# NOTES ON THE FAUNA OF THE CHIPOLA FORMATION – IX

## ON THE PRESENCE OF *KUPHUS INCRASSATUS* GABB

HAROLD E. VOKES
*TULANE UNIVERSITY*

"Large tubes, similar to the Dominican *Kuphus incrassatus* are remarkably abundant in the Tertiary (Eocene to Miocene) limestones of the West Indies and Central America, especially in Anguilla, Puerto Rico, Haiti, Cuba, Jamaica, and Guatemala." (Woodring, 1925, p. 195).

This extensive geographical and geological distribution of *Kuphus incrassatus* has been recognized since the days when Gabb (1873, p. 246) described his species from near Guayubin, in Santo Domingo. Later Gabb (1881, p. 342) noted its occurrence in Costa Rica, as well as at other localities in Santo Domingo, adding that "it is a very common and characteristic fossil in the upper part of the Dominican Miocene." Nevertheless, there has developed a tendency to consider it as "diagnostic [in the United States] of the Chickasawhay limestone and equivalent beds" [Suwanee Limestone] of Mississippi, Alabama and Florida (see: Toulmin, 1955, p. 471; Puri and Vernon, 1964, p. 123; Copeland and Deboo, 1967, p. 45, etc.).

It is the primary purpose of the present note to record the fact that specimens of *Kuphus incrassatus* are widespread and not rare in the lime-sand facies of the stratigraphically younger Chipola Formation of western Florida, occurring in the majority of the Tulane University collections from the middle part of the section exposed along the Chipola River and from the beds of equivalent stratigraphic position and facies on Farley Creek. It is however, wholly absent from the lower and uppermost strata exposed along the Chipola River and from the entire section present on Ten Mile Creek, a tributary from the east. All of these latter areas are marked by sediments with a relatively high clay or silt content; hence there seems little basis to doubt that the distribution of *Kuphus incrassatus* was controlled by bottom sediment conditions and that it is more indicative of sedimentary facies than a guide for stratigraphic correlation.

*Kuphus* tubes are elongate, tapering, calcareous structures, usually of somewhat irregular or rugose surface contour. Most characteristic is the presence, in the upper smaller end of the tube, of two small tubes, one slightly larger than the other, that are encased in an extensive development of supplementary calcareous deposits (pl. 1, figs. 6-8). These smaller tubes house the inhalent and exhalent siphons of the animal, the one for the inhalent siphon being of somewhat larger diameter than that for the exhalent one. In the Recent species these tubes tend to project beyond the end of the primary tube (pl. 1, fig. 1); only very rarely is this to be observed in the fossil specimens, the tubes being brittle and tending to break away. However, fragments of these shorter tubes are commonly found in association with the larger primary ones.

These tubes agree with those formed by the Recent species "*Serpula*" *polythalamia* Linnaeus (1767, p. 1226), the type species of the genus *Kuphus* Guettard, 1770. It may be that the Recent species attains a larger size than did *Kuphus incrassatus,* for Dillwyn (1817, p. 1088) quotes a Mr. J. Griffiths, Esq., as follows: "The length of the longest of these shells that came into my possession was five feet four inches, and the circumference at the base nine inches, tapering upwards to two inches and a half . . . This specimen was nearly perfect, having a small part of the lower extremity entire. I have others of various dimensions, a very good one about three feet long, and four inches round, tapering to an inch and a half at the point." The largest fossil specimens known to the writer include a fragment of a tube from the type locality of the upper Miocene August Town Formation of Jamaica in the Tulane University collections (TU 1013), which has a maximum circumference of almost five inches; the circumference of the largest Chipola specimen is four and one-half inches. Maury reported (1917, p. 399) that in the "Teredo limestone" near Caimito, Santo Domingo, the tubes "were several feet long and at first glance appeared to be exposed roots of trees." Later (1920, p. 46) she stated that they "may attain several feet in length and an inch and a quarter in diameter" [*i.e.*, a circumference of four inches].

Family TEREDINIDAE Rafinesque, 1815

Subfamily KUPHINAE Tryon, 1862

Genus KUPHUS Guettard, 1770

Type species (by subsequent designation, Cox, 1927) *Serpula polythalamia* Linnaeus, 1767. Recent, Indo-Pacific from East Africa, Madagascar and Red Sea, to East Indies and Solomon Islands, etc.

*Kuphus* GUETTARD, 1770, Mém. diff. Sci., v. 3, p. 139.

*Furcella* LAMARCK, 1801, Syst. Anim. sans Vert., p. 104.

*Septaria* LAMARCK, 1818, Anim. sans Vert., v. 5, p. 436 [*non* Ferussac, 1807, Gastr.]

*Clossonnaria* FERUSSAC, 1821, Hist. Nat. gen. et partic. Moll., Tabl. Syst., p. xlv.

*Clausaria* MENKE, 1828, Syn. Meth. Moll., p. 73 [n.n.].

*Cuphus* AGASSIZ, 1846, Nomen. Zool. Index Univ., p. 180 [err. pro *Kuphus*].

*Kyphus* HERRMANNSEN, 1847, Ind. Gen. Malacozool., v. 1, p. 569 [emend. pro *Kuphus*] (May, 1847).

"*Cuphus* Guettard, 1772" GRAY, 1847, Proc. Zool. Soc. London, 1847, p. 188 (November, 1847).

*Cyphus* FISCHER, 1887, Man. Conch., p. 1138 [emend. pro *Kuphus; non Cyphus* Schonherr, 1824, Coleopt.].

Linnaeus, in 1758, (p. 787, sp. 699) described *Serpula arenaria* with references to:

"Bonan. recr. I. t. 20, f. C.
Rumph. mus. t. 41, f. E. Solen arenarius.
Gualt. test. t. 10, f. L. N."

In 1767, in the 12th edition of the Systema Naturae, he removed the Rumphius reference from his *S. arenaria* (p. 1266, sp. 803), citing it as the sole reference to his, then newly described, *Serpula polythalamia* (p. 1266, sp. 802). Gmelin, in the 13th edition, added Rumphius' fig. D, plus Martini's "Neues Systematisches Conchylien-Cabinet" vol. 1, pl. 1, fig. 6, which is a reproduction of the Rumphius Fig. E. The Rumphius illustrations (1711, pl. 41, figs. D and E) are here reproduced for comparison with our fossil forms (pl. 1, figs. 1, 2).

PLATE 1

Figs. 1, 2. *Kuphus polythalamia* (Linnaeus), reproduction (X 0.6) of the Rumphius illustrations (1711, pl. 41, figs. D, E). (1) Rumphius' fig. E, the only illustration cited by Linnaeus when he proposed the name *Serpula polythalamia.* According to Rumphius this represents the "vero superior." (2) Rumphius' Fig. D, added to the synonymy by Gmelin, 1791, and stated by Rumphius to represent the "pars inferior" of the tube.

Figs. 3-8. *Kuphus incrassatus* Gabb. (3) USNM 646636, portion of a siphonal tube showing evidence of much damage and repair during the life of the animal (ca. X 1.6), length 64.7 mm; locality TU 826. (4) USNM 646635, tube with part of the siphonal tubes still intact (ca. X 1), length 195 mm, greatest diameter 20 mm, least diameter of main tube 14.5 mm; locality TU 825. (5) USNM 646637, another somewhat larger and irregular tube (ca. X 0.9), length 206 mm, greatest diameter 24.5 mm, least diameter 14.2 mm; locality TU 818. (6-8) Polished surfaces showing the position and size of the siphonal tubes, the larger housing the inhalent siphon. Several authors suggest that the two smaller tubes are separated by a septum; note that no such structure is present: (6) USNM 646638, an average specimen (X 2), diameter 12.7 mm; locality TU 548. (7) USNM 646634, specimen in which the inhalent siphonal tube was damaged and, as repaired, projects outside of the regular tube (X 2), greatest diameter 14.3 mm; locality TU 825. (8) USNM 646639, specimen cut at point where larger tube was bent; note that the siphonal tubes are adjacent to the inner side of the curve, and that the outer tube is much thickened on the outer side of the curve (X 2), diameter 14.7 mm; locality TU 548.


PLATE 1

The original *Serpula arenarius* is now considered to represent a tubiculous annelid while the *Serpula polythalamia* is known to be a sediment-penetrating teredid bivalve mollusk.

In addition to the variant spellings of *Kuphus* noted in the synonymy above, there have been a number of variants of the other generic names here included in the synonymy, especially of the name *Clossonnaria* Ferrusac; their inclusion in the above list would only serve to add unnecessary complication.

## KUPHUS INCRASSATUS (Gabb)

Plate 1, figures 1-8

*Kuphus incrassatus* GABB, 1873, Amer. Philos. Soc., Trans., (N.S.), v. 15, p. 246 (near Guayubin, Santo Domingo); GABB, 1881, Acad. Nat. Sci., Phila., Jour., (Ser. 2), v. 8, p. 342, pl. 44, figs. 12a-e (first illustration, plus additional Santo Domingo localities, also reported from Sapote on Rio Reventazon, Costa Rica).

"*Teredo fistula* Lea, ? = *Kuphus incrassatus* Gabb." GUPPY, 1876, Quart. Jour. Geol. Soc. London, v. 32, p. 529 (Miocene, Haiti).

*Teredo circula* ALDRICH, 1886, Alabama Geol. Surv., Bull. 1, pt. 1, p. 36 (Choctaw Bluff, Ala.).

"*Teredo incrassata* Gabb (as *Kuphus*)." DALL, 1898, Wagner Free Inst. Sci., Trans., v. 3, pt. 4, p. 813 ("Oligocene of Santo Domingo, Haiti, and Costa Rica, Gabb; and of the Bowden marls, Jamaica, Henderson and Simpson. *T. fistula* Guppy (*non* H. C. Lea) from the Oligocene of Trinidad, is probably the same.")

*Teredo incrassata* Gabb. MAURY, 1917, Bull. Amer. Paleontology, v. 5, no. 29, p. 235, pl. 39, fig. 24 (Santo Domingo).

*Teredo* sp., COOKE, 1919, Carnegie Inst. Wash., Publ. 291, p. 146 ("abundant in the Oligocene of Cuba.").

*Teredo incrassata* (Gabb). MAURY, 1920, Sci. Survey Puerto Rico and Virgin Islands, v. 3, pt. 1 (Tertiary Mollusca), p. 45 (cites many Puerto Rican localities).

*Teredo (Kuphus) incrassatus* Gabb. PILSBRY, 1922, Acad. Nat. Sci., Phila., Proc., v. 73, p. 428 (Type lot is ANSP No. 2875).

*Teredo (Kuphus)* aff. *polythalamia* (Linné)! COX, 1927, Rept. Paleontology Zanzibar Protectorate, p. 62 [part, only]. (Inasmuch as fossil *tubes* [not part of the shell] cannot be distinguished from those of Recent specimens, Cox suggests using above designation for all types. The present writer prefers to continue use of Gabb's name to distinguish western Atlantic from Indo-Pacific occurrences.)

*Teredo (?) incrassata* (Gabb). MANSFIELD, 1937, Florida Geol. Surv., Bull. 15, pp. 49, 282, pl. 21, fig. 4 (Suwannee Ls., Florida).

"Tube large, cylindrical, irregular, surface covered by lines of growth, substance thick; apex often twisted or otherwise distorted; divided by a longitudinal septum into two tubes, often of unequal size.

"Fragments of this species are very common in the brown earthy shale east of Guayubin [Santo Domingo]. The largest I have seen is a little over an inch in diameter, and they usually occur in pieces of two or three inches in length. . . . The shelly walls are often so thickened that the internal diameter is not over half that of the outside." (Gabb, 1873)

*Occurrence:*

*Chipola Formation:* As noted above, tubes of *Kuphus incrassatus* are found at several localities from the middle portion of the formation exposed along the Chipola River, and from the strata of equivalent stratigraphic position and facies on Farley Creek, a tributary entering the Chipola River from the east side. It is represented in collections from 6 of the 22 Tulane University fossil localities in the river banks (TU 458, 459, 548, 555, 807, 950), and from 12 of the 15 localities along the course of Farley Creek (TU 818, 820, 821, 823, 824, 825, 826, 827, 828, 999, 1048).

*Other United States Coastal Plain Formations:* Glendon Limestone, Oligocene, Brandon, Mississippi (TU 931); Chickasawhay Marl, upper Oligocene, Alabama and Mississippi (Mansfield, 1940, p. 201, pl. 27, fig. 35); Suwannee Limestone, upper Oligocene, Florida (Mansfield, 1937, p. 282, pl. 21, fig. 4); ? Flint River Formation, Oligocene, well near Thomasville, Georgia (Mansfield, 1937, p. 50).

*Central America and Antilles:* (Note: references cited only for those areas not documented in the discussion or synonymy above.) Cercado and Gurabo Formations, Miocene, Santo Domingo; Miocene, Haiti; Oligocene/Miocene, Puerto Rico; Oligocene, Cuba; Oligocene/Miocene, Jamaica*: August Town Ls., upper Miocene (TU 1013), Brown's

*Dall's record of the presence of *Kuphus* in the fauna "of the Bowden marl, Jamaica, Henderson and Simpson" is not confirmed by Woodring, (1925, p. 195) who states that the tubes of *Teredo* found in that fauna "are much smaller and thinner than tubes from the Dominican Republic to which Gabb gave the name *Kuphus incrassatus*."

Town Member of White Limestone, Oligocene (TU 1015); Anguilla Formation, lower Miocene, Anguilla; Miocene, Trinidad (Maury, 1925, p. 96, pl. 18, figs. 9, 10); upper Oligocene limestone, Rio Conchos, near Méndez, Tamaulipas, Mexico (TU 1080 and Gardner, 1945, pp. 19, 140), Meson Formation, upper Oligocene, south of Tampico, Mexico (TU 1074); lower Miocene limestone, Guatemala; Miocene, Costa Rica; Emperador Limestone, lower Miocene, Panamá (Vaughan, 1919, p. 558).

## LOCALITY DESCRIPTIONS

The following are all Tulane University fossil locality numbers:

*Chipola Formation, late lower Miocene:*

458. East bank of Chipola River, above Farley Creek (SW ¼ Sec. 20, T1N, R9W), Calhoun Co., Florida.
459. East bank of Chipola River at steep bank about 1500 feet above mouth of Taylor Lake Branch (NW ¼ Sec. 29, T1N, R9W), Calhoun Co., Florida.
548. West bank of Chipola River (NW ¼ Sec. 29, T1N, R9W), Calhoun Co., Florida.
555. East bank of Chipola River, about ¼ mile below mouth of Four Mile Creek (SW ¼ Sec. 29, T1N, R9W), Calhoun Co., Florida.
807. West bank of Chipola River, at north edge Sec. 20, T1N, R9W, Calhoun Co., Florida.
818. Farley Creek, south bank, 0.1 mile west of bridge on Florida highway 275 (SW ¼ Sec. 21, T1N, R9W), Calhoun Co., Florida.
820. Farley Creek, north bank, at bridge of Florida highway 275, (SW ¼ Sec. 21, T1N, R9W), Calhoun Co., Florida.
821. Farley Creek, north bank, 0.1 mile east of bridge of Florida highway 275 (SW ¼ Sec. 21, T1N, R9W), Calhoun Co., Florida.
823. Farley Creek, south (east) bank, about 2000 feet east of bridge of Florida highway 275 (SE ¼ Sec. 21, T1N, R9W), Calhoun Co., Florida.
824. Farley Creek, south (east) bank about 0.5 mile east of bridge of Florida highway 275 (SE ¼ Sec. 21, T1N, R9W), Calhoun Co., Florida.
825. Farley Creek, north bank at abandoned mill about ¼ mile west of bridge of Florida highway 275 (SW ½ Sec. 21, T1N, R9W), Calhoun Co., Florida.
826. Farley Creek, north bank, about 400 feet downstream from loc. 825 (on line between Secs. 20 and 21, T1N, R9W), Calhoun Co., Florida.
827. Farley Creek, north bank about 0.5 mile west of bridge on Florida highway 275 (SE ¼ Sec. 20, T1N, R9W), Calhoun Co., Florida.
828. Farley Creek, north bank, immediately upstream from mouth of unnamed tributary and 3/4 mile below bridge on Florida Highway 275 (SE ¼ Sec. 20, T1N, R9W), Calhoun Co., Florida.
950. Chipola River, west bank, about 2000 feet above mouth of Farley Creek (near north edge of SW ¼ Sec. 20, T1N, R9W), Calhoun Co., Florida.
999. Farley Creek, south bank, about 1000 feet west of bridge on Florida highway 275 (SW ¼ Sec. 21, T1N, R9W), Calhoun Co., Florida.
1048. Farley Creek, southeast bank, about 0.8 mile east of bridge on Florida highway 275 (NE ¼ Sec. 21, T1N, R9W), Calhoun Co., Florida.

*Non-Chipola localities cited:*

931. Glendon Ls., Oligocene, quarry of Marquette Cement Co., south of U.S. highway 80 at Brandon, Mississippi.
1013. August Town Fm., upper Miocene, Hope River Gorge at August Town, Parish of St. Andrew, near Kingston, Jamaica.
1015. Brown's Town Fm., Oligocene, at Orange Park, east of Claremont, Parish of St. Ann, Jamaica.
1074. Meson Fm., upper Oligocene, State of Vera Cruz, road cut on Mexico highway 180, 8.4 miles south of ferry landing on Rio Panuco opposite Tampico, Tamps.
1080. Upper Oligocene coralliferous limestone, top of first hill west of Méndez, Tamaulipas, Mexico, on Méndez-China road.

## LITERATURE CITED

COPELAND, C. W., and P. B. DEBOO, 1967, Summary of upper Paleogene and lower Neogene stratigraphy of Alabama: p. 44-47, *in* Geology of the Coastal Plain of Alabama (D. E. Jones, Ed.), Guidebook, Field Trip Number One, Geol. Soc. America, 80th Ann. Meeting, New Orleans, La., v + 113 p., 4 pls., 15 figs.

DILLWYN, L. W., 1817. A descriptive catalogue of Recent shells, etc., v. 2, p. 581-1092 + index (29 p.), London.

GABB, W. M., 1873, On the topography and geology of Santo Domingo: Amer. Philos. Soc., Trans., (N.S.) v. 15, p. 49-259, 2 maps.

GABB, W. M., 1881, Descriptions of Caribbean Miocene fossils: Acad. Nat. Sci., Phila., Jour., (Ser. 2) v. 8, p. 337-348, pls. 44, 45.

GARDNER, JULIA, 1945, Mollusca of the Tertiary Formations of Northeastern Mexico: Geol. Soc. Amer., Mem. 11, xi + 332 p., 28 pls., 1 text fig., 6 tables.

LINNAEUS, CAROLUS, 1758, Systema Naturae per regna tria naturae, Secundum Classes, Ordines, Genera, Species, cum characteribus, Diferentiis, Synonymis Locis. Tom. I. Editio Decima, Reformata: 824 p.; Holmiae.

LINNAEUS, CAROLUS, 1766-1767, Systema Naturae per regna tria naturae, . . . Editio Duodecima, Reformata: v. 1, Regnum Animale, pt. 1, p. 1-532, 1766, pt. 2, p. 533-1327, 1767; Stockholm.

MANSFIELD, W. C., 1937, Mollusks of the Tampa and Suwannee limestones of Florida: Florida Geol. Surv., Bull. 15, 334 p., 21 pls., 2 text figs., 2 tables.

MANSFIELD, W. C., 1940, Mollusks of the Chickasawhay Marl: Jour. Paleontology, v. 14, no. 3, p. 171-226, pls. 25-27.

MAURY, C. J., 1917, Santo Domingo type sections and fossils, pt. 1: Bull. Amer. Paleontology, v. 5, no. 29, 251 p., 39 pls., map.

MAURY, C. J., 1920, Tertiary Mollusca from Puerto Rico: v. 3, pt. 1, New York Acad. Sci., Sci. Survey Puerto Rico and Virgin Isl., 77 p., 9 pls.

MAURY, C. J., 1925, A further contribution to the paleontology of Trinidad (Miocene horizons): Bull. Amer. Paleontology, v. 10, no. 42, 250 p., 43 pls.

PURI, H. S., and VERNON, R. O., 1964, Summary of the Geology of Florida and a guidebook to the classic exposures: Florida Geol. Surv., Spec. Publ. 5, ix + 311 p., 11 pls., 37 text figs., 4 tables.

RUMPHIUS, G. E., 1711, Thesaurus imaginum Piscium Testaceorum; Quales sunt Cancri, Echini, Echinometra, Stellae Marinae, etc. Ut Cochlearum . . . Conchylia, . . . : 15 p., 60 pls., index (8 p., numbered as plates LXI-LXVIII; Lugduni Batavorum apud Petrum vander Aa.)

TOULMIN, L. D., 1955, Coastal Plain Geology of West-Central Alabama: p. 460-489 *in* Guides to Southeastern Geology (R.J. Ruseell, Ed.), Geol. Soc. Amer., 1955 Annual Meeting, 592 p., ill.

VAUGHAN, T. W., 1919, The biologic character and geologic correlation of the sedimentary formations of Panama in their relation to the geologic history of Central America and the West Indies: U.S. Natl. Mus., Bull. 103, p. 547-612.

WOODRING, W. P., 1925, Miocene mollusks from Bowden, Jamaica: Pelecypods and Scaphopods: Carnegie Inst. Washington, Publ. 366, vii + 222 p., 28 pls.

November 28, 1972

## REVIEW

PRINCIPLES OF GEOLOGY, by Charles Lyell; with an introduction by Martin J. S. Rudwick: reprinted in facsimile. Distributed by Stechert-Hafner Service Agency, Inc., New York, 1970, 3 vols.; I, xxv, front., xv + 511 pp. with 2 pls. and 33 woodcuts; II, iv, front., xii + 330 pp. with folding map and 9 woodcuts; III, iv, 4 pls. shells, map, front., xxxii + 398 pp. with 93 woodcuts, + 109 pp. comprising two appendices, a glossary and index; $71.50

Sir Charles's *Principles of Geology,* the most influential book in the history of this branch of science, is here reprinted in the original state of the first edition for the first time. These three volumes appeared separately in 1830, 1832, and 1833 and second editions of volumes I and II were published in 1832 and 1833 before the third volume first appeared. Thus, sets of first editions are relatively rare and previous to this reprint edition generally inaccessible. Most libraries contain mixed sets of the first two editions or later versions. During Lyell's lifetime the *Principles* was constantly in revision and eleven subsequent editions appeared between 1834 and 1875, representing a remarkable degree of success and influence on geologic thought. As Doctor Rudwick states in his lengthy analytical introduction, though the *Principles* "should be numbered among the most revolutionary books in the history of science . . . it has suffered in modern times from being more venerated than read." He attributes this condition not only to the inaccessibility of the first edition but to its great length of more than 1200 pages. Lyell's original conception of the scope and nature of geology can be gained only from study of the first edition before the extensive modifications appeared in response to its success and the continuous discussion and criticism it evoked within the scientific community. Doctor Rudwick also calls attention to the approach of Lyell as revealed by the subtitle, "grounded on the methodological principle of actualism, the *attempt* to interpret and explain the past in terms of 'actual causes,' i.e., processes observable in the present." This handsome and well-done reprint will permit modern historians of geology and all other interested readers to re-evaluate Lyell and his work in the original version.

H.C.S.