterior views, ×1. Large, oval to rounded pentagonal, strongly biconvex, externally like *P. longiusculus; OD*; dorsal septum short, crural processes broad; descending lamellae thin, slightly flanged crural processes; hinge plates in transverse band broad, trapeziform flanges long. Lower Cretaceous: Russia (northeastern Siberia, Kamchatka, Khabarovsk region).—**Fig. 1403, la–x.** *P. longiusculus; a–c, dorsal, lateral, and anterior views, ×1; d–x, serial transverse sections 2.0, 2.3, 2.6, 2.8, 3.1, 3.4, 3.7, 4.0, 4.7, 5.2, 6.2, 7.0, 7.4, 9.0, 9.3, 10.3, 10.8, 12.8, 13.1, 14.8, 17.6 mm from first section, ×0.3 (Smirnova & Terekhova, 1972).

**Perrierithyris** ALMÉRAS, 1971, p. 423 [*Terebratula dorosilicata var. perrieri* DESLONGCHAMPS, 1859, p. 22; OD]. Large, subtriangular, strongly biconvex, beak short, anterior commissure par pilate, foramen large, circular, symphytium exposed; pedicle collar present; cardinal process short, trilobed; hinge plates forming a deep V; loop 0.5 to 0.6 dorsal valve length, transverse band subhorizontal. Middle Jurassic (Callovian)—Upper Jurassic (Oxfordian): France, Switzerland, Germany, Portugal.—**Fig. 1404, la–k.** *P. dorosilicata perrieri* (DESLONGCHAMPS), France; a–c, dorsal, lateral, and anterior views of neotype, FSI47667, ×1; d–k, serial transverse sections 2.8, 3.7, 4.1, 5.2, 8.4, 11.4, 12.4, 15.8 mm from ventral umbo, ×1 (Alméras, 1971).

**Moiseevia** MAKRIDIN, 1964, p. 243 [*M. sokolovi; OD*]. Large, elongate oval, smooth, beak strongly curved, foramen small; pedicle collar well developed; cardinal process short; short, short dorsal septum (possibly myophragm), loop more than 0.3 dorsal valve length, with long flanges. [No loop illustrations are available, therefore placement in family is uncertain.] Upper Jurassic: Europe, Russian Platform, Caucasus, Crimea.—**Fig. 1403, 3a–e.** *M. sokolovi, Oxfordian, Russia; dorsal, lateral, and anterior views, ×1 (Makridin, 1964).

**Peculithyris** SMIRNOVA in SMIRNOVA & TEREKHova, 1972, p. 76 [*P. longiusculus; OD*]. Elongate oval, lateral margins flattened, anterior margin uniplicate, valves moderately convex, equally convex along whole surface; beak low, foramen small, permesothyrid; pedicle collar massive, funnel-like, cardinal process small, not lobate, with distinct, longitudinal crenulation; hinge plates thin, inclined to symmetry plane; crural bases distinct, broad, prominent dorsally, oriented with sharp angle to hinge plates; parallel to symmetry plane; inner socket ridges high, distinguishable from hinge plates; dorsal septum short, crural processes broad; loop slender, about half length of dorsal valve, transverse band broad, trapeziform flanges long. Lower Cretaceous: Russia (northeastern Siberia, Khabarovsk region).—**Fig. 1403, la–x.** *P. longiusculus; a–c, dorsal, lateral, and anterior views, ×1; d–x, serial transverse sections 2.0, 2.3, 2.6, 2.8, 3.1, 3.4, 3.7, 4.0, 4.7, 5.2, 6.2, 7.0, 7.4, 9.0, 9.3, 10.3, 10.8, 12.8, 13.1, 14.8, 17.6 mm from first section, ×0.3 (Smirnova & Terekhova, 1972).

**Pteroclystus** BRUCKMAN, 1918, p. 222 (BRUCKMAN, 1914, p. 2, nom. nud.) [*Terebratula polyplecta* BRUCKMAN, 1901, p. 242; OD] [=Oligorhytisia COOPER, 1983, p. 125 (type, *O. magnifica*, OD);
Fig. 1402. Postepithyrididae (p. 2113–2115).
Fig. 1403. Postepithyrididae (p. 2115–2119).
Fig. 1404. Postepithryididae (p. 2115–2119).
Terebratulida—Loboidothyridoidea

Pleuraloma COOPER, 1989, p. 84 (type, P. labiatum, OD); Dioraria COOPER, 1989, p. 97 (type, D. costata, OD). Large, ventribiconvex, subpentagonal to elongate oval, smooth in juveniles, irregular, rounded costae developing anteriorly; anterior commissure rectimarginate to uniplicate, becoming multiplicate, beak short, foramen permesothyrid, symphymytum partly visible; pedicle collar present; cardinal process small, thin, bilobed; outer hinge plates short, narrow, deeply concave; loop about 0.6 dorsal valve length, with strongly webbed, long terminal points; transverse band narrow, strongly arched. Middle Jurassic (Bajocian–Callovian): England, France, Saudi Arabia.——Fig. 1404, a–d. P. polyplecta (BUCKMAN), Bajocian, England; a–c, dorsal, lateral, and anterior views of holotype, ×1 (Muir-Wood, 1965a); d, dorsal valve interior, ×1 (Cooper, 1983).

Pseudoaulacothyris SMIRNOVA, 1990a, p. 93 [*P. pandus; OD]. Medium size, subcircular, slightly biconvex, smooth, with sulcus on dorsal valve, ventral valve carinate; anterior commissure unisulcate, beak low, broad; foramen small, epithyrid; pedicle collar thin; cardinal process concave, bilobate; hinge plates slightly concave, not differentiated from inner socket ridges; loop about 0.5 dorsal valve length. Lower Cretaceous: Russia (northeastern Siberia, Kamchatka).——Fig. 1403, a–v. *P. pandus; a–c, dorsal, lateral, and anterior views of holotype, ×1; d–u, serial transverse sections 0.6, 0.7, 0.9, 1.1, 1.9, 2.1, 3.0, 3.2, 3.9, 4.2, 5.1, 5.3, 6.1, 6.3, 7.0, 7.3, 8.6, 9.4, 11.2 mm from first section, ×1 (new).

Somalithyris MUIR-WOOD, 1935, p. 124 [*S. macfadyeni; OD]. Medium size, subpentagonal to subcircular; ventribiconvex; anterior commissure uniplicate to sulciplicate; beak short, suberect, symphymytum hidden; foramen large, permesothyrid; cardinal process bilobed; loop 0.5 dorsal valve length. Lower Cretaceous (Oxfordian): Somalia, Saudi Arabia.——Fig. 1404, a–c. *S. macfadyeni, Oxfordian, Somalia; dorsal, lateral, and anterior views of holotype, BMNH B 85655, ×1 (Muir-Wood, 1965a).——Fig. 1404, 2d. S. ovata, Kimmeridgian, Saudi Arabia; interior of dorsal valve, ×1 (Cooper, 1989).

Xestosina COOPER, 1983, p. 166 [*X. arguta; OD]. Externally similar to Sellithyris, but with widely triangular loop, 0.5 dorsal valve length, with moderately long terminal points. Upper Jurassic (Kimmeridgian): France.——Fig. 1405, a–d. *X. arguta; a–c, dorsal, lateral, and anterior views, ×1; d, interior of dorsal valve, ×1 (Cooper, 1983).

Family TCHEGEMITHYRIDIDAE

Tchorshevsky, 1972

[Tchegeithyridae TCHORSZHEVSKY, 1972, p. 36]

Small to large, smooth, rectimarginate to uniplicate to sulciplicate, crural processes anterior of midloop, outer hinge plates attached dorsally to crural bases; loop long, with long flanges; transverse band with narrow bridge; loop development may be complex. Middle Jurassic (Callovian)–Upper Jurassic (Oxfordian).

Subfamily TCHEGEMITHYRIDINAE

Tchorshevsky, 1972

[Tchegeithyridinae TCHORSZHEVSKY, 1972, p. 36]

Loop about 0.6 dorsal valve length. Middle Jurassic (Callovian)–Upper Jurassic (Oxfordian).

Tchegeithyris TCHORSZHEVSKY, 1972, p. 36 [*T. tchegemensis MOISSEEV, 1934, p. 97; OD]. Small to medium size, subcircular to subpentagonal; strongly biconvex or globose, anterior commissure uniplicate; beak strongly incurved, symphymytum short; foramen mesothyrid or epithyrid, pedicle collar weakly developed; outer hinge plates thick, crural processes derived from anterior margin of hinge plates. Middle Jurassic (Callovian)–Upper Jurassic (Oxfordian): Turkmenia, Caucasus, Lebanon, Syria.——Fig. 1406, a–u. *T. tchegemensis (MOISSEEV), Oxfordian, Caucasus; a–c, dorsal, lateral, and anterior views, ×1 (Moisseev, 1934); d–u, serial transverse sections 1.0, 3.5, 4.25, 5.3, 6.2, 6.8, 7.3, 8.15, 9.0, 9.85, 10.1, 10.5, 11.35, 12.65, 13.25, 14.3, 16.45, 16.75 mm from first section, ×1 (Tchorshevsky, 1972); v, reconstruction of loop, ×3.5 (Cooper, 1983).

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Subfamily
TURKMENITHYRIDINAE
Tchorshevsky, 1974

[Turkmenithyridae Tchorshevsky, 1974, p. 50]
Loop about 0.3 dorsal valve length. Upper Jurassic.

Turkmenithyris PROSOROVSKAJA, 1962, p. 109 [*T. krimholzi; OD] [=Bebrutella TCHORSHEVSKY, 1972, p. 40 (type, B. bejrutica, OD)]. Medium to large, subpentagonal, ventribiconvex, strongly uniplicate to sulciplicate; beak incurved, concealing symphysis, foramen large, mesothyrid; pedicle collar present; cardinal process large, bilobed; hinge plates short, slightly concave, posteriorly U-shaped, becoming V-shaped anteriorly; crural processes high, their ventral ends deflected laterally, loop short (about 0.3 dorsal valve length), widely triangular, transverse band thin, strongly arched, loop flanges very long. Upper Jurassic: Turkmenia, Crimea, Lebanon, Syria.——Fig. 1406, 2a–e. *T. krimholzi, Turkmenia; a–c, dorsal, lateral, and anterior views of holotype, x1; d–v, serial transverse sections 2.2, 6.6, 6.8, 8.0, 8.1, 9.2, 9.6, 10.0, 10.5, 10.6, 10.9, 11.4, 12.0, 13.2, 14.0, 15.4, 16.0, 18.2 mm from ventral umbo, x1; e, reconstruction of loop, x1 (Proсоровская, 1962).

Family TEGULITHYRIDIDAE
Muir-Wood, 1965

[Tegulithyrididae Muir-Wood, 1965a, p. 801]
Smooth or rarely capillate, anterior commissure biplicate or parasulate. Lower Jurassic (Toarcian)–Middle Jurassic (Callovian).

Tegulithyris BUCKMAN, 1918, p. 123 (Buckman, 1915, p. 78, nom. nud.) [*Tebratula bentleyi DAVIDSON, 1851, p. 58; OD]. Medium size, subpentagonal, ventribiconvex; anterior commissure strongly biplicate; dorsal sulcus becoming median fold, and angular folds separating deep ventral sulcus from concave flanks; smooth or rarely capillate; beak long, erect; foramen large, permesothyrid; symphysis exposed; cardinal process small, bilobed; outer hinge plates short, narrow, concave, may be thickened, attached dorsally to crural bases; crura short, loop long, 0.5 dorsal valve length, transverse band strongly arched, medially flattened, protuberant, with short flanges. Middle Jurassic (Bathonian–Callovian): England, France, Germany, Russia.——Fig. 1407, 1a–e. *T. bentleyi (Davidson), Callovian, England; a–d, dorsal, ventral, lateral, and anterior views, x1; e, dorsal valve interior, x2 (Cooper, 1983).

Prototegulithyris ALMÉRAS, ELMI, & BENSHTILL, 1988, p. 67 [*P. khadijae; OD]. Description as for Tegulithyris, but smooth, rounded pentagonal in outline, and anterior commissure gently parasulate. Lower Jurassic (Toarcian)–Middle Jurassic (Aalenian): Morocco, Sicily, Italy, Bavaria.——Fig. 1407, 3a–q. *P. khadijae, Toarcian, Morocco; a–c, dorsal, lateral, and anterior views of holotype, FSL 306466, x1; d–q, serial transverse sections 1.2, 4.4, 5.1, 5.6, 7.6, 8.2, 8.4, 8.6, 9.8, 10.8, 11.0, 11.2, 12.0, 12.7 mm from ventral umbo, x1 (Alméras, Elmi, & Benshtill, 1988).

Family ALABUSHEVOVYTHYRIDIDAE
Smirnova, 1994

[Alabushevothyrididae Smirnova, 1994, p. 40]
Biconvex, smooth, rectimarginate, dental plates massive, diverging; cardinal process trilobate, loop anteriorly spinose. Lower Cretaceous.

Alabusheothyris SMIRNOVA, 1994, p. 41 [*A. angusta; OD]. Medium size, elongate oval; beak erect, interarea high; beak cavities fused with callus; cardinal process trilobed, strongly grooved; loop about 0.5 length of dorsal valve. Lower Cretaceous: Russia (Kamchatka).——Fig. 1407, 2a–v. *A. angusta; a–c, dorsal, lateral, and anterior views of holotype, MGU138/350, x1; d–v, serial transverse sections 0.0, 0.2, 0.6, 1.5, 2.0, 4.0, 4.8, 5.8, 6.8, 7.6, 8.6, 9.0, 9.3, 9.8, 10.8, 12.0, 13.0, 14.4, 16.4 mm from first section, x1 (new).

Family CLATHRITHYRIDIDAE
Smirnova, 1974

[Clathrithyrididae Smirnova, 1974, p. 47]
Smooth or with reticulate ornament, unisulcate; dental plates present; inner hinge plates may be present; adult loop deltidiform; loop ontogeny may involve septal pillar in early stages. Lower Cretaceous.

Clathrithyris SMIRNOVA, 1974, p. 48 [*C. clathriensis; OD]. Medium size, dorsibiconvex with deep dorsal sulcus and prominent, ventral median fold; growth lamellae squamose and overlapping, radial costae thin, low, flattened, ornament reticulate; beak erect; foramen small, epiphytid, deltidial plates conjunct; beak cavity infilled with callus; dental plates broad, pedicle collar present; no cardinal process, hinge plates broad, inclined; deep septalium consisting of high median septum and wide, inner hinge plates; septalium infilled with callus in adult shells; crural bases massive, fused with inner hinge plates; crural processes broad; adult loop about 0.5 length of valve, anteriorly spinose, transverse band broad, flattened. Lower Cretaceous: Russia (Kamchatka).——Fig. 1408, 3a–w. *C. clathriensis; a–c, dorsal, lateral, and anterior views of holotype, MGU 138/331, x1; d, closeup of ornament, x5; e–v, serial transverse sections 0.8, 1.0, 1.8, 2.2, 2.7, 2.8, 3.1, 3.3, 3.8, 4.4, 5.1, 5.8, 6.2, 6.9, 7.7, 8.1, 8.9, 10.8.
Fig. 1406. Tchegeemithryididae (p. 2119–2120).
Fig. 1407. Tegulithryidae and Alabushevothyrididae (p. 2120).
Fig. 1408. Clathrithryididae and Trigonithryididae (p. 2120–2129).
Family HARPOTOTHYRIDIDAE
Smirnova, 1990

[Harpotothyrididae Smirnova, 1990b, p. 53]

Medium to large, smooth; biconvex, pedicle collar present; cardinal process small, crural bases broad, concave, inclined almost perpendicularly to hinge plates; loop with long flanges. Lower Cretaceous.

Harpotothyris Smirnova, 1990b, p. 53 [*H. karakhbadensis; OD]. Elongate oval to rounded trigonal; anterior commissure rectimarginate to uniplicate; beak high, strongly incurved; cardinal process small, concave, often medially convex; crural bases high, crescent shaped in section, inclined almost perpendicularly to narrow, flattened hinge plates; short median ridge present; transverse band of loop thin, flanges long, slender. Lower Cretaceous: Kazakhstan.—Fig. 1409, a–w. *H. karakhbadensis; a–c, dorsal, lateral, and anterior views of holotype, MGU 139/700, x1; d–w, serial transverse sections 0.0, 0.3, 0.5, 0.7, 0.9, 1.1, 1.3, 1.5, 1.7, 1.9, 2.1, 2.3, 2.5, 2.7, 2.9, 3.1, 3.3, 3.5, 3.7, 3.9, 4.1, 4.3, 4.5, 4.7, 4.9, 5.1, 5.3, 5.5, 5.7, 5.9, 6.1, 6.3, 6.5, 6.7, 6.9, 7.1, 7.3, 7.5, 7.7, 7.9, 8.1, 8.3, 8.5, 8.7, 8.9, 9.1, 9.3, 9.5, 9.7, 9.9, 10.1, 10.3, 10.5, 10.7, 10.9, 11.1, 11.3, 11.5, 11.7, 11.9 mm from first section, approximately x1 (new).

Atelithrys Smirnova, 1975c, p. 77 [*A. cretensis; OD]. Elongate oval, slightly uniplicate; beak long, foramen large, epithyrid, beak ridges rounded; cardinal process low, hinge plates slightly inclined, flattened; inner socket ridges indistinct, crural processes high; loop about 0.5 dorsal valve length, transverse band slender, strongly arched, flanges long. Lower Cretaceous (Hauterivian): Russia (Russian Platform).—Fig. 1409, 2a–d. *A. cretensis; a–c, dorsal, lateral, and anterior views of holotype, MGU 138/477, x1; d, reconstruction of loop, x1 (Smirnova, 1975c).

Convexothyris Smirnova, 1994, p. 37 [*C. tylokrilica; OD]. Large, elongate oval, anterior commissure rectimarginate to slightly uniplicate, beak massive, incurved; cardinal process small; hinge plates broad, ventrally convex, crural bases concave with pointed dorsal ends; dorsal septal platform may be developed, loop with long flanges, transverse band trapeziform in section. Lower Cretaceous: Russia (Kamchatka).—Fig. 1409, 4a–c. *C. tylokrilica; dorsal, lateral, and anterior views of holotype, MGU 138/518, x1 (Smirnova, 1994).

Lissothyris Smirnova, 1987, p. 35 [*L. piriformis; Smirnova, 1987, p. 37; OD]. Large, subpentagonal, anterior commissure uniplicate to biplicate; beak high, foramen large; pedicle collar not seen; cardinal process low, broad; hinge plates broad, parallel to valve floor, slightly demarcated from inner socket ridges; crural bases with strongly concave inner surface and high, sharp, ventral ends; short dorsal ends of crural bases almost fused with hinge plates; transverse band strongly curved, rectimarginate in section; loop slender with long flanges; cardinal structures may be fused with calix. Lower Cretaceous: Russia (Russian Platform).—Fig. 1409, 3a–c. *L. piriformis; dorsal, lateral, and anterior view of holotype, MGU 139/547, x1 (Smirnova, 1987).

Okathyris Smirnova, 1975c, p. 71 [*O. chevkinensis; OD]. Medium size, subcircular, slightly unisulcate or bisulcate; foramen epithyrid, beak ridges obscure; cardinal process low, slightly concave; hinge plates narrow, steeply inclined to plane of symmetry; inner socket ridges high, crural bases inclined to hinge plates; crural processes long; loop about 0.5 dorsal valve length, transverse band broadly arched. Lower Cretaceous (Berriasian): Russia (Russian Platform), England.—Fig. 1409, 1a–d. *O. chevkinensis; a–c, dorsal, lateral, and anterior views of holotype, MGU 139/91, x1 (Smirnova, 1975c); d, loop reconstruction, x1 (Cooper, 1983).

Family MAMETOTHYRIDIDAE
new family

[Mametothyrididae Smirnova & Lee, herein] [type genus, Mametothyris Smirnova in Smirnova & Pergament, 1969, p. 34]

Large, smooth, anterior commissure rectimarginate, foramen small, no pedicle collar, crural bases fused with hinge plates, loop long with long flanges. Lower Cretaceous (Albian).

Mametothyris Smirnova in Smirnova & Pergament, 1969, p. 34 [*M. mameca; OD]. Rounded trigonal, beak short, incurved, cardinal process low, concave, hinge plates ventrally concave; loop slender, long, 0.5 dorsal valve length; transverse band high, rounded. Lower Cretaceous (Albian): Russia (Kamchatka).—Fig. 1410a–x. *M. mameca; a–c, dorsal, lateral, and anterior views of holotype, MGU 138/64, x1; d–x, serial transverse sections 0.3, 0.5, 0.8, 1.4, 2.1, 2.3, 2.8, 3.3, 3.6, 3.8, 5.2, 5.4, 6.9, 7.2, 7.6, 8.1, 8.6, 9.9, 11.1, 11.7, 12.9 mm from first section, x2 (Smirnova & Pergament, 1969).

Penzhinothyris Smirnova in Smirnova & Pergament, 1969, p. 36 [*P. plana; OD]. Subcircular, thick shielded, slightly biconvex or dorsisbiconvex, beak slightly incurved, beak ridges sharp; interarea high, smooth; cardinalia massive, cardinal process trilobed, hinge plates inclined to symmetry plane, demarcated from inner socket ridges by a groove; loop long; more than 0.5 dorsal valve length; transverse band broad, high, trapeziform in section; loop flanges long; septal platform massive, consisting of three ridges. Lower Cretaceous (Albian): Russia (Kamchatka).—Fig. 1411a–r. *P. plana; a–c, dorsal, lateral, and anterior views of holotype, MGU 138/63, x1; d–r, serial transverse sections 0.2, 2.1, 4.1, 5.4, 6.3, 6.9, 8.0, 8.1, 9.2, 9.4, 10.6, 11.4, 13.2, 14.6, 16.1 mm from first section, x1.5 (Smirnova & Pergament, 1969).
Fig. 1409. Harpotothyrididae (p. 2124).
Family SPASSKOTHYRIDIDAE
Smirnova, 1977

Medium to large, smooth, pedicle collar may be present; crural bases with well-developed ventral and dorsal ends, inner hinge plates may be present; loop narrow with long flanges. Lower Cretaceous.

Spasskothyris Smirnova, 1975c, p. 74 [*S. rjasanensis; OD]. Large, elongate oval; slightly bisulcate; beak long; foramen large, epithyrid; pedicle collar rounded; cardinal process low; crural bases with long ventral and dorsal extremities separating inner and outer hinge plates, and in contact with floor of dorsal valve, much reduced anteriorly; ventral extremities of crural bases forming ridgelike projections adjacent to hinge plates, passing into inner hinge plates; outer hinge plates broad, concave; crural bases and crural processes concave; loop narrow, 0.5 to 0.6 length of dorsal valve; flanges very long. Lower Cretaceous (Berriasian): Russia (Russian Platform).——Fig. 1412a–cc. *S. rjasanensis; a–c, dorsal, lateral, and anterior views of holotype, MGU 139/65; d, reconstruction of loop, ×1; e–cc, serial
transverse sections 0.0, 0.2, 6.2, 7.2, 7.7, 8.0, 8.5, 9.0, 10.2, 10.7, 11.3, 11.7, 13.0, 13.7, 14.7, 16.2, 17.9, 18.7, 19.1, 20.3, 21.5, 23.6, 26.3, 29.3 mm from first section, ×1 (Smirnova, 1975c).

Volgathyris SMIRNOVA, 1987, p. 38 [*V. sublatus; OD]. Rounded-pentagonal, biconvex, uniplicate; beak massive, foramen large; no pedicle collar; hinge teeth large, wedge shaped with distinct denticulum; cardinal process narrow, denticulated; hinge plates dorsally inclined to midvalve, planar, gradually transformed into broad socket ridges at right angles to crural bases; crural bases broad with long ventral and shorter dorsal ends, inclined to symmetry plane with sharp angle; crural processes broad; loop narrow with thin branches, transverse band highly trapeziform, flanges long. Lower Cretaceous: Russia (Russian Platform).——Fig. 1413a–u. *V. sublatus; a–c, dorsal, lateral, and anterior views of holotype, MGU139/509, ×1; d–u, serial transverse sections 1.1, 1.6, 2.0, 2.4, 2.6, 2.8, 3.2, 3.5, 4.0, 4.6, 5.0, 7.8, 9.1, 11.9, 12.5, 14.4, 15.4, 16.4 mm from first section, ×1 (Smirnova, 1987).

Fig. 1411. Mametothyrididae (p. 2124).
Family TRIGONITHRYIDIDAE
Radulović, 1986

Medium to large, smooth, biconvex, anterior commissure rectimarginate to slightly unisulcate, foramen large, no pedicle collar; outer hinge plates broad, subhorizontal to dorsally inclined; crura long and narrow, loop narrow, thin, about 0.4 to 0.5 dorsal valve length. Middle Jurassic (Bajocian)—Upper Jurassic (Oxfordian).

*Trigonithrys* Muir-Wood, 1935, p. 131 [*T. eruduensis*; OD]. Medium size, trigonal, anterior commissure rectimarginate; beak short, foramen...
epithryid, symphytium visible; cardinal process broad, medianly depressed, with posterior umbonal cavity; outer hinge plates well developed, horizontal or becoming slightly convex ventrally; crura long and narrow, crural processes well anterior of outer hinge plates; loop about 0.5 dorsal valve length, not known fully. Upper Jurassic (Oxfordian): Somalia. ——Fig. 1408, 2a–m. *T. eruduensis; a–c, dorsal, lateral, and anterior views, ×1; d–m, serial transverse sections, no measurements available, ×1 (Muir-Wood, 1965a).

_Lazithyris_ RADULOVIC, 1986, p. 45 [*L. andjelkovici; OD]. Medium to large, circular to elongate oval, anterior commissure rectimarginate to slightly unisulcate; beak short, narrow, erect, foramen hypothyrid; symphytium short; deltoidal plates weakly developed, disjunct; cardinal process bilobate; loop about 0.4 dorsal valve length, not known fully. Middle Jurassic (Bajocian–Bathonian): Yugoslavia (Carpathians, Balkanides). ——Fig. 1408, 1a–o. *L. andjelkovici; a–e, dorsal, lateral, and anterior views of holotype, ×1; f–o, serial transverse sections 2.5, 3.5, 4.1, 4.7, 4.9, 5.5, 5.7, 5.9, 6.1, 6.3, 6.7, 7.5 mm from ventral umbo, ×1.6 (Radulovic, 1986).

**Family UNCERTAIN**

**Subfamily GONIOTHYRIDINAE**

Tchorshevsky, 1971

_medium to large, beak short, strongly truncated, dorsal valve strongly convex; loop long, outer hinge plates convex ventrally. Middle Jurassic (Aalenian–Bajocian)._
Goniothyris Buckman, 1918, p. 117 (Buckman, 1914, p. 2, nom. nud.) [*Terebratula gravida Szajnocha, 1881, p. 74; OD]. Trigonal to subpentagonal, strongly dorsibiconvex, ventral valve convex to carinate, anterior commissure rectimarginate; foramen epithyrid to permesothyrid, symphymy narrow; pedicle collar very short; cardinal process very small, hinge plates in section convex ventrally and deflected dorsally, keeled; loop of type species unknown; loop of *G. poleymiensis* moderately long, narrow, with broad transverse band, crural processes near midloop, terminal points. Moderately long. *Middle Jurassic* (Aalenian–Bajocian): England, France, Czech Republic, Slovakia, Austria, Hungary, Transcarpathia. ——Fig. 1414.1a–d. *G. gravida* (Szajnocha), Carpathians; holotype, dorsal, ventral, lateral, and anterior views, ×1 (Szajnocha, 1881).

Subfamily HETEROBROCHINAE

Cooper, 1983

[†Heterobrochinae Cooper, 1983, p. 42]

Medium size, subpentagonal, anterior commissure sulciplicate, loop wide angled, crural processes posterior of midloop, outer hinge plates ventrally attached to crural bases, transverse band broad, medially protuberant. *Upper Jurassic* (Kimmeridgian).

Heterobrochus Cooper, 1983, p. 89 [*H. incultus Cooper, 1983, p. 90; OD]. Large, subpentagonal, smooth, beak short, erect; foramen large, permesothyrid; cardinal process small, bilobed; outer hinge plates small, flattened to concave, attached to ventral edge of crural bases; loop very wide. *Upper Jurassic* (Kimmeridgian): Germany. ——Fig. 1414.3a–d. *H. incultus*; a–c, dorsal, lateral, and anterior views, ×1; d, closeup of loop, ×2 (Cooper, 1983).

Subfamily PSEBAJITHYRIDINAE

Tchorszhevsky, 1974

[†Psebajithyridinae Tchorszhevsky, 1974, p. 47]

Medium to large, uniplicate to weakly sulciplicate, loop short, narrow, about 0.3 dorsal valve length, outer hinge plates attached to ventral edges of crura, transverse band broad, nearly horizontal; transverse band developing from vertical plate of acuminate (centronelliform) loop. *Upper Jurassic*.

Psebajithyris Tchorszhevsky, 1974, p. 48 [*P. rostovtsevi; OD]. Large, oval to subpentagonal, anterior commissure uniplicate, beak thick, strongly curved, foramen large, oval, beak ridges rounded; pedicle collar short; cardinal process very small, delicate, oval; outer hinge plates delicate, rather long, hooklike, dorsally curved. *Upper Jurassic* (Oxfordian): northwestern Caucasus, Russia. ——Fig. 1415,5a–c. *P. rostovtsevi*, Crimea; a–c, dorsal, lateral, and anterior views, ×1; d–i, serial transverse sections 3.6, 3.7, 3.9, 4.1, 4.4, 5.2, 5.7, 5.8, 6.5, 6.8, 7.0, 7.45, 7.75, 8.3, 8.55, 8.75 mm from first section, ×1 (adapted from Tchorszhevsky, 1974).

Placothyris Westphal, 1970, p. 38 [*Terebratula rollieri Haas, 1893, p. 124; OD]. Medium to large, elongate subpentagonal, ventribiconvex; anterior commissure uniplicate to sulciplicate, beak labiate; pedicle collar present, hinge plates pendant; loop 0.3 valve length, with broad transverse band and blunt crural processes. *Upper Jurassic*: Germany, Switzerland, France. ——Fig. 1414.4a–n. *P. rollieri* (Haas), Oxfordian, Switzerland; a–c, dorsal, lateral, and anterior views, ×1; d–m, serial transverse sections 0.5, 1.2, 1.7, 2.5, 3.3, 3.6, 4.2, 4.9, 5.3, 5.5, 5.7 mm from ventral umbo, ×1 (Boullier, 1976); n, oblique view of silicified loop, ×2 (Cooper, 1983).

Unkurithyrella Ovtsharenko, 1991, p. 75 [*U. unkuriensis; OD]. Small to large, subcircular, strongly biconvex or planoconvex, uniplicate, cardinal process small, flat; outer hinge plates planar, loop short, with short flanges. *Upper Jurassic*: Pamirs. ——Fig. 1411.2a–i. *U. unkuriensis*; a–c, dorsal, lateral, and anterior views, ×1; d–m, serial transverse sections 0.5, 1.2, 1.7, 2.5, 3.3, 3.6, 4.2, 4.9, 5.0, 5.2 mm from first section, ×1 (Ovtsharenko, 1991).

Family and Subfamily UNCERTAIN

Gibbithyrella Ovtsharenko, 1989, p. 87 [*G. kurtenisi; OD]. Medium size, strongly biconvex, anterior commissure bisulcate, beak ridges rounded, foramen small, oval, mesothyrid; hinge plates broad; crural bases dorsally curved; loop about 0.3 dorsal valve length, loop flanges short. *Middle Jurassic*: Tadzhikistan (Pamirs). ——Fig. 1415.2a–i. *G. kurtenisi*; a–c, dorsal, lateral, and anterior views, ×1; d–i, serial transverse sections 0.1, 1.2, 3.0, 3.5, 4.7, 5.2 mm from first section, ×1 (Ovtsharenko, 1989).

Jaisalmieria Sahni & Bhatnagar, 1958, p. 421 [*J. taylori; OD]. Small to medium size, biconvex, finely capillate; anterior commissure rectimarginate to uniplicate to bisulcate; beak ridges angular; foramen small, submesothyrid; deltidial plates disjunct; loop unknown. *Upper Jurassic*: India, Pakistan. ——Fig. 1415.3a–d. *J. taylori*, India; a–c, dorsal, lateral, and anterior views, ×1; d, dorsal valve showing capillae, ×1 (Muir-Wood, 1965a).

Kendzhilgitthys Ovtsharenko, 1983b, p. 82 [*K. kendzhilgits; OD]. Medium size, subrounded, beak short, anterior commissure rectimarginate; pedicle collar present; cardinal process small, outer hinge plates broad, horizontal or slightly curved, loop narrow, with long, diverging flanges. *Lower Jurassic*: Tadzhikistan, Pamirs. ——Fig. 1415.7a–m. *K. kendzhilgits*, Tadzhikistan; a–c, dorsal, lateral, and anterior views, ×1; d–m, serial transverse sections 2.4, 2.8, 3.1, 4.0, 4.8, 5.0, 6.0, 7.6, 8.3, 8.7 mm from ventral umbo, ×1 (new).
Fig. 1414. Uncertain (p. 2130).
Fig. 1415. Uncertain (p. 2130–2133).
Medium to small, subpentagonal in outline; capit- 
late; rectimarginate; interior details uncertain. Upp- 
er Triassic: China (Sichuan).——FIG. 1416, 1a–d.
*L. striata*: a–c, dorsal, lateral, and anterior views, 
×1; d, close-up of shell ornament, ×2 (Xu, 1978).

?Magarithrysis FARAG & GAUTNAD, 1962, p. 77 [*M. 
triplicata; OD]. Medium size, globose, said to be 
closely related to Parathyridina, but shell more elon- 
gate, folding uniplicate, triplicate, or multiplicate.
[Genus based on one imperfectly preserved speci-
men; internal characters unknown.] Middle Jurassic 
(Bathonian): Egypt, ?Saudi Arabia.——FIG. 
1415, 8a–c. *M. triplicata*: dorsal, lateral, and anter-
ior views, ×1 (Farag & Gautnad, 1962).

Naradanithyris TOKUYAMA, 1958a, p. 2 [*N. 
kuratai; OD]. Small to medium size, oval to pentagonal, 
shell rarely capitate; biconvex, anterior commissure 
angularely biplicate, beak short, incurved, foramen 
large, possibly mesothyrid or permesothyrid; 
symphymytum short, usually concealed; beak ridges 
obscur; no pedicle collar; cardinal process short, 
wide, hinge plates in section inclined dorsally, sepa-
rated from inner socket ridges by shallow sulcus; 
loop less than 0.5 dorsal valve length; internal char-
acters poorly known. Middle Jurassic (Bajocian)— 
Upper Jurassic: Japan, ?Pamirs—Bathonian; Asia, 
Upper Jurassic.——FIG. 1416, 2a–c. *N. 
kuratai*: Japan, dorsal, lateral, and anterior views of 
holotype, ×1 (Tokuyama, 1958a).

Neumayrithyris TOKUYAMA, 1958b, p. 120 [*N. 
torinouensis; OD]. Medium size, smooth, biconvex, 
anterior commissure uniplicate, beak short, 
suberect to incurved, beak ridges rounded, foramen 
permesothyrid; cardinal process short, medianly de-
pressed, commonly with posterior umbonal cavity; 
hinge plates in section almost horizontal, merging 
into socket ridges; crural bases given off ventrally at 
angle to hinge plates. Middle Jurassic—Upper Jurassic: 
Europe, Middle Jurassic: Crimea, Japan, Sarawak, 
Upper Jurassic.—FIG. 1415, 1a–l. *N. 
torinouensis*: Upper Jurassic, Japan; a–c, dorsal, lat-
eral, and anterior views of holotype, ×1; d–l, serial transverse sections 0.5, 1.05, 1.55, 1.95, 2.05, 2.2, 2.65, 2.75, 3.05 mm from first section, ×1 (Tokuyama, 1958b).

Pamirothyris DAGYS, 1974, p. 195 [*Lobothyris 
kuhschini DAGYS, 1963, p. 184; OD]. Small, smooth, 
biconvex, anterior commissure rectimarginate, beak 
incurved; foramen mesothyrid to permesothyrid; 
pedicle collar short, cardinal process low; hinge 
plates wide, lying in plane of valves, crural bases 
developed poorly, crura narrow, loop short (0.3 
dorsal valve length), extremities rounded. Triassic 
(Norian–Rhuanian): Pamir.——FIG. 1415, 4a–j. *P 
kuhschini (DAGYS): a–h, dorsal and lateral views of 
holotype, IGIG 200/62, ×1; c–j, serial transverse 
sections 0.0, 2.1, 3.4, 3.8, 4.4, 5.0, 6.1, 6.5 mm 
from first section, ×1 (Dagys, 1963).

Rarithyris TCHORSZHEVSKY, 1989a, p. 79 [*R. rarus; 
OD]. Small, strongly biconvex, smooth, anterior 
commissure unislicate, beak short, incurved; fora-
men small, epitheylid, deltidia plates conjunct; 
cardinal process small, pedicle collar thin; outer hinge 
plates broad, horizontal or inclined dorsally, crura 
slender, arc shaped, loop short (about 0.25 dorsal 
valve length), rounded, transverse band low, wide. 
Upper Jurassic (Tithonian): Carpathians.——FIG. 
1416, 3a–k. *R. rarus*: a–c, dorsal, lateral, and anter-
or views of holotype, Kharkov University 10/ 
5056, ×1; d–k, serial transverse sections 0.6, 1.3, 
1.7, 4.0, 4.2, 4.4, 4.7, 4.8 mm from first section, 
×2 (Tchorszhevsky, 1989a).

Rugithyris BUCKMAN, 1918, p. 127 (BUCKMAN, 1915, 
p. 79, nom. nud.) [*Terebratula subombogaster 
BUCKMAN, 1901, p. 259; OD]. Medium size, plano-
convex, surface ornament of squamose growth 
lamellae; anterior commissure rectimarginate to 
uniplicate or sulciplicate; beak incurved, foramen 
permesothyrid; cardinal process short, lobate; hinge 
plates narrow, slightly concave; loop not fully 
known. Middle Jurassic (Bajocian): England, ?Rus-
sia.——FIG. 1415, 6a–c. *R. subombogaster 
(Buckman), England; dorsal, lateral, and anterior 

Taurothyris KIYANSEP, 1961, p. 27 [*T. avundaeni; 
OD]. Large, biconvex, elongate oval, smooth but 
decorticated shell capitate; anterior commissure 
rectimarginate to uniplicate; beak very small, 
suberect, tapering; symphytium exposed; cardinal 
process massive, bilobate; hinge plates and inner 
socket ridges in section slightly deflected ventrally 
and slightly concave; crural bases given off ven-
trally; loop possibly short, triangular, not fully 
known. Upper Jurassic (Oxfordian): Crimea, Rus-
sia.—FIG. 1416, 4a–k. *T. avundaeni*: a–c, dor-
sal, ventral, and lateral views, ×1 (Kyansep, 1961); 
d–k, serial transverse sections 0.0, 0.2, 0.9, 1.4, 1.5, 
1.8, 1.9, 2.1 mm from first section, ×1 (Muir-

Trichothyris BUCKMAN, 1919, p. 125 (BUCKMAN, 1915, 
p. 78, nom. nud.) [*Dicyothiris compressa KITCHEN, 
1897, p. 28; OD]. Small, biconvex, finely capitate, 
anterior commissure uniplicate to parasulciplicate; 
beak short, foramen large, epithyrid, with discrete 
deltidial plates. Internal features unknown. Middle 
Jurassic (Callovian): Pakistan.—FIG. 1415, 5a–d. 
*T. compressa (KITCHEN): dorsal, ventral, lateral, 

Tshemarythrysis OVTSHARENKO, 1983a, p. 38 [*T. 
shemarenensis; OD]. Small, subtrigonal, biconvex, 
anterior commissure slightly bisulculate, beak short, 
foramen mesothyrid; pedicle collar small; outer 
hinge plates broad, loop about 0.3 dorsal valve 
length, loop narrow, with long flanges. Upper Juras-
sic: Tadzhikistan, Pamirs.——FIG. 1417, 2a–m. *T. 
shemarenensis*: Tadzhikistan; a–c, dorsal, lateral, and 
anterior views; d–m, serial transverse sections 2.8, 
3.4, 3.9, 4.3, 4.5, 5.3, 5.6, 6.0, 6.35, 6.9 mm from 
ventral umbo, ×1 (new).

Vialithyris VOROS, 1978, p. 62 [*Terebratula 
ozaszenensis PARONA, 1880, p. 196; OD]. Medium 
to large, subpentagonal to subcircular, ventribi-
convex, capitate; anterior commissure broadly
unisulcate; foramen large, mesothyrid to permesothyrid; pedicle collar long; outer hinge plates thin, horizontal in section; crural bases given off dorsally; crural processes small, poorly defined; loop short (0.25 dorsal valve length), narrow, with fairly long terminal points; loop supported by variable narrow plates resting on valve floor. *Lower Jurassic (Pliensbachian): Italy, Hungary.* —Fig. 1417, 1a–p. *V. gozzanensis* (Parona); a–c, dorsal, lateral, and anterior views, ×1; d–p, serial transverse sections 1.30, 1.65, 2.0, 2.2, 2.3, 2.5, 3.4, 3.9, 4.5, 4.7, 5.0, 5.3, 5.9 mm from ventral umbo, ×1 (Vörös, 1978).

**Weldonithyris** Muir-Wood, 1952, p. 130 [*W. weldonensis*; OD]. Small to medium size, biconvex,
Terebratulida—Loboidothyridoidea

smooth, anterior commissure uniplicate to sulciplicate, beak incurved in adult, foramen large, epithyrid, labiate, concealing symphytium; cardinal process low, medianly depressed; hinge plates and inner socket ridges in section slightly deflected dorsally, gently concave, keeled; loop approximately 0.3 dorsal valve length, high arched, with medianly horizontal transverse band. Middle Jurassic (Bajocian): England.—Fig. 1417, a–p. W. weldonensis; a–c, dorsal, lateral, and anterior views of holotype, SM J34,866, ×1; d–p, incomplete serial transverse sections of posterior region of shell, no distances given, ×1 (Muir-Wood, 1952).

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DYSCOLIOIDEA

D. E. Lee

[University of Otago]

Superfamily
DYSCOLIOIDEA
Fischer & Oehlert, 1891


Adult shells small to very large; commonly biconvex, rarely planoconvex; may be subtriangular to subrounded in outline; commonly smooth but may be finely capillate; foramen commonly mesothyrid or permesothyrid; anterior commissure rectimarginate, unisulcate, or with dorsal median sulcus and ventral fold posteriorly, sometimes developing as two lateral lobes in young and fusing in adult to enclose median perforation; no median septum or dental plates; cardinal process commonly small; hinge plates poorly defined; crural processes anterior of midloop; transverse band nearly horizontal or directed anteriorly, anterolateral extremities of loop rounded or subangular; living species strongly spiculate. Upper Cretaceous (Cenomanian)–Holocene.

Family DYSCOLIIDAE
Fischer & Oehlert, 1891

[Dyscoliidae Fischer & Oehlert, 1891, p. 23]

Small to very large, smooth or capillate, capillae often in zigzag pattern; loop short, variable, commonly with thin, narrow transverse band that is horizontal or directed anteriorly; outer hinge plates often poorly defined; crural bases indistinct posteriorly; crural processes anterior of midloop. Lower Cretaceous–Holocene.

Subfamily DYSCOLIIINAE
Fischer & Oehlert, 1891


Medium to very large, exterior smooth or with fine, zigzag capillae; anterior commissure rectimarginate; beak commonly truncated, labiate; loop short, scooplke, outer hinge plates poorly defined; crural bases indistinct posteriorly; crural processes anterior of midloop; transverse band nearly horizontal or directed anteriorly, anterolateral extremities of loop rounded or subangular; living species strongly spiculate. Upper Cretaceous (Cenomanian)–Holocene.

Dyscolia Fischer & Oehlert, 1890, p. 70 [*Terebratula wyvilli* Davidson, 1878b, p. 436; OD; emend., Fischer & Oehlert, 1891, p. 70]. Medium to very large, subtriangular to elongate oval; ventribiconvex; surface smooth or with fine, zigzag capillae; beak short, suberect, often truncated or labiate; foramen large, epithyrid to submesothyrid; symphytium almost concealed; pedicle collar long, anteriorly excavated; cardinal process not developed, diductor muscles attached to apical pit; outer hinge plates very weakly developed; crural processes weak, blunt; loop small (less than 0.3 dorsal valve length), thin, with rounded, anterolateral extremities; lophophore small, modified schizolophe; spicules very abundant; four main mantle canals in each valve, branching pattern pinnate. Neogene (Pliocene)–Holocene.

Goniobrochus Cooper, 1983, p. 260 [*Dyscolia ewingi* Cooper, 1973b, p. 19; OD]. Large, subcircular; surface ornament of radial, zigzag capillae; beak truncated, suberect, labiate; foramen large, mesothyrid to submesothyrid; pedicle collar short; crural process not developed, diductor muscles attached to apical pit; sockets wide; crural bases narrow troughs between weakly developed, narrow hinge plates and stout socket ridges; crura short, narrow; loop wide, almost square in outline. Holocene–off Argentina.—Fig. 1419a–d. *G. ewingi* (Cooper); a–c, dorsal, lateral, and anterior views of holotype, USNM 550461a, x1; d, valves separated showing mantle canals and imperfect loop, Caribbean, x1 (Muir-Wood, 1965a); e, interior of dorsal valve, off northwest Africa, x1 (Cooper, 1983).

Moraviaturia Sahni, 1960, p. 19 [*Terebratula diphimorpha* Stoliczka, 1872, p. 25; OD]. Large, subtriangular, ventribiconvex; anterior margin geniculate; surface capillate with steplike growth lamellae; beak massive, slightly incurved, symphytium narrow; foramen large, beak ridges obscure; internal characters unknown, probably dyscoliid. Upper
Cretaceous (Cenomanian): southern India. — Fig. 1418, 1a–c. *M. diphimorpha* (STOLICZKA); dorsal, lateral, and anterior views of holotype, ×1 (Muir-Wood, 1965a).

**Waisiuthyrina** BEETS, 1943, p. 341 [*W. margineplicata*; OD]. Large, subcircular, dorsibiconvex; smooth; beak truncated, labiate; foramen large, mesothyrid or epithyrid; symphytium narrow;

**Dyscolia**

**Moraviaturia**

**Waisiuthyrina**
pedicle collar absent, hinge teeth small, grooved; cardinal process small, transverse, bilobed; loop unknown, probably dyscoliid. Neogene (Pliocene): southeastern Asia (Sulawesi).—Fig. 1418,2a–c. *W. marginiplicata; dorsal, lateral, and anterior views of holotype, ×0.5 (Muir-Wood, 1965a).

**Subfamily AENIGMATHYRIDINAE**

Cooper, 1983

[Anigma thridinae Cooper, 1983, p. 40]

Small to medium size, rectiformate to strongly unisulcate, smooth or may be lamellose or faintly capillate; foramen commonly permesothyrid; loop short, outer hinge plates poorly defined, crura commonly narrow, crural processes near or anterior to midloop; transverse band commonly convex anteriorly with narrow median fold. Paleogene (Danian)—Holocene.

**Aenigmathyris** Cooper, 1971, p. 3 [*A. stearnsi; OD]. Shell medium, widely ovate, ventribiconvex, anterior commissure rectiformate to unisulcate; ornament of faint capillae; beak short, labiate, foramen permesothyrid, symphysis concave; pedicle collar narrow, elevated; cardinal process small, transverse; loop variable, but narrower and more strongly folded than in *Dyscola*. Paleogene (Eocene): Eua, Tonga.—Fig. 1420,2a–d. *A. stearnsi, Eua: a–c, dorsal, lateral, and anterior views of holotype, USNM 55047a, ×1; d, closeup view of loop, ×3 (Cooper, 1983).

**Abyssothyris** Thomson, 1927, p. 190; *emend.,* Muir-Wood, 1960, p. 521 [*Terebratula wyvilli Davidson, 1878b, p. 436; OD; *emend.,* Thomson, 1927, p. 190]. Small to medium, oval to subpentagonal in outline; ventribiconvex, smooth, thin shelled; anterior commissure unisulcate; beak small, subrect; foramen large, permesothyrid; symphysis partly visible; pedicle collar short, teeth small; cardinal process small, semieliptical, outer hinge plates narrowly triangular, tapering anteriorly to bluntly pointed crural processes located at midloop; crural bases narrow; transverse band broad, gently folded medially, anterior part of loop variable, anterolateral extremities rounded to subangular; lophophore plectolophous with small median coil. [Thomson (1927) confused the terebratulid genus *Abyssothyris* with the rhynchonellid genus *Neorhynchia* in his original diagnosis. Subsequently, Muir-Wood (1960) redenfined the genus *Abyssothyris* and disentangled the two homeomorphs.] Neogene (Miocene)—Holocene: Fiji, Miocene; Pacific Ocean (Alaska, Galapagos Islands, Chile, New Guinea, New Caledonia, South Australia, New Zealand, Antarctica), South Atlantic Ocean at abyssal depths (825 m to >5,000 m). Holocene.—Fig. 1420,4a–d. *A. wyvillei (Davidson), Holocene, off South Australia; a–c, dorsal, lateral, and anterior views of lectotype, NHM B12501, ×2 (Muir-Wood, 1965a); d, Holocene, off California; closeup of loop, ×2 (Cooper, 1983).

**Acrobeslia** Cooper, 1983, p. 247 [*Gyrphus cooperi d’Hondt, 1976, p. 6; OD]. Small to medium, subcircular, ventribiconvex, lamellose with faint radial capillae; foramen large, submesothyrid; deltidial plates disjunct; pedicle collar short, anteriorly excavate; cardinal process small, bilobed myophore; crura short, thin, ribonlike; crural processes anterior to midloop; loop very short (0.2 dorsal valve length); transverse band of loop convex anteriorly. Holocene: Atlantic Ocean, France (Gulf of Gascogne), Canary Islands.—Fig. 1420,3a–d. *A. cooperi (d’Hondt): a–c, dorsal, lateral, and anterior views, ×2; d, dorsal valve interior, ×4 (Cooper, 1983).

**Ceramisia** Cooper, 1983, p. 227 [*Terebratula meneghiniana Seguenza, 1865, p. 29; OD]. Small to medium, subcircular, biconvex; unisulcate; lamellose without radial capillae; foramen large, mesothyrid, deltidial plates conjunct or disjunct; pedicle collar short, excavate; cardinal process small, transverse; hinge plates not developed; transverse band of loop convex anteriorly. Neogene (Pliocene): Sicily.—Fig. 1420,1a–d. *C. meneghiniana

![Fig. 1419. Dyscoliidae (p. 2136).](image-url)
(Seguenza); a–c, dorsal, lateral, and anterior views, ×2; d, closeup of loop, ×5 (Cooper, 1983).

Faksethyris Asgaard, 1971, p. 385 [*E. nielsen Asgaard, 1971, p. 386; OD; = Terebratula cincla Nielsen, 1911, p. 609, non Cotteau, 1857]. Small, ovate, biconvex, lamellose; anterior margin rectimarginate; beak straight, foramen submesothyrid, large, attrite; deltial plates conjunct;
pedicle collar long; cardinal process weak, transverse; hinge plates not developed; crural processes posterior to midloop, loop narrow, rounded anteriorly. Paleogene (Danian): Denmark.—FIG. 1420, a–d. *E. nielsen; a–c, dorsal, lateral, and anterior views of lectotype, MMH 574, x10; d, interior of dorsal valve, x25 (Asgaard, 1971).

Xenobrochus COOPER, 1981, p. 19 [*Grypehus africanus COOPER, 1973a, p. 8; OD]. Small to medium, oval, ventribiconvex, smooth; anterior commissure rectimarginate; beak long, erect, labiate, foramen large, permessothyrid, symphymty visible; pedicle collar short, teeth large; cardinal process broad, semielliptical; hinge plates narrow, poorly defined; loop narrow, rounded, transverse band convex anteriorly. Holocene: Indian Ocean, western Pacific, off Philippines and New Caledonia, Atlantic, Mediterranean.—FIG. 1420, a–d. *X. africanaus (COOPER), Durban Bay, Indian Ocean; a–c, dorsal, lateral, and anterior views of holotype, USNM 550375a, x4; d, interior of dorsal valve, x4 (COOPER, 1983).

Subfamily EURYSORIINAE
COOPER, 1983

(Euryosorinae COOPER, 1983, p. 40)

Small to medium, subpentagonal, smooth or faintly capillate; anterior commissure uniplicate; crural processes obtuse, anterior to midloop; outer hinge plates and crural bases poorly defined; loop short. Lower Cretaceous.

Euryosoria COOPER, 1983, p. 189 [*E. texana; OD]. Ventribiconvex; beak ridges strong; foramen mesothyrid, deltidium partially resorbed; cardinal process small; outer hinge plates wide, attached to narrow crural bases; loop short, wide, almost square in outline, transverse band broad, convex posteriorly. Lower Cretaceous: USA (Texas).—FIG. 1420, a–d. *E. texana; a–c, dorsal, lateral, and anterior views of holotype, USNM 550572a, x1; d, closeup of loop, x2 (COOPER, 1983).

Family PYGOPIDAE
Muir-Wood, 1965


Shell medium to large, smooth, commonly subtriangular to subrounded in outline; rectimarginate to strongly unisulcate; shell may develop two lateral lobes that curve toward each other and may fuse in adult stage, enclosing median perforation; hinge plates horizontal to slightly convex in serial section, tapering, or with rounded inner edges, which pass forward as horizontal structures to join crura; loop very short, with low-arched transverse band. Lower Jurassic (Pliensbachian)–Lower Cretaceous (Barremian).

Subfamily PYGOPIDAE
Muir-Wood, 1965


Pygopidae in which shell may develop two lateral lobes, which may curve toward each other and fuse in adult stage, enclosing a median perforation. Upper Jurassic (Kimmeridgian)–Lower Cretaceous (Barremian).

Pygopes LINNÉ, 1830, p. 451 [*Terebratala antinomia CATULLO, 1827, p. 169 (pl. 52); SD BUCKMAN, 1906a, p. 445; =T. deltoida VALENCIENNES in LAMARCK, 1819, p. 250; T. diphya VON BUCH, 1835, p. 88] [=Antinomia CATULLO, 1851, p. 74 (type, Terebratala dilatata CATULLO, 1851, p. 75); Pugites BRONN, 1838, p. 653, obj.]. Shell medium to large, subtriangular to subrounded in outline, umbo erect to incurved; foramen oval, permessothyrid; beak ridges rounded; anterior commissure rectimarginate to uniplicate; shell strongly sulcate in juvenile, developing two lateral lobes that come into contact and fuse in adult stage, enclosing median perforation; perforation central or posterior of center. [Few authors (with the exception of BUCKMAN, 1906 and Muir-WOOD, 1965) have used any name but Terebratala diphya VON BUCH, 1835, for the type species of Pygope. The ICZN has not further considered the positions of the names Terebratala deltoida VALENCIENNES, 1819 and T. diphya VON BUCH, 1835 (ICZN, 1988).] Upper Jurassic (Kimmeridgian)–Lower Cretaceous (Barremian); Europe, North Africa, Greenland.—FIG. 1421, a–m. *P. diphya (VON BUCH), Tethiornia, Italy; a–d, dorsal, ventral, lateral, and anterior views, x1; e–m, serial transverse sections 1.2, 4.0, 5.2, 5.6, 6.0, 6.8, 7.6, 8.0, 8.4 mm from ventral umbo, x2 (D. MIDDLEMISS, 1981).

Pygites BUCKMAN, 1906a, p. 449 [*Terebratala diphyoides D’ORBIGNY, 1849 in 1849–1852, p. 87; OD]. Similar to Pygope but ventral valve with sulcus in median fold posterior to perforation, dorsal sulcus with similar median fold; large central perforation in adult; cardinal process low; posterior umbonal cavity developed; hinge plates in section dorsally deflected, slightly concave ventrally, tapering, not well demarcated from long inner socket ridges. Upper Jurassic (Tithonian)–Lower Cretaceous (Barremian); Europe, North Africa, Arctic.—FIG. 1421, a–e. *P. diphyoides (D’ORBIGNY), Berriasian; a–d, dorsal, ventral, lateral, and anterior views, France, x1 (Muir-Wood, 1965a); e, closeup of loop, Czech Republic, Slovakia, x2 (COOPER, 1983).
Terebratulida—Dyscolioidea

Fig. 1421. Pygopidae (p. 2140).
Subfamily TRIANGOPINAE
Manceño, 1993

[Triangopinae Manceño, 1993, p. 203]

Similar to Pygopinae but imperforate.
Lower Jurassic (Pliensbachian)–Lower Cretaceous (Barremian).

Triangope DIENI & MIDDLEMISS, 1981, p. 39 [*Terebratula triangulus VALENCIENNES in LAMARCK, 1819, p. 250; OD]. Shell triangular, beak suberect to incurved; foramen oval, permesothyrid; hinge plates slightly convex, crural bases given off dorsally from anterior ends of hinge plates. Upper Jurassic (Kimmeridgian)–Lower Cretaceous (Barremian): Europe, North Africa.—Fig. 1422, 2a–d. *T. triangulus (VALENCIENNES), Tithonian, Italy; dorsal, ventral, lateral, and anterior views, ×1. (Dieni & Middlemiss, 1981).

Securithyris VÖRÖS, 1983, p. 13 [*Terebratula adnethensis SUSS, 1855b, p. 31; OD]. Medium to large, subtriangular; slightly to strongly biconvex, anterior commissure wide, rectimarginate, ligate or unisulcate; pedicle collar well developed; cardinal process wide, crenulated; hinge plates reduced or absent; crura given off from inner socket ridges; loop short, narrow. Lower Jurassic (Pliensbachian): Mediterranean, Sicily, Italy, Hungary, Greece, Spain, Morocco.—Fig. 1422, 1a–d. *S. adnethensis (SUSS), Bakony Mountains, Hungary; a–c, dorsal, lateral, and ventral views, ×1; d, reconstruction of loop, ×2 (Vörös, 1983).

Family NUCLEATIDAE
Schuchert, 1929


Small to medium size, smooth, moderately to strongly unisulcate; loop short, crural bases indistinct, crural processes blunt, anterior to midloop; outer hinge plates poorly defined; transverse band anteriorly rounded. Lower Jurassic–Upper Cretaceous (Cenomanian).

Fig. 1423. Nucleatidae and Uncertain (p. 2142–2144).
ventribiconvex or planoconvex, anterior commissure unisulcate; beak short, truncated by small to medium foramen; beak ridges obscure, no symphytium; cardinal process small; short crural bases expanding directly into crural processes and curving into wide transverse band of very short, wide, rounded loop. 

Middle Jurassic (Bathonian), Upper Jurassic (Oxfordian)–Upper Cretaceous (Cenomanian): Europe, Crimea, Caucasus, North Africa, Greenland; Upper Jurassic: Indonesia (Sula Islands).—Fig. 1423,5a–o. *N. nucleata (Schlotheim), White Jura, Bavaria, Germany; a–b, dorsal and anterior views of silicified specimen, ×2; c, ventral valve with loop exposed, ×2 (Cooper, 1983); d–o, serial transverse sections, 1.2, 1.7, 2.2, 2.5, 2.9, 3.5, 4.1, 4.4, 4.7, 4.9, 5.3, 5.7 mm from first section, ×1 (Barczyk, 1969).

Kubanithyris Tchorszhevsky, 1989b, p. 29 [*K. parvus; OD]. Small, planoconvex; anterior commissure unisulcate; beak ridges sharp; foramen small, mesothyrid; cardinal process small, bilobate; outer hinge plates narrow, dorsally inclined; no crural bases; loop short. Middle Jurassic: Caucasus, England.—Fig. 1423,2a–c. *K. parvus, Caucasus, dorsal, lateral, and anterior views, ×1 (Tchorszhevsky, 1989b).

Linguithyris Buckman, 1918, p. 99 (Buckman, 1914, p. 2, nom. nud.) [*Terebratula bifida Rothpletz, 1886, p. 114; OD]. Small to medium, biconvex, anterior commissure strongly unisulcate; beak incurved, beak ridges angular, epithyrid; symphytium narrow; cardinal process long, short, lobate; hinge plates in transverse section short, slightly concave ventrally, tapering, well demarcated from inner socket ridges; loop about 0.25 of valve length, transverse band slightly arched, rounded. Lower Jurassic–Middle Jurassic: Europe, North Africa; New Zealand. Lower Jurassic.—Fig. 1423,1a. *L. bifida (Rothpletz), Middle Inferior Oolite, Dorset, England; reconstruction of loop, ×1 (Muir-Wood, 1965a).—Fig. 1423,1b–d. L. umbonata Buckman, Middle Inferior Oolite, England; dorsal, lateral, and anterior views, ×1 (Muir-Wood, 1965a).

Phymatothyris Cooper & Muir-Wood, 1951, p. 195, nom. nov. pro Pallasiella Renz, 1932, p. 40, non Sars, 1895 [*Pallasiella kerkyraea Renz, 1932, p. 41; OD]. Small to medium, smooth, planoconvex, anterior commissure unisulcate; umbones swollen, strongly incurved; foramen concealed by swollen beak of ventral valve; loop presumably short; muscle scars similar to those of nucleatids. Lower Jurassic (Hettangian–Toarcian): Italy, Albania, Hungary, Greece, Alps.—Fig. 1423,3a–c. *P. kerkyraea (Renz), Greece; dorsal, lateral, and anterior views, ×1 (Muir-Wood, 1965a).

Family UNCERTAIN

Papodina Vorös, 1983, p. 15 [*Terebratula bittneri Geyer, 1889, p. 11; OD]. Medium to large, subtrigonal, biconvex, finely capillate; anterior commissure rectimarginate to ligate; beak high, suberect; foramen mesothyrid; pedicle collar well developed; cardinal process small, low, crenulated; no hinge plates; loop wide, short, dorsally arched transverse band. Lower Jurassic (Sinemurian–Pliensbachian): Hungary.—Fig. 1423,4a–d. *P. bittneri (Geyer), Pliensbachian; a–c, dorsal, lateral, and anterior views ×2; d, reconstruction of loop, ×2 (Vorös, 1983).
CANCELLOTHYRIDOIDEA
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Superfamily CANCELLOTHYRIDOIDEA
Thomson, 1926


Adult shells small to medium in size; outline elongate-oval, subcircular, or subtriangular; capillate, costate, or costellate; anterior commissure commonly rectimarginate, rarely unisulcate, uniplicate, or sulciplicate; foramen small to large, commonly margined by narrow deltidial plates. Dental plates commonly absent, median septum rarely present, outer hinge plates commonly absent, inner hinge plates absent, socket ridges strong, elevated, crural bases attached to socket ridges; loop short (0.3 of dorsal valve length); crural processes may be disjunct or united to form a ringlike loop or tube; dorsal pedicle muscles attached to floor of dorsal valve between adductors; lophophore spirolophous or plectolophous. Mantle and body wall usually strongly spiculate. Lower Jurassic (Pliensbachian)–Holocene.

Family CANCELLOTHYRIDIDAE
Thomson, 1926


Valves capillate or costellate; crural processes of loop united to form a ring with transverse band; lophophore usually plectolophous. Lower Jurassic (Pliensbachian)–Holocene.

Subfamily CANCELLOTHYRIDINAE
Thomson, 1926


Valves rostrate, ovate with narrow hinge; crural processes fused in adult forming complete ringlike loop. Upper Jurassic–Holocene.

Cancellothyris Thomson, 1926, p. 525 [*Terebratula cancellata Koch in Kuster, 1844, p. 35; OD; non Eichwald, 1829, p. 276; =Terebratulina hedleyi Finlay, 1927 (March), p. 533; Cancellothyris australis Thomson, 1927, p. 188]. Small to medium sized, ovate to subpentagonal, valves biconvex; anterior commissure uniplicate to sulciplicate; surface finely capillate; umbo short, massive, suberect; foramen large, epityphrid, labiate; deltidial plates conjunct. Pedicle collar developed; cardinal process low, bilobed; loop wide, transverse band broad, slightly arched ventrally, lophophore pleckolophous. Neo- gene (Miocene)–Holocene: New Zealand, Miocene; South Africa, Pliocene–Pleistocene; South Australia, Tasmania, off southwestern New Zealand (6–366 m); Holocene.—Fig. 1424, Aa–d. *C. hedleyi (FINLAY), Holocene, South Australia; a–c, dorsal, lateral, and anterior views, ×1.2; d, dorsal valve interior with loop, ×1.2 (Muir-Wood, 1965a).

Murravia Thomson, 1916a, p. 45 [*Terebratulina davi- doni Etheridge, 1876, p. 16; OD; non BOLL, 1856, p. 37; =Terebratulina cattinuliformis Tate in Tate & Dennant, 1896, p. 130 (footnote)]. Small, thick shelled, thick, ovate, planoconvex, with wide hinge line, anterior commissure rectimarginate or unisulcate; surface costellate; foramen hypothyrid, deltidial plates disjunct. Pedicle collar present, myophragm may be present; cardinal process prominent, swollen anteriorly; socket ridges strong; internal margin of both valves crenulate. Paleogene (Oligocene)–Holocene: Australia; New Zealand, Oligocene.—Fig. 1424, 4a–c. *M. cattinuliformis (TATE), Miocene, Victoria, Australia; dorsal view, interior views of ventral and dorsal valves, ×3 (Muir-Wood, 1965a).—Fig. 1424, 4d–e. *M. exarata VERCO, Holocene, South Australia; holotype, dorsal and lateral views, ×6 (Muir-Wood, 1965a).

Ortholina Calzada Badia, 1984b, p. 5 [*Terebratella decorata VIDAL, 1921, p. 56; OD]. Small to medium sized, subcircular in outline, planoconvex, hinge line wide, almost straight; anterior commissure rectimarginate; surface finely costellate; foramen small, submesothyrid, deltidial plates disjunct. Cardinal process small, bilobed, loop wide, myophragm present. Upper Cretaceous: Spain.—Fig. 1424, 5a–c. *O. decorata (VIDAL), Maastrichtian; dorsal, ventral, and lateral views, ×1.5 (Calzada Badia, 1984b).—Fig. 1424, 5d. O. lujana VIDAL, Maastrichtian; interior of dorsal valve, ×3 (Calzada Badia, 1984b).

Rhyonchonelopsis Vincent, 1893, p. 51, non BÖSE, 1894, nec DE GREGORIO, 1930 [*Terebratulina myti BOSQUET, 1862, p. 349; OD]. Small, thick shelled, rounded, convexoplane; anterior commissure
Fig. 1424. Cancellothyrididae (p. 2145–2147).
rectimarginate to gently uniplicate; surface capillate; umbo small, short, suberect, beak ridges obscure; foramen small, deltidial plates disjunct. Hinge plates absent, socket ridges prominent and united with crural bases, crura converging, loop probably terebratulid; inner shell margin crenulated. Paleogene (Oligocene): Belgium, The Netherlands, Germany, Russia.—Fig. 1424,6a–c. *R. nyitii (Bosquet), Belgium; a–b, dorsal and lateral views, ×3; c, dorsal valve interior with loop, restored, ×9 (Muir-Wood, 1965a).

Sendaithyris Hatai, 1940, p. 253 [*S. otutumiensis; OD]. Medium size, circular, biconvex, anterior commissure rectimarginate; surface indistinctly costellate. Interior imperfectly known; cardinalia and loop said to be as in Terebratulina, but with short, bifurcated septum in dorsal valve. Neogene (Miocene): Japan.—Fig. 1425,2. *S. otutumiensis, Rikuzen; dorsal valve view, ×1 (Muir-Wood, 1965a).

*Surugathyris Yabe & Hatai, 1934, p. 587 [*S. (Terebratulina) suragaensis; OD]. Imperfectly known, may be immature form of some species of Terebratulina. Holocene: Japan.—Fig. 1424,2. *S. suragaensis; dorsal valve view, ×2.4 (Muir-Wood, 1965a).

Terebratulina d’Orbigny, 1847 in 1847–1851, p. 249 [*Anomia retusa Linnaeus, 1758, p. 701; OD = A. caputserpentis Linnaeus, 1767, p. 1,153, non Linnaeus, 1758, p. 703). Small to large, ovate to subpentagonal, slightly auriculate, valves biconvex; anterior commissure rectimarginate to uniplicate; surface costellate, costellae may be enlarged or granular, with prominent nodules in young; umbo suberect, foramen incomplete, mesothyrid to permesothyrid, deltidial plates disjunct. Pedicle collar present, median septum and hinge plates absent; cardinal process small; socket ridges and crural bases fused, forming prominent ridge, hinge teeth without swollen bases, but with sulcus on inner face; crura converging, crural processes united to form ringlike loop, transverse band ventrally arched. Upper Jurassic–Holocene: Europe, Upper Jurassic–Cretaceous; cosmopolitan, Paleogene–Holocene.—Fig. 1425,1a–i. *T. retusa (Linne), Holocene; a–c, dorsal, lateral, and anterior views, off Norway, ×2 (Muir-Wood, 1965a); d–e, dorsal valve views, Gulf of Gasogne, France, ×5; f–h, dorsal valve interiors showing loop ontogeny, Gulf of Gasogne, France, ×5; i, dorsal valve interior showing adult loop, Gulf of Gasogne, France, ×2 (Coo-per, 1981).

Trachyphyra Jin & Ye in Jin & others, 1979, p. 68 [*T. bangonica; OD]. Small, elliptical to roundly pentagonal, ventribiconvex; anterior commissure rectimarginate or incipiently uniplicate; costellae low, rounded and bifurcated; beak straight; beak ridges angular; interarea narrow and flattened; foramen large, subcircular, submesothyrid to hypo- thyrid; deltidial plates disjunct. Pedicle collar short or absent; ventral muscle scar obscure and petal-like; myophragm narrow. Cardinal process low, bilobate; socket ridges raised above posterior margin and buttressed by small, curved plates; crural bases attached to ends of inner socket ridges; crura converging; crural processes united to form ring; loop very short; transverse band gently arched ventrally; dorsal median ridge low and bifurcating anteriorly. Cretaceous (Albian): northern Tibet (Bangon).—Fig. 1424,3a–d. *T. bangonica; a–b, holotype, dorsal, and ventral views, ×3; c–d, interior of ventral and dorsal valves, ×3 (Jin & others, 1979).
Subfamily CRICOSINAE
Cooper, 1973

[Cricosinæ Cooper, 1973c, p. 383] [Cricosininae Smirnova, 1990a, p. 53]

Small, costellate or capitate, subcircular, with nearly tubular loop. Upper Jurassic–Paleogene (Danian).

Cricosia Cooper, 1973c, p. 384 [*Terebratulina filiosa
Conrad, 1866, p. 77; OD]. Small, subcircular to oval, finely costellate; anterior commissure nearly rectimarginate; foramen small, oval, hypoclypeid; deltoidal plates small, disjunct, extended adjacent to dorsal valve margin and obliquely raised; pedicle collar thin. Thin, elevated socket ridges join with thickened posterior area that serves as cardinal process; crura stout, narrow; crural processes united to form single loop, tubelike. Upper Cretaceous (Campanian–Maastrichtian): Denmark, England. ——Fig. 1426a–k. *G. gracilis (Schlothum), Tringham, Norfolk, England; a–d, dorsal, ventral, lateral, and anterior views, x3; e, dorsal valve interior, x4; f–g, interiors of dorsal and ventral valves, x4 (Cooper, 1973c); h–k, growth stages, 1.4 mm, 2.1 mm, 4.8 mm, 10.7 mm (Surlyk, 1972).

Bisulcina Titova, 1977, p. 81 [*Terebratula tunicata
Vantschurov in Vantschurov & Kaulugin, 1966, p. 121; OD]. Small to medium size, rounded to oval, slightly biconvex; beak blunt, foramen large, deltoidal plates disjunct; shell capitate (up to 100 ribs present), small tubercles prominent in posterior and lateral parts of shell. Pedicle collar present, hinge teeth narrow with denticulum; inner socket ridges more prominent than outer. Upper Cretaceous–Paleogene (Danian): western Turkmenia; Western Europe, Upper Cretaceous. ——Fig. 1426,1a–u. *B. tunicata (Vantschurov), Daniian, western Turkmenia; a–d, dorsal, ventral, lateral, and anterior views, x5; e–u, serial transverse sections 0.10, 0.25, 0.45, 0.55, 0.65, 0.75, 0.90, 1.05, 1.35, 1.80, 2.00, 2.15, 2.30, 2.55, 2.70, 3.05, 3.25 mm from ventral umbo, x3 (Titova, 1977).

Ciruralina Smirnova, 1966, p. 32 [*C. ciruralinica Smir-
ova, 1966, p. 33; OD]. Small, round to pentagonal, anterior margin rectimarginate to unipli-
cate; costellate; beak suberect or slightly incurved, beak ridges sharp, with false interarea; foramen large, pedicle collar present. Cardinal process small, inner margins of hinge plates forming projections on valve floor that connect with cranial bases; cranial bases close together, separated by depressions from inner socket ridges that are low, parallel to, and almost united with valve floor; crura short, cranial processes join to form single cross piece that is strongly curved ventrally; transverse band bent ventrally and medially at acute angle. Lower Cretaceous–Upper Cretaceous: Crimea, Europe, Lower Creta-
ceous; USA (Texas), Cuba, Upper Cretaceous. ——Fig. 1427,1a–jj. *C. ciruralinica, Lower Creta-
ceous, Crimea; a–d, holotype, dorsal, ventral, lateral, and anterior views, x1; e–f, ventral and lateral views of reconstructed loop, x2 (Smirnova, 1966); g–jj, serial transverse sections 0.0, 0.3, 0.5, 0.9, 1.2, 1.3, 1.32, 1.35, 1.37, 1.40, 1.45, 1.50, 1.55, 1.60, 1.63, 1.68, 1.71, 1.81, 1.91, 2.01, 2.11, 2.21, 2.31, 2.41, 2.51, 2.61, 2.71, 2.81, 2.91, 3.01 mm from ventral umbo, x2 (Smirnova, 1990a).

Gyrosoria Cooper, 1973c, p. 386 [*Terebratulites grac-
cilis Schlothum, 1813, p. 112, pl. 3; 3; OD]. Small, outline elongate-oval in juveniles, subcircular in adults; planoconvex; costellae strong, often granulose or beaded; beak short, incurved; foramen small, deltoidal plates disjunct, extended adjacent to dorsal valve margin; pedicle collar absent, teeth strong. Cardinalia narrow, socket ridges stout, card-
inal process small, supported by short ridge; crura thick, oblique, supporting a narrow, tubelike loop. Upper Cretaceous (Campanian–Maastrichtian): Den-
mark, England. ——Fig. 1428a–k. *G. gracilis (Schlothum), Tringham, Norfolk, England; a–d, dorsal, ventral, lateral, and anterior views, x3; e, dorsal valve interior, x4; f–g, interiors of dorsal and ventral valves, x4 (Cooper, 1973c); h–k, growth stages, 1.4 mm, 2.1 mm, 4.8 mm, 10.7 mm (Surlyk, 1972).

Symphythyris Smirnova, 1966, p. 37 [*Terebratula arguinensis Moisseev in Weber, 1949, p. 117; OD]. Small to medium size, rounded trigonal, gently bi-
convex; anterior commissure rectimarginate to unipli-
cate; surface finely costellate; beak very elongated, suberect or gently incurved; foramen large, circular, mesothyrid or submesothyrid, symphytid long, convex. No pedicle collar; cardinal process small, outer hinge plates fused with high, massive socket ridges that project deeply into beak cavity, socket ridges buttressed by small, curved plates that reach valve floor on either side of low median septum; cranial processes forming broad transverse band, slightly convex ventrally; loop almost tubular. Upper Jurassic–Lower Cretaceous: Crimea, Caucasus, Switzerland, Czech Republic. ——Fig. 1427,1a–b. *S. arguinensis (Moisseev), Valanginian, Crimea; dorsal and lateral views, x1 (Smirnova, 1990a). ——Fig. 1427,1c–h. S. neocomiensis D’Orbigny, Neocomian, Switzerland; c–f, dorsal, ventral, lateral, and anterior views, x2 (Cooper, 1973c); g–h, reconstructions of loop, x2 (Smirnova, 1972).

Subfamily ALITHYRIDINAE
Sun, 1981

[Alithyridinae Sun, 1981, p. 242]

Small, subcircular, with dental plates. Upper Cretaceous.

Alithyris Sun, 1981, p. 242 [*A. shiquanheensis; OD]. Small, subcircular, biconvex, anterior commissure rectimarginate; beak short, slightly incurved; delthyrium open; surface with subangular plicae

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Fig. 1426. Cancellothyrididae (p. 2148).
and weak capillae; foramen obscure. Dental plates recessive and slightly diverging; umbonal cavities narrow, teeth small and obtusely circular; cardinal process a low, short platform, bilobate; inner socket ridges high, projecting over cardinal margin and fused with outer hinge plates; crural falcifer; crural processes uniting to form ringlike loop; descending branches short; transverse band incurved ventrally with low arch. *Upper Cretaceous: Tibet.——Fig. 1429a–t. *A. shiquihensis; a–d, dorsal, ventral, lateral, and anterior views, ×3; e–t, serial transverse sections 0.5, 0.7, 1.0, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.15, 1.25, 1.3, 1.4, 1.45, 1.5 mm from ventral umbo, ×6 (Sun, 1981).
Subfamily UNCERTAIN

Cooperithyris Tchorszhevsky, 1988, p. 31 [*C. tenuicostata; OD]. Small, biconvex, anterior commissure rectimarginate; capillate with fine, sharp ribbing; beak small, foramen small, deltitudal plates conjunct. Pedicle collar narrow, admicula well developed in ventral valve. Cardinal process small; septal ridge extending for 0.3 dorsal valve length; crural bases strong, crural processes high, arcuate, uniting to form high half ring; transverse band low, narrow; loop tapering anteriorly. Lower Jurassic (Pliensbachian–Toarcian): Transcaucasia.——Fig. 1430a–y. *C. tenuicostata, Pliensbachian; a–c, dorsal, ventral, and anterior views, ×3; d–y, serial transverse sections, 0.2, 0.5, 0.8, 0.9, 1.1, 1.2, 1.4, 1.6, 1.8, 2.2, 2.4, 2.6, 2.8, 3.0, 3.1, 3.2, 3.4, 3.6, 3.9, 4.1, 4.4, 4.45 mm from first section, ×4 (Tchorszhevsky, 1988).

Family CHLIDONOPHORIDAE Muir-Wood, 1959


With characteristic cardinalia of superfamliy but with crural processes of loop never united to form ring. Lower Jurassic (Pliensbachian)–Holocene.

Subfamily CHLIDONOPHORINAE Muir-Wood, 1959

[Chlidonophorinae Muir-Wood, 1959, p. 295]

Transverse band of loop directed anteroventrally; lophophore subplectolophous. Lower Jurassic (Pliensbachian)–Holocene.

Chlidonophora Dall, 1903, p. 1,538 [*Terebratulina? incerta Davidson, 1878b, p. 438; OD]. Small, semicircular, valves moderately biconvex, anterior commissure rectimarginate to gently uniplicate; hinge line wide, straight, interarea short; beak short, foramen incomplete; deltitudal plates narrow, disjunct, pedicle collar developed. Socket ridges broad, projecting above hinge line and uniting with transverse cardinal process; crura short, crural processes concave inwardly and sharply pointed; anterior part of loop flat and ribbonlike, directed anteriorly; pedicle variable but characteristically frayed into numerous strands; lophophore subplectolophous. *Upper Cretaceous, Holocene; Spain, *Upper Cretaceous; Atlantic, Caribbean, Gulf of Mexico
Rhynchonelliformea—Rhynchonellata

Fig. 1429. Cancellothyrididae (p. 2148–2150).

(534–3,384 m), Indian Ocean (680–1,660 m), ?Pacific, Holocene.—Fig. 1431,1a–f. *C. incerta (DAVIDSON), Holocene, North Atlantic Ocean; a–c, holotype, dorsal, lateral, and anterior views, ×2.5 (Muir-Wood, 1965a); d–e, laterally tilted and ventral view of dorsal valve interior with loop, ×4 (Cooper, 1973b); f, ventral valve interior showing teeth and mantle canals, ×3 (Muir-Wood, 1965a).—Fig. 1431,1g–h. C. chuni BLOCHMANN, Holocene, Maldive Islands, Indian Ocean; g, dorsal valve view with long, divided pedicle attached to Globigerina, ×2; h, subplectolophous lophophore, ×10 (Muir-Wood, 1965a).

Deslongchampsityris LEE & TCHORSHEVSKY, herein, p. 2,255, nom. nov. pro Deslongchampsia TCHORSHEVSKY, 1988, p. 33, non MORRIS & LYTCHET, 1851, nec ROCHE, 1939 [*Deslongchampsia moiseevii TCHORSHEVSKY, 1988, p. 33; OD; = Terebratella

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**Disculina** Deslongchamps, 1884a, p. 147 [*Terebratula hemisphaerica* J. Sowerby, 1826 in 1826–1829, p. 69; OD]. Small, subcircular, valves concavo- to planoconvex, anterior commissure rectimarginate to incipiently unisulcate; valves finely capillate and nodose; umbo incurved, foramen large, incomplete, mesothyrid; deltidial plates disjunct, small interarea in ventral valve. Pedicle collar present; cardinal process small; socket ridges broad and long; crura oblique with disjunct crural processes and anteriorly ventrally protuberant transverse band. Middle Jurassic (Bathonian)–Upper Jurassic (upper Oxfordian): England, France.——FIG. 1431.4a–d. *D. hemisphaerica* (J. de C. Sowerby), Bathonian, France; a–c, dorsal, ventral, and lateral views, ×4, d, dorsal view of loop, ×5 (Cooper, 1973c).

**Gisilina** Steinich, 1963, p. 735 [*Terebratula gisii* Roemer, 1841, p. 40; OD]. Small, rounded, auriculate, valves biconvex, with narrow interarea; anterior commissure rectimarginate or incipiently unisulcate; capillae simple, prominent, smooth or enlarged at intersection with growth lines; umbo short, suberect or erect; foramen ovoid, mesothyrid; deltidial plates disjunct. Pedicle collar present; hinge teeth with swollen bases; loop ventrally directed, crural processes converging, lophophore from spicule arrangement probably plectolophous. Upper Cretaceous–Paleogene (Danian, ?Eocene): Denmark, Germany, Romania, England, Upper Cretaceous; Ukraine, Danian, ?Eocene; Australia, Santonian–Campanian.——FIG. 1432.1a–i. *G. gisii* (Roemer), Rugen; a–b, dorsal and lateral views, ×3; c–f, dorsal, lateral, anterior, and ventral valve interior views, ×4 (Muir-Wood, 1965a); g, dorsal.
Fig. 1431. Chlidonophoridae (p. 2151–2156).
Fig. 1432. Chlidonophoridae (p. 2152–2156).
valve interior with loop, ×10; b–i, dorsal valve interior, ventral valve interior, ×11 (Steinich, 1963).

Meonia STEINICH, 1963, p. 732 [*Terebratula semiglobularis* POSSELT, 1894, p. 35; OD]. Small, rounded shells with straight hinge line and narrow interarea, strongly planoconvex; anterior commissure rectimarginate or slightly sulcate; umbo short, foramen small, mesothyrid; capillae simple, granular. Cardinal process crenulated; hinge teeth with deep sockets on inner face; loop short, ventrally projecting; crural processes scarcely developed, narrow transverse band uniting broader converging crura; lophophore probably spiriform, with spirals set at angle to plane of symmetry. Upper Cretaceous, Paleogene (Eocene)–Holocene: Denmark, Sardinia, Spain, ?Gulf of Gascogne, Upper Cretaceous; Denmark, ?Danian; Ukraine, ?Eocene. ——Fig. 1431, 2a–g. *M. semiglobularis* (POSSELT); a–d, dorsal valve, lateral, anterior, ventral valve interior, ×3 (Muir-Wood, 1965a); e–f, dorsal valve interior showing loop, same, more posterior view; g, dorsal valve showing interarea, strongly planoconvex and part of interior restored, ×10 (Steinich, 1963).

Prochloridonophora THOMSON & O'WEN, 1979, p. 28 [*P. muirwoodae* O'WEN]. Small, subcircular, costellate with spinules, planoconvex to incipiently biconvex; beak short, erect, foramen large, circular, mesothyrid; hinge line slightly extended, interarea long, beak ridges distinct; delthyrium well exposed, deltidial plates conjunct. Cardinalia and loop unknown. Lower Cretaceous: Antarctica (Alexander Island). ——Fig. 1431, 3a–b. *P. muirwoodae*: a, holotype, silicone rubber cast from external mold of ventral valve, ×2; b, latex cast from external mold of ventral valve, ×2 (Thomson & O'WEN, 1979).

Rugia STEINICH, 1963, p. 735 [*R. tenuicostata* OD]. Minute, resembles *Terebratula* in hinge characters and probable plecostomatous lophophore, but differs in small size of adult shells, rectimarginate commissure, more elongate umbo, long tapering deltidial plates and long pedicle collar, hypothyrid foramen, and more granular shell surface. Upper Cretaceous: Denmark, Germany, Poland, England, Sweden, Spain. ——Fig. 1432, 2a–g. *R. tenuicostata*: a–d, dorsal, ventral, lateral, and anterior views; e–f, dorsal valve interior showing loop and crural processes in ventral and lateral views; g, ventral valve umbo showing deltidial plates, ×10 (Steinich, 1963).

Subfamily EUCALATHINAE Muir-Wood, 1965

[Eucalathinae Muir-Wood, 1965a, p. 811]

Transverse band of loop medially directed toward dorsal valve; lophophore spiriform. Paleogene (Eocene)–Holocene.

Eucalathis Fischer & Oehlerlert, 1890, p. 72 [*Terebratula? murrayi* DAVIDSON, 1878b, p. 437; OD]. Small, subtrigonal, auriculate, ventribiconvex, anterior commissure rectimarginate or incipiently uniplicate, hinge straight; surface capillate with rare intercalations or granular; umbo short, obliquely truncate; deltidial plates short, triangular, disjunct. Pedicle collar present, loop chilidonophorid but transverse band dorsally directed, socket ridges as narrow plates uniting with cardinal process, and anteriorly with crural bases; lophophore with 2 single whorl spirals set at angle to plane of symmetry, filaments long. Paleogene (Eocene)–Holocene: USA, Eocene; Italy, Miocene; cosmopolitan (185–3,870 m). ——Fig. 1433, 2a–e. *E. murrayi* (DAVIDSON), Holocene, off Fiji Islands, Pacific Ocean; a, dorsal view, ×16; b–c, lateral and anterior views, ×9; d–e, dorsal valve interior showing lophophore, with loop, ×20 (Muir-Wood, 1965a). ——Fig. 1433, 2f–j. *E. ergastica* FISCHER & Oehlerlert, Holocene, North Atlantic Ocean; f–h, dorsal, lateral, anterior views; i, ventral valve interior; j, dorsal valve interior with loop, ×4 (Muir-Wood, 1965a).

Bathynanus Foster, 1974, p. 79 [*B. tenuicostatus* FOSTER, 1974, p. 80; OD]. Very small, faintly capitulate, subpentagonal in outline; foramen small, hypothyrid; deltidial plates disjunct. Cardinal process indistinct, socket ridges fusing with crural bases; crural plates extending anteriorly as low, narrow ridges on valve floor, crura short, flat, converging slightly; loop incomplete, lophophore zygolophous. Holocene: Pacific, Indian, Atlantic Oceans (3,843–5,160 m). ——Fig. 1433, 1a–f. *B. tenuicostatus*, southeastern Pacific Ocean; a, holotype, dorsal valve view, USNM 550282A; b–c, interior views of ventral and dorsal valves; d, dorsal valve interior, ×5; e–f, drawing of dorsal valve and dorsal valve interior, ×12.5 (Foster, 1974).

Nanacalathis Zezina, 1981a, p. 162 [*N. minuta* OD]. Minute, biconvex, costate; beak suberect, foramen mesothyrid, deltidial plates conjunct. Cardinal process small, socket ridges fusing with crural bases; crura short, converging slightly; loop incomplete. Holocene: Indian Ocean, Atlantic Ocean (289–3,731 m). ——Fig. 1434, 1a. *N. minuta*, Indian Ocean; dorsal view, ×23 (Zezina, 1981c). ——Fig. 1434, 1b–e. *N. minuta*, sp. Atlantic Ocean; b–c, exterior and interior of dorsal valve, ×10; d–e, exterior and interior of ventral valve, ×10 (Cooper, 1973b).

Notozyga Cooper, 1977, p. 105 [*N. lowenstami* OD]. Small, subpentagonal in outline, biconvex, hinge wide, costellae beaded. Differs from *Eucalathis* in having thick, wide crural bases, thick, angular crural processes, and a broad, rounded transverse band that does not extend anteriorly to crural processes. Holocene: Caribbean, Indian Ocean, Pacific Ocean. ——Fig. 1434, 2a–e. *N. lowenstami*, Caribbean; a–d, holotype, dorsal,
Fig. 1433. Chlidonophoridae (p. 2156).
ventral, lateral, and anterior views, USNM 550591a, x10; e, interior of dorsal valve, x15 (Cooper, 1977).

Subfamily AGULHASIINAE
Muir-Wood, 1965

[Agulhasiinae Muir-Wood, 1965a, p. 812]

With greatly elongated ventral beak and long pedicle collar. Neogene (lower Miocene)—Holocene.

Agulhasia King, 1871, p. 109 [*A. davidsoni; OD].
Small, rounded trigonal; rostrate, with greatly elongated ventral beak one-third of valve length; biconvex, with faint, ventral median sulcus, anterior commissure rectimarginate to unisulcate; deltidial plates disjunct, separated by long, narrow, sunken apical plate forming elongated pedicle collar; foramen anterior, hypothryrid. Hinge teeth longitudinally grooved and articulating with socket ridges, cardinal process large, knoblike; loop rather long, narrow, and anteriorly rounded; internal shell margin strongly crenulated. Neogene (lower Miocene)—Holocene: South Africa, lower Miocene; South Atlantic and southern Indian Ocean (off South Africa, 78–800 m), Holocene.——Fig. 1435,1a–g. *A. davidsoni, Holocene, Agulhas Bank; a–d, dorsal, ventral, lateral, and anterior views, x6; e–f, interior of ventral and dorsal valve, x6; g, dorsal valve interior showing loop, x12 (Cooper, 1973b).

Subfamily ORTHOTHYRIDINAE
Muir-Wood, 1965

[Orthothyridinae Muir-Wood, 1965a, p. 813]

Small, costate, concavoconvex chlidonophorids. Upper Cretaceous.

Orthothyris Cooper, 1955a, p. 64 [*O. radiata; OD].
Small, subcircular in outline with wide, straight hinge, slightly biconvex, becoming concavoconvex; anterior commissure broadly sulcate; ornament of coarse costae medianly and anteriorly, and posteriorly mediolaterally directed costellae; delthyrium margined by elevated deltidial plates, interarea well developed, beak ridges strong, foramen small. Sockets deep, with erect socket ridges; crura short, stout, crural processes large, expanded; loop a thin ribbon, projecting ventrally, attached to socket ridges; interior margin scalloped anteriorly. Upper Cretaceous.

Fig. 1434. Chlidonophoridae (p. 2156–2158).
Terebratulida—Cancellothyridoidea

Caribbean, India.—Fig. 1435,2a–d. *O. radiata, Habana Province, Cuba; a–c, holotype, dorsal, lateral, and anterior views, USNM 108687; d, dorsal interior view, ×8 (Cooper, 1973c).

Family CNISMATOCENTRIDA

Cooper, 1973

Small to large, smooth or capillate with ornament of radial striae; deltoidal plates conjunct; cardinalia with strong, elevated socket ridges, no definable outer hinge plates; crural processes anterior, loop very wide and slightly arched, narrow transverse band; musculature like that of *Terebratulina with dorsal adjustors on dorsal valve floor. *Upper Cretaceous–Holocene."

Subfamily CNISMATOCENTRINAE

Cooper, 1983

Large, capillate, uniplicate; foramen large. *Holocene.

Cnismatocentrum Dall, 1920, p. 321 [*Terebratula (Liothyris) sakhalinensis Dall, 1908, p. 28; OD]. Large, stout, biconvex, anterior commissure uniplicate, surface smooth or anteriorly capillate; umbo stout; foramen large, deltoidal plates conjunct, symphytium exposed. Pedicle collar with short septum; cardinal process small, prominent; low median ridge in dorsal valve; socket ridges attached to valve wall and prolonged anteriorly over flat crura at their bases; crural processes short; loop very wide, slender, almost flattened, transverse band narrow and medially folded; lophophore
plectolophous. Holocene: Sakhalin Island, Okhotsk Sea, Japan, USA (Alaska).——Fig. 1436, 3a–e. *C. sakhalinensis* (DALL); a–d, holotype, dorsal valve, lateral, anterior, and posterior views, off Sakhalin, USNM 110786A, ×1; e, interior of dorsal valve, Chignik Bay, Alaska, ×2 (Cooper, 1983).

**Subfamily ARCUATOTHYRIDINAE**
**Katz, 1974**


Small to medium, smooth or with ornament of radial striae, rectimarginate to slightly uniplicate or unisulcate, loop short, crural processes small and anterior. *Upper Cretaceous.*

**Arcuatothyris** Popiel-Barczyk, 1972, p. 136 [*Terebratula arcuata* Roemer, 1841, p. 44; OD]. Shell medium size, biconvex, oval to pentagonal in outline, anterior commissure rectimarginate or unisulcate, shell ornament of irregular, radial striae; beak large, suberect, foramen large, permesothyrid, symphytium distinct. Cardinal process small with distinct myophore; socket ridges stout, long, high; crural bases narrow, small, triangular; thin plate separating socket ridge and fulcral plate; loop short, straight, transverse band narrow, nearly horizontal ribbon attached just beyond anterior end of crural processes. *Upper Cretaceous* (Cenomanian): Germany, England, France, Poland, Russia.——Fig.
Terebratulida—Cancellothyridoidea

Nucleatina Katz, 1962, p. 135 [*Terebratula nanclasi Coquand, 1862, p. 237; OD]. Medium to large, subcircular to elongate pentagonal, biconvex, anterior commissure uniplicate; smooth or with faint radial ornament; beak short, suberect; foramen minute, permesothyrid, symphytium hidden. Cardinal process small, narrow, semielliptical; inner socket ridges well developed, incurved laterally; crural bases developing directly from lateral valve sides in front of socket ridges; loop short, wide posteriorly, narrow and truncated anteriorly. Upper Cretaceous: France, Russia, Spain, central Asia, southern India, northern Africa, southern Europe.—Fig. 1436, 1a–g. *N. nanclasi (Coquand), Santonian, Rouen, France; a–c, dorsal, lateral, and anterior views, ×1; d–e, dorsal valves showing loops, ×2 (Cooper, 1983).

Family INOPINATARCULIDAE

Muir-Wood, 1965


Small, costellate, foramen small, anterior commissure uniplicate; crural processes large, transverse band fairly broad longitudinally, moderately arched. Lower Cretaceous (Albian)—Upper Cretaceous (Campanian).

Inopinatarcula Elliot, 1952, p. 2 [*Trigonosemus acanthodes Etheridge, 1913, p. 15; OD]. Small, subcircular in outline, biconvex, anterior commissure uniplicate; surface finely costellate, costellae with short spines; beak short, suberect; foramen minute, permesothyrid, symphytium triangular, transversely rugose. Cardinal process small, trilobed; socket ridges erect, massive; fulcral plates thick, massive, no outer hinge plates; crural bases concealed beneath thickened socket ridges; crura short, crural processes short; transverse band broad, medially arched. Lower Cretaceous (Albian)—Upper Cretaceous (Campanian): Australia, Santonian—Campanian; New Zealand, Albian.—Fig. 1437, 1a–e. *I. acanthodes (Etheridge), Senonian, Australia; a–c, dorsal, lateral, and anterior views, ×2; d–e, dorsal valve, ventral valve interiors, ×2 (Cooper, 1983).

Family UNCERTAIN

Pseudokingena Boese & Schlosser, 1900, p. 177 [*Terebratulina deslongchampsi Davidson, 1850c, p. 450; OD]. Small, rounded or quadrate, ventribiconvex; dorsal valve may have shallow sulcus; anterior commissure rectimarginate or slightly folded; shell surface granular, with 2 sizes of tubercles; beak short, palintrope well defined; beak ridges well defined; foramen hypothyrid; deltidial plates narrow, disjunct. Pedicle collar present; dental plates absent; inner shell surface around margins capillate. Cardinalia like those of Terebratulina; loop short (about 0.3 dorsal valve length), similar to that of Eucathis. Lower Jurassic: England, France.
Superfamily UNCERTAIN

**Goliathyris** Feldman & Owen, 1988, p. 4 [*G. lewyi; OD]. Very large, thick shelled, smooth, subpentagonal in outline, concavoconvex or planococonvex, ventral valve almost carinate; strongly unisulcate, foramen small, permesothyrid; beak incurved; cardinal process massive, bilobate; hinge plates weakly differentiated from inner socket ridges, horizontal, becoming concave toward floor of dorsal valve; loop unknown. Middle Jurassic (Callovian); Sinai.—Fig. 1438a–h. *G. lewyi; a–c, dorsal, lateral, and posterior views of holotype, GSI M7261a, ×1; d–h, serial transverse sections, ×0.5 (Feldman & Owen, 1988).

**INVALID GENERIC NAME ASCRIED TO BRACHIOPODA**

**Eudesites** Riolult, 1966, p. 74 [*E. deslongchampsia; OD]. Parageneric name applied to brachiopod spicules.