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THE GENUS BANKIA IN THE WESTERN ATLANTIC[1]

BY
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Boring mollusks present some of the most important biological problems in the Mollusca. Their life histories are extremely complicated and economically they are a factor of tremendous importance in the deterioration and destruction of marine structures such as wharves and boats, particularly those built of wood and concrete. The two most important families which contain species that bore into stone, inferior grades of concrete, wood and rope are the Pholadidae and Teredinidae. The former are known to bore into

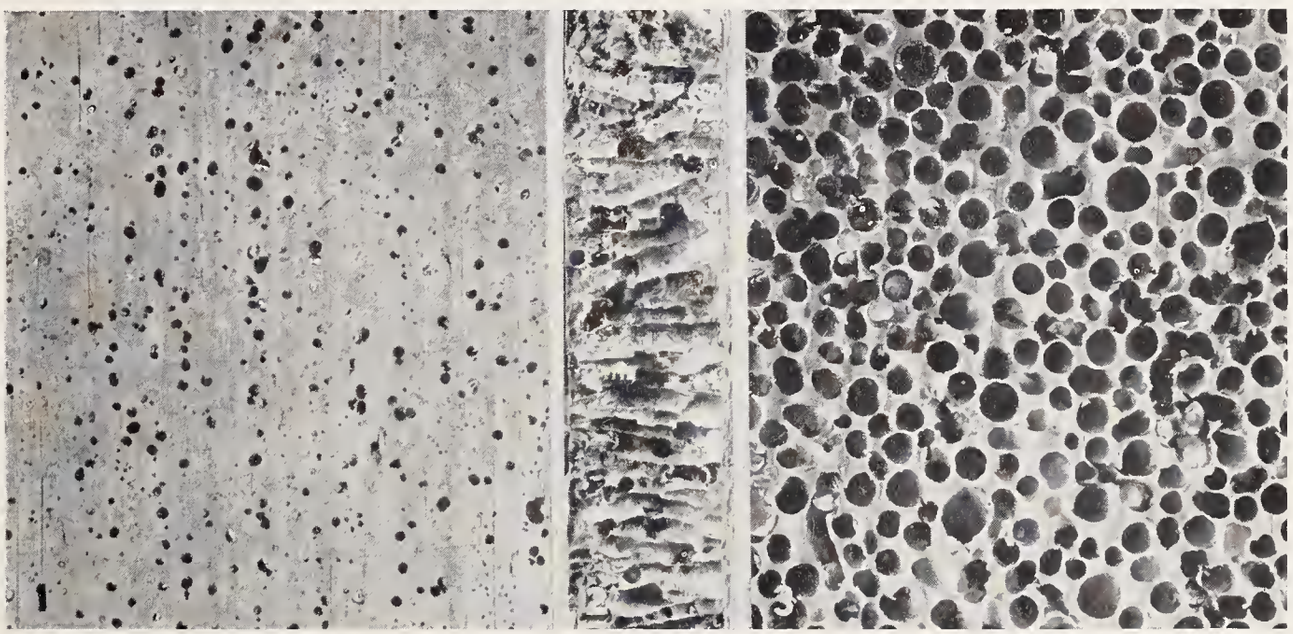

Fig. 1 Fig. 2 Fig. 3

Plate 1. Damage by *Bankia gouldi* Bartsch

First layer of a laminated test-board from Pensacola, Florida. (Submerged December 22, 1944, removed from water August 22, 1945. Board examined monthly, no apparent damage until May.)

Fig. 1. Outside of board showing minute entrance holes. Smaller holes are those of *Bankia* that were living at time of removal; larger holes are those of *Bankia* that were dead at time of removal. Fig. 2 Cross-section through one-half inch board. Fig. 3 Inside of board showing tunnels after one-half inch of growth. All enlarged $1\frac{1}{2}\times$. Specimen from the William F. Clapp Laboratories.

Photographs by F. P. Orchard

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all these substances, even into the covering of marine telegraph cables, while the various members of the Teredinidae are limited to boring into wood, rope and asphalt.

The Teredinidae are probably the most important economically among all families of Mollusca. The amount of damage caused by the many species in this family probably exceeds by far the total income from the sale of mollusks that are used for food, art work and all other purposes. The destruction caused by this group in recent years is clearly evidenced by the exhaustive reports which have been published on marine piling investigations. During the years 1919 to 1921 there were sudden and severe invasions of borers in San Francisco Bay. This was due to a decline in rain fall and an intensified program of irrigation. The resultant lowering of the river waters allowed the salt water of the bay to advance up the tidal areas of these rivers. This created conditions favorable to the spread of *Teredo* and *Bankia*. The damage caused at this time resulted in the complete collapse of almost every wooden structure in San Pablo Bay with a loss of $25,000,000. Following this catastrophe the committee on Marine Piling Investigation was organized by the National Research Council and their report was published in 1924. In 1927, the San Francisco Bay Piling Committee published a complete study of the marine borers in that locality. In 1933 the situation became serious in New England, and as a consequence, a New England Committee was formed. The Australians likewise have been faced with this problem and from their researches two reports have appeared: one for the Port of Sydney and the other for the Port of Brisbane. All of these papers are of great importance to students in this group as considerable space in each is devoted to the biology and taxonomy of the Teredinidae. These reports are, of course, only a fraction of the very large body of literature that has been written about these animals from both a taxonomic and an economic point of view.

The present study concerns the taxonomy of the genus *Bankia*, one of the genera in the family Teredinidae. All members of this family are commonly referred to as shipworms, as pileworms and in Australia as "cobras."

We are under great obligation to Dr. William F. Clapp[1] of the Clapp Laboratories, Duxbury, Massachusetts for the very large collection of Teredinidae which he donated to this museum in 1928. Since that time he has more than doubled the original collection and today it numbers more than 5,000 specimens. All of this material was obtained from test-boards, wharves, bridges and other permanent structures in ports throughout the world. The majority of the specimens, however, are from the Western Atlantic.

The pallets and shells of each specimen in this collection are preserved together in glycerine-alcohol for permanency. It is necessary to keep the pallets moist because they consist in part of a chitinous periostracum. In drying out this generally scales off and consequently the differential characteristics contained in this covering are lost. The best method, to our knowledge, is to preserve them in a mixture of four parts alcohol (70%) and one part glycerine. The glycerine keeps the periostracum soft and pliable, and if the alcohol evaporates the pallets will remain moist for a considerable period of time. Permanent slides can be made by mounting the pallets in diaphane or euparol directly from the specimens that have been preserved for some time in glycerine-alcohol or from fresh

[1] Biologist, National Research Council, Committee on Marine Piling Investigation in the Western Atlantic (1922 to 1924).

specimens that have been placed in 75% alcohol for 24 hours. Magnifications of 10 to 24 diameters will allow ready identification in all cases. It is to be borne in mind, however, that the pallets must be in excellent condition for proper identification. Dried pallets or those that have started to decompose lose much if not all of the periostracum. Many species in this family remain unknown, other than by name, as the original diagnosis was based upon incomplete or poorly preserved specimens.

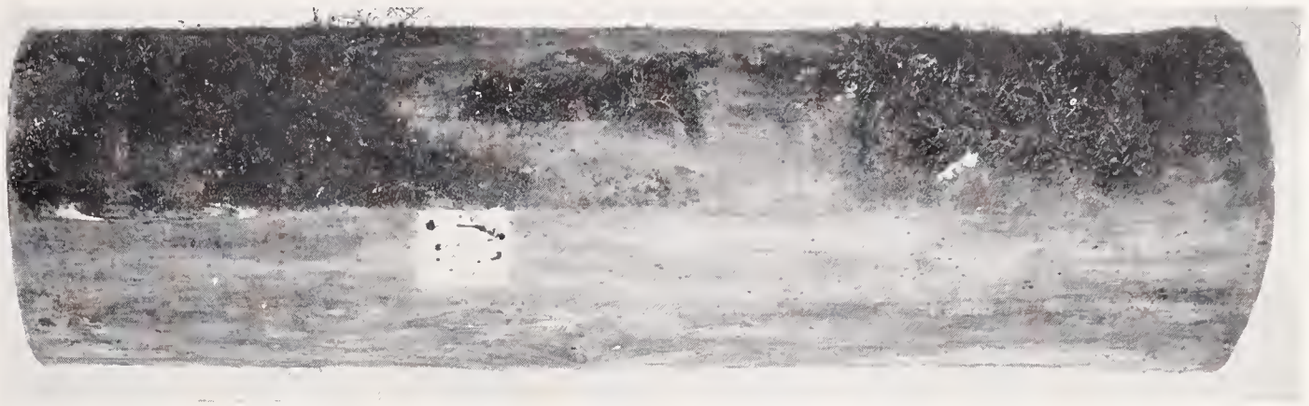

Fig. 1

Fig. 2

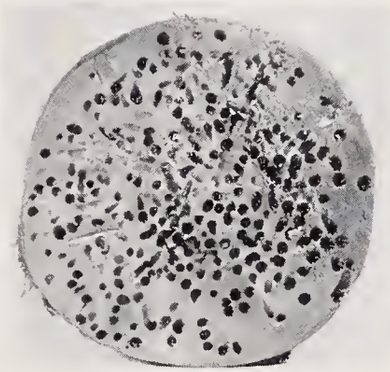

Fig. 3

Plate 2. Damage by *Bankia gouldi* Bartsch

Cypress dolphin piling from near channel, Cape Fear River, Wilmington, North Carolina. Driven August 1, 1944, pulled May 5, 1945.)

Fig. 1. Outside of piling showing almost no evidence of damage other than at the $2\frac{1}{2}$-inch exposed area, Upper half cleaned of marine growth. Fig. 2. Inside of piling (split midway) showing the extent of destruction. Fig. 3. Cross-section of piling. (All greatly reduced. Actual size 2 feet, 10 inches in length and 10 inches in diameter.) Specimen from the William F. Clapp Laboratories. *Photographs by F. P. Orchard*

Notes on the life history of *Bankia gouldi* Bartsch

The following notes on the life history of *Bankia gouldi* Bartsch fit all species in this genus so far as now known. These notes have been obtained mainly from the paper on this species by C. P. Sigerfoos.

Though shipworms begin life in a typical molluscan fashion, the adults are probably among the most specialized and striking of all pelecypods. The eggs of *Bankia gouldi* are extruded from the exhalant siphon and are fertilized in the water. Development of

the egg is very rapid and on warm days the embryo may become free-swimming within three hours, reaching the typical veliger stage within a day. During the free-swimming stage, which probably lasts about a month, the shipworm closely resembles a typical minute bivalve except for the possession of a velum or swimming organ. At this stage the young may also crawl about rapidly, but once a point of attachment has been selected they fasten themselves by a single byssus thread and immediately scrape a shallow depression in the surface of the wood. By cementing these scrapings together, they build a small conical covering for protection. Once within this protective covering a metamorphosis takes place. The velum is lost, the foot becomes pestle-shaped for aid in boring, and the shell becomes specialized, gaping anteriorly for the projection of the foot and posteriorly for the extension of the long body. Under favorable conditions this change requires about two days and after this time the young *Bankia* begins to bore and develop rapidly into an elongate animal, enlarging its burrow as it increases in size. According to Sigerfoos, a newly attached larva is less than 0.25 mm. in length; within twelve days it is 3 mm., and in 36 days 100 mm. (about 4 inches). The rate of growth is dependent upon the salinity and temperature of the water, the food supply and the crowding of the animals. When extreme crowding prevails stunted or stenomorphic individuals result.

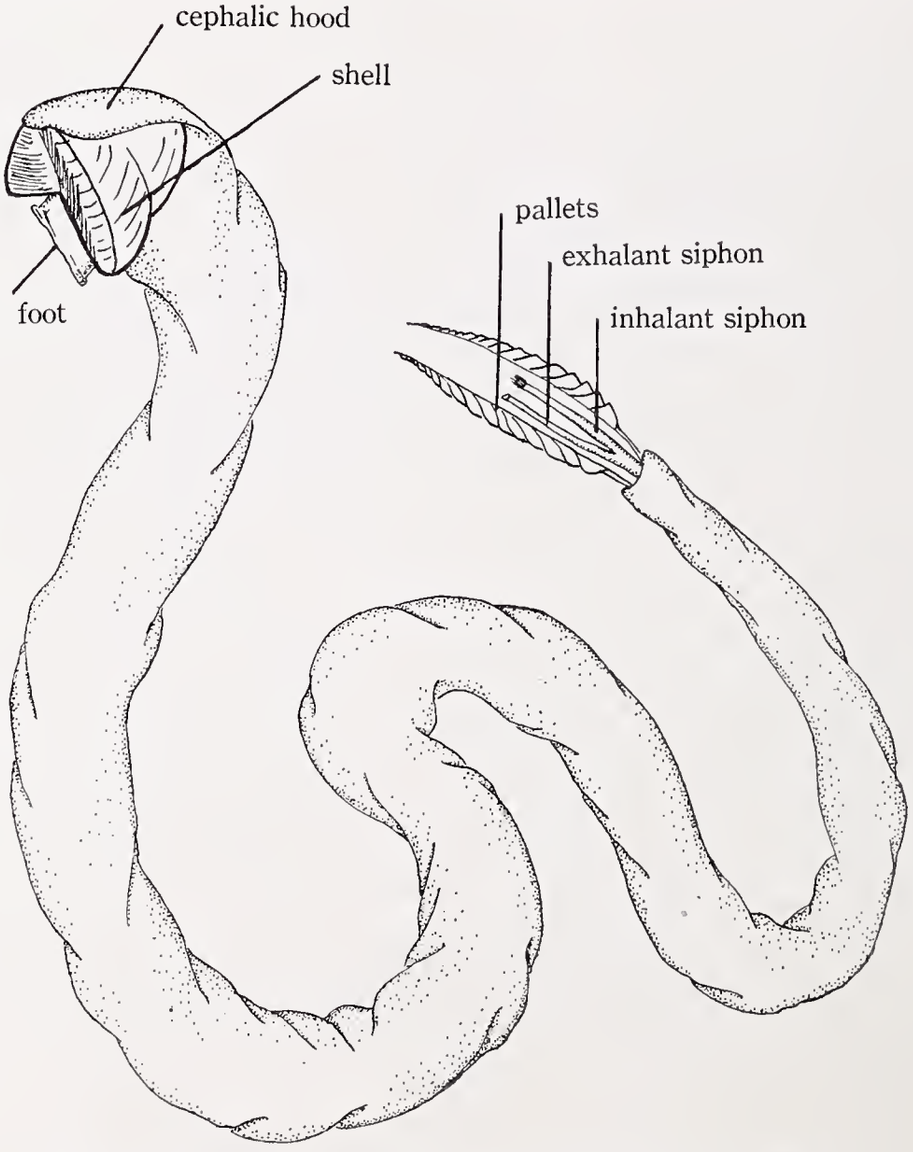

Plate 3. Diagrammatic drawing of an entire *Bankia*, showing relative position of shell and pallets (lateral view).

Under general conditions the shell of an adult specimen is about 1/40 of the total length of the animal, the remainder of the body being protected by the wood in which it bores. The mantle secretes a thin, smooth calcareous lining for the burrow as an added protection to the soft body. The pallets which are located at the posterior end of the animal can be pushed forcibly into the minute opening at the end of the burrow as a plug, thus giving protection from enemies, changes in salinity or other adverse conditions. When the shipworm is undisturbed the pallets are withdrawn and the siphons are extended into the water for breathing and feeding.

Descriptive characters of shells and pallets of the Teredinidae

External view of shell. The shell consists of three main parts, the lobe, the disc,[1] and the auricle. The lobe, the anterior part of the shell, is covered with rows of denticulations which run parallel to the ventral margin. The number of rows and spacing between them vary with the age and rate of growth of the specimen. On the dorsal part of the lobe there is a smooth non-denticulated area, the umbo, from which the rows of teeth radiate. The ventral margin of the lobe meets the anterior margin of the disc at about a right angle. The disc is divided into three parts, anterior, median and posterior. The anterior portion of the disc is armed with rows of denticulated ridges which run parallel to the anterior margin. These rows of denticles are coarser and more crowded than those on the lobe, the spaces between the rows being very narrow. The median portion of the

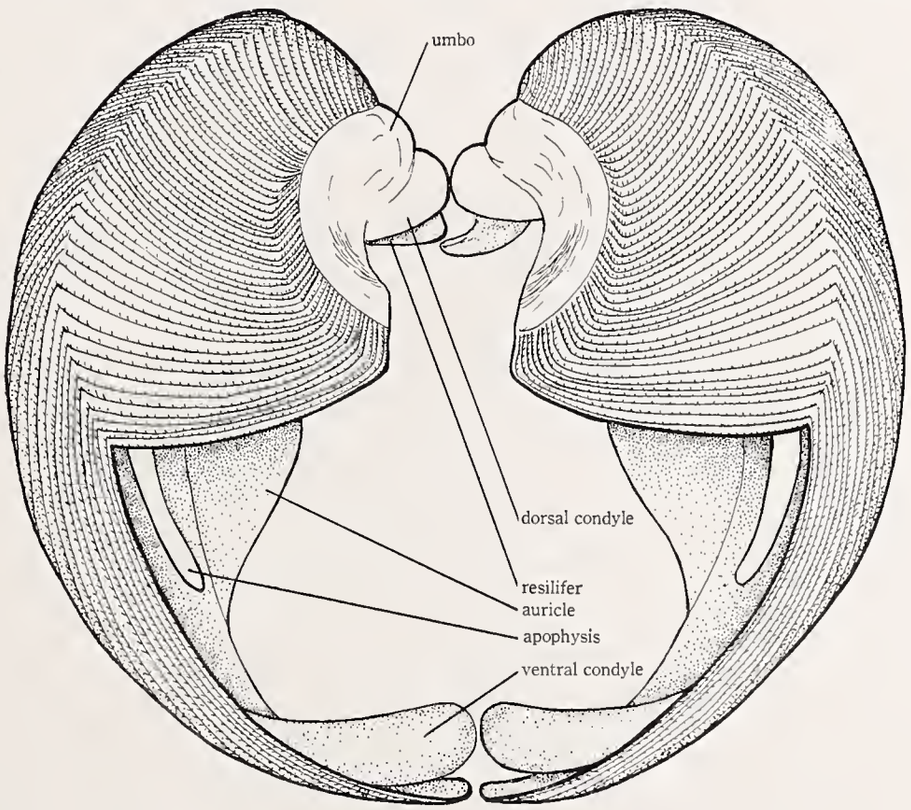

Plate 4. Anterior view (pedal gape) of teredinid shell showing various structures and the apposition of the condyles upon which the two valves rotate.

[1] The disc is also known as the median area and the three portions of the disc as anterior median area, middle median area, and posterior median area. To be consistent with the terminology employed in the descriptions of other bivalve shells, we have retained the term *disc* when referring to the central portion of the valves.

disc is without denticles, is usually much narrower than the anterior and posterior portions, and sometimes may be slightly elevated. The posterior portion of the disc is broad and marked with concentric lines of growth. The auricle is posterior to the disc. This part of the shell is largely imbedded in the mantle of living specimens. The line of fusion between the auricle and the disc may be almost invisible or, again, so marked that a distinct shelf is formed on the internal side where the two overlap.

Internal view of shell. The main portions of the shell discussed for the external view can readily be distinguished internally, and in addition there are four more parts to be seen, namely the dorsal and ventral condyles, the shelf, and the apophysis. On the internal edge of the umbo may be seen the dorsal condyle. The ventral condyle is located at the ventral margin of the median portion of the disc. In boring, the two valves rotate

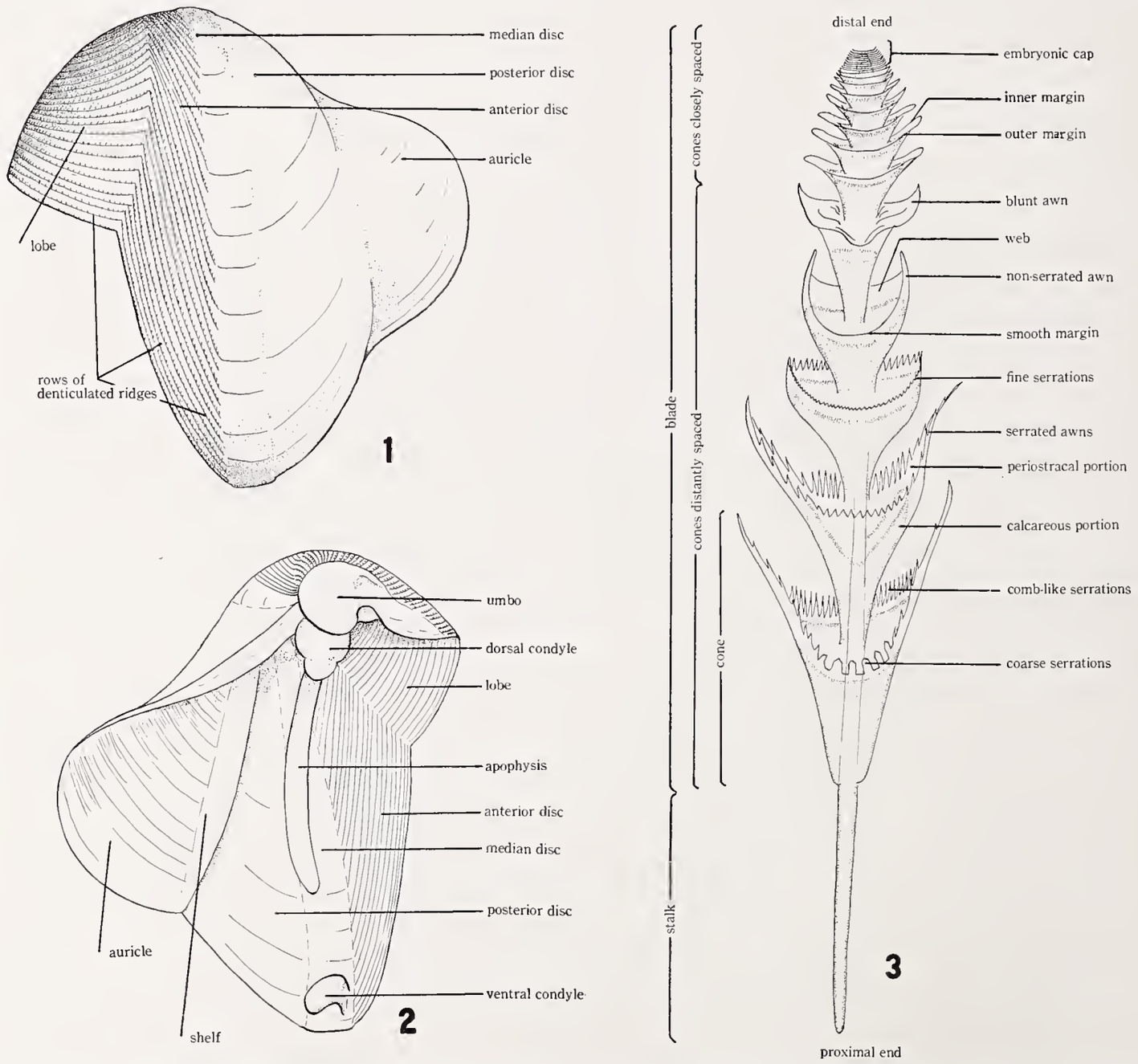

Plate 5. Diagrammatic drawing of shell and pallets, to show various parts and to indicate descriptive terms. Fig. 1. External view of shell. Fig. 2. Internal view of shell. Fig. 3. Hypothetical pallet to show the forms of cone structure and modification of the periostracum.

on these processes. The apophyses, to which the muscles of the foot are attached, originate on the under side of the dorsal condyles and extend to about one-half the distance between this and the ventral condyles. The shelf which is formed by the overlapping of the auricle and the disc may be almost invisible or quite marked, its width and depth varying with the species and the age of the specimen.

The denticulated ridges of the shell are the cutting tools of the boring mechanism. As the two valves rotate back and forth, pivoting on the dorsal and ventral condyles, the denticles scrape away minute particles of wet wood. The foot plays an important part in boring, for by means of suction, it holds the animal in one position during the cutting operation. The position of the valves, of course, is changed from time to time as the burrow is lengthened. The backward rotation does the cutting and as a consequence the posterior adductor muscle which is attached to the auricle has become greatly enlarged to aid in this work. The anterior adductor muscle remains small and its function is to bring the valves forward again. The muscles of the foot are attached to the apophyses.

Pallets. The pallets of all teredinids are made up of two parts, the blade and the stalk. The blade, which is the broad flat portion, is made up of one piece in the genus *Teredo,* but composed of several cone-like elements in the genus *Bankia.* The stalk is usually nearly circular in cross-section and in some species is clearly visible through the cones. In cross-section the blade of the pallet is flattened on the inner surface and convex on the outer surface, the degree of convexity varying greatly with the species and individually within any one species. The cone-like elements which make up the pallets are most distinctive and are of great importance taxonomically. They are made up of a calcareous base and are covered with a thin chitinous periostracum. The amount of periostracum varies with the species. Its upper margin may be smooth or serrate and in many species it is produced laterally to form awns. The spacing of the cones is generally consistent within the species though much depends upon the rate of growth of the individual.

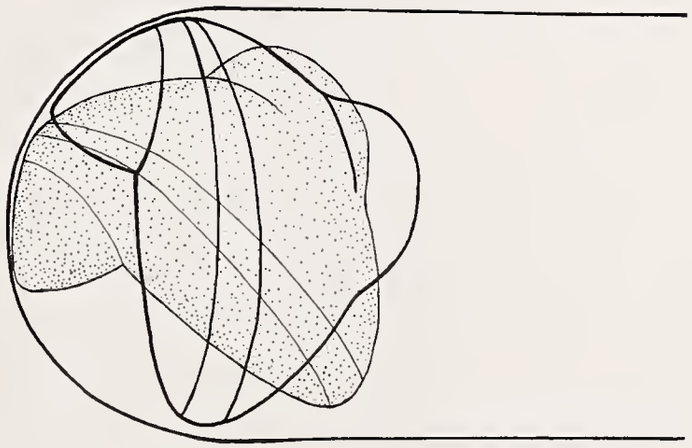

Plate 6. Diagrammatic drawing of a teredinid shell in the burrow, to show two positions in boring (lateral view).

Genus **Bankia** *Gray* 1842

Bankia Gray 1842, Synopsis of the Contents of the British Museum, ed. 44, p. 76; 1847, Proc. Zool. Soc. London, p. 188: *non Bankia* Guenée 1852.

Xylotrya Leach of authors, *non* Menke 1830, Synopsis Methodica Molluscorum, Pyrmont, p. 121.

Genotype, *Teredo bipalmulata* Lamarck (original designation, Gray 1842).

The shell is small, seldom exceeding 15 mm. in height. When the two opposing valves are in normal position it is nearly spherical in shape. The shell gapes widely both anteriorly for the foot and posteriorly for the body, the shell being only a small fraction of the length of the animal. Each valve is composed of three main parts, the lobe, the disc and the auricle. The lobe and the anterior portion of the disc are armed with closely set rows of denticulated ridges. It is extremely difficult, if not impossible, to separate with any degree of certainty the shells of this genus from those of the genus *Teredo*. The pallets are elongate and consist of a series of cone-like sections which are composed of lime and are covered with periostracum. The margin of the periostracum may vary from being non-serrated and without awns to being deeply serrated and possessing long awns. The cone elements are built on a central stalk: the individual elements, however, are free from each other (not fused) and can be easily separated. This character differentiates the genus *Bankia* from the genus *Nausitora*, the latter having the multiple cone elements fused together.

The name *Xylotrya* 'Leach' Menke 1830 has been the cause of considerable confusion. The name did not appear officially until 1830 when Menke listed it as a synonym under *Pholas*. Whatever Leach had intended in manuscript for this genus is, of course, of no moment now. Its use by Menke, however, was valid and the name must date from his Synopsis Methodica Molluscorum. Gray, in 1847, synonymized his own genus *Bankia*, which he had proposed in 1842, under *Xylotrya* and for the genera *Xylotrya* and *Bankia* he gave as type *Teredo bipalmulata* Lamarck. Unfortunately, this type selection cannot be used for *Xylotrya* as Menke's use, even as a synonym, was under the genus *Pholas*. In order to avoid confusion for future workers, we here select *Pholas dactylus* Linné as the type of *Xylotrya* Menke, thus making the latter an absolute synonym of *Pholas* Linné which possesses the same type, designated by Children in 1823.

Subgenus **Bankia** *Gray*

Bankia Gray 1842, Synopsis of the Contents of the British Museum, ed. 44, p. 76.

Subgenotype, *Teredo bipalmulata* Lamarck (original designation, Gray 1842).

The species of this subgenus have a serrated margin of periostracum on the inner surface and a narrower and smooth-edged margin on the outer surface. The lateral portions extend as long awns. The awns are not of equal length on the same cone, one being nearly twice as long as the other. The two pallets of a specimen are really mirror images of one another, so that when the pallets are in normal position, the long awns are opposite each other and the short awns are also opposite each other.

The characters of *B. bipalmulata* Lamarck, the genotype, were never clearly outlined until the re-examination of the type material by E. Lamy (1927, pp. 267-268). We quote a translation from Lamy's report:

"The alcoholic collection of mollusks in the Museum of Paris includes a specimen,

no. 81, in a very bad state of preservation (except the pallets) labelled *T. palmulatus* Lk. with this indication of origin: 'Pondichery-Adanson.' This is probably the specimen which Lamarck described and which, moreover, is perhaps the specimen examined by Adanson.

"This Indian form ought to keep the oldest name of *T. bipalmulata* Lk. Its pallets are formed of about twenty triangular cups, the outer angles of which are extended, forming two heavy projecting spines, of which the upper is longer than the lower."

No species in the subgenus *Bankia* is known to occur in the Western Atlantic. However, we include a synonymy and description and figures of *Bankia bipalmulata* Lamarck to aid in a better understanding of this group. Our studies are based upon material from the New Hebrides and Hawaiian Islands.

Bankia (Bankia) bipalmulata *Lamarck*, Plate 7, fig. 1–5

Teredo bipalmulata Lamarck 1801, Systême des Animaux Sans Vertèbres, p. 129 (no locality); Lamy 1926, Jour. de Conch., **70**, p. 266.

Teredo palmulatus Lamarck 1818, Animaux sans Vertèbres, **5**, p. 440 (Indian Ocean [Pondichéry, India]); *non T. palmulata* Forbes and Hanley 1853.

Bankia rubra Sivickis 1928, Philippine Jour. Sci., **37**, p. 288, pl. 1, fig. 6 (living mangrove stems, Puerto Galera, Mindoro Island, Philippines).

Bankia kingyokuensis Roch 1931, Mitt. Zool. Staatsinstitut Zool. Mus. Hamburg, **44**, p. 20, pl. 2, fig. 21 (Kingyoku, Takanoshima, Japan).

Bankia (Neobankia) konaensis Edmondson 1942, Occasional Papers B. P. Bishop Museum, **17**, no. 10, p. 134, fig. 10a–c (Kealakekua Bay, Kona, Hawaii).

Bankia (Neobankia) hawaiiensis Edmondson 1942, Occasional Papers B. P. Bishop Museum, **17**, no. 10, p. 136, text fig. 11a–e (Oahu, Hawaiian Islands).

Description. Shells similar to those of *B. gouldi*, and adults under favorable conditions are quite large. Old specimens generally produce a very distinct shelf on the inside of the shell where the disc and auricle overlap. The apophysis is long, and in adults, it is fairly wide and minutely and irregularly serrated on its inner edge. Pallets consisting of a series of widely spaced cones with the blade rather narrow in proportion to its length. Both the calcareous part and the periostracum rather strong and heavy. Outer margin of periostracum smooth and broadly U-shaped, inner margin nearly straight and rather coarsely serrated. Lateral processes extending as long awns, one being twice the length of the other. Each pallet is a mirror image of the other so that in a normal condition of apposition the long awns fit together and the short awns also fit and oppose one another. In plate 7, if the inner pallet (fig. 2) was placed underneath the other pallet (fig. 1), which would be the natural position, the long and short awns of each cone would be opposite each other. In very young specimens, the awns are of nearly equal length (fig. 3).

height	length	pallet (length)	
11.5	11	48.5 mm.	New Hebrides
7	7.5	28	Pearl Harbor, Oahu

Types. Lamarck's type of *bipalmulata* is no. 81 in the National Museum in Paris. The holotypes of *B. hawaiiensis* Edmondson and *B. konaensis* Edmondson are in the B. P. Bishop Museum, Honolulu and the holotype of *B. kingyokuensis* is in the Berlin Museum. The holotype of *B. rubra* Sivickis was probably destroyed when the Japanese burned

the Philippine Bureau of Science during the recent war. The type locality is Pondichéry, India as given by Lamy from Lamarck's label in the Paris Museum.

Common name. Oriental Shipworm.

Remarks. This species would never have been understood had it not been for the re-examination of Lamarck's type specimen by Lamy. The great confusion that existed in the early literature, particularly among the English malacologists, was due to the fact that Lamarck described the pallets so briefly, merely indicating that they were those of the present genus *Bankia*. As a consequence about all of the various species now considered in the genus *Bankia* that were described prior to 1875 were called *bipalmulata* and *palmulata* at one time or another.

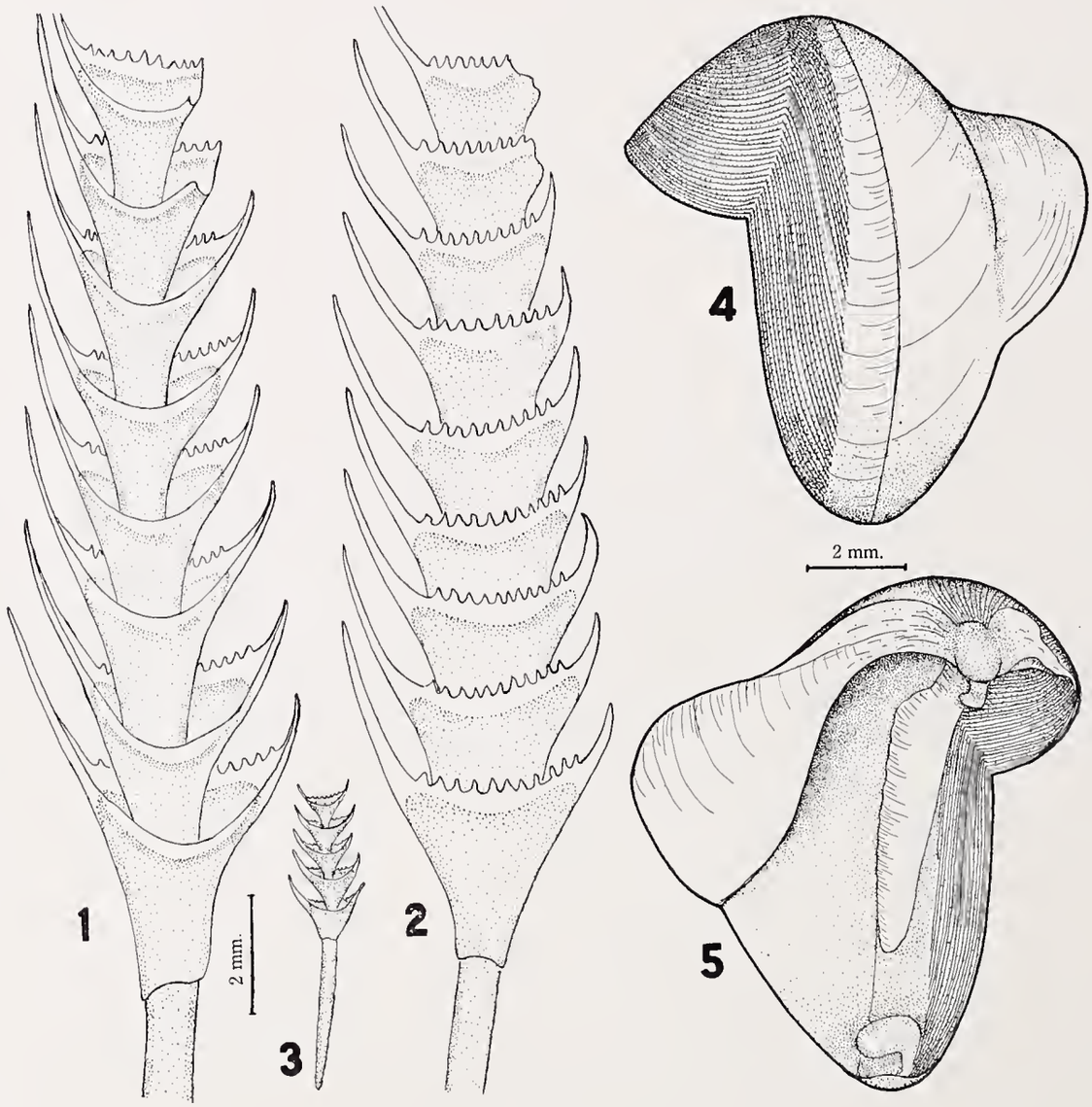

Plate 7. *B. bipalmulata* Lamarck [1]

Espiritu Santo Island, New Hebrides. Fig. 1. Outer surface of pallet. Fig. 2. Inner surface of opposite pallet. Fig. 3. Pallet of young specimen showing nearly equal awns (same magnification). Fig. 4. External view of shell. Fig. 5. Internal view of same shell.

[1] All drawings of pallets and shells were made by the junior author with the aid of a standard camera-lucida and enlargements of these drawings by means of a Berville camera-lucida.

We have given above in our synonymy a few names which refer to this widespread Indo-Pacific form. There are unquestionably several more which will eventually prove to be the same as *bipalmulata* Lamarck.

This species very probably extends throughout the Indo-Pacific area. It is extremely destructive wherever found due to its large size and rapid growth. Edmondson (1942, p. 183) records the largest specimen as 175 mm. (7 inches) after a growth period of only 65 days. Test boards from the New Hebrides (W. F. Clapp Laboratories) were completely riddled in a matter of 90 days. These boards measured 12×6×2 inches.

Edmondson's statement (1942, p. 137) that the growth in *B. hawaiiensis* takes place at the *distal* end of the pallet is most peculiar to say the least—in fact he uses this character to separate this species from his new *B. konaensis* which he states adds new cones to the pallet on the *proximal* end. All pallets of *Bankia* are added to on the proximal end. Edmondson was apparently misled by the peculiar compact embryonic terminations that he had observed in an extremely young specimen of *B. hawaiiensis*. The young pallet figured by Edmondson may not even belong to his *B. hawaiiensis*. A very clear description of the pallet growth is given by Sigerfoos (1908, p. 206).

Range. Hawaiian Islands and west to Japan (Roch and Moll), the Philippines (Sivickis) and probably south to New Caledonia and west at least to India (Lamarck).

Records. Hawaiian Islands: Pearl Harbor, Oahu. New Hebrides: Espiritu Santo Id. (both MCZ).

Key to the Western Atlantic subgenera of *Bankia*

1.	Periostracal margin of the cones non-serrated	2
	Periostracal margin of the cones serrated	4
2.	Awns rather broad, projected away from the cone above	3
	Awns narrow and fine, projected upwardly against the cone above	*Bankiella*
3.	Embryonic cones plate-like and compact	*Bankiopsis*
	Embryonic cone similar to later cones, not compact	*Liliobankia*
4.	Cones with long and serrated awns	*Plumulella*
	Cones without awns	*Neobankia*

Key to *Bankia* of the Western Atlantic (pallets only)

1. Margin of cone periostracum non-serrated — 2
   Margin of cone periostracum serrated — 4

2. Awns short and fine, connected by a wide margin of periostracum on the inner surface — *gouldi*

   Awns short and broad — 3

3. Cones funnel-shaped, moderately spaced, embryonic cones crowded forming compact tip — *caribbea*

   Cones funnel-shaped, distantly spaced, embryonic cones not crowded — *katherinae*

4. Cones without awns — *destructa* and *zeteki*
   (cones closely spaced, *destructa;* cones distantly spaced, *zeteki*)

   Cones with awns — 5

5. Cones closely packed, periostracal margin with fine serrations, awns moderately long and serrate — *cieba*

   Cones distantly spaced, awns large and serrated — 6

6. Periostracal margin wide, calcareous portion V-shaped — *fimbriatula*

   Periostracal margin rather narrow, with coarse serrations, calcareous portion broadly U-shaped — *fosteri*

Stippled areas indicate the calcareous portion of the cones.

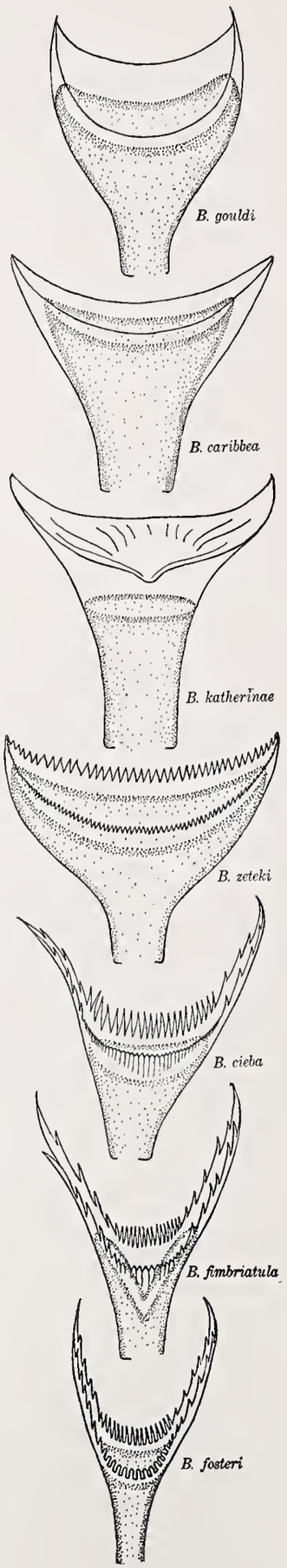

Plate 8

As stated elsewhere we have found the shells in this genus to be nearly useless for purposes of identification. This same observation has been frequently made by nearly all students of this genus and upon other genera in this complex family. Dr. W. F. Clapp, during the course of several years study, made every attempt possible to differentiate the shells of one species from those of another by all the observable characters possessed by the various structures of the valves. Cross sections were made to obtain profiles of the denticulated ridges, countless measurements made and other usual taxonomic procedures followed to determine if any of these unit observations would be of value. These studies were all based upon a very large collection of material. The results were all negative as far as any one character or even the summation of several characters was concerned. Extreme variation and very marked differentiation are brought about by the individual nature of the local conditions under which each specimen lives. In addition, there is a marked change in the shell outline and the morphology of the various structures during the life of the individual.

We have given a full description of the shell of *Bankia gouldi*. General statements of a comparative nature are based on some slight differential characters that we have noticed. It must be clearly understood, however, that the apparent differenees existing in the shells of the various species we have seen and figured are due mainly to the particular stage in growth that our various specimens had reached. A few more weeks or even days of growth would have resulted in a marked differenee in the shells that we have figured.

Subgenus **Bankiella** *Bartsch*

Bankiella Bartsch 1921, Proc. Biol. Soc. Washington, **34**, p. 26.

Subgenotype, *Bankia mexicana* Bartsch = *B. gouldi* Btsh. (original designation, 1921).

Shells similar to those in other subgenera in the genus *Bankia*. Pallets consisting of cones that possess a non-serrated margin of the periostraeum (both inner and outer face) and have the lateral portions of the periostraeum extended to form rather short and inconspicuous awns. The periostraeal margin on the inner face is wider than on the outer faee. This appears as a "web" between the two lateral awns.

Bankia setacea Tryon of the west coast (Alaska south to southern California) is a member of *Bankiella* and not *Bankia* s.s. as given by Bartseh (1922, p. 7). Tryon (1863, p. 144) states "sides of the joints fringed," a reference to the lateral awns only and not meant to convey the idea of any periostracal serrations. His figure, plate 1, fig. 3, shows no serrations at all.

Bankia (Bankiella) gouldi *Bartsch*, Plate 9, figs. 1–4

Xylotrya gouldi Bartsch 1908, Proc. Biol. Soc. Washington, **21**, p. 211 (Norfolk harbor, Virginia).

Bankia (*Bankiella*) *mexicana* Bartsch 1921, Proc. Biol. Soc. Washington, **34**, p. 27 (Sinaloa [west coast] Mexico); Bartsch 1922, United States Nat. Mus. Bull. 122, p. 10, pl. 30, fig. 2.

Bankia schrencki Moll 1935, Sitz. Akad. Wissen. Wien (Math.-natur. Klasse), **144**, p. 275, pl. 2, fig. 7 (Sao Francisco do Sul, Brasil).

Description. Shells equivalve, strongly convex, gaping widely anteriorly for the protrusion of the body. Shell very small in proportion to the size of the animal, thin, whitish and very finely sculptured. Outer surface: Lobe consisting of numerous very fine concentric ridges which are finely denticulate. Anterior dise possesses an equal number of denticulated ridges. The ridges of the anterior dise are much finer and the dentieles much

coarser than those existing on the lobe. The ridges of the lobe and the anterior disc connect at an angle of about 125°. These ridges exist on the median disc, posterior disc and the auricle as exceedingly fine non-denticulated growth lines. Median disc exists as a dorso-ventral area which is somewhat elevated. The posterior disc is nearly smooth, as stated above, with the growth lines running obliquely. The auricle is somewhat ear-shaped in outline, smooth, and slightly depressed dorso-ventrally through its center; its posterior margin flares outwardly. Inner surface: The three main portions, the lobe, the disc, and the auricle are clearly indicated, not only by the marginal contour but also by sculptured growths such as ridges and even incised lines. Below the margin of the umbo on the inner side of the valve there is developed a rounded knob, the dorsal condyle, and on the ventral margin of the median disc there is a similar knob, the ventral condyle. From beneath the umbo there extends downward a scimitar-shaped process, the apophysis, which is flattened antero-posteriorly. The overlapping of the auricle and the disc is materially thickened and forms a shelf-like area. The auricle, posterior disc and median

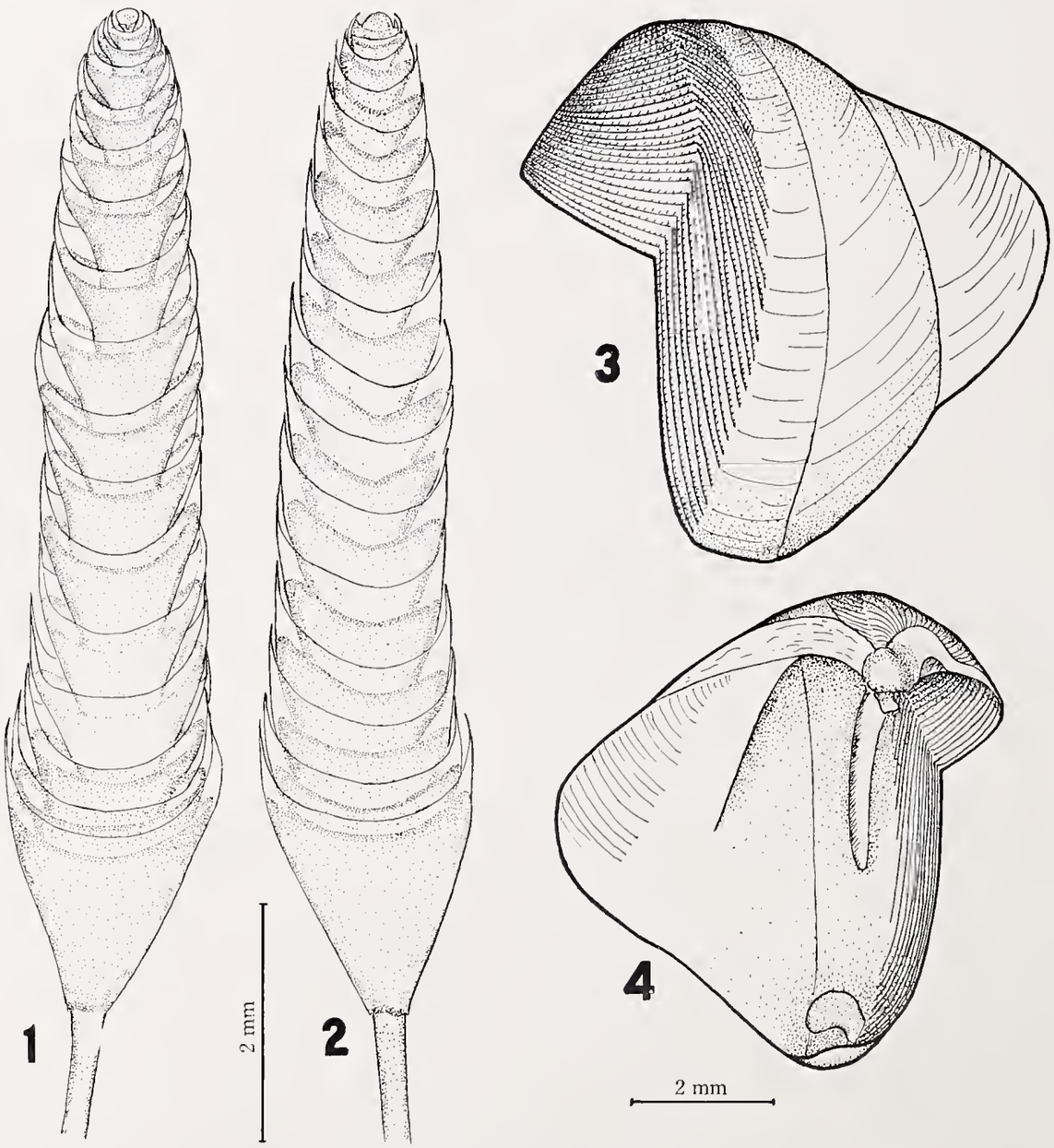

Plate 9. *B. gouldi* Bartsch

Norfolk, Virginia. Fig. 1. Outer surface of pallet. Fig. 2. Inner surface of same pallet. Fig. 3. External view of shell. Fig. 4. Internal view of same shell.

disc are covered with a fine yellowish periostracum. Pallets consisting of a series of closely-spaced cones, calcareous portion of each cone funnel-shaped and with the inner margin wider than the outer. Periostracal margin of the outer surface broadly U-shaped, wide and smooth, forming a "web" between the awns which are short and fine.

	height	length	pallet (length)	
	8.6	8.5	9.7 mm.	Holotype (*B. gouldi*)
(average)	7	7.2	13.6	Norfolk, Virginia
	6.5	7	fragment	Holotype (*B. mexicana*)

Types. Holotype, United States National Museum, no. 27415, Norfolk, Virginia (dried specimen). Holotype of *B. mexicana* Bartsch, United States National Museum, no. 194176a, Sinaloa, Mexico (dried specimen). Holotype of *B. schrencki* Moll is probably in the Berlin Museum.

Common name. Gould's Shipworm.

Remarks. B. gouldi is the most widespread and abundant species in this genus on the Atlantic coast and also the most destructive. Bartsch, in his Monograph (1922) has shown photographs of "Ravages by Gould's Shipworm" on three plates. Damage done on these wharf pilings in all three cases was accomplished largely by *Limnoria*, a crustacean. On plate 11, the "hour-glass" shape of the piling is a typical characteristic feature of *Limnoria* work. *Teredo* and *Bankia* bore into the wood forming only internal tunnels and do not destroy the wood by cutting it away from the outside. Plates 14 and 15 are hand-lettered on the photograph as "destroyed by *Limnoria*" and are not entirely the work of *Bankia* as the printed caption by Bartsch would indicate. There is no question that *Teredo* or *Bankia* may have aided in the destruction of these pilings, but the obvious damage was done by *Limnoria*. On our plate 2 the damage done by *Bankia gouldi* is clearly indicated by the numerous tunnels made in the wood, but the original width of the piling remains the same.

Bankia gouldi also occurs on the west coast of Central America and is the one named *mexicana* by Bartsch. We have been privileged to examine the type specimen. The very small pallet (less than 2 mm. in length) certainly does not belong to the two large shells associated with it. The embryonic portion as figured by Bartsch (1922) is not on the small pallet fragment we have examined. The figures given by Bartsch on plate 30, fig. 2, may well be overdrawn as his statement on page 11 would indicate. "The pallets are all fragmentary, and hence it is impossible to give their measurements." His key is valueless in separating *gouldi* from *mexicana* as the terms are purely relative and all characters fall well within the variations of *gouldi* that we have seen from many localities in the Western Atlantic. Specimens we have received from the Pacific side of Panama from Mr. J. Zetek are definitely *B. gouldi.*

Bankia schrencki Moll described from São Francisco do Sul, Brasil also appears to be *gouldi.* The figured specimens were dried and almost nothing remains of the periostracum. The "segments bear on all sides a narrow membrane with short fringes." This statement in the original description may well define a condition of the periostracum in dried specimens where it splits lengthwise and produces an artificial serration.

Range. New Jersey, the West Indies, Central America, and probably as far south as Brasil. Also in the Eastern Pacific at Panama.

Records. New Jersey: Barnegat Bay (T. C. Nelson). Delaware: Lewis. Maryland: Baltimore. Virginia: Great Bridge and Norfolk, Norfolk Co.; Newport News; Hampton Roads. North Carolina: Washington; Beaufort. South Carolina: Charleston. Georgia: Coekspur Id., Savannah; Brunswick. Florida: Fernandina; Mayport; Daytona Beach; Tampa; St. Petersburg; Pensacola. Alabama: Fort Morgan; Mobile. Mississippi: Pascagoula; Gulfport; Port Eads. Texas: Sabine Pass; Port Bolivar; Galveston; Rockport; Port Aransas; Corpus Christi; Pt. Isabel. Hispaniola: Port au Prinee. Puerto Rico: San Juan. Jamaica: Kingston. Honduras: Puerto Cortes; Puerto Castilla. Panama: Coco Solo; Almirante. Colombia: Santa Marta (all MCZ). Eastern Pacific: Balboa, Canal Zone, Panama (J. Zetek).

Subgenus **Bankiopsis,** new subgenus

Subgenotype, *Bankia caribbea* Clench and Turner.

Species in this subgenus have a narrow and smooth margin of periostraeum which is produced laterally into short and rather wide awns. The embryonie cones are crowded at the tip of the pallet and are covered with a eap of periostracum.

This subgenus differs from *Liliobankia* in having a narrow margin of periostracum and particularly in having the early or embryonie eones pushed together to form a compaet and close-set series.

Bankia (Bankiopsis) caribbea, new species, Plate 10, figs. 1–4

Description. Shell exceedingly variable and similar in all of the characteristics to that of *B. gouldi.* We figure a comparatively young shell whieh shows the auricle to be formed fairly high on the margin of the posterior dise. Pallets eonsisting of a series of elosely-spaeed eones. Calcareous portion of each cone funnel-shaped with the inner margin higher than the outer margin. Periostracal margin of the inner and outer surfaces shallowly U-shaped, narrow and smooth. Awns short and broad.

height	length	pallet (length)	
4.5	4.9	10 mm.	Paratype
3.8	3.5	8	Holotype

Types. Holotype, Museum of Comparative Zoölogy no. 121065, Fort Pickens, Pensacola, Florida. Paratypes from the same locality.

Common name. The Caribbean Shipworm.

Remarks. This is not a common speeies. As a rule, this species is quite small. The compact and flattened cones of the embryonic cap of the pallet are very different from the early cones of any other known species in the Western Atlantic. *B. caribbea* ean be readily differentiated from other species with non-serrated cones by the embryonic cap, the nearly horizontal margin of the distal portion of the eone, and the narrow margin of periostraeum on both the inner and outer surfaces.

Range. Gulf of Mexico, the West Indies and south to Bahía, Brasil.

Records. Florida: Pensacola. Mississippi: Gulfport. Texas: Gulfport. Puerto Rico: Fajardo. Honduras: Puerto Castilla. Costa Rica: Port Limón. Panama: Coeo Solo. Colombia: Santa Marta. Brasil: Bahía (all MCZ).

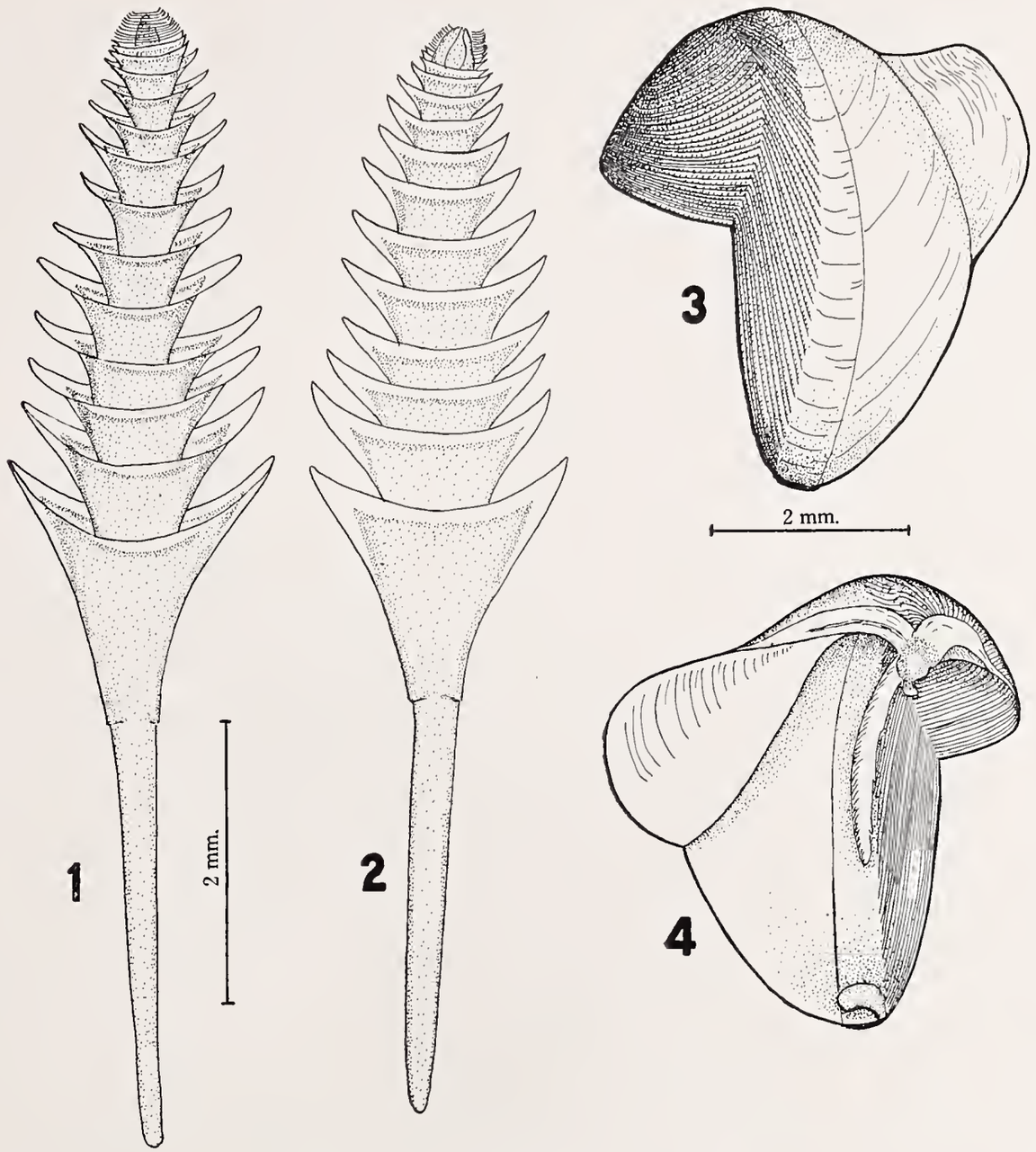

Plate 10. *B. caribbea* Clench and Turner

Holotype MCZ 121065, Fort Pickens, Pensacola, Florida. Fig. 1. Outer surface of pallet. Fig. 2. Inner surface of same pallet. Fig. 3. External view of shell. Fig. 4. Internal view of same shell.

Subgenus **Liliobankia,** new subgenus

Subgenotype, *Bankia katherinae* Clench and Turner.

The pallets of *Liliobankia* have a moderately wide and smooth margin of periostracum which is produced laterally to form wide, blunt awns. The embryonic cones are not crowded at the tip of the pallet but are distantly spaced. This subgenus differs from other subgenera of *Bankia* by having broad and non-serrated awns and distantly spaced embryonic cones.

Bankia (Liliobankia) katherinae,[1] new species, Plate 11, figs. 1–6

Description. Shells essentially the same as those of *B. gouldi* and show just as wide a growth variation. We have drawn two stages (Plate 11, figs. 3–5) to indicate the variation in the relative size and position of the auricle. Figures 3 and 4 are those of a shell 4 months old, and figures 5 and 6 are those of a shell 1 month old. Pallets consisting of a series of widely-spaced cones. Calcareous portion of each cone funnel-shaped with the inner and outer margin of equal height. Periostracal margin of the outer surface shallowly U-shaped, smooth and with a broad notch near the center. Inner margin similar but without the notch. Periostracal margin of the cones wide, flattened and bell-shaped with

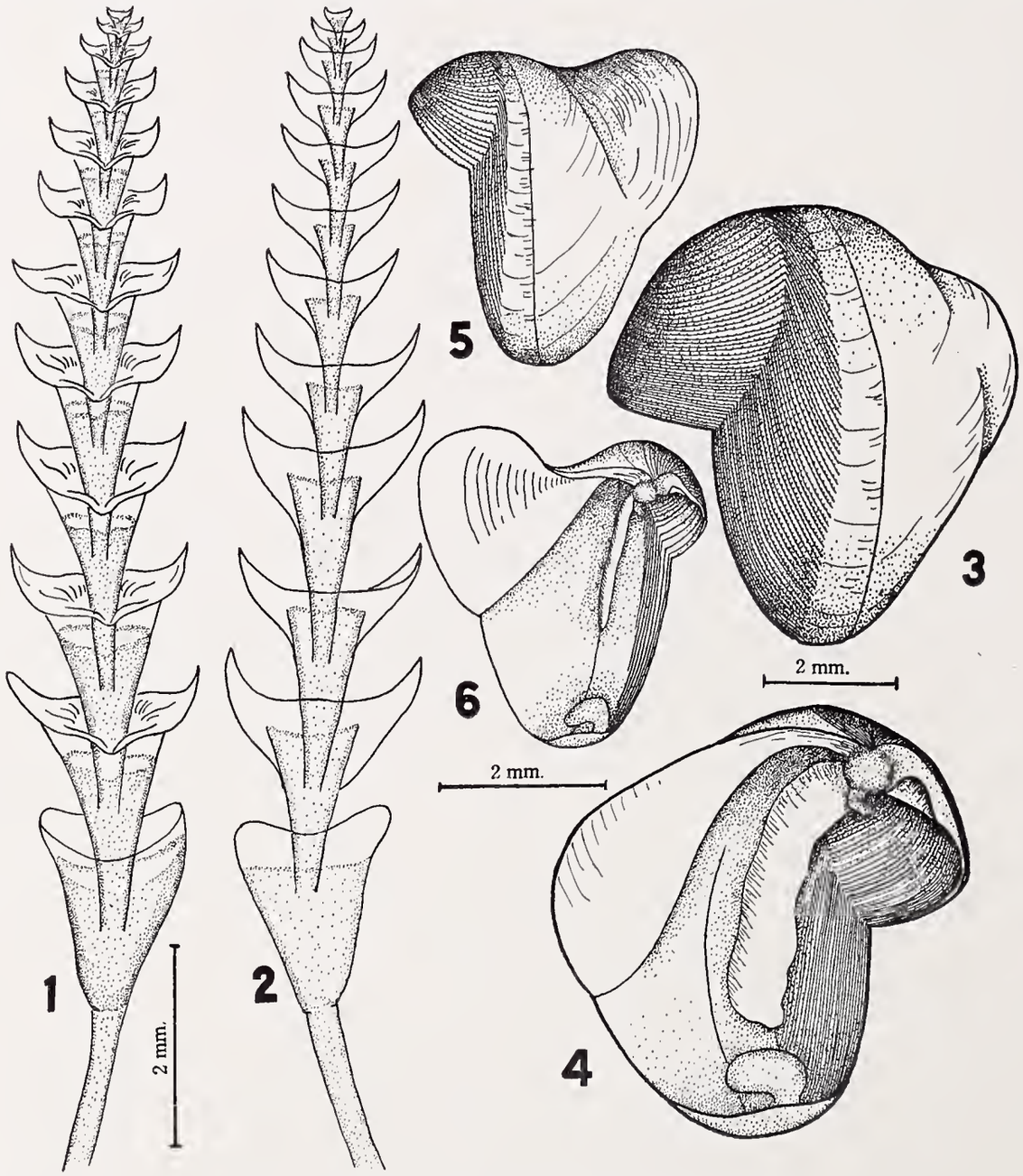

Plate 11. *Bankia katherinae* Clench and Turner

Holotype MCZ 168023, Bahía, Brasil. Fig. 1. Outer surface of pallet. Fig. 2. Inner surface of same pallet. Fig. 3. External view of shell (4 months). Fig. 4. Internal view of same shell. Fig. 5. External view of shell (1 month). Fig. 6. Internal view of same shell.

[1] Named for Katherine Tucker, to whom we are indebted for considerable material.

a small central notch on the margin of the outer face. Lateral portions broadened and somewhat upwardly curved forming wide, blunt awns. Outer surface of the periostracum that covers the calcareous portion of the cone is minutely papillose.

	height	length	pallets (length)	
(average)	5.3	5	16 mm.	Holotype
(large)	7.5	8	40	Trinidad

Types. Holotype, Museum of Comparative Zoölogy, no. 168023, Bahía, Brasil. Paratypes from the same locality.

Common name. The Lily Shipworm.

Remarks. We still know but little concerning this species. The pallets are very different from those of any other species in the Western Atlantic and can be readily told by the flattened and bell-shaped margin of the cones. The entire blade is very long and narrow and the cones very distantly spaced.

Range. Caribbean Sea and south to Bahía, Brasil.

Records. Lesser Antilles: Trinidad. Panama: Almirante. Colombia: Santa Marta. Brasil: Bahía (all MCZ).

Subgenus **Neobankia** *Bartsch*

Neobankia Bartsch 1921, Proc. Biol Soc. Washington, **34**, p. 26.

Deviobankia Iredale 1932, [in] Destruction of Timber by Marine Organisms in the Port of Sydney, Sydney Harbour Trust, p. 33. [Subgenotype, *Bankia debenhami* Iredale, original designation.]

Subgenotype, *Bankia zeteki* Bartsch (original designation, Bartsch 1921).

In this subgenus, the species have a moderately wide margin of periostracum which is serrated on both the inner and outer margins but is not produced laterally to form definite awns.

The subgenus, *Deviobankia* Iredale appears to us to be an absolute synonym of *Neobankia* Bartsch. We have a paratype specimen of the subgenotype (*B. debenhami* Iredale) received from Dr. W. F. Clapp.

Bankia (Neobankia) zeteki *Bartsch;* Plate 12, figs. 1–4

Description. Shells similar to *B. gouldi.* We have figured a rather young specimen so that the rows of denticulated ridges are widely spaced and the auricle is placed high on the posterior margin of the disc. Pallets consisting of a series of distantly-spaced cones. Calcareous portion of each cone funnel-shaped and semicircular in cross-section, with the inner margin higher than the outer margin. The periostracal margin of the outer surface is shallowly U-shaped, with a finely serrated margin. The inner margin straight, with moderate comb-like serrations. With wear, these serrations may become more and more truncated and finally leave the cone with a nearly or quite smooth margin. Awns absent.

height	length	pallets (length)	
4.5	5	9 mm.	Coco Solo, Canal Zone
9	8.5	35	Balboa, Canal Zone
9.5	10.2	12 (broken)	Holotype

Types. Holotype, United States National Museum, no. 341128, Canal Locks, Balboa, Canal Zone. From greenheart timber. James Zetek, collector (dried specimen).

Common name. Zetek's Shipworm.

Remarks. This is probably an Eastern Pacific species that has reached the Western

Atlantic by means of commerce. We have records from two localities on the Atlantic side of Central America.

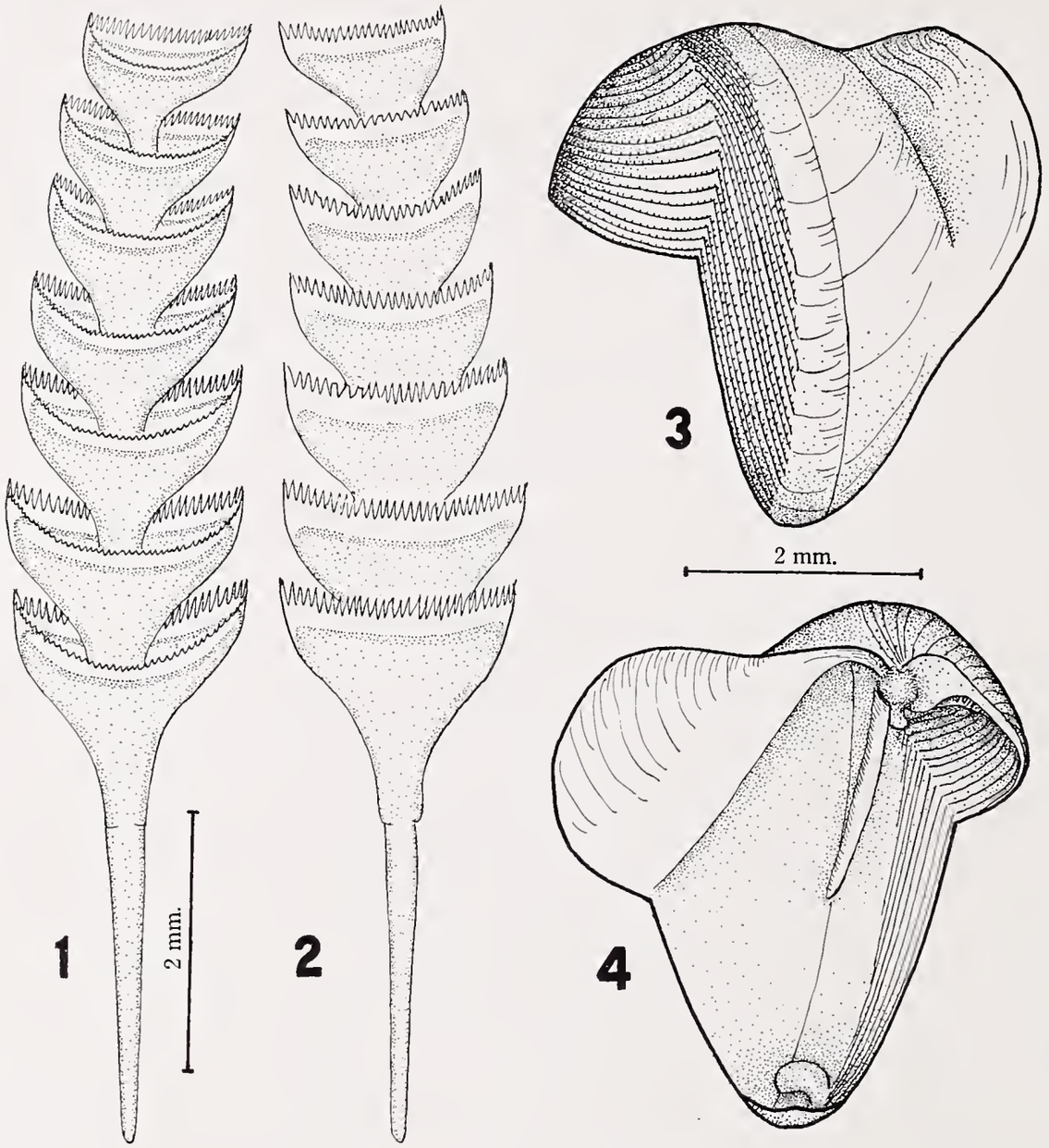

Plate 12. *Bankia zeteki* Bartsch

Fig. 1. Outer surface of pallet. Fig. 2. Inner surface of same pallet. Fig. 3. External view of shell. Fig. 4. Internal view of same shell (a rather young specimen).

Bankia zeteki is quite close in its relationship to *B. destructa*. The cones of *zeteki* are more goblet-shaped and more distantly spaced than in *destructa*.

Range. Both sides of the Isthmus of Panama.

Records. Panama: Cristobal and Coco Solo. Eastern Pacific: Balboa and Puerto Armuelles, Panama (all MCZ).

Bankia (Neobankia) destructa, new species, Plate 13, figs. 1–4

Description. Shell similar to *B. gouldi*. We figure a moderately matured specimen which is average for the species. Pallets with the cones rather closely-set on a narrow stalk. Calcareous portion widely U-shaped on the outer surface and slightly curved on the inner surface. Periostracal margins narrow, very finely serrated on the outer margin

and rather coarsely serrated on the inner margin. Lateral areas not extended as awns though slightly broadened out.

height	length	pallet (length)	
4	4.1	13.5 mm.	Holotype
8	7.5	40	Almirante, Panama

Types. Holotype, Museum of Comparative Zoölogy, no. 123303, La Cieba, Honduras.

Common name. The Destructive Shipworm.

Remarks. This species appears closely related to *B. zetcki.* The significant differences are in the possession of closely-set and broadly U-shaped inner margins of the cones in *B. destructa* and the widely-spaced and straight inner margins of the cones in *B. zetcki.*

It is quite possible that these two species originated from common stock, similar to other closely related marine mollusks that exist on both sides of the Isthmus of Panama. Their common origin would date from the time when the connection existed between

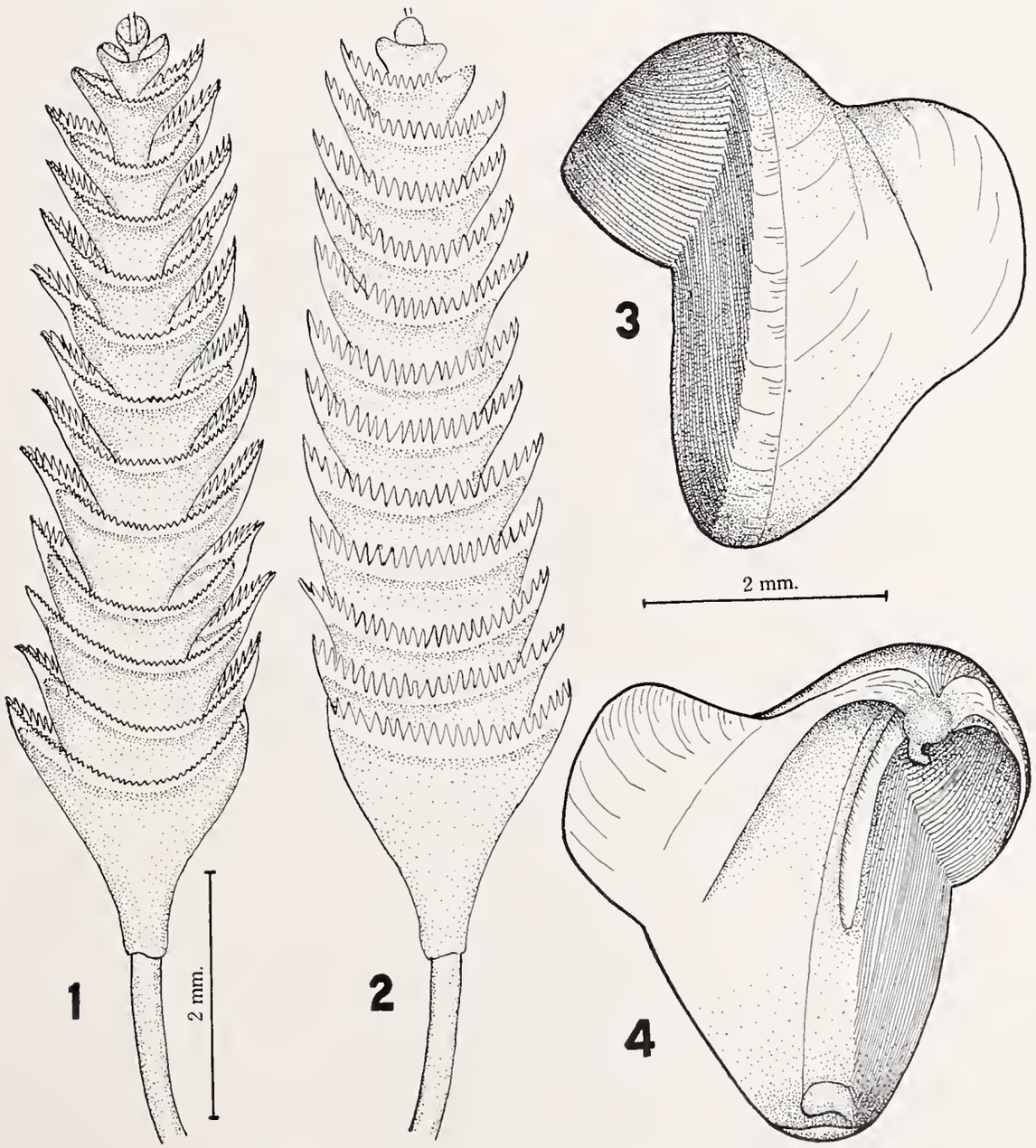

Plate 13. *Bankia destructa* Clench and Turner

Holotype MCZ 123303, La Cieba, Honduras. Fig. 1. Outer surface of pallet. Fig. 2. Inner surface of the same pallet. Fig. 3. External view of shell. Fig. 4. Internal view of same shell.

the Atlantic and Pacific Oceans in this region. Subsequent isolation since that time has brought about sufficient differentiation so that they exist as distinct subspecies and species. In the case of *Bankia* and very probably several other genera capable of mechanical transport, they have become re-established on the opposite sides of the canal region. This is not at all difficult for members of the Teredinidae as there are ample records of many species being able to withstand several days in fresh water.

Range. Atlantic and Pacific sides of Central America.

Records. HONDURAS: Puerto Castilla, La Cieba, Puerto Cortes. PANAMA: Almirante. COLOMBIA: Santa Marta. VENEZUELA: Puerto Cabello. EASTERN PACIFIC: Puerto Armuelles, Panama (all MCZ).

Plumulella, new subgenus

Subgenotype, *Teredo fimbriata* Jeffreys (=*Bankia fimbriatula* Moll and Roch).

This subgenus has species possessing pallets that have long, serrated awns. The periostracal margins on both the inner and outer surfaces of each cone are finely to coarsely serrated. The three species herein considered members of this subgenus have the inner margins of the cones with deep, comb-like serrations.

Bankia (Plumulella) fimbriatula *Moll and Roch,* Plate 14, figs. 1–4

Teredo bipalmulata 'Lamarck' Forbes and Hanley 1853, History of British Mollusca, London, **1**, p. 86, pl. 2, figs. 9–11 (Ireland from the timbers of a vessel returning from a foreign voyage); *non* Lamarck 1801; Philippi 1836.

Teredo fimbriata Jeffreys 1860, Ann. Mag. Nat. Hist. (3) **6**, p. 126 (Leith [Scotland]); *non T. fimbriata* Defrance 1828.

Bankia fimbriatula Moll and Roch 1931, Proc. Malac. Soc. London, **19**, p. 213; new name for *fimbriata* Jeffreys 1860, *non* Defrance 1828. [The name only applies to this species. The remarks in the text and the plate refer to a totally different species, very possibly *B. gouldi* Bartsch. Moll and Roch did not see the Jeffreys type material which is now located in the National Museum, Washington, D.C.]

Bankia (*Bankia*) *canalis* Bartsch 1944, Smithsonian Misc. Collections, **104**, no. 8, pp. 1–3, pl. 1, (Balboa and Cristobal, Canal Zone).

Description. Shells similar to *B. gouldi.* The specimen figured (plate 14, figs. 3–4) is a young but mature individual. Pallets consisting of a series of moderately-spaced cones. Calcareous portion of each cone deeply notched or V-shaped. Periostracal margin of the outer surface deeply U-shaped, wide, with a finely serrated margin and with faint indications of vertical ribs extending below the union of the serrations. Inner margin deeply U-shaped and possessing long comb-like serrations. Awns greatly extended and deeply serrated.

	height	length	pallets (length)	
(average)	4.5	4.5	16 mm.	Port au Prince, Haiti
(large)	6.8	6.5	39	Port au Prince, Haiti
(large)	6.3	6.2	18.4 (fragment)	Balboa, Canal Zone

Types. Cotypes of *B. fimbriata* Jeffreys are in the United States National Museum from Leith, Scotland. The holotype of *B. canalis*, USNM, no. 568817 is from Balboa, Canal Zone (measurements above). As the actual origin of the specimens of both Forbes and Hanley and of Jeffreys is unknown, we here select Balboa, Canal Zone to be the type locality, based upon the types of *B. canalis* Bartsch.

Common name. Jeffreys' Shipworm.

Remarks. Most species of Bankia that have been described from British waters are admitted by Forbes and Hanley, and J. G. Jeffreys to be of drift origin. The confusion of names that has surrounded these species is rather appalling. Many of the names have been used interchangeably and Lamarck's *B. palmulata* and *bipalmulata* also have been included in this complex.

The origin then of these species is of considerable interest, as one quite certainly and others possibly may be of West Indian origin. Just what *B. bipennata* Turton may be, is still uncertain; at least we have seen nothing from the West Indies that would appear to be this species. However, *B. fimbriatula* is more or less widespread in the Gulf of Mexico and the West Indian region and exists also on the Pacific coast of Panama.

Bankia canalis Bartsch is unquestionably *fimbriatula* Moll and Roch. The deep V-notch of the calcareous portion of the cones is a very important and characteristic feature. Through the kindness of Dr. Paul Bartsch we were privileged to see the types of both of these forms. Both type lots are based on dried specimens and little periostracum remains, but the calcareous portions are identical.

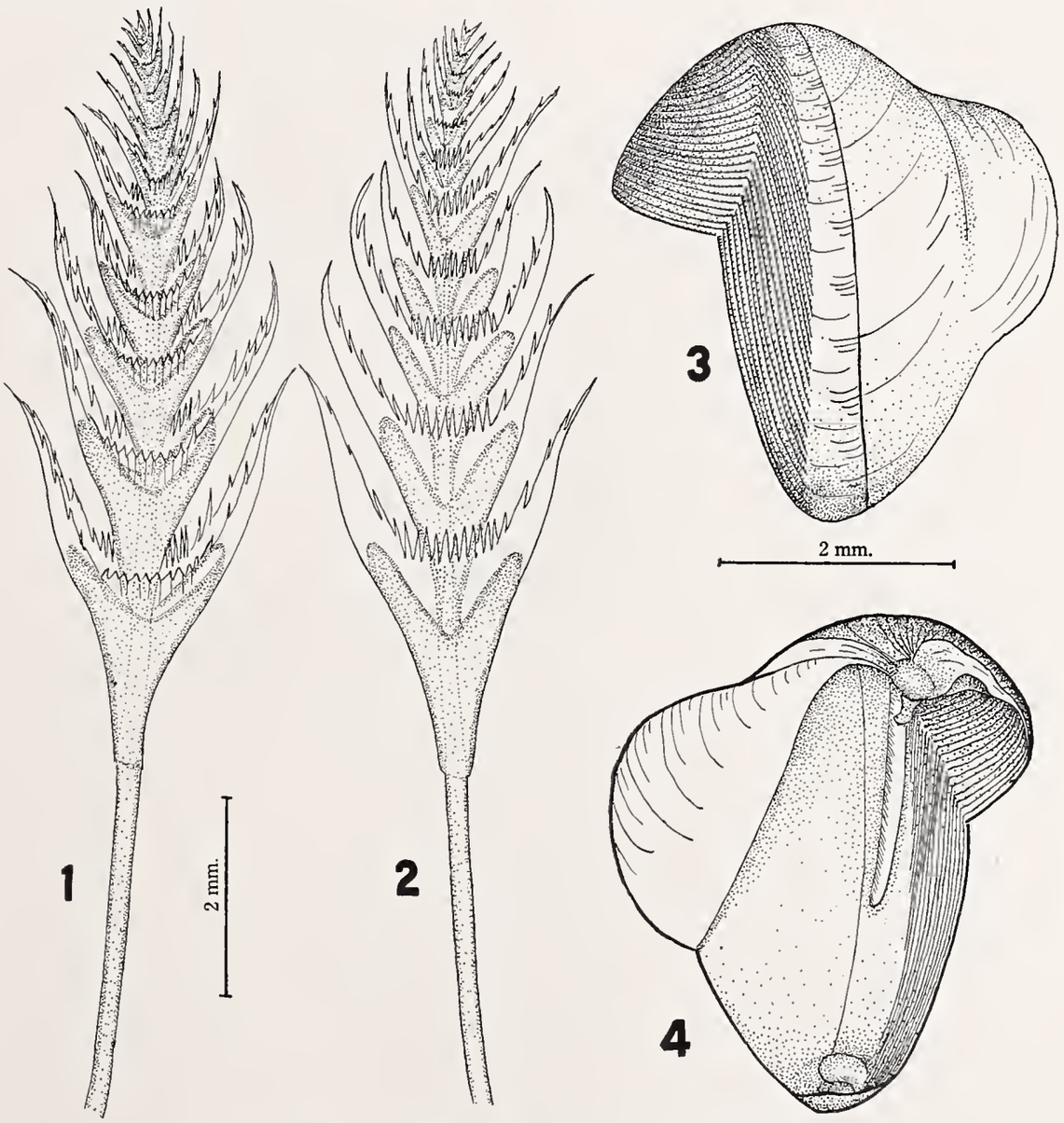

Plate 14. *Bankia fimbriatula* Roch and Moll

Port au Prince, Haiti. Fig. 1. Outer surface of pallet. Fig. 2. Inner surface of same pallet. Fig. 3. External view of shell. Fig. 4. Internal view of same shell.

Range. East and West Florida, the West Indies and south to Bahía, Brasil. Also the Eastern Pacific at Panama.

Records. FLORIDA: Jupiter Inlet; Tampa; Pensacola. CUBA: Banes Bay; Guantánamo. HISPANIOLA: Port au Prince; Santo Domingo City; San Pedro de Macorís. PUERTO RICO: San Juan. JAMAICA: Kingston. LESSER ANTILLES: Trinidad. HONDURAS: Puerto Cortes; Puerto Castilla. COSTA RICA: Port Limón. NICARAGUA: Bluefields. PANAMA: Coco Solo; Cristobal; Almirante. BRASIL: Bahía (all MCZ). EASTERN PACIFIC: Balboa, Canal Zone (J. Zetek).

Bankia (Plumulella) fosteri, new species, Plate 15, figs. 1–4

Description. Shells similar to *B. gouldi*. All shells so far examined show the same range of variation seen throughout the entire genus. Pallets consisting of a series of moderately-spaced cones. The calcareous portion of each cone funnel-shaped with the inner margin higher than the outer margin. The periostracal margin of the outer surface deeply

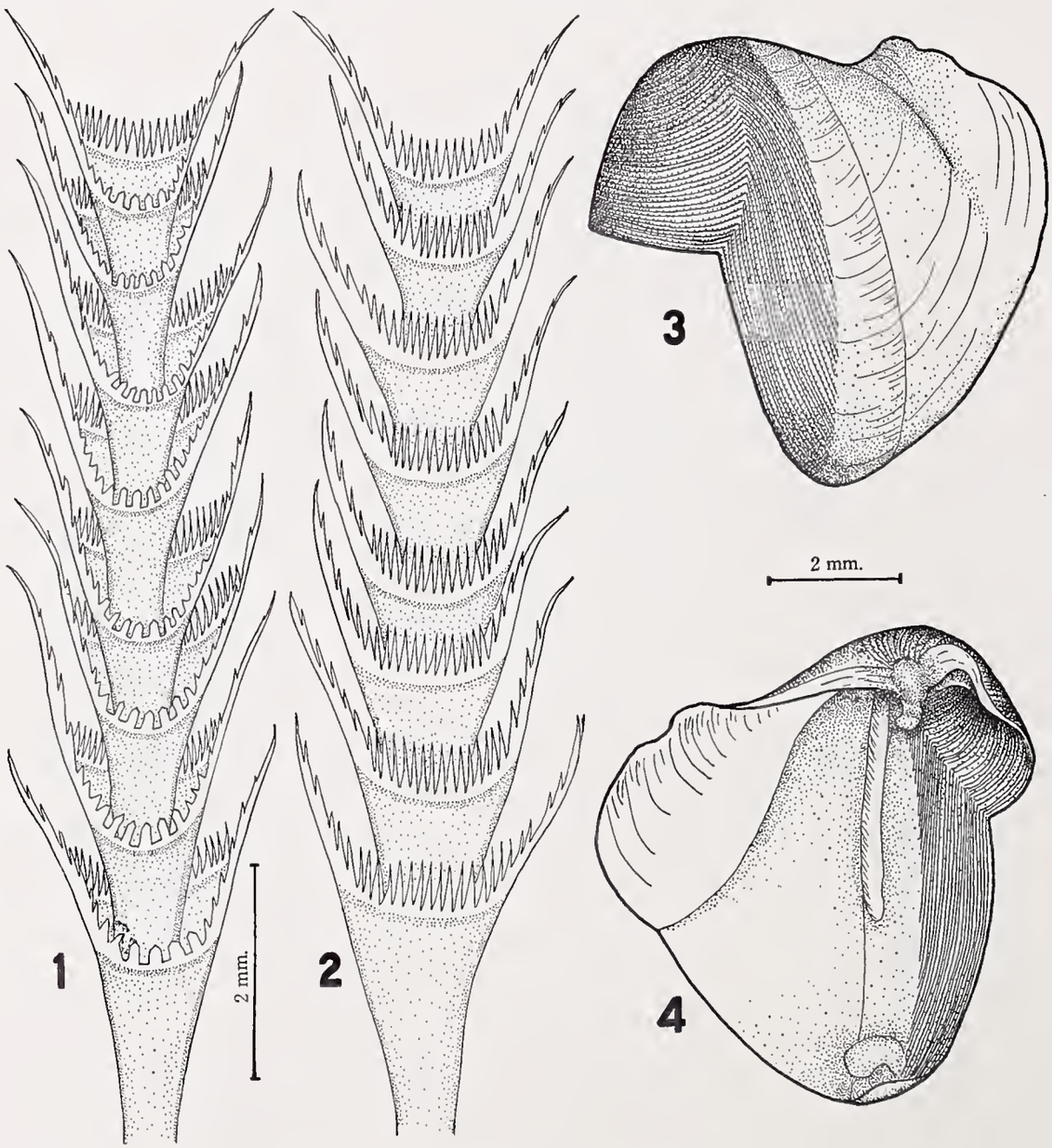

Plate 15. *Bankia fosteri* Clench and Turner

Holotype MCZ 122536, Santa Marta, Colombia. Fig. 1. Outer surface of pallet. Fig. 2. Inner surface of same pallet. Fig. 3. External view of shell. Fig. 4. Internal view of same shell.

U-shaped, rather narrow and with coarse serrations. Inner margin deeply U-shaped with long comb-like serrations. Awns greatly extended and deeply serrated.

height	length	pallets (length)	
6.8	7	12 mm. (fragment)	Holotype
7.5	7	15 (fragment)	Santa Marta, Colombia

Types. Holotype, Museum of Comparative Zoölogy, no. 122536, Santa Marta, Colombia.

Common name. Foster's Shipworm.

Remarks. In all fifteen lots we have seen of this species, the pallets have been fragmentary. A 10 mm. fragment was used in drawing the plate. It is a comparatively rare species and, so far as we now know, possesses but a limited range in the Caribbean Sea.

It is readily differentiated from both *fimbriatula* and *cieba* by having very coarse and almost square serrations on the outer margin of the periostracum. The calcareous portion of the cone is very dense and solid.

Range. Mainland bordering the Caribbean Sea from Honduras to Colombia.

Records. Honduras: Puerto Castilla. Colombia: Santa Marta (both MCZ).

Bankia (Plumulella) cieba, new species, Plate 16, figs. 1–4

Description. Shells similar to *B. gouldi.* A few shells we have seen are more arcuate over the top of the dise than generally exists among other species in this genus. Pallets consisting of a series of closely-spaced cones. Calcareous portion of each cone funnel-shaped. Periostracal margin of the outer surface deeply U-shaped, wide, very finely serrated, and with faint indications of vertieal ribs extending below the union of the serrations. Inner margin broadly U-shaped with long, comb-like serrations. Awns greatly extended and deeply serrated.

height	length	pallets (length)	
5.5	5.2	10 mm.	Holotype
4.5	4.5	10	Santa Marta, Colombia

Types. Holotype, Museum of Comparative Zoölogy, no. 168097, Balboa, Canal Zone.

Common name. The Cieba Shipworm.

Remarks. In this species the cones are closely-set and it is necessary to float the pallets in glycerine-aleohol so that the awns will separate from the cone above. Dissection of the pallet to separate a single eone will aid greatly in identification.

Bankia cieba is a relatively small species and very delicate in structure. The specimen figured is among the largest we have seen. This species can be separated from *B. fosteri* by its very wide margin of periostracum and the extremely fine serrations on the outer surface. From *B. fimbriatula* it is readily separated by the relatively small calcareous portion which has a straight upper margin. In *fimbriatula* the calcareous portion is very deeply V-shaped. Our largest and most perfect series of specimens eame from Balboa, from whieh station we received the best test-board material.

Range. Greater Antilles and south to Colombia. Also on the Pacific side of Panama.

Records. Cuba: Banes Bay. Hispaniola: Port au Prince. Lesser Antilles: Trinidad. Honduras: Puerto Castilla; Puerto Cortes. Colombia: Santa Marta. Eastern Pacific: Balboa, Canal Zone (all MCZ).

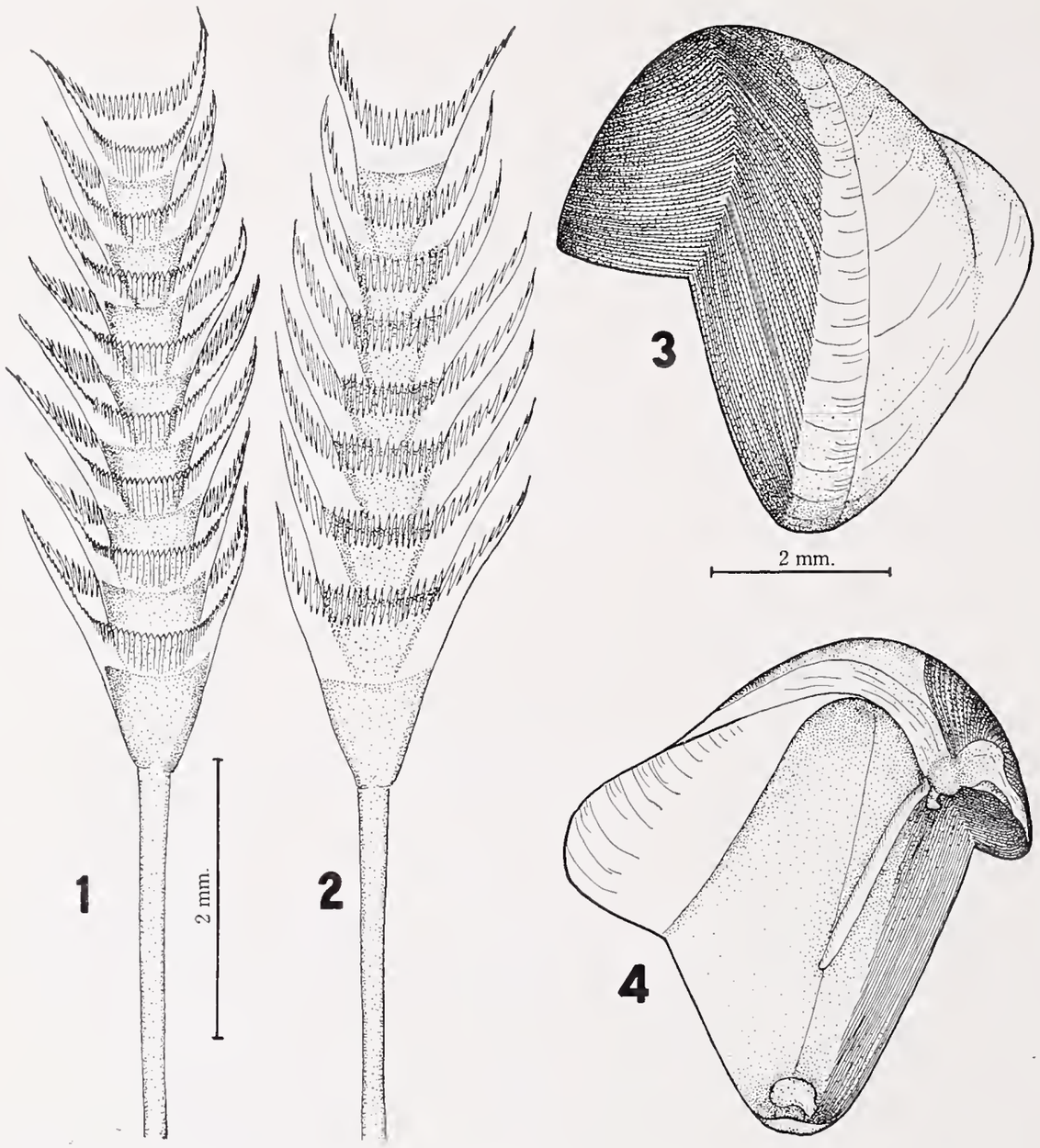

Plate 16. *Bankia cieba* Clench and Turner

Holotype MCZ 168097, Balboa, Canal Zone. Fig. 1. Outer surface of pallet. Fig. 2. Inner surface of same pallet. Fig. 3. External view of shell. Fig. 4. Internal view of same shell.

Bankia (Plumulella) argentinica *Moll*

Bankia argentinica Moll 1935, Sitz. Akad. Wissen. Wien (Math.-natur. Klasse), **144**, p. 274, pl. 2, fig. 5 (Buenos Aires, Argentina).

Description. (Translation of the original description from the German by Joseph Bequaert). "Pallets: About 25 elongate funnel-shaped segments whose distal extremity is semi-circularly curved inward. Segments with lateral long spines and provided on the outer side with a finely denticulated membranous margin.

"Shell: Anterior piece large and broad, covered with very fine, closely-placed rows of teeth. Auricle narrow and elongate. The shells as a whole are very large and strong."

Types. The whereabouts of the holotype of this species was not given by Moll. It is possibly in the Berlin Museum. The type locality is Buenos Aires, Argentina.

Common name. Argentina Shipworm.

Remarks. This species is unknown to us. The limited description and the small and indistinct figures given by Moll leave much to be desired in the way of a proper diagnosis of this species. However, the few characters outlined would indicate that it is a member of the subgenus *Plumulella.* The published figures were so small and dark that they could not be reproduced.

Range and Records. Known only from Buenos Aires, Argentina, the type locality.

Spurious species

Teredo campanulata was named by Deshayes in the British Museum collection but was never described by him. Jeffreys listed the name as a synonym under *B. stutchburyi* De Blainville and later, Sowerby deseribed this form from the same specimens examined by Jeffreys. Moll and Roch have considered this form distinct from *B. stutchburyi*, validating its use by Sowerby and proposing a new name, as *campanulata* Sowerby had thus became a homonym of *campanulata* Jeffreys.[1] However, neither the description nor the figures of Sowerby are recognizable; in fact it is very questionable whether the single pallet and the shells figured are from the same speeimen. The shells figured for *campanulata* by Sowerby are quite charaeteristic of *Psiloteredo*, a subgenus of *Teredo*, which possesses auricles that are broad and high and have a notch at the dorsal union with the posterior disc. The pallets of *Psiloteredo* consist of a single blade and not the compound cone elements of a *Bankia* as figured by Sowerby. Furthermore, Moll and Roch state that the type has been lost and there is no known locality. This leaves us with about as many uncertainties as could exist for any sort of an understanding regarding this species. It *may*, of course, be our *Bankia katherinae*, but with the type material lost, the poor description and the possible mixed original material of Sowerby, *campanulata* will be questionable for all time. We give below a synopsis of its published history.

Bankia campanellata *Moll and Roch*

Teredo campanulata 'Deshayes' Sowerby 1875, Conchologica Iconica, **20, Teredo,** pl. 2, fig. 9a–c (locality unknown); *non T. campanulata* 'Deshayes' Jeffreys 1860 [a manuscript name given as a synonym under *T. stutchburyi* DeBlainville].

Bankia campanellata Moll and Roch 1931, Proc. Malac. Soc. London, **19,** p. 215, plate 25 [new name for *campanulata* Sowerby 1875, *non* Jeffreys 1860, Ann. Mag. Nat. Hist. (3), **6,** p. 127.

* * * *

The genus *Bankia* in the Western Atlantic extends from southern New England and south to the Straits of Magellan. In the Eastern Atlantic, though records for *Bankia* are known from latitudes far north of those reported for the Western Atlantic, its ex-

[1] A nude name, once listed as a synonym of a described species, automatically takes the description of that species.

istence there is probably fortuitous. If *Bankia* actually breed in the northern waters they probably live but a short time and are then winter-killed. In a very comprehensive study of the molluscan fauna of the Netherlands, Dr. Jutting credits no records of *Bankia*, though the companion genus, *Teredo* is quite abundant. It would appear to us that most if not all of the many English records are due to chance introductions of *Bankia* by commerce in wooden ships and probably quite frequently by driftwood of West Indian origin by way of the Gulf Stream. *Bankia* does exist, however, in the Mediterranean Sea and may extend well up along the French coast in the open Atlantic and, of course, south along the African coast. This genus is widely distributed in the Indo-Pacific and Eastern Pacific areas.

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BIBLIOGRAPHY

Atwood, W. G. and A. A. Johnson 1924: Marine Structures Their Deterioration and Preservation. National Research Council, Washington, D.C. (Biological section, pp. 6–76, 12 plates, by W. F. Clapp, C. A. Kofoid and R. C. Miller).

Bartsch, P. 1922: Bull. United States National Mus., no. 122, pp. 1–48, 37 plates.

Children, J. G. 1823: Quarterly Journal of Science, Literature and the Arts, London, **14**, p. 82.

Clapp, W. F. [in] A. H. Merrill 1935: First Progress Report. New England Committee on Marine Piling Investigation, pp. 19–32, Clapp Laboratories, Duxbury, Mass.

Clapp, W. F. [in] A. H. Merrill 1936: Second Progress Report. New England Committee on Marine Piling Investigation, pp. 35–62, Clapp Laboratories, Duxbury, Mass.

Edmondson, C. H. 1942: Occ. Papers B. P. Bishop Museum, **17**, pp. 97–150, 12 figures.

Iredale, T. and R. A. Johnson 1932: Destruction of Timber by Marine Organisms in the Port of Sidney. Sidney Harbour Trust, (Section on Teredinidae by Iredale, pp. 24–40, 4 plates).

Jeffreys, J. G. 1865: British Conchology, London, **3**, pp. 122–184.

Jutting, T.v.B. 1943: Fauna van Nederland, Mollusca (1) C. Lamellibranchia, Leiden, pp. 397–418.

Kofoid, C. A. and R. C. Miller [in] Hill and Kofoid 1927: Final Report, San Francisco Bay Marine Piling Committee. (Section on Teredinidae, pp. 188–300, 51 plates).

Lamy, E. 1926 [1927]: Jour. de Conchy., **70**, pp. 201–284.

Moll, F. and F. Roch 1931: Proc. Malac. Soc., London, **19**, pp. 201–217, 4 plates.

Nelson, T. C. 1922: New Jersey Agricultural Experiment Station. Circular no. 139, pp. 1–15, 8 figures.

Roch F. and F. Moll 1931: Mitt. aus dem Zool. Staat. und Zool. Mus. in Hamburg, **44**, pp. 1–22, 20 text figures, 2 plates.

Roch F. and F. Moll 1935: Sitz. Akad. Wissen. Wien (Math.-natur. Klasse), **144**, pp. 263–276, 7 text figures, 2 plates.

Sigerfoos, C. P. 1908: Bureau of Fisheries, Document no. 639, pp. 193–231, 14 plates.

Sivickis, P. B. 1928: The Philippine Journ. of Sci., **37**, pp. 285–298, 3 plates.

Sowerby, G. B. [in] L. Reeve 1875: Conch. Icon., **20, Teredo**, text and pl. 1–4.

Tryon, G. W. 1862: Proc. Acad. Nat. Sci., Philadelphia, pp. 97–126.

Tryon, G. W. 1863: Proc. Acad. Nat. Sci., Philadelphia, p. 10.

Watson, C. J., F. A. McNeill, R. A. Johnson and T. Iredale 1936: Destruction of Timber by Marine Organisms in the Port of Brisbane. Queensland Forest Service Bull. no. 12. (Section on Teredinidae by Iredale, pp. 31–44, 2 plates).