A Survey and Illustrated Catalogue of the Teredinidae

TURNER

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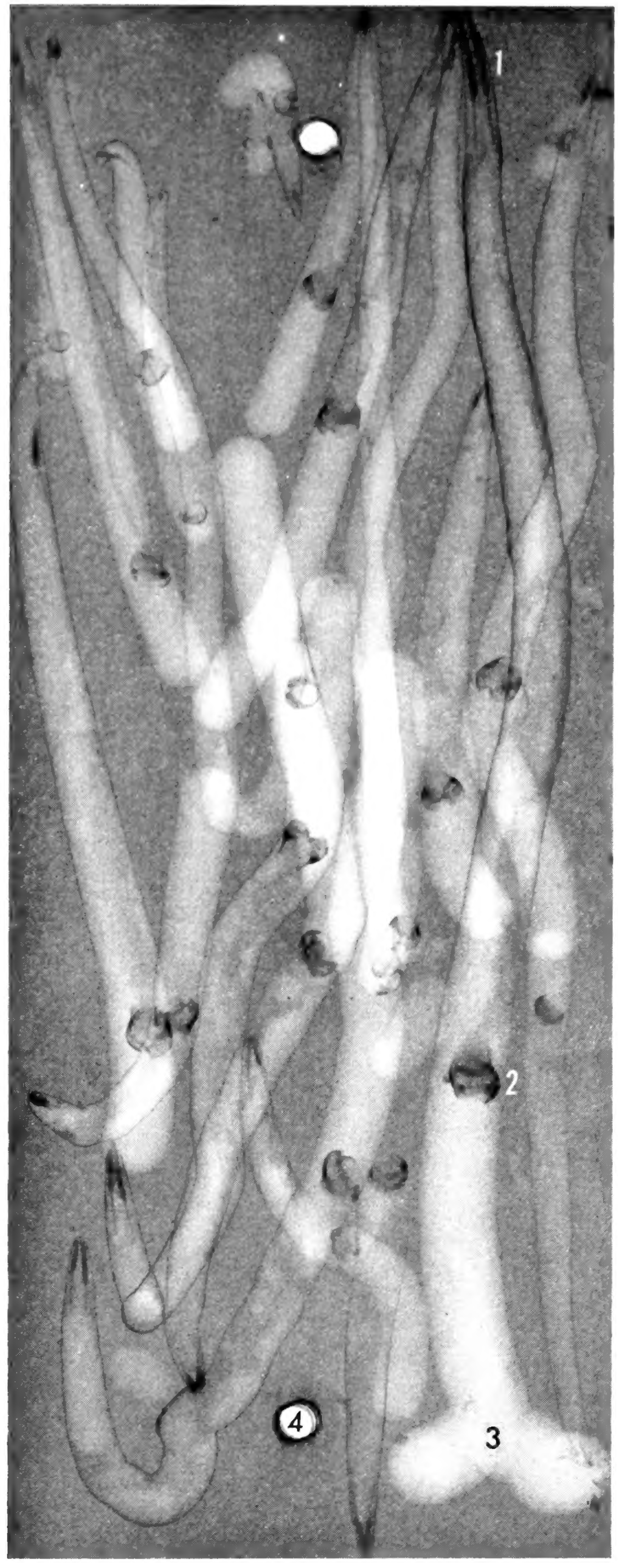

FIGURE 1

X-ray of test panel submerged for 3 months at Opua, North Island, New Zealand, courtesy of the Forest Research Institute, Rotorua, New Zealand (natural size).

This panel has been moderately attacked by *Bankia australis* (Calman). The pallets (1) and shells (2) can be easily seen, as well as the calcareous lining of the tube which is thickest at the posterior end and shows as a dark line outlining the tube. At (3) an animal has had to stop boring because there was no further space available. (4) indicates the hole used in securing the panel.

As a result of the disturbance caused by removing the panel from the test rack and the water in order to take the X-ray, the animals contracted anteriorly and so do not extend the length of their burrows.

A Survey and Illustrated Catalogue of the Teredinidae

(Mollusca: Bivalvia)

By

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Forewords

The need for a comprehensive treatise on the systematics and anatomy of the Teredinidae has been long apparent to invertebrate marine taxonomists. Moreover, the necessity to develop more effective wood preservatives against marine borers led to the discovery by physiologists and biochemists that the lack of a modern reference for the identification and description of the teredine borers made it difficult to conduct critical field and laboratory experiments with these organisms.

The Office of Naval Research has been privileged, therefore, to sponsor Dr. Ruth Turner's research efforts which have produced this comprehensive catalogue of Teredinidae that is likely to become a standard reference for all scientists concerned with these economically and biologically important and interesting animals.

S. R. Galler
Head, Biology Branch
Office of Naval Research

To those concerned with studies involving the biology and control of marine borers two factors are essential for efficient work—ready access to all the literature concerned and the means of determining the species involved.

As a result of the cooperative effort of the W. F. Clapp Laboratories Inc., the Library of Congress, and the Office of Naval Research, an annotated bibliography of marine borers was published in 1963. This work is an effective tool in supplying the first of the essentials.

The present publication on the biology and systematics of the Teredinidae will be a useful companion volume to aid in satisfying the second need so far as this important family of borers is concerned. This work has been made possible through the cooperative efforts of the W. F. Clapp Laboratories, the Mollusk Department, Museum of Comparative Zoology, Harvard University, and the Office of Naval Research. It is hoped that future cooperative efforts will result in similar studies on other groups.

Mrs. A. P. Richards
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PART I

SURVEY OF THE TEREDINIDAE

Preface

The Teredinidae, commonly called shipworms or pile worms, is one of the more difficult groups of bivalve Mollusca to classify, and the systematics of this family are in a chaotic state. Actually, shipworms have sufficient characters upon which a classification can be based, and if large series of well preserved animals had been available to early workers in this field, much of the confusion probably would have been avoided. This was not the case, however, and many species were described on the basis of shells only or upon a few dried specimens or on a single specimen and sometimes on a fragment of a pallet. In addition, the specimens were often taken from drift logs or from ships that had sailed in distant waters so that the origin of the specimens was unknown or the locality in error. The fact that teredinids are readily distributed by floating wood or ships was not fully realized until fairly recently, and consequently many new species were described on the basis of zoogeographic provinces. Literature on the Teredinidae is scattered, and many of the publications are rare or unavailable, thus presenting one of the greatest problems to students of this group. No illustrated work covering the family as a whole has been attempted for over one hundred years, and the last catalogue was the list published by Moll in 1941 which is now a very rare publication. Consequently, workers not near a large library find it inconvenient or impossible to do the necessary search of the literature when dealing with local faunas, with the result that many synonyms have been created.

The four major objectives in undertaking this study were:

(1) To make available a catalogue of all the names used in the family Teredinidae; to illustrate as many of the type specimens as possible, giving descriptive notes concerning them; and to indicate synonyms whenever this could be done.

(2) To survey the work that has been done on the systematics, biology and distribution.

(3) To study the anatomy of as many species as possible and to relate the findings to the classification, evolution and physiology of the Teredinidae.

(4) To redefine the genera and to make a key for use in the generic placement of species.

Acknowledgments

To the late Dr. William F. Clapp, founder of the W. F. Clapp Laboratories, Duxbury, Massachusetts, and world renowned authority on marine boring and fouling organisms, I owe the inspiration and stimulus to begin this work. Since his death and that of the late Mr. A. P. Richards, the staff of the Clapp Laboratories have continued the support and have been most helpful in every way. As indicated on the title page, financial support was received from the Office of Naval Research through contracts with the Clapp Laboratories and Harvard University, as well as from the Milton Fund of Harvard University. These are gratefully acknowledged.

During my visits to various museums for the purpose of locating type specimens and studying the collections, the cooperation of the staff members was most gratifying, and I would like to express my thanks to all those in charge of the collections in the following museums:

Academy of Natural Sciences, Philadelphia
B. P. Bishop Museum, Honolulu, Hawaii
British Museum (Natural History), London
California Academy of Sciences, San Francisco
École des Mines, Paris
Geological Museum, Stanford University, Palo Alto, California
Institut Royal des Sciences Naturelles de Belgique, Brussels
Institut für spezielle Zoologie und zoologisches Museum der Humboldt-Universität, East Berlin
Manchester Museum, Manchester, England
Muséum National d'Histoire Naturelle, Paris
Musée Royal de l'Afrique Centrale, Tervuren, Belgium
Naturhistoriska Riksmuset, Stockholm
Paleontological Collection, University of California, Berkeley
Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands
Senckenbergische Naturforschende Gesellschaft, Frankfurt a.M.
United States National Museum, Washington, D. C.
Universitetets Zoologiske Museum, Copenhagen
Zoölogisch Museum, Amsterdam
Zoological Survey of India, Calcutta

Aid and materials, both literature and specimens, received from many institutions and individuals, have been most important. Many of these will be acknowledged in the monographic studies to be published later, but at this time I would particularly like to express gratitude to the following:

W. Adam, Institut Royal des Sciences Naturelles, Brussels
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A. R. Ranjha, Zoological Survey Department, Karachi, West Pakistan
A. Reyne, Zoölogisch Museum, Amsterdam, Netherlands

I am deeply grateful to Dr. William Newman of the Department of Marine Invertebrates for his vital interest in the biological section of this report. His breadth of knowledge of the invertebrates, his enthusiasm in discussing varied problems at length, and his critical reading of the manuscript have added greatly to its interest and value. I am also grateful to Drs. B. M. Twarog and K. R. H. Read of the Biological Laboratories, Harvard

University, for checking the accuracy of statements on physiology. Dr. H. Stenzel of Rice University kindly reviewed the section on fossils.

Thanks are also extended to my associates in the Mollusk Department, Dr. W. J. Clench and Mr. R. I. Johnson, who were helpful in discussing many problems, particularly in systematics, as well as critically reading the manuscript. As graduate student assistants, Miss M. L. Smith and Miss V. C. Kenk aided in many ways. To my secretary, Miss C. A. S. Martin, and the editor, Miss N. Wright, I wish to extend thanks for their enthusiastic interest and attention to small details which have contributed so much to consistency.

Introduction to the Family Teredinidae

Before going into a discussion of the history and biology of the Teredinidae, it may be well to describe the family and by so doing explain some of the terms which will be used throughout the paper.

Shipworms are highly specialized bivalves adapted for boring into wood. They are most closely related to the Pholadidae, or piddocks, and with them constitute the suborder Pholadina of the eulamellibranch order Myoida. The more important characteristics of this suborder include: a nearly closed mantle; a discoid, truncated foot; a greatly reduced hinge; a small internal ligament; a small ventral adductor muscle; a large, strong, posterior adductor muscle; and a small anterior adductor muscle which inserts on the umbonal reflection anterior to the umbos. The anterior adductor is protected by the cephalic hood, an extension of the mantle (in the Teredinidae) or accessory shelly plates (in the Pholadidae). The shells have a large pedal gape, a sculptured anterior slope, and pronounced dorsal and (except for the Pholadinae) ventral condyles on which the valves rock. Stylloid apophyses extend from beneath the umbos for the attachment of the foot muscles, except in the pholadid subfamilies Xylophaginae and Jouannetiinae.

The Teredinidae differ from the Pholadidae in having the shell greatly reduced, the long worm-like body of the shipworm being protected by the wood in which it is boring. In addition, the Teredinidae lack accessory plates and have pallets, specialized organs located at the base of the siphons which function to close the burrow when the siphons are withdrawn (Fig. 2).

Unlike all other bivalves, most of the vital organs of shipworms are posterior to the posterior adductor muscle, as shown in Figures 5, 7-11. The siphons are relatively short, combined or separate, and protrude from the minute opening of the burrow into the water for respiration and feeding. Figure 13 D illustrates the distal end of a tube which has been opened to show the relationship of the pallets, the siphons, and the muscles which control them. It is only at this point, where the retractor muscles of the pallets and siphons insert, that the animal is attached to the tube. In the X-ray picture of a test board containing living specimens of *Bankia australis* (Calman) (Fig. 1) it is possible to see the elongate

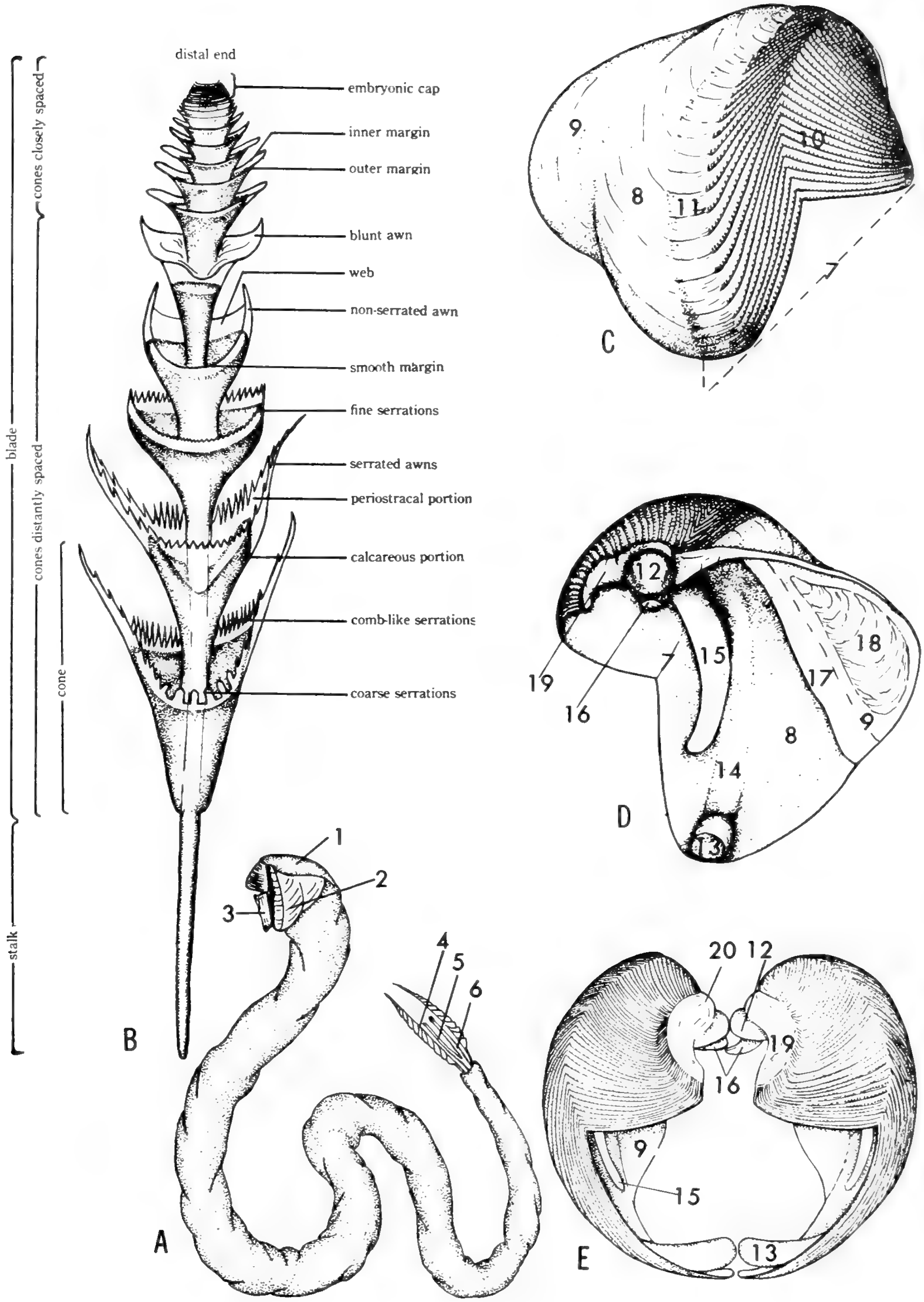
FIGURE 2

Nomenclature of the parts of the teredinid usually used in the description of species.

- A. Diagrammatic sketch of an entire animal (*Bankia*) showing relative position of the shell, pallets and siphons.
- B. Hypothetical, composite pallet of a *Bankia* to show the types of cones and modifications of the periostracal border. Pallets in all genera are composed of a blade and a stalk, but the blade is most elaborated in *Bankia*.
- C. External view of right valve.
- D. Internal view of right valve.
- E. Anterior view of opposed valves showing the large pedal gape.

Key to Numbers

1. Cephalic hood
2. Shell
3. Foot
4. Pallet
5. Excurrent siphon
6. Incurrent siphon
7. Anterior slope
8. Disc
9. Posterior slope
10. Denticulated ridges
11. Umbonal-ventral sulcus
12. Dorsal condyle
13. Ventral condyle
14. Umbonal-ventral ridge
15. Apophysis
16. Chondrophore for attachment of internal ligament
17. Shelf (formed by the extension of the posterior slope over the disc)
18. Posterior adductor muscle scar
19. Umbonal reflection (attachment area of anterior adductor muscle)
20. Umbo


distal end
embryonic cap
inner margin
outer margin
blunt awn
web
non-serrated awn
smooth margin
fine serrations
serrated awns
periostracal portion
calcareous portion
comb-like serrations
coarse serrations
cones closely spaced
cones distantly spaced
cone
blade
stalk
A
B
C
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1
2
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FIGURE 2

pallets at the distal end of the tube, the shells (which are withdrawn somewhat from the anterior end of the burrow), and the calcareous lining of the burrow which shows up as a dark line, thickening toward the posterior end. When shipworms are undisturbed, the siphons are extended from the minute opening at the surface of the wood and gently wave about in the water. If, however, they are disturbed, the siphons are retracted, and the opening is plugged by the pair of pallets. These are more or less semicircular in cross-section and when brought together form a cone which is forced into the opening, effectively protecting the animal within. (See also the section on pallets, p. 66).

The valves of the teredo shell are nearly hemispherical, with a deep right-angled notch in the ventral half of the anterior margin. Parallel with the edge of the notch, the outer surface of each valve is sculptured with fine ridges which, when magnified, appear as rows of minute teeth or denticles like those of a file or rasp. The large muscular foot, which is protruded through the gape formed by the notches, is circular, truncated, and acts as a suction disc to hold the valves tightly against the anterior end of the burrow. When boring, the anterior adductor muscle contracts, bringing the anterior ends of the valves together and spreading the posterior ends. The foot is firmly attached to the end of the burrow and the valves are drawn as far forward as possible, bringing the denticles hard against the wood. The forceful contraction of the posterior adductor muscle then spreads the valves anteriorly and the denticles scrape against the wood with sufficient force to rasp off fine particles. The alternating, rhythmic contraction and relaxation of the anterior and posterior adductor muscles may be repeated many times before the animal rests. The large posterior adductor muscle supplies the force for boring, and the shell is the tool with which it works.

The surface of the foot and the mantle have ciliary tracts by means of which the fine particles of wood are carried into the mantle cavity and to the mouth. They are finally extruded through the excurrent siphon after passing through the digestive tract. The extent to which the wood can be utilized as food probably varies with the species (see section on Biology).

Shipworms can only invade new wood during the short larval period when they are free swimming. The initial entrance hole is extremely small and normally is only slightly enlarged throughout the life of the animal. Consequently, the damage which they do often goes undetected until the interior is nearly or completely destroyed and the wood disintegrates. It is for this reason they are often referred to as "termites of the sea." As agents in the reduction of wood to its constituent elements they serve a useful purpose, but when they attack man's handiwork they become an important economic problem.

Historical Survey

The following survey of the literature includes works dealing with the systematics and classification of the Teredinidae. For reviews of papers on other aspects of the family, reference should be made to the excellent book, "Marine Borers, an Annotated Bibliography," by Clapp and Kenk (1963).

The most important pre-Linnean work on the Teredinidae was the remarkable treatise of Sellius (1733) written at the time when the Netherlands were in great danger from the destructive activities of shipworms in the dikes. He proved that shipworms were mollusks, did the basic anatomical work, and reviewed all that was known concerning teredines at that time. In the 10th edition of the "Systema Naturae" (1758), Linnaeus instituted the genus *Teredo.* He referred to the work of Sellius but placed the genus in Vermes Intestina rather than Vermes Mollusca, apparently overlooking the statements of Sellius. Linnaeus included two species: *Teredo navalis* and *Teredo lapidaria.* In the 12th edition, only *navalis* was mentioned under *Teredo,* the species *lapidaria* being placed in *Terebella,* a genus of testaceous worms. Guettard (1770), when writing on the genera of "vermiculaire," included the shipworms, and in volume 3 of his "Memoires sur Differentes Parties des Sciences et Arts" he described and figured the genera *Kuphus* and *Uperotus;* both names are in use today.

In the 13th edition of the Systema Naturae (1791), Gmelin added two new species of *Teredo: utriculus* and *clava.* The description and references for *utriculus* were so inadequate that the name was not used until Hanley (1882, 1885) suggested that it was the Mediterranean form of *norvagicus* Spengler 1792. For a detailed discussion of this problem see under *utriculus* in the Catalogue. Under *clava,* Gmelin referred to the works of Walch (1777) and Spengler (1779), and these are sufficient to clearly define the species.

In 1792 Spengler described four species, but unfortunately his names did not correspond to those of his predecessors. *Teredo batavus* Spengler is *Teredo navalis* Linnaeus, while *Teredo navalis* Spengler is *Bankia carinata* (Gray), and *Teredo nucivorus* Spengler is *Uperotus clavus* (Gmelin). Only *Teredo norvagicus* Spengler [*Nototeredo norvagica*] is in use at the present time. Spengler's species were well described, and so his work was quite naturally followed by many workers, resulting in a confusing double usage of names, particularly in the early literature, for the authors of the names were not always given by subsequent workers. Much of this confusion was pointed out by Forbes and Hanley (1853) but they were not generally followed.

It is unnecesary at this time to go into a detailed account of every paper in which a new shipworm was described, for these are all given in the Catalogue. Among the more important writers, however, were Lamarck (1801) who described *bipalmulata,* and Turton (1822) who instituted *malleolus* and *bipennata.* In 1827 J. E. Gray wrote a brief "monograph" of the genus listing 11 species, with *carinata* described as new. In the work of Blainville (1828) credit is given to Leach for some of the species described. This was also done by Sowerby, Deshayes, Gray and others. William Elford Leach had prepared a large manuscript on British mollusks, which, along with his named collection, he willingly let visitors consult. Due to ill health, Leach's work was interrupted in 1820 and was never completed, though the first section had been printed and a few copies distributed. Unfortunately, any manuscript on *Teredo* which Leach may have written was lost, so that there is now no way of knowing exactly to what he referred. In the literature one often finds names credited to Leach, but according to Article 50 of the International Code of Zoological Nomenclature, they must date from the authors who first published them unless "it is clear from the contents of the publication some other person is alone responsible." Such names are indicated in the Catalogue as *carinata* 'Leach' de Blainville or *stutchburyi* 'Leach' Sowerby. Unfortunately, the interpretations of Leach's work were not always the same, and considerable confusion has resulted: for example, *Xylotrya* 'Leach' Menke 1830 is a genus in the Pholadidae, while *Xylotrya* 'Leach' Gray 1847 is a genus in the Teredinidae. In his paper on the arrangement of the Pholadidae into natural groups, Gray (1851) recognized 14 species of teredinids grouped into four genera: *Teredo* Linnaeus 1758; *Xylotrya* 'Leach' Gray 1847 [=*Bankia* Gray 1842]; *Cuphus* Guettard [*Kuphus* Guettard 1770]; and *Guetera* Gray 1847 [=*Uperotus* Guettard 1770].

One of the outstanding works of this period was that by Forbes and Hanley (1853). They described each of the six endemic British teredinids in detail, giving notes on their ecology and distribution. In their synonymies they discussed the confusion that existed at that time as a result of the differences in the use of names. They pointed out that *Teredo navalis* of British authors equaled *Teredo norvagicus* Spengler [=*Nototeredo norvagica*] and reported the true *Teredo navalis* Linnaeus from the British Isles, apparently for the first time. Only *Teredo* [*Psiloteredo*] *megotara* Hanley was introduced as new, and this in reality was a change of name for *Teredo nana* Turton which had been based on inadequate material.

In 1856, H. and A. Adams outlined the Tereininae in their work "The Genera of Recent Mollusca." They gave a brief description of the group, simply listing the 21 species which they recognized and grouping them into three subgenera: *Teredo sensu stricto, Xylotrya* Leach, and *Uperotis* [*sic*] Guettard. In a similar though more detailed account, Paul Fischer in 1856-57 "monographed" the genus *Teredo.* He recognized and described 18 species and stated that, though Gray and others had recognized five sections, he did not believe this was justified. He suggested the plan of naming the various parts of the shell, which has been followed to the present time, and concluded with a brief discussion of the geographic distribution of the species then known. This was the first time consideration had been given to the geographic distribution of the group.

In 1860, a committee of the British Association for the Advancement of Science, of which J. Gwyn Jeffreys was chairman, proposed that certain experiments be made in the dockyards at Plymouth where shipworms were very destructive. A small grant had been voted by the Association for this work, and though the Port Admiral approved, the Admiralty Office refused permission without giving any reason for so doing. Somewhat embittered by this, Jeffreys wrote that "Great Britain unlike other States, does not count a single naturalist in her national assembly; and the Government will not, unless urged by popular pressure, take the initiative, or even forward any plan of public improvement which is out of the regular groove of routine." As a result of his interest in the subject at that time, Jeffreys (1860a) published a paper listing 21 species of teredinids recorded from British waters, seven of which he described as new. Included were warm water species taken from drift logs cast ashore in Britain.

The first survey of this group published in the United States was by Tryon (1862) in the Proceedings of the Academy of Natural Sciences, Philadelphia. Remarks in his introduction are still so appropriate that they are worthy of quoting here. "In the preparation of these papers much difficulty has arisen from the number of species which have been described (sometimes inadequately) but not figured, and from the conflicting views of European naturalists regarding the validity of many species. There is no good reason why the Pholadacea should not be searched for, and distributed very generally in public and private cabinets, yet such is not the case, and every conchologist who studies the order labors under the disadvantage of being unable to examine and compare specimens of a large number of species."

Tryon recognized the teredines as a distinct family which he called Tereddidae [Teredinidae], based on Carpenter's paper (1861), and divided it into three subfamilies: the Teredinae, Teredininae (fossil), and Kuphinae. He listed 92 names in his "Index of Species," many of which are the same but apply to different species: for example, there are five entries for *T. navalis,* three for *bipalmulata,* and five for *palmulata.* Many of these were not instituted as new by the authors indicated, but were only listings of misidentifications and so they do not appear in the present catalogue. Tryon recognized and gave descriptions of 25 living teredines grouped into four genera; of these, several are today considered synonyms, for, like his European colleagues, Tryon also misinterpreted several species because of the lack of comparative material and the poor original descriptions. This is the first time that so comprehensive a survey of the family had been made, and it did much to aid his successors.

Perhaps the most entertaining and complete account of the early work on the Teredinidae is that of Jeffreys (1865). Going back to the early Greek and Latin authors, he summarized all early references to shipworms, their occurrences, anatomy, physiology and control. He quoted freely from the work of Sellius (1733) which he rightly considered "a masterpiece of learned research." In the systematic portion he recognized and described fully the six species native to the British fauna. In addition he named six new varieties, all of which today are considered synonyms, being only ecological forms. A few species, found in floating logs on British shores and considered exotic, were also mentioned but not described.

The first completely illustrated monograph of the Teredinidae was that of Sowerby (1875 a,b). Nineteen species were described and figured in the genus *Teredo* and two in the genus *Kuphus*. Unfortunately, the illustrations are small, usually natural size, the descriptions brief, and the locality often unknown or in error. However, despite all these shortcomings, this was the most complete, illustrated account of the family up to that time, and it was the standard reference work for many years, particularly for the non-specialist.

By the 1860's the British were well established in India and Australia, and material from these areas was reaching England. Some of this was studied by E. P. Wright, Professor of Zoology at the University of Dublin, who published two fine papers. The first, which appeared in 1864, described the genus *Nausitora* with the species *dunlopei*. In the second (1866), he discussed at length the problem of the relationship of the genera *Kuphus* Guettard, *Furcella* Gray, and *Calobates* Gould; he outlined his classification of *Teredo*, recognizing five subgenera based on the form of the pallets (*Teredo* Linnaeus 1758, *Nausitora* Wright 1864, *Kuphus* Guettard 1770, *Calobates* Gould 1862 [= *Bactronophorus* Tapparone-Canefri 1877], and *Xylotrya* Gray 1847 [=*Bankia* Gray 1842]). Three species were described as new.

The section on *Teredo* of Clessin's illustrated monograph of the Pholadea in the Conchylien-Cabinet, which appeared in 1893, was largely patterned after Sowerby's account in the Conchologia Iconica. Apparently Clessin had not seen specimens of most of the species, for of the 30 treated, the illustrations of 21 were copied from Sowerby, three from Wright, and one from Hutton; only a single species was described as new. At the conclusion of his account he summarized the classification and recognized six genera: the five recognized by Wright and *Uperotus* Guettard. Though Clessin's work contained little which was new, it agreed with the work of Sowerby, and these two illustrated monographs, one in German, the other in English, were the works generally consulted for many years when determining teredinids.

A few small papers by Hutton, Tate, and Hedley on Australian and New Zealand species appeared between 1873 and 1898. These workers were among the first to be interested in local faunas in the Pacific, and new species described by them were the first of which the types were not in some collection in Europe or the United States.

Thus, at the turn of the century, though there was a multitude of names available, the confusion as to the identity of many species was such that only about 40 specific names were generally recognized. These were grouped into six genera or subgenera depending on the author.

After World War I the destructive activity of marine borers in widely separated areas of the world brought about the formation of special committees to study the problem, and numerous reports were published on the damage and means of control. An indirect result of this was a large amount of descriptive systematic work, most of it being done by one or two workers in each country. In the United States an investigation of the problem was begun in 1922. William F. Clapp, who was then Curator of Mollusks at the Museum of Comparative Zoology, was asked to take charge of the work on the Atlantic Coast. He became so interested in the problem that he established his own laboratory at Duxbury, Massachusetts, where he continued research on marine boring and fouling organisms until his death in 1951. Dr. Clapp instituted a test board program on a large scale, and many of the test sites which were begun in the 1920's have continued to this day. The result has been the amassing of material and data showing the range of variation within several species, the time of breeding, rate of growth, and the effect of changes in temperature on their occurrence. Dr. Clapp published numerous papers on marine borers, particularly on their occurrence and control, though he also described six new species.

Paul Bartsch, Curator of Mollusks in the United States National Museum, was also active at that time, devoting himself entirely to systematic work and describing in his several papers 52 new species, mainly from the United States and the Philippine Islands. Charles Edmondson was in charge of the investigations in the Hawaiian Islands, and between 1933 and 1960 published several papers on Hawaiian and Pacific forms. Robert C. Miller, who with Charles A. Kofoid was in charge of the Biological section of the California investigation, made a detailed study of the anatomy and variations of *Teredo navalis* and described a few new species from California and the Samoan Islands. In 1928, P. B. Sivickis published a single paper on the shipworms of the Philippines, introducing seven new species. Iredale (1932, 1936), in conjunction with the Australian investigation, wrote two papers describing 18 species of Australian shipworms.

Perhaps the most prolific writers on the systematics of the Teredinidae were the German workers Friedrich Moll and Felix Roch. They visited most of the museums of Europe and wrote a series of papers on these collections. Many of the reports were written jointly, though they actually took individual credit for the 79 new species described. Much of this work was descriptive, but some revisional, distributional and biological work was done by these authors, such as that on the Teredinidae of Africa (Moll and Roch, 1937) and of the Mediterranean (Roch, 1940). In this last paper Roch not only discussed the distribution of Teredinidae in the Mediterranean but also the variation within some of the species, and illustrated the differences in the siphonal papillae of four species.

In recent years Nagabhushanam, Nair, Gurumani, Daniel and Rajagopalaiengar[1] have been working on the marine borers of India. As a result of their studies 20 more new species were described, all of which prove to be synonyms. Tchang Si, Tsi Chung-yen and Li Kié-min (1955, 1958) have published the only recent work on the shipworms of China. The papers, which are in Chinese with a French summary, are well illustrated and record 11 species for the area, none of them new. In Japan, I. Taki, T. Habe and K. Kuronuma have been the most active workers and together have described numerous species. A publication on the damage and the method of protection against wood-boring animals, edited by Y. Okada and published by the council of the Japanese Association for the Advancement of Science (1958), summarizes the current work in Japan. The latest systematic paper from Japan is that of Mawatari and Kitamura (1960) who discussed the fauna of southern Japan and described two new species. The outstanding Russian paper in this field is that of Rjabtschikoff (1957) on the teredinid fauna of the USSR. Only the genus *Zachia* and its two species *Z. zenkewitschi* and *Z. lignaui* have been described from the USSR. These were published by G. A. Bulatoff and P. I. Rjabtschikoff in 1933.

From the above discussion it is apparent that most of the work on the Teredinidae has been done on the restricted basis of either a limited geographic area or a museum collection. The result has been that the percentage of synonyms created has been directly proportional to the narrowness of the outlook.

During World War II the study of marine boring and fouling mollusks benefited greatly from the research program of the U. S. Navy, and this interest has continued to the present time. As a result of continued collecting programs on a nearly world-wide basis, collections are being brought together which will make it possible to prove that many species in this family are world-wide in distribution within the limits of their temperature and salinity tolerance. Much of this work was and is being done

[1] Early papers were published under this name, but after 1964 he shortened it to Rajagopal.

through the William F. Clapp Laboratories, Duxbury, Massachusetts, and most of the material is deposited in the Museum of Comparative Zoology. This material, combined with the study of the type specimens, has been used in determining the synonyms which are indicated in the present Catalogue, and will form the basis of the planned generic monographs.

In 1957 a symposium on marine borers sponsored by the University of Washington and the Office of Naval Research was held at the Friday Harbor Laboratories of the University. As a result of these meetings a new world-wide testing program was instituted. Under this new program material is not only being obtained from areas not previously collected but the specimens are in far better condition, as the boards are preserved in alcohol immediately on removal from the water. Many of these specimens are sufficiently well preserved to be used in basic anatomical work and also to give information on the parasites and predators of shipworms.

There are many areas in the world from which preserved material is still needed, particularly western and southern South America, India, much of Africa, and Indonesia. It is hoped that present and future collecting programs will fill in these gaps.

Fossil Record

Identification of fossil Teredinidae is difficult because the calcareous tubes made by some annelid worms, irregular gastropods (Vermetidae) or bivalves (Gastrochaenidae, Clavagellidae or Pholadidae) are often similar and may be confused with those of teredinids. If the tubes are found in fossil wood in marine or brackish water sediments they can be safely considered Teredinidae, and when the valves are preserved in association with the tubes, specimens can be put in the proper family, but the genus cannot be ascertained. Isolated valves may be teredinids, but they are more likely one of the teredo-like pholads such as *Teredina, Xylophaga, Diplothyra, Lignopholas* or *Martesia.* If, in addition to the valves and the tube, the pallets are preserved, the genus can be determined. Identification to species is still uncertain because the periostracum which covers the calcareous portion of the pallets is not preserved in fossils, and it is in this that the specific characters are largely found, particularly in the genus *Bankia.*

The Teredinidae first appeared in the Jurassic according to d'Orbigny (1849 [1850]), Terquem and Jourdy (1871), Whitfield and Hovey (1906), and Moll (1942). Earlier records from the Carboniferous are generally questioned. The tubes described as *Teredo antiqua* by McCoy (1844) from the Carboniferous Limestone system of Ireland (the only species described as *Teredo* from the Carboniferous) were not in fossilized wood and are not teredinids. Even the species reported from the Jurassic are based on tubes only, and these are usually not in association with wood so that their placement in the family is questionable.

Tubes in fossilized wood are well known in the Cretaceous, and Stoliczka (1871), when describing four new species from India, stated that these brought the number of species from this period to twenty-six. None, however, can be placed generically, as the pallets are unknown. Hatai (1951) described and figured valves and tubes from the Lower Cretaceous of Iwate Prefecture, Japan. He stated that "more than ten of the tubes were broken to find the shells of *Teredo,* but owing to most of them being highly crystallized within, only four specimens of isolated valves could be extracted."

Stephenson (1952) described the shells of a Cretaceous teredinid taken from a fossil log found in the Woodbine Group of Texas. Though, as he indicated, the shells appear typical for the family, he proposed the new genus *Terebrimya* for them, stating that "a vast time interval separates the Cretaceous from the Recent shells." It is, of course, possible, even probable, that if the soft parts of *Terebrimya* were known it would differ from any living genus. It is also possible that the numerous specimens of *T. lamarana* reported from that locality represent more than one genus, for it is not unusual to find living specimens of *Teredo, Lyrodus* and *Bankia* in one piece of wood. It would, perhaps, be better to place such material in the family only.

The oldest fossil pallets known to me are from the Paleocene and, though there are only two records, they are widely separated both geo-

FIGURE 3

Fossil *Nototeredo* from the Cannonball Formation (Paleocene) of North Dakota collected by Alan M. Cvancara.

A-G are from the north side of Heart River, 11½ miles WSW of Mandon, NE Morton County, North Dakota.

H-K are from Mitchell Butte, 3¼ miles ESE of Flasher, S Morton County, North Dakota.

A. Shell imbedded in debris in the tube.

B and D. Outer faces; C and E. Inner faces of pallets.

F. Tube from first locality and the same one as shown in A, but less highly magnified to show the pallets in the tube.

G. Tube from second locality with pallets.

H. Tube with concamerations [see Figure 13 D].

I-K. Outer faces of pallets showing the segmental structure of a *Nototeredo* pallet [see Figure 19 A].

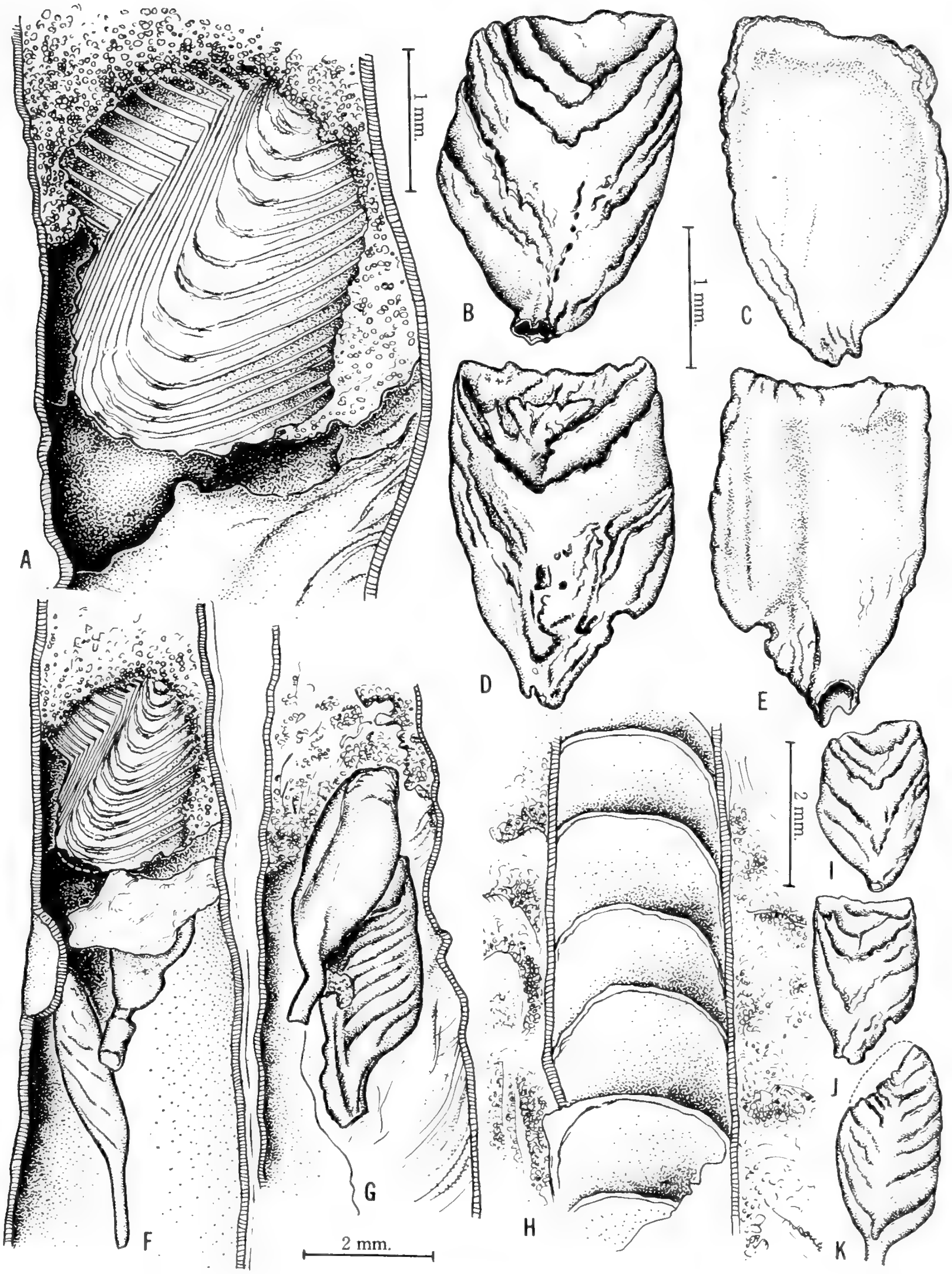


FIGURE 3

graphically and systematically, so it would appear that by this time the family was widely distributed and the genera were well differentiated. *Bankia kurdistanensis* was described by Elliott (1963) from thin-sectioned material showing pallets, shells, and tubes from the Paleocene of Iraq. Recently, Alan M. Cvancara of the Geology Department, University of North Dakota, discovered the pallets of a *Nototeredo* close to *norvagica* in the Cannonball Formation of Morton County, North Dakota. This important material is the earliest known record for pallets in North America and the second for the Paleocene. It will be reported upon by Cvancara but I am grateful to him for the loan of the material and the privilege of figuring some of it here (Fig. 3).

Pallets of *Bankia, Teredo, Teredora* and *Nototeredo* are known from the Eocene of France and Belgium (Ryckholt, 1852; Deshayes, 1860; Vincent, 1925) and the Upper Eocene of England (Stinton, 1957). When considered in the light of our present knowledge of variation in the pallets of living *Bankia,* the four species described by these authors [*B. burtini* (Ryckholt), *B. devoluta* (Vincent), *B. parisiensis* (Deshayes) and *B. tumida* Stinton] are probably synonymous, but, because today three or more species of *Bankia* are often found living in a geographic area of equal size, this is impossible to prove.

Durham and Zullo (1961) described *Bankia lincolnensis* from the Lincoln Formation (Middle Oligocene) near Porter, Washington—the first fossil *Bankia* known from North America. This species is without doubt the predecessor of *Bankia setacea* Tryon, the species now living in that area, for the pallets of *lincolnensis* do not exceed the limits of variation exhibited by dried pallets of *setacea.*

Benoist (1877) described and figured the pallets, shells, and tube of *Teredo* [*Nototeredo*] *daleaui* Benoist from the Upper Miocene of Martignas, France.

Tauber (1954) reported on the Teredinidae from the Tertiary of the Burgenland of Austria, and gave excellent figures of the pallets of what he called *Bankia minima* Blainville. He recognized four subspecies of *minima,* one of which he described as new. In addition, he figured and reported on fossil *Teredora megotara dilatata* Stimpson [=*megotara* Hanley] and *Teredo* (*Phylloteredo*) *utriculus* Gmelin [=*Nototeredo norvagica* (Spengler)]. The last two species may be related to living species, because, unlike *Bankia,* in these genera the small amount of periostracum on the pallets is not so important for identification.

When removing shipworms from test boards or sections of piling, it has been noticed that the muscles of the siphons and pallets become

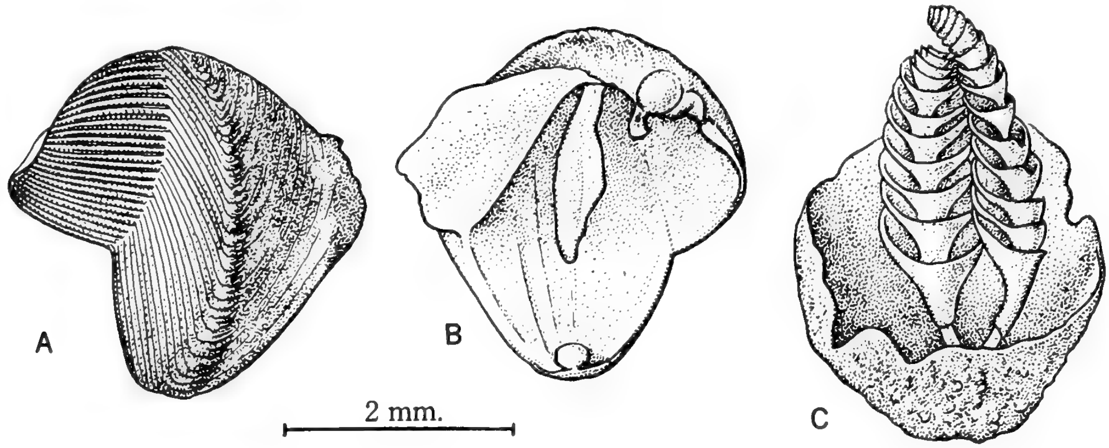


FIGURE 4

Fossil *Bankia* from the Lutétien (Middle Eocene) of Vaudancourt, near Paris, France. Invert. Paleo. Dept., Brussels Mus. 5119.

A. External view of left valve.
B. Internal view of left valve.
C. Base of tube which was opened to expose the nearly perfect pallets.

detached from the lining of the tube and disintegrate soon after the animal dies. The pallets are then free and often shift to the larger end of the burrow near the shells. Thus, this end of the tube should be a logical place to look for pallets when opening or sectioning fossil tubes. This proved to be true when, through the kindness of Dr. Maxime Glibert of the Brussels Museum, I opened several fossil tubes in their collection. One from the Lutétien (Middle Eocene) of Vaudancourt, near Paris, had at the bottom the nearly perfect specimen shown in Figure 4. The valves were resting on either side of the pallets and were only slightly cemented to the side of the tube. The pallets, however, were completely cemented to the tube on their inner faces so that they could not be removed without breaking them. The specimen had been labeled *Teredo cincta* Deshayes, a name based on valves only; it is probably *Bankia parisiensis* (Deshayes). Most of the other tubes were empty, though a few had valves which proved to be Gastrochaenidae.

Those interested in fossil Teredinidae should consult the papers by Moll (1941b and 1942), Stoliczka (1871), and others referred to by these authors. Moll (1941b), in the Fossilium Catalogus, listed 173 names in the catalogue of the Teredinidae; however, he included some pholads and other forms that are not in this family.

The present catalogue includes only names of fossil forms which refer to taxa now considered members of the Teredinidae, or those which are often confused with them, or which were introduced as belonging in the Teredinidae and as such must be considered for homonymy. Under each entry mention is made of the material upon which the description of the species was based (i.e., tubes only, tubes and shells, shells only, etc.), and for those not considered teredinids, the group in which they are now placed, if this is known.

Biology of the Teredinidae

It is not the purpose of this report to review all that is known concerning the biology of the Teredinidae, but only to point out the areas in which work has been done and to indicate problems which need investigation, especially those which may be helpful in systematic work. A perusal of the subject index and the abstracts of the papers in Clapp and Kenk (1963) will serve as an introduction to work done through 1954.

As I had felt for some time that the morphology of the soft parts, in addition to that of the shells and pallets, would prove important in the classification of this family, a survey was made of the anatomy of as many genera as possible. The results were unexpected and most striking, and these new findings are reported in some detail here.

Anatomy of the Soft Parts

As mentioned previously, Sellius (1733) published the first reliable work on the general morphology of the soft parts of *Teredo navalis,* showing that they were mollusks and relating them to the pholads. The same conclusions were arrived at independently by Adanson (1765), based on *T. senegalensis.* The next important contribution was the detailed and beautifully but unconventionally illustrated work of Deshayes (1848) on *Teredo navalis* [=*Nototeredo,* probably *knoxi* Bartsch]. At the same time Quatrefages was working on the anatomy of *Teredo fatalis* [=*Nototeredo norvagica* (Spengler)], and in his "Mémoire sur le genre Taret" (1849) he pointed out several differences between his observations and those of Deshayes. Actually, Deshayes and Quatrefages were working with different species of *Nototeredo,* and most of the differences noted resulted from this. Some of this early work has been questioned, but the present studies have shown that when the same species is dissected, the observations of these early workers are generally accurate, though the nomenclature of the various organs may be archaic.

More recently, three species, *Xylotrya* [=*Bankia*] *gouldi* Bartsch (Sigerfoos, 1908), *Teredo navalis* Linnaeus (Lazier, 1924), and *Bankia indica* Nair [=*B. carinata* (Gray)] (Nair, 1956-1957) have been studied in considerable detail, but even these need further investigation.

Though these studies explain the organization of the Teredinidae, there still remain in some text books and popular articles many misconceptions and errors. Among the more glaring is the diagram of the anatomy of "*Teredo*" published in a recent popular scientific journal, and this unfortunately was copied in one of the better text books. Also one often encounters such completely erroneous statements as "the siphons enlarge enormously at the expense of the rest of the body."

Figure 5 compares the anatomy of a species in the Teredinidae [*Teredora malleolus* (Turton)] with one in the Pholadidae [*Zirfaea crispata* (Linnaeus)] and one in the Veneridae [*Mercenaria mercenaria* (Linnaeus)]. The differences exhibited by the Teredinidae result largely from the tremendous elongation of the body of the animal while the anterior and posterior adductor muscles remain in close approximation to each other.

In newly settled teredinids, before the body begins to elongate, the organs are more typically oriented, as shown by Sigerfoos (1908). Studies of growth series show the gradual lengthening of the body and the simultaneous changes in the relative size and position of the various organs.

The orientation of the organs in adult teredinids is easily understood if one realizes that the mouth and the anus are in the typical bivalve positions, i.e., the mouth is dorsal to the foot and near the anterior adductor muscle, while the intestine extends over the dorsal surface of the posterior adductor muscle and opens just posterior to it. Since there is not room for all of the vital organs between the two adductor muscles, as is the case with most bivalves (illustrated here for a typical venerid), the body in the Teredinidae has extended posteriorly into a long narrow loop. The result is that the organs on the dorsal arm of the loop are "up-side-down and back-side-to." This places the kidney and the elongated heart behind the posterior adductor muscle. The kidney is then dorsal to the heart and the ventricle anterior to the auricles. The posterior aorta extends anteriorly to supply the posterior adductor muscle and then turns posteriorly as the pallial artery, while the anterior aorta immediately turns posteriorly to supply the visceral mass. The cerebral ganglia are in the normal position just dorsal to and on either side of the mouth, but the pedal ganglion is in the dorsal part of the foot just under the esophagus. The visceral ganglion has been carried posteriorly by the extension of the loop and is located at the posterior end of the pericardium instead of on the surface of the posterior adductor muscle. The gills are elongate, and in most species extend from the base of the siphons anteriorly to the visceral mass where they are reduced to food grooves, and these pass forward to the anterior gills and the labial palps. In *Teredora* and *Uperotus,* however, the gills extend without reduction from the base of the siphons to the mouth.

Other unique features in the anatomy of the Teredinidae include: 1) the anal canal, which extends from the anus over the visceral mass to the suprabranchial cavity; 2) the caecum, or wood-storing pouch, which extends posteriorly from the stomach (except in *Kuphus* which lacks a caecum); 3) the pallets with the muscles which work them; and 4) the insertion of the siphonal retractor muscles on the calcareous lining of the burrow rather than on the valves from which they are, of course, greatly separated.

Except for the three studies mentioned above, most anatomical work has been undertaken in conjunction with comparative studies of the digestive, nervous, reproductive or other systems among the Bivalvia. Usually only single, or at best two or three, species of teredinids were considered in any one study. Nothing on a comparative basis within the Teredinidae has ever been attempted.

The survey made for this report has shown that the general body plan is the same for all teredinids, but the variations on this plan are numerous and striking. In the following brief descriptions of the genera and species studied, only the major characters and those not likely to vary within the species are considered. All specimens dissected had been preserved in alcohol, but unfortunately under varying and unknown conditions so that there is no way of evaluating the amount of shrinkage. Measurements given in the accompanying chart are proportional, for these remained reasonably constant when several specimens of the same species were dissected. Because it was often impossible to determine the extent of the pericardium, this is indicated by broken lines, and measurements are given for the heart only.

Very little was done with the nervous system; the internal structure of the stomach and caecum was not studied; and no sectioning or histological studies were attempted because the material had not been properly preserved for this type of work. Studies of this kind, as well as far more anatomical work on living and carefully preserved material, must be done before detailed anatomical illustrations can be made. Specimens are also needed in different stages in the reproductive cycle, for the relative size of the gonads varies with the age of the specimen and the season. All that can be done at the present time is to point out and attempt some interpretation of the striking differences in the major systems.

There is no question that a great deal more work is needed, and this will be done for the planned monographic studies of the various genera. The purpose in reporting this preliminary work is to show the importance of the anatomy in relation to the classification and physiology of the teredinids, and it is hoped that others will become interested in the many problems suggested and will begin work on their local species.

In the accompanying semidiagrammatic illustrations it has sometimes been necessary to separate the organs slightly in order to define them clearly. Not all organs could be indicated for all species without making the illustrations too complicated, but they are discussed in the text. Emphasis in the drawings was placed on those features which appear to be of greatest importance from a systematic point of view. Some specimens were in poor condition, so that the illustrations based on them are not complete or are composites resulting from the study of several fragmentary specimens. Such cases are noted in the text. Labeling and shading in the illustrations is the same throughout (Figs. 5, 7-11); for example, number 2 always refers to the posterior adductor muscle, and "check marks" were always used to indicate digestive glands. For ease in referring to the illustrations, a key to the numbers is given with the caption for each figure. The fact that a number may be missing in the key simply means that the organ or feature to which it refers is not illustrated in that particular figure.

The genera are arranged phylogenetically in the following discussion. Their relationships are shown graphically in Figure 25. The discussion begins with *Kuphus,* then follows up the non-segmented pallet line (Teredininae) and concludes with *Bankia,* the most highly developed of the segmented pallet line (Bankiinae). (See also the section on Evolutionary Trends.)

KUPHUS Guettard Figs. 6 B; 7 A,B

[Synonyms and diagnosis, p. 73]

Species dissected: *polythalamia* Linnaeus (only 1 specimen).

Kuphus is unique in many of its anatomical features, but the most striking external one is the strong muscular collar which surrounds it just posterior to and partially covering the valves.

The siphons are long and separated; the anterior and posterior adductor muscles are small. The mantle is thick, composed of seven layers which, from the outer surface inward, are as follows: 1) an outer epithelium, 2) a thin layer of circular muscles, 3) a

FIGURE 5

Comparison of the anatomy of the teredinids with that of some other bivalves.

A. **Veneridae**—*Mercenaria mercenaria* (Linnaeus), specimen purchased in Boston market. The valve, mantle, and wall of the visceral mass have been removed from the left side. The important characters are the combined crystalline style-midgut; the passage of the intestine through the ventricle; the position of the kidney ventral to the pericardial cavity; the location of the visceral ganglion on the anterior side of the posterior adductor muscle; and the position of the anterior and posterior pedal retractor muscles close to the anterior and posterior adductor muscles.

B. **Pholadidae**—*Zirfaea crispata* (Linnaeus), from Fourth Cliff, Scituate, Massachusetts. *Zirfaea* is one of the less specialized genera in this family which is closely related to the Teredinidae, and shows the transition from the more typical eulamellibranchs.

The valve and mantle have been removed from the left side. The important characters include the large separate crystalline style sac which extends anteriorly; the intestine traversing the heart; the kidney which is ventral to the posterior adductor muscle; the location of the visceral ganglion on the posterior side of the posterior adductor; the extension of the gills posteriorly; and the insertion of the anterior adductor muscle on the unbonal reflection outside of the valves.

C. **Teredinidae**—*Teredora malleolus* (Turton), from Dakar, Sénégal. *Teredora* is used for comparison here because it is one of the two genera in the Teredinidae in which the gills extend without reduction from the mouth to the siphons. The valve and mantle have been removed from the left side. The important characters are the large anterior crystalline style sac; the separation of the intestine from the heart; the location of the kidney posterior to the posterior adductor muscle and dorsal to the heart; and the location of the visceral ganglion at the posterior end of the pericardium. For further details and variations in the anatomy of the Teredinidae see the text and Figures 6 to 14.

Key to numbers

1. Anterior adductor muscle
2. Posterior adductor muscle
3. Cephalic hood
4. Foot
5. Mouth
6. Labial palps
7. Crystalline style sac
8. Stomach
9. Digestive glands
10. Intestine (and combined midgut crystalline style sac in *M. mercenaria*)
11. Caecum
12. Gonads
13. Gills
14. Infrabranchial cavity
15. Pallet
16. Incurrent siphon
17. Excurrent siphon
18. Mantle
19. Epibranchial or suprabranchial cavity.
20. Anus
21. Anal canal
22. Kidney
23. Auricle
24. Ventricle
25. Pericardial cavity
26. Visceral ganglion
27. Anterior pedal retractor
28. Posterior pedal retractor
30. Food groove or branchial groove
33. Proctractor muscles of the pallet
34. Ventral adductor muscle
39. Mantle collar around siphons and pallets
40. Esophagus

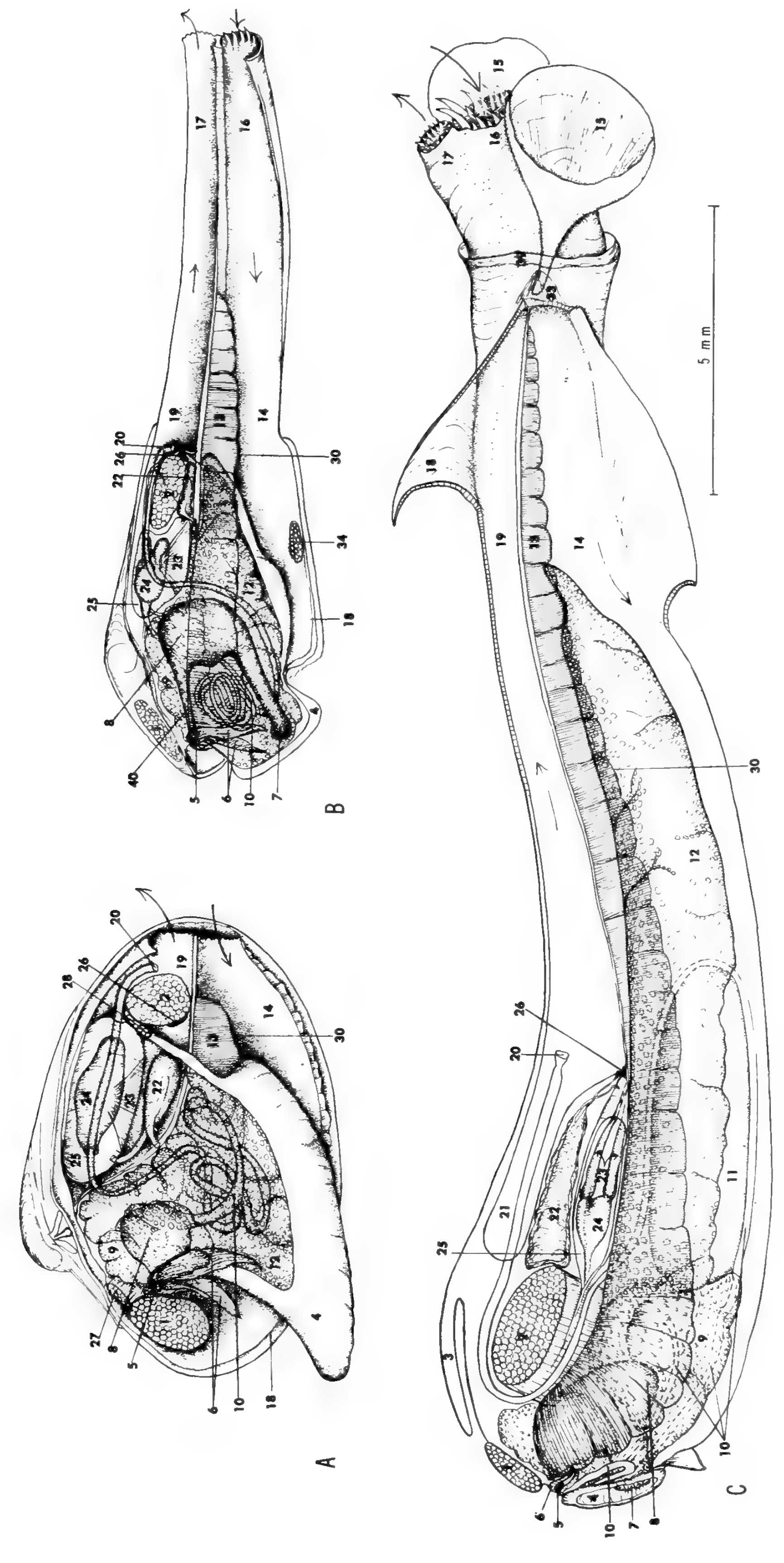


FIGURE 5

thin layer of longitudinal muscles, 4) a thick layer of transverse muscle fibers, 5) a thin layer of circular muscles, 6) a thin layer of longitudinal muscles, 7) an inner epithelium. The transverse fibers of the thick middle layer are branching, rather widely spaced, often with bunches of red-brown granules attached. The spaces between the fibers are filled with a milky fluid, which when allowed to settle produces a whitish precipitate (for a discussion of this see p. 42). A thick mantle is apparently generally distributed throughout the family, especially in older specimens, but it is nowhere as greatly developed as in *Kuphus*. Among

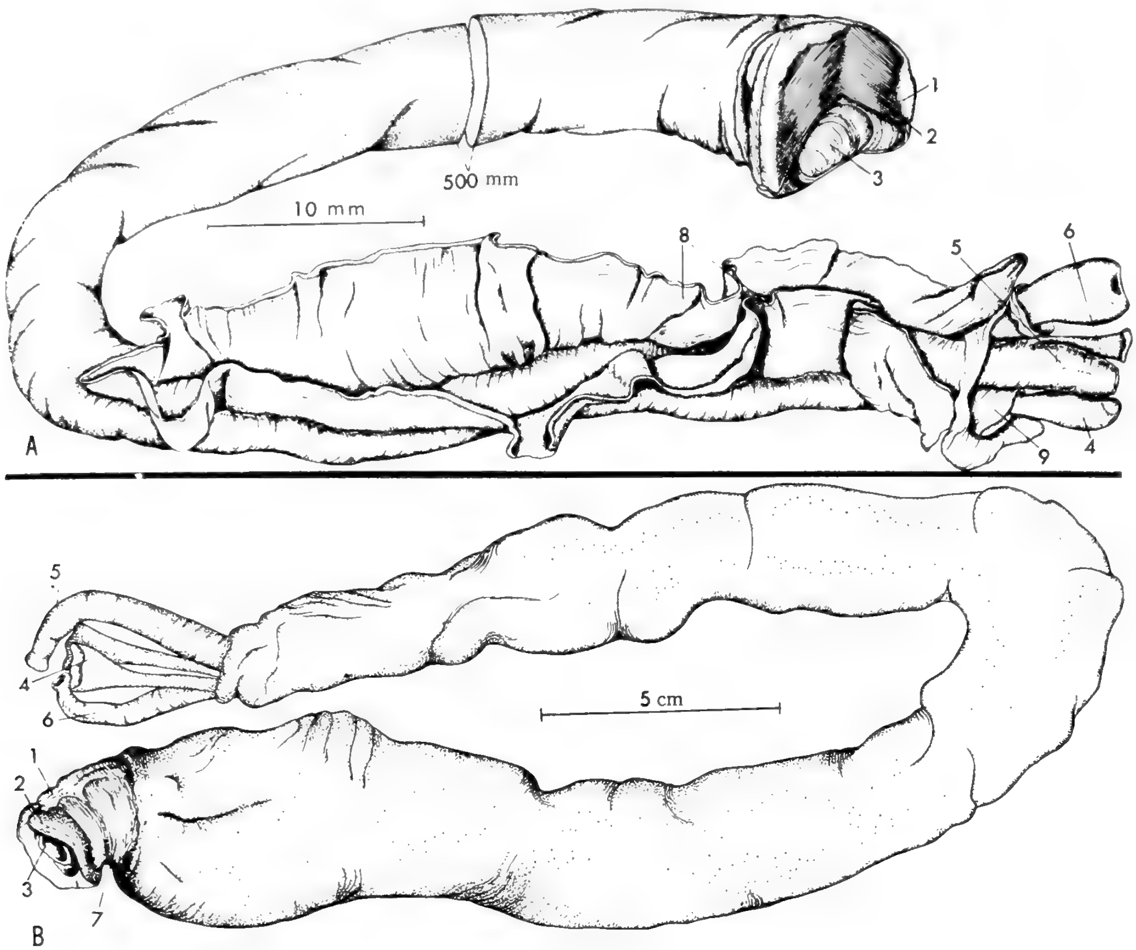


FIGURE 6

A. Entire animal of *Neoteredo reynei* (Bartsch) from a dead tree on the beach on the east coast at the mouth of the Nickerie River, N of Nieuw Nickerie, District of Nickerie, Surinam, collected by C. v. Regteren Altena. The animal, after preservation, measured 610 mm in length. In the Figure about 500 mm were cut out.

B. *Kuphus polythalamia* (Linneaus) from the Solomon Islands, received through the kindness of the Division of Mollusca, British Museum (Natural History). *Kuphus* are said to be mud borers, though this has not been definitely proven. The reduced, nearly smooth shells, which are surrounded posteriorly by a heavy muscular collar and the very small adductor muscles, suggest that *Kuphus* do not move their valves in the same way as other teredinids and that they probably can not bore into wood.

Key to Numbers

1. Cephalic hood
2. Shell
3. Foot
4. Pallet
5. Incurrent siphon
6. Excurrent siphon
7. Muscular collar surrounding the valves
8. Dorsal lappets
9. Pallet collar

the material dissected for this work, it was noted particularly in *Bactronophorus, Neoteredo* and *Nausitora*. It has been described and figured for *Bankia* by Bade, Masurekar and Bal (1961), and Sigerfoos (1908) mentions it for *B. gouldi*.

The visceral mass in *Kuphus* is greatly reduced, being less than one-tenth the length of the animal and contained within a thin, strong, muscular body wall. It appears as a black, egg-shaped mass at the anterior end of the mantle cavity. The labial palps are developed as large folds which are free at the tips. The food groove is well developed, extending from the ventral margin of the gills over the visceral mass to the labial palps. The esophagus is long, broadening into a thin-walled pouch anterior to the muscular collar, but constricting again as it passes through the collar. It then extends to the stomach which is located at the posterior end of the visceral mass. The stomach is nearly spherical with the crystalline style sac protruding from the anterior left side. The crystalline style is large and extends across the stomach to the gastric shield which is located on the dorsal posterior wall. The caecum is lacking. The intestine opens from the right side of the stomach, loops around it and then passes dorsally through the muscular wall of the visceral mass into the pericardial cavity. It passes through the ventricular bulb, loops upon itself, then extends anteriorly beneath the posterior adductor muscle, and dorsally over it. Posterior to the adductor muscle the intestine is imbedded in the thickened mantle until it opens into the epibranchial cavity posterior to the heart. The digestive glands, which appear to be of two types, cover the esophagus and the esophageal pouch as well as the stomach. What appeared to be gonads in the single specimen available were small and located mainly on the right side of the stomach. The heart, which is over one-third the length of the animal, is located dorsal to the gills and mainly posterior to the visceral mass. The ventricle is muscular, long, tubular, and with an expanded, thin-walled bulb at its anterior end, from which it is separated by a triangular valve. The posterior aorta opens from the mid-dorsal surface of the ventricular bulb and extends anteriorly to the posterior adductor muscle before branching. The auricles are long, thin, tubular and nearly black. The kidneys are relatively small and are apparently imbedded in the mantle just posterior to the posterior adductor muscle and ventral to the intestine.

BACTRONOPHORUS Tapparone-Canefri Fig. 8 B

[Synonyms and diagnosis, p. 73]

Species dissected: *thoracites* Gould (1 specimen in poor condition).

The unique 'sheath-and-dagger' type pallets immediately identify this genus. The siphons are united for most of their length, the excurrent siphon having two papillae on the dorsal surface at the tip, the aperture of the incurrent siphon having numerous small papillae. The muscles of the pallets and siphons are similar to those in *Neoteredo* and the dorsal surface of the animal (in a position equivalent to the dorsal lappets of *Neoteredo*) is tuberculate. The gills extend anteriorly from near the base of the siphons to overlap the visceral mass for a short distance. They are broadly U-shaped, flattened ventrally, and have a prominent food groove. The anterior gill is composed of 16 lamellae, and the labial palps are evident as prominent folds. The esophagus is short and broad, the stomach globular and the caecum large and thin walled. The intestine opens from the midgut, anteriorly, on the right side of the stomach. It makes a loop anteriorly over the crystalline style sac, turns posteriorly, passes beneath the stomach to the left side, makes a loop around the caecum and then continues dorsally over the posterior adductor muscle. The posterior end of the intestine is enlarged, muscular, and has longitudinal ridges internally. The anal canal extends posteriorly well beyond the pericardium and is closed posteriorly by muscular folds so that the feces may be retained. The heart is large, extending from a point just under the posterior adductor muscle to the posterior end of the gonads (nearly half the length of the animal). The ventricle is deeply lobed posteriorly and is only slightly wider than the combined width of the tubular, red-brown auricles which are broad anteriorly but taper to fine tubes. The gonads in the single specimen available were enlarged, a bright orange in color, and the main portion located posterior to the caecum. The main body of the kidney is long and located dorsal to the heart.

NEOTEREDO Bartsch Figs. 6 A, 8 A, 13 A-C

[Synonyms and diagnosis, p. 73]

Species dissected: *reynei* Bartsch (5 specimens, 3 from Surinam, 1 from Antigua, and 1 from Africa).

A striking and unique feature of this genus is the pair of large lappets on the dorsal surface of the animal just anterior to the siphons. The mantle is thick, particularly at the posterior end of the animal, and is similar in structure to that of *Kuphus*.

Rancurel (1954) first described the dorsal lappets in this species and stated that the animal was free to move up and down in its tube, as the muscles of the pallets and siphons were inserted at the base of the lappets rather than on the wall of the tube. A comparison of the musculature of the posterior end of *reynei* with that of *Bankia gouldi* and *B. setacea* (Fig. 13) shows that they are all similar. This indicated that the attachments to the tube, though weak, did exist; later a specimen from Antigua, dissected from a piece of mangrove after it had been preserved in alcohol, showed this to be true. Living specimens of many species of shipworms, disturbed while being dissected from the wood, contract so violently that they pull themselves free from the tube, and this is probably what happened with Rancurel's material. X-ray studies of living material should certainly settle this question. Studies on living material are also needed to explain the massive musculature of the posterior end of the animal and the function of the dorsal lappets. A large muscular collar surrounds the base of the siphons, and there is a smaller one around each of the pallets. The siphons are united for about half their length. The broad, flattened gills extend from the base of the siphons anteriorly to the visceral mass. The food groove is rather weak, and the anterior gills are not evident. The stomach is globular; the intestine opens anteriorly from the right side of the midgut, makes a loop over the crystalline style sac anteriorly, then turns posteriorly to make a simple loop around the caecum and over the posterior adductor muscle. The intestine opens into the anal canal by a large funnel-shaped anus. The anal canal is in the form of a large thin-walled sac which extends the length of the visceral mass. The posterior opening is controlled by a large, strong, well formed sphincter muscle so that feces may be retained within, swelling it to enormous size. The heart is extremely long, extending from the posterior adductor muscle to the posterior end of the gonads. The ventricle is short, muscular, and lobed posteriorly; the auricles are long, broad anteriorly, tapering to fine tubes posteriorly, nearly black anteriorly but gradually lightening until they are transparent at the posterior end. The gonads are largely posterior to the caecum, but two small lobes extend dorsally over the posterior tip of the caecum. The kidneys are large, dorsal to the heart and, unlike those of other teredinids, extend dorsally over the posterior part of the posterior adductor muscle and surround the intestine after it passes over the adductor muscle.

DICYATHIFER Iredale Fig. 7 C, D

[Synonyms and diagnosis, p. 75]

Species dissected: *manni* Wright (5 specimens).

The *Kuphus*-like pallets and absence of a muscular collar surrounding the valves identify this genus.

The siphons are moderately long and separate; the adductor muscles and mantle are typical for the family. The labial palps are evident only as small ridges above and below the mouth, and the anterior gill is well developed. The main portions of the gills are broad, flattened, and extend from the siphons anteriorly to the posterior tip of the gonads; the well

FIGURE 7

A-B. *Kuphus polythalamia* (Linnaeus), Solomon Islands.
A. Entire animal as seen from the left side with the mantle removed.
B. Anterior end enlarged to show detail.
C-D. *Dicyathifer manni* (Wright), Tansong, Penuru, Singapore, Malaya.
C. Entire animal as seen from the left side with the mantle removed.
D. Anterior end enlarged to show detail.
Dicyathifer manni (Wright) has generally been placed in *Kuphus*, but a comparison of the anatomy with that of *polythalamia* shows that they are vastly different.

Key to Numbers

1. Anterior adductor muscle
2. Posterior adductor muscle
3. Cephalic hood
4. Foot
5. Mouth
6. Labial palps
7. Crystalline style sac
8. Stomach
9a-c. Digestive glands
10. Intestine
11. Caecum (lacking in *Kuphus*)
12. Gonads
13. Gills
14. Infrabranchial cavity
15. Pallet
16. Incurrent siphon
17. Excurrent siphon
18. Mantle
19. Epibranchial cavity
20. Anus
21. Anal canal (lacking in *Kuphus* and filled with feces in *Dicyathifer*)
22. Kidney
23. Auricles
24. Ventricle
25. Pericardial cavity (indicated by broken line)
31. Midgut (on right side of stomach in *Dicyathifer* and indicated by broken line)
33. Protractor muscle of pallets
35. Ventricular bulb
36. Posterior aorta
37. Valve between ventricle and ventricular bulb
38. Muscular closure of anal canal
39. Mantle collar around siphons and pallets
40. Esophagus
41. Enlarged pouch of the esophagus
42. Large duct of digestive glands indicated by broken line
43. Openings of ducts from digestive glands into the large common duct
45. Muscular collar around anterior end of animal

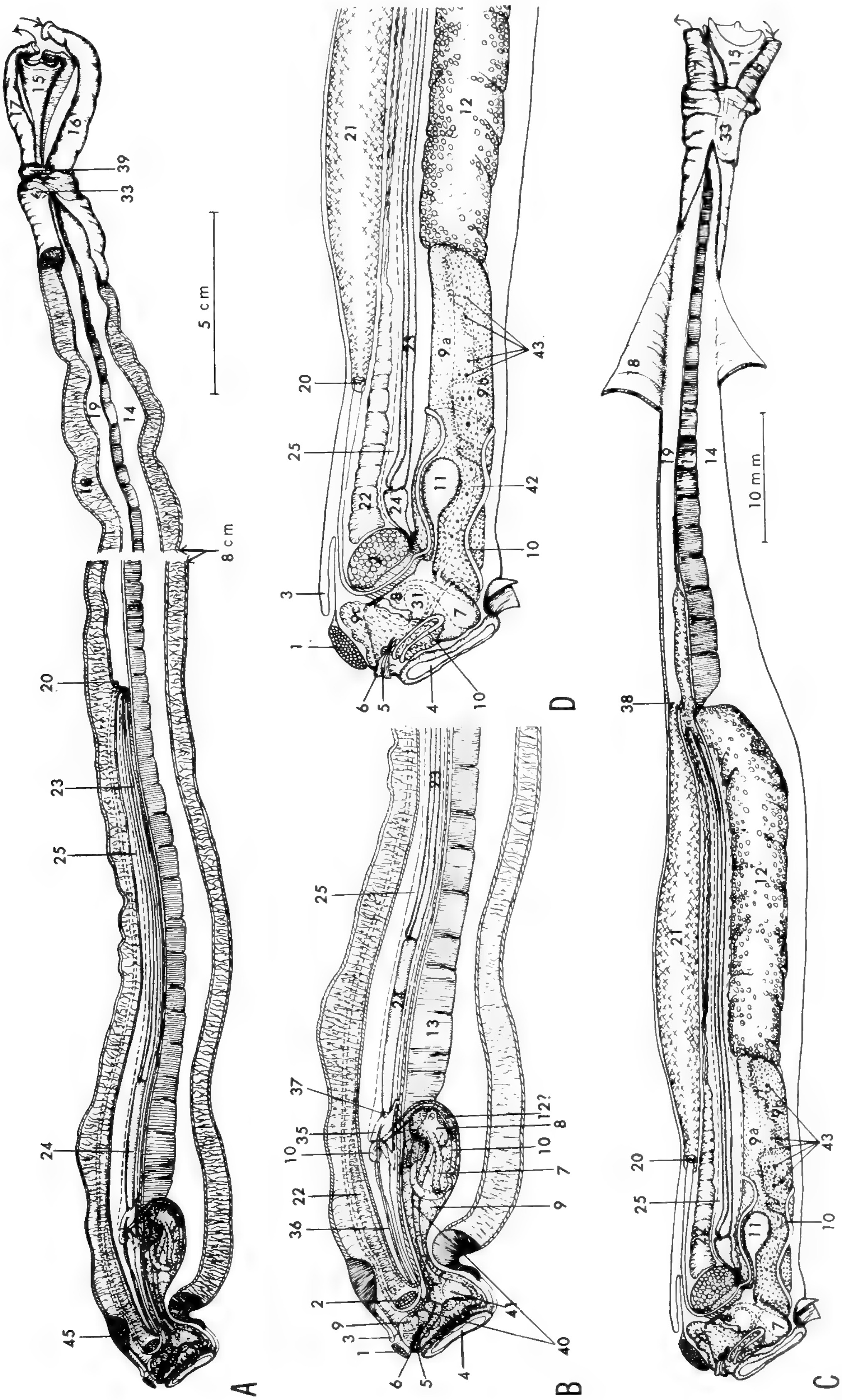


FIGURE 7

developed food groove is evident on the ventral outer edge of the gill, extending forward over the visceral mass to the anterior gill and the labial palps. The esophagus is short; the stomach globular. A small digestive gland surrounds the dorsal surface of the stomach, and two large glands (one brown, the other whitish) surround the small, flask-shaped caecum and extend posteriorly well beyond it. These are connected to the stomach by a large duct into which the glands open by many small ducts. The intestine opens from the midgut, anteriorly, on the right side, extends anteriorly, makes a loop over the anterior projection of the crystalline style sac, passes down the right side of the stomach, then crosses beneath it to the left side, extends posteriorly along the left side of the digestive gland for about half its length, passes beneath it to the right side, then turns dorsally again and meanders anteriorly along the dorsal surface of the gland and beneath the pericardium to pass under and then dorsally around the posterior adductor muscle. The intestine extends a short distance beyond the muscle before opening into the anal canal. Muscular folds at the posterior end of the anal canal control the opening into the epibranchial cavity so that the feces can be retained within the canal. The gonads are large and located posterior to the digestive glands. The heart is about one-half the length of the animal and extends from the posterior adductor muscle to the anterior end of the gills. The ventricle is short, broad, and inflated; the auricles medium brown, long, and tubular. The body of the kidney is large, dorsal to the pericardium, and extends from the posterior adductor muscle posteriorly for about half the length of the heart.

TEREDOTHYRA Bartsch Figs. 8 C, 19 D-G

[Synonyms and diagnosis, p. 75]

Species dissected: *dominicensis* Bartsch (2 specimens in poor condition), *matocotana* Bartsch (2 specimens in poor condition).

The structure of the pallets characteristic of this genus is shown in Figure 19.

The siphons are separate for most of their length. The gills extend from the base of the siphons to the posterior end of the gonads. The well–developed food groove passes over the visceral mass to the weak anterior gill and the labial palps, which are evident only as ridges. The esophagus is short, the stomach globular with a small caecum which folds on itself to the right. The intestine is rather short, opening from the midgut anteriorly on the right side. It extends anteriorly, makes a loop over the anterior projection of the crystalline style sac, and then passes around and under the stomach to the left side to make a simple loop around the caecum, beneath the pericardium, and then dorsally around the posterior adductor muscle to open into the anal canal by means of a large muscular anus. The anal canal is partially closed posteriorly by muscular folds so that the feces can be retained within it. A small digestive gland covers the dorsal part of the stomach; posterior to the caecum there are two glands, a dorsal white and a ventral brown one. The heart is anterior; the rather short triangular ventricle extends beneath the posterior adductor muscle, dorsal to the intestine. The auricles are long, tubular, tapering posteriorly, and extend to the anterior end of the gills. The gonads are located posterior to the digestive

FIGURE 8

A. *Neoteredo reynei* (Bartsch), from Paramaribo, Surinam.
B. *Bactronophorus thoracites* (Gould), from Port Darwin, North West Territory, Australia.
C. *Teredothyra matocotana* (Bartsch), from Tansong, Penuru, Singapore, Malaya.

Key to Numbers

1. Anterior adductor muscle
2. Posterior adductor muscle
3. Cephalic hood
4. Foot
5. Mouth
6. Labial palps
7. Crystalline style sac
8. Stomach (largely covered by digestive gland)
9. Digestive glands
10. Intestine
11. Caecum
12. Gonads (posterior to caecum and digestive gland)
13. Gill
14. Infrabranchial cavity
15. Pallet
16. Incurrent siphon
17. Excurrent siphon (behind pallet in A)
18. Mantle
19. Epibranchial cavity
20. Anus (with enlarged openings)
21. Anal canal (filled with feces)
22. Kidney (surrounding the intestine in A)
23. Auricle
24. Ventricle
25. Pericardial cavity (indicated by broken line)
29. Anterior gill
30. Food groove
33. Protractor muscle of pallets
38. Muscular closure of posterior end of anal canal
39. Mantle collar around siphons and pallets
44. Papillae on dorsal surface
46. Dorsal lappets

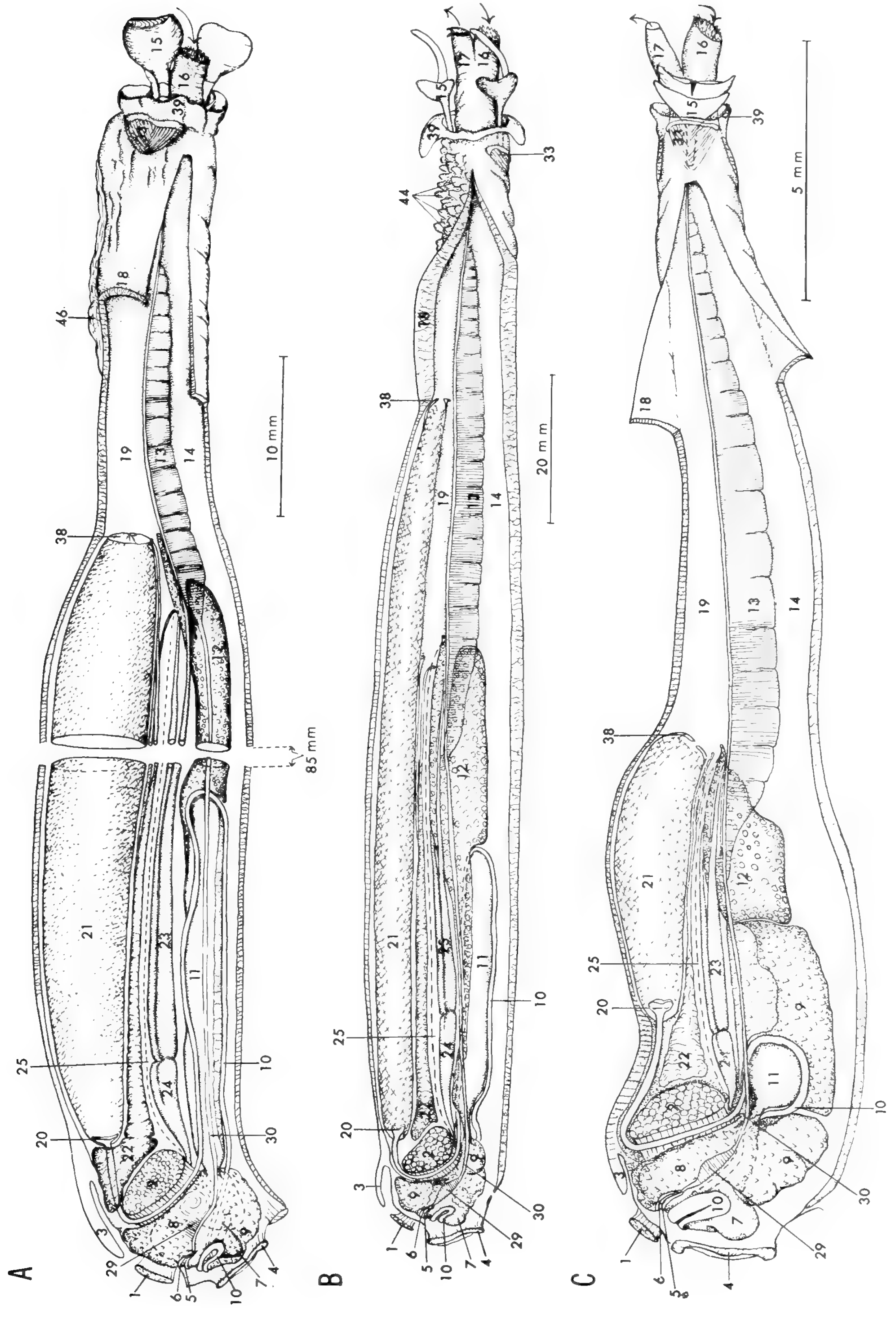


FIGURE 8

glands. In several of the specimens of *dominicensis* examined a double string of large eggs appeared to issue from the gonapore and extend forward over the surface of the visceral mass. However, the specimens were in such poor condition that it was impossible to trace the route of the eggs from the tube. It is possible that they are held in a pouch on the dorsal surface of the gills as in *Teredo* and *Lyrodus*, but this seems unlikely because larval shells have never been found in *Teredothyra* tubes in test boards. Like the valves and the pallets, the larval shells will remain in the tubes even though the soft parts have completely disintegrated.

TEREDORA Bartsch Figs. 5 C, 17, 18

[Synonyms and diagnosis, p. 75]

Species dissected: *malleolus* Turton (2 specimens), *princesae* Sivickis (3 specimens).

This genus is characterized by the extension of the gills without reduction from the siphons to the mouth, and by their characteristic pallets (Figs. 17, 18).

The siphons are united; the incurrent siphon has numerous large papillae. The gills are blade-like and the labial palps free. The stomach is elongate-globular and extends slightly posterior to the posterior adductor muscle, largely on the right side. The digestive glands are large and adhere closely to the surface of the stomach. The caecum is thin walled and doubled upon itself to the right. The intestine opens anteriorly from the midgut on the right side, extends anteriorly to make a loop over the anterior projection of the crystalline style sac, then passes posteriorly to the posterior end of the stomach before crossing to the right side. It makes a simple loop around the caecum, then passes over the posterior adductor muscle and extends free into the anal canal to open into the epibranchial cavity. The feces are produced in pellets. The heart is relatively small; the ventricle is short, broad, and extends under the posterior adductor muscle. The auricles are short, tapering, and a light reddish orange in color. The gonads in all specimens examined were very large and filled with developing ova. They extended over the dorsal surface of the caecum and posteriorly for about two-thirds the length of the animal. The kidney is entirely dorsal to the heart.

UPEROTUS Guettard Pl. 23

[Synonyms and diagnosis, p. 75]

Species dissected: *clavus* Gmelin (1 specimen from nut, Mandapam), *rehderi* Nair (3 specimens from wood, Madras).

Entire specimens of species in this genus were not available at the time the other species described in this report were studied. They were obtained, however, during a trip to India made after the manuscript had been completed, and the following notes were taken while there. A complete description and figures of the anatomy, which is very close to that of *Teredora*, will be published at a later date.

The siphons are united to the tip, the incurrent siphon having numerous small papillae, the excurrent siphon having two large papillae on the dorsal surface. The gills are blade-like, extending from the base of the siphons to the mouth; the labial palps are large and free. The stomach is globular, the caecum doubled on itself to the right. The intestine opens anteriorly from the right side of the midgut, extends forward, makes a loop over the anterior projection of the crystalline style sac, passes down the right side of the stomach and then beneath it to the left side, turns posteriorly, lying in the groove between the two lobes of the doubled caecum, then dorsally over the posterior end of the caecum and anteriorly along the dorsal surface where it is imbedded in the gonads. It emerges from the gonads and goes around the posterior adductor muscle and down the anal canal to open posterior to the pericardium. The feces are formed into pellets. The gonads are dorsal to the caecum but extend posteriorly well beyond it, as shown in Figure 5 for *Teredora*. The heart and kidney are similar to those in *Teredora*. The anatomy of *clavus* and *rehderi* is so similar that it would appear they are only ecologic forms of the same species. (See p. 61.)

PSILOTEREDO Bartsch Fig. 9 A-C

[Synonyms and diagnosis, p. 76]

Species dissected: *megotara* Hanley (2 specimens), *healdi* Bartsch (3 specimens), *senegalensis* Blainville —form *petitii* Récluz (3 specimens).

The characteristic features of this genus are the lack of any closure at the posterior end of the anal canal, reduced gills, and gonads entirely dorsal to the caecum.

The siphons are united for about one-third their length. The labial palps are attached or free at the tips (in *megotara*). The blade-like gills extend anteriorly from the base of the siphons and overlap the posterior end of the caecum for a short distance. The food groove is well developed; the anterior gill has from 10-20 lamellae. The esophagus is short, the stomach globular. A large, crystalline style protrudes anteriorly. The intestine opens from the midgut, anteriorly, on the right side, extends anteriorly to make a loop over the crystalline style sac, then turns posteriorly, lying along the right and ventral surface of the stomach and caecum, loops around the posterior end of the caecum, and then extends anteriorly on the dorsal surface of it.

In the specimens dissected there was considerable variation in the size of the gonads and the caecum, and this appears to be a reflection of the feeding and the stage of development of the gonads. In specimens with greatly swollen gonads the caecum was always empty and, though long, it was flattened and inconspicuous. It lay just dorsal to the intestine, was thin walled and lacked a typhlosole. Specimens of *healdi* were found with and without material in the caecum; the caecum of the specimen of *senegalensis* examined was empty and the gonads were greatly enlarged. In *megotara* the gonads were reduced and the caecum fully packed.

The heart is slightly posterior to the posterior adductor muscle. The ventricle is elongate and wedge shaped; the auricles are tubular, tapering posteriorly, and very light to medium orange or red-brown in color. The aorta extends anteriorly slightly to the right and branches beneath the posterior adductor muscle. The kidney is partially anterior to the heart.

The pallets of young *senegalensis* [*petitii* form, as illustrated by Monod (1952, p. 30)], *healdi*, and *megotara* are quite similar, though the adult pallets appear rather different. The shells of these three species have large dorsal condyles and ligaments, and the apertures of the calcareous tubes are partially divided by longitudinal ridges. Anterior to the ridges, *megotara* has the imbrications in the tube also. These characters add support to other evidence that the species *megotara, senegalensis* and *healdi,* not hitherto considered as being closely related, should be placed in the same genus. The last two species (*senegalensis* and *healdi*) have previously been placed in the genus *Neoteredo* because they are found in brackish water and because the adult pallets are similar to those of *reynei* Bartsch. However, on the basis of anatomical characters, they certainly cannot be placed with *reynei* (see under *Neoteredo*). Though *megotara* is a marine, temperate water species, the inclusion of tropical brackish water forms in *Psiloteredo* does not violate the range of habitat exhibited by species in other genera.

TEREDO Linnaeus Fig. 11 A

[Synonyms and diagnosis, p. 76]

Species dissected: *navalis* Linnaeus (1 specimen), *furcifera* von Martens (2 specimens), *poculifer* Iredale (2 specimens), *clappi* Bartsch (2 specimens), *fulleri* Clapp (1 specimen).

Species in this genus are characterized by retaining the young to the veliger stage, and by having pallets which are largely calcareous.

The siphons are separate. The gills are blade-like to U-shaped and extend anteriorly from the base of the siphons to about midway on the visceral mass. The food groove and the anterior gill are well developed. The labial palps are evident as prominent folds above and below the mouth. The esophagus is short; the stomach is very elongate, extending well beyond the posterior adductor muscle. The digestive glands are mainly on the right side of the stomach. The caecum is large, cylindrical, and has a large typhlosole. The intestine opens from the midgut on the right side of the stomach, extends forward a short distance and loops upon itself (but not far enough forward to loop over the anterior projection of the crystalline style sac), or immediately turns posteriorly to pass along the ventral side of the elongate stomach, crosses beneath it to the left side, meanders posteriorly along the ventral left side of the posterior portion of the stomach and the caecum, turns dorsally around it and then anteriorly along the dorsal surface of the caecum and around the posterior adductor muscle to open into the anal canal. The anal canal is open posteriorly; the feces are formed into pellets. The heart ranges from about an eighth to a fifth the length of the animal and is located dorsal to the caecum and posterior to the elongate stomach. The ventricle is muscular, elongate, and slightly lobed posteriorly; the auricles are tubular, slightly tapering posteriorly and not pigmented. The main body of the kidney is anterior and dorsal to the heart. The gonads are dorsal to the caecum and extend around the posterior end of the pericardium. The young are retained until the veliger stage in the brood pouch which extends along the dorsal surface of the gills and is formed by the fusion of adjacent gill filaments.

For a detailed description and figures of the anatomy of *Teredo navalis* Linnaeus see Lazier (1924) or Hill and Kofoid (1927).

LYRODUS Gould Figs. 20, 21

[Synonyms and diagnosis, p. 78]

Species dissected: *pedicellatus* Quatrefages (3 specimens), *takanoshimensis* Roch (1 specimen), *medilobata* Edmondson (2 specimens), *massa* Lamy (3 specimens).

On the basis of the species studied, the anatomy of *Lyrodus* is similar to that of *Teredo*. The only pronounced difference between the two genera is in the structure of the pallets. In *Lyrodus* they are composed of a calcareous base with a large periostracal cap (Fig. 20), while in *Teredo* they are almost entirely calcareous. The size and arrangement of the brood pouches appear to vary with the species but further work is needed on this. Though *massa* has pallets somewhat similar to *Teredothyra,* it is placed in *Lyrodus* because it retains its young to the veliger stage.

NOTOTEREDO Bartsch Figs. 10, 13 D, 19 A

[Synonyms and diagnosis, p. 78]

Species dissected: *norvagica* Spengler (1 specimen), *edax* Hedley (2 specimens), *knoxi* Bartsch (2 specimens).

The characteristic features of this genus are the paddle-like but segmented pallets, the greatly lengthened intestine, and the large free labial palps.

The siphons are united for about one-half their length; the labial palps are large and free. The broad, flattened gills extend from near the base of the siphons, anteriorly, to overlap the gonads for a short distance; they have a well-developed food groove, and an anterior gill of 10 or more filaments. The esophagus is short, and the stomach globular with a large digestive gland on the dorsal surface. The caecum is large and mostly dorsal to the digestive glands which surround it. The digestive glands are of two types (one greenish brown and the other tan) and they are intermixed, giving the visceral mass a mottled appearance. The intestine is greatly lengthened, opening from the midgut on the right side of the stomach and passing anteriorly to make a loop over the anterior projection of the crystalline style sac, then extending posteriorly to about midway on the caecum before crossing to the left side. On the left side and at the posterior end of the caecum, the loops of the intestine are numerous, particularly in *norvagica*. The intestine finally meanders anteriorly across the dorsal surface of the caecum and digestive glands, passes around and over the posterior adductor muscle, and opens into the anal canal which is open posteriorly. The feces are produced in pellets. The gonads are largely posterior to the caecum. The relatively short heart is located dorsal to the gonads and has a subquadrangular ventricle which is thin walled but has internal crossed muscle fibers. The auricles are tubular, short, tapering, and are orange-yellow in color. The kidneys are large, with the main body anterior and dorsal to the heart.

SPATHOTEREDO Moll — Fig. 11 B

[Synonyms and diagnosis, p. 78]

Species dissected: *spatha* (Jeffreys) (2 specimens), *obtusa* (Sivickis) (2 specimens).

The characteristic features are the medial position of the heart, the broad thin "aorta," and the pallets which are segmentally produced and have a band of periostracum around the base of the blade.

The siphons are united except at the tip. The gills are narrowly to broadly U-shaped. The food groove is well developed. The anterior gill has about 20 lamellae. The digestive system is similar to that in the genus *Nausitora*, but the stomach does not appear to be quite as elongate, the spiral typhlosole of the intestine is more prominent, and a large digestive gland covers the anterior one-third of the caecum. The heart is centrally located, dorsal to the caecum and largely anterior to the gills. The ventricle is long and deeply lobed posteriorly; the auricles are long, tapering, and a light tan in color. Immediately anterior to the ventricle, the aorta expands into a broad, thin-walled vessel which adheres closely to the surface of the gonads and extends forward for some distance before sending off small branches which penetrate the visceral mass. The gonads are dorsal and mainly posterior to the caecum. The intestine loops around the posterior end of the gonads. The main body of the kidney is anterior to the heart.

NAUSITORA Wright — Figs. 11 C, 12

[Synonyms and diagnosis, p. 78]

Species dissected: *dunlopei* Wright (5 specimens), *hedleyi* Schepman (3 specimens), *fusticula* (Jeffreys) (1 specimen).

The elongate pallets with distinct but fused segments, the posterior location of the heart, and the broad aorta characterize this genus.

The siphons are united for about one-half to three-fourths their length; the incurrent siphon may have small papillae surrounding the aperture or long tentacular-like processes (Fig. 12). The gills are short, one-fourth to one-third the length of the animal, broadly U-shaped to flattened. The food groove is weak except in *fusticula;* the anterior gill is composed of 6 to 10 lamellae. The labial palps are evident as low

FIGURE 9

A-B. Entire animal of ***Psiloteredo healdi*** (Bartsch), from Toevlucht, 40 km up Surinam River, Surinam.
A, Anterior half; B, posterior half.
C. ***Psiloteredo megotara*** (Hanley), from Duxbury, Massachusetts.
D. *Psiloteredo senegalensis* (*petitii* form), from Abidjan, Ivory Coast.

Key to Numbers

1. Anterior adductor muscle
2. Posterior adductor muscle
3. Cephalic hood
4. Foot
5. Mouth
6. Labial palps (free at the ends in *megotara*)
7. Crystalline style sac
8. Stomach (partially covered by digestive glands)
9. Digestive glands
10. Intestine
11. Caecum
12. Gonads (all dorsal to the caecum)
13. Gill
14. Infrabranchial cavity
15. Pallet
16. Incurrent siphon
17. Excurrent siphon
18. Mantle
19. Epibranchial cavity
20. Anus
21. Anal canal
22. Kidney
23. Auricles
24. Ventricle
25. Pericardial cavity
26. Visceral ganglion
29. Anterior gill
30. Food groove
33. Protractor muscle of pallet
34. Ventral adductor muscle (a slight thickening in the mantle edge)
39. Mantle collar

ridges. The elongate stomach extends well beyond the posterior adductor muscle; the caecum is greatly enlarged except in *fusticula*. The midgut opens anteriorly from the posterior end of the right side of the stomach. The intestine, leaving the anterior end of the midgut, turns posteriorly, passes along the ventral surface of the caecum, and then extends dorsally around the caecum and over the posterior adductor muscle. The gonads extend over the dorsal surface of the caecum and cover the intestine, except in *fusticula* where the caecum is reduced, and the main portion of the gonads are posterior to it. The heart is short and is located in the posterior one-third of the animal at the posterior end of the gonads and dorsal to the gills. The ventricle is broad and lobed posteriorly; the auricles are light to dark brown, relatively short, broad, and rapidly tapering posteriorly. As in *Spathoteredo*, the aorta expands into a wide thin-walled vessel which covers the dorsal surface of the gonads and extends anteriorly for some distance

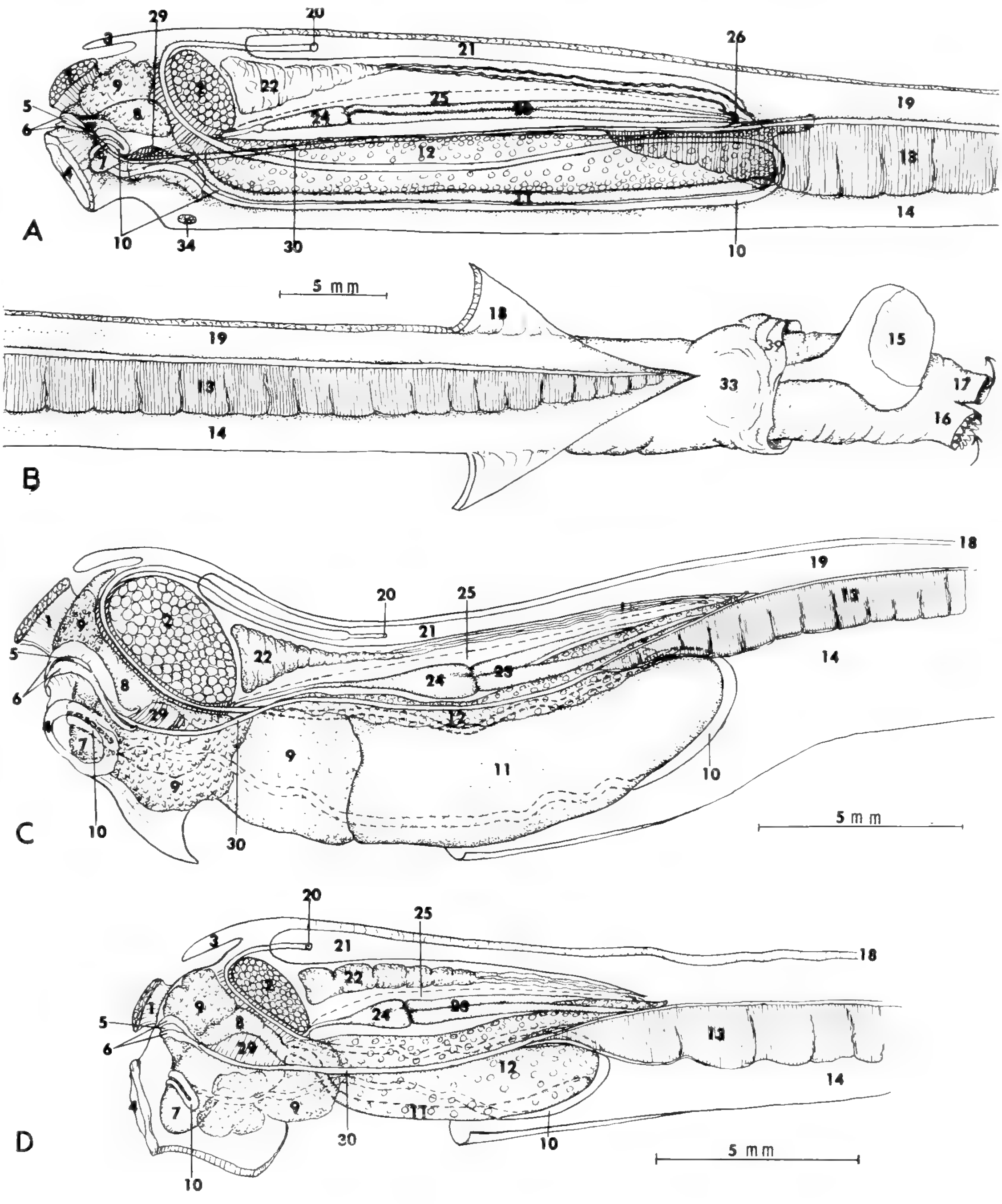


FIGURE 9

before branching. The kidney is extremely long, the main body situated immediately posterior to the posterior adductor muscle.

Moll (1952) created the subgenus *Nausitorella* for *fusticulus* Jeffreys on the basis of the calcareous incrustation on the pallets. This character is also found in other *Nausitora* and so is not a valid basis for separation. However, when more material has been studied, the subgenus *Nausitorella* may prove to be valid on the basis of the anatomical differences noted above.

BANKIA Gray Figs. 13 E-F, 19 B-C, 22-24

[Synonyms and diagnosis, p. 79]

Species dissected: *gouldi* Bartsch (2 specimens), *setacea* Tryon (2 specimens), *campanellata* Moll and Roch (1 specimen), *australis* Calman (1 specimen).

The anatomy of *Xylotrya* [=*Bankia*] *gouldi* Bartsch has been described and illustrated by Sigerfoos (1908), and Nair (1957) did the same for *Bankia indica* Nair [=*B. carinata* (Gray)]. The species mentioned above, which were dissected for this study, agree with the work of Sigerfoos and Nair, and they are all similar to *Teredo* except that the young are not retained within the parent. Therefore an illustration is not given here.

Species in *Bankia* are readily recognized by their "cone-in-cone" type pallets (Fig. 24).

The siphons are separate. The gills are broadly U-shaped to flattened, and extend from the base of the siphons anteriorly to overlap the visceral mass for about one-third its length. The stomach is elongate, the caecum large, and the gonads cover the dorsal surface. The heart is located anteriorly, dorsal to the caecum and largely anterior to the gills. The ventricle is long, narrow, and lobed posteriorly; the auricles are tubular and unpigmented. The variation exhibited by the species dissected to date is considerable, though within the range of a genus. Much additional work is necessary before the many subgenera described on the basis of the pallets can be evaluated.

Functional Morphology and Physiology

Several questions posed by Sellius and other early authors still are incompletely answered. Among the more basic ones are: How long do shipworms live? Do they continue to grow throughout life? Is wood so essential to their diet that they die as soon as it becomes impossible for them to extend their burrows? What are the factors which control the settling and initial penetration of the wood by the larvae? How long can larval life be extended and does a delay always result in reduced ability to penetrate?

The marked differences in anatomy described in the previous section emphasize the fact that there is no one answer to any of these questions. Probably no other single family in the Mollusca exhibits more striking variations in the morphology of the soft parts or presents so many unique features. Consequently, it is obvious that these animals must also differ physiologically, but very little is known concerning this.

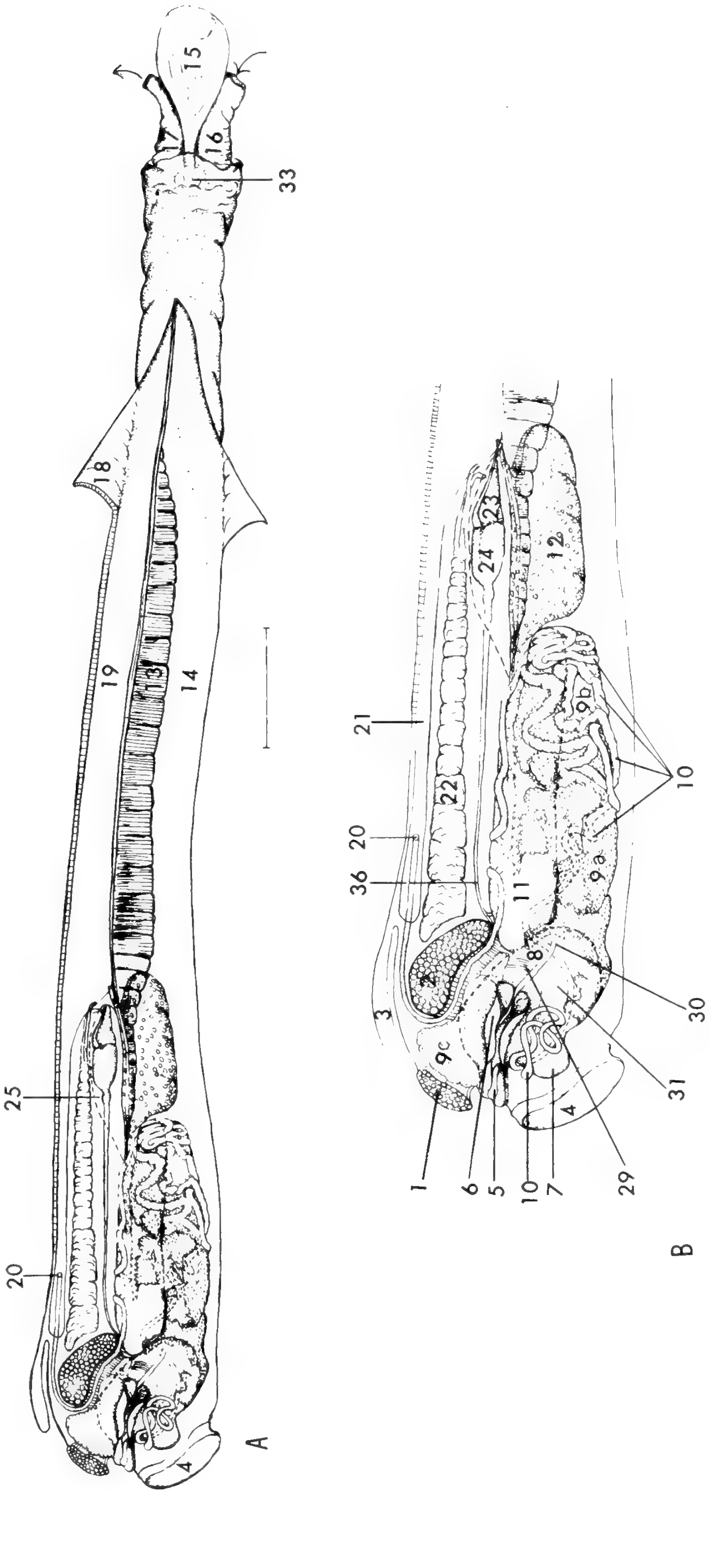
Most of the physiological work in the Teredinidae has been confined to a few species and has been concerned mainly with the method of boring, factors affecting the settlement of the larvae, the range of tolerance of the young and adults to changes in temperature and salinity, the presence of a cellulase and the utilization of wood as food, respiration, oxygen requirements, glycogen storage and glycolosis.

FIGURE 10

A. Entire animal of *Nototeredo norvagica* (Spengler), from Loch Ryan, Scotland.
B. Anterior end enlarged to show detail.

Key to Numbers

1. Anterior adductor muscle
2. Posterior adductor muscle
3. Cephalic hood
4. Foot
5. Mouth
6. Labial palps (large and free at end)
7. Crystalline style sac
8. Stomach
9a-c. Digestive glands
10. Intestine
11. Caecum (largely covered by digestive gland)
12. Gonads
13. Gill
14. Infrabranchial cavity
15. Pallet
16. Incurrent siphon
17. Excurrent siphon
18. Mantle
19. Epibranchial cavity
20. Anus
21. Anal canal
22. Kidney
23. Auricles
24. Ventricle
25. Pericardial cavity
29. Anterior gill
30. Food groove (cut off at point where labeled)
31. Midgut
33. Protractor muscles of pallet
36. Posterior aorta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29
B

FIGURE 10

The species most often used in such experiments are *Teredo navalis* Linnaeus, *T. bartschi* Clapp, *Lyrodus pedicellatus* (Quatrefages), *Bankia gouldi* (Bartsch), *B. setacea* (Tryon) and *B. indica* Nair [=*B. carinata* (Gray)]. The anatomy of all these species is basically similar (except that *Lyrodus* and *Teredo* brood the young), and consequently it is not surprising that the results of experiments using them are also similar. However, differences which are evident serve to emphasize the need for additional research and the danger of making generalized statements for the family as a whole.

Probably the most controversial subject under discussion in recent years is the use of wood as food and the means by which shipworms reduce cellulose. Many papers have been published on this but the arguments still go on.

Harrington (1921), working with extracts made from the 'livers' of *Teredo* [*Nototeredo*] *norvagica* was the first to give experimental proof that teredinids could reduce wood. Dore and Miller (1923) analyzed samples of wood particles ejected by *Teredo navalis* and found they differed in chemical composition from the wood in which the animal was boring. They concluded that "on this basis, it appears that during its passage through the animal's digestive tract the wood has lost about 80% of its cellulose and from 15% to 56% of its hemicellulose." Miller and Boynton (1926) analyzed samples of wood particles taken from the caecum of *Bankia setacea* and found the percentage of the reducing wood sugars to be as high as 3.86%, while in the wood from which the borings came it was only 0.92%. Carrying the investigation further, in 1927 they analyzed various parts of the digestive tract and concluded that the enzyme was produced in the "digestive diverticula attached to the stomach." Greenfield and Lane (1953), working with a small species of *Teredo*, divided the digestive system into two parts and tested homogenates made of the organs: 1) anterior to the caecum and 2) the caecum and posterior to it. They concluded that the reduction of cellulose occurred mainly in the posterior portion of the digestive tract, though they suggested that it was possible that the enzymes or enzyme-producing bodies might have entered the system anteriorly and become concentrated as the gut contents moved posteriorly. Deschamps (1953) stated that he could not separate the cellulase of bacterial origin from that of the animal itself and questioned the presence of an enzyme. According to Nair (1956c) "cellulose splitting seems to take place in steps in two different sites, one extracellularly in the caecum and the other intracellularly in the vacuoles of the digestive diverticula which has a cellobiase powerful

FIGURE 11

A. *Teredo poculifer* Iredale, from Bundabery, Queensland, Australia.
B. *Spathoteredo obtusa* (Sivickis), from Bibundi, Cameroon.
C. *Nausitora dunlopei* Wright, from Chalmer, Queensland, Australia.

In these semidiagrammatic illustrations the detailed structure of the elongate stomach is not shown completely. It has been well illustrated by Lazier (1924) and is generally similar in all these genera.

Key to Numbers

1. Anterior adductor muscle
2. Posterior adductor muscle
3. Cephalic hood
4. Foot
5. Mouth
6. Labial palps
7. Crystalline style sac
8. Stomach
9. Digestive glands
10. Intestine
11. Caecum
12. Gonads
13. Gill
14. Infrabranchial cavity
15. Pallet
16. Incurrent siphon
17. Excurrent siphon
18. Mantle
19. Epibranchial cavity
20. Anus
21. Anal canal (with fecal pellets in A)
22. Kidney
23. Auricles
24. Ventricle
25. Pericardial cavity
29. Anterior gill (not shown in A)
30. Food groove (not shown in A and C)
31. Midgut
32. Young in brood pouch
33. Protractor muscles of the pellets
36. Aorta
39. Mantle collar around siphons and pallets

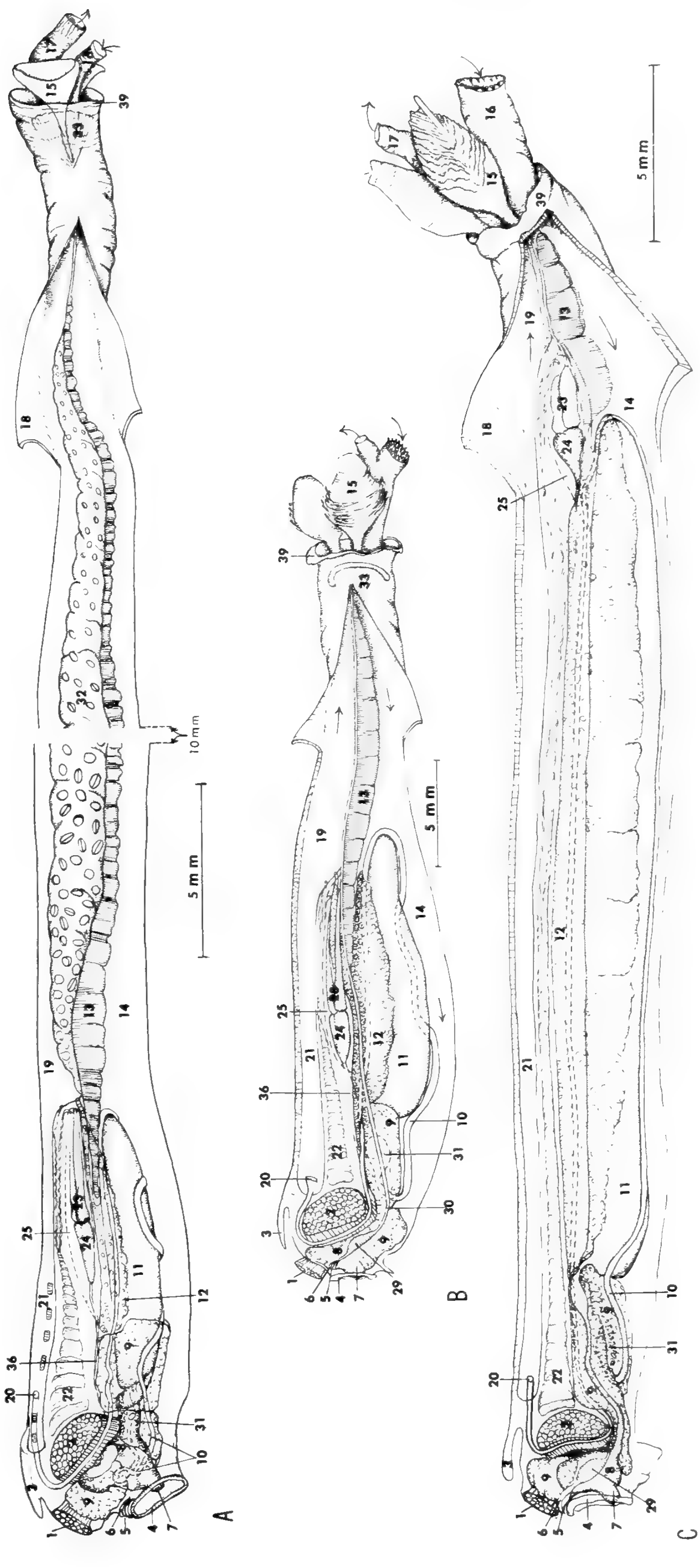


FIGURE 11

enough to complete the digestion before absorption, thereby exploiting to the fullest measure the nutrient resources of the wood." Greenfield (1959) summarized the work done up to that time and concluded that "the experimental data acquired thus far have strongly indicated both cellulolytic activity in shipworms and utilization of the end products of the process." He pointed out that it is as important to determine the site at which the enzyme is produced as it

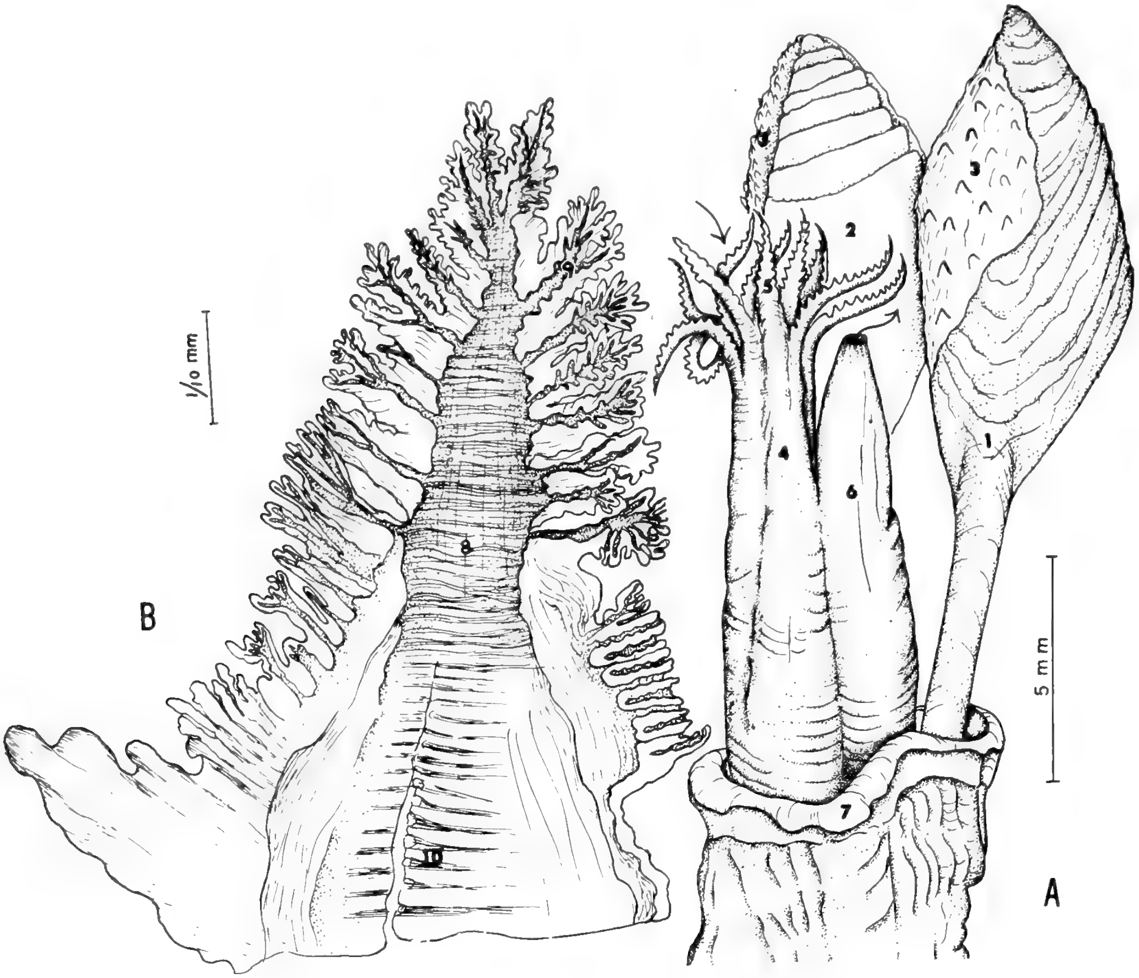


FIGURE 12

Nausitora fusticula (Jeffreys), from Cananéia, southern coast of Estado São Paulo, Brasil, received through the kindness of J. P. Carvalho, Institute of Oceanography, University of São Paulo.

A. Posterior end of animal showing the elaborate incurrent siphon, suggesting a return to filter feeding.

B. Enlargement of a single "tentacle" showing the structure of the inner surface. The channels are apparently ciliated. Histological studies or observation of living material will be necessary to confirm this.

Key to Numbers

1. Outer face of left pallet
2. Inner face of right pallet
3. Papillose, calcareous deposit on pallet
4. Incurrent siphon
5. Muscular tentacle-like structures on siphon
6. Excurrent siphon
7. Mantle collar
8. Main channel in "tentacle" showing longitudinal and horizontal muscular bands
9. Elaborately branched side channel
10. Cut ends of muscle bands

is to purify the enzyme system and analyze its properties. He also suggested that further investigations should include studies on phagocytes and bacteria found in the gut. It might also be well to investigate the presence of bacteria and fungi in the wood itself (at the anterior end of the burrow) and check on the possible reduction of the cellulose before it is ingested by the shipworm.

The entire question needs further investigation, particularly in the light of the work on *Helix pomatia* Linnaeus by Florkin and Lazet (1949). The Helicidae have generally been used as a classic example of cellulase production in invertebrates, but these experiments indicate that symbiotic bacteria are responsible for the reduction of cellulose in these land snails. The results of recent experiments with *Otala lactea* agree with those of Florkin and Lazet. Digestive enzymes in the Mollusca were reviewed by Stone and Morton (1958).

Lane (1955), when discussing the use of wood as food by *Teredo* sp., stated that as long as the borer is alive the burrow is extended by approximately its diameter each week, but if the animal meets some obstacle and there is no possibility of changing direction, it seals off the end of the burrow with a rounded cap (Fig. 1). This he said effectively terminates growth and eventually the life of the animal, since there is no wood available upon which it can feed. This may be true for the species with which Lane was working; however, stenomorphic forms of *Teredo navalis,* found in the slats of lobster pots or in rope in colder New England waters, seem to be in good condition and capable of breeding though further boring is impossible.

Quayle (1959b) observed that in Ladysmith Harbour, British Columbia, the greatest monthly increments of growth of *Bankia setacea* Tryon occurred in April, May and June, and though this might be due to increased water temperature or the relatively greater growth of larger animals, clearly it might also be the result of the increased availability of planktonic food at this period. Becker (1959) reported that he was able to carry *Lyrodus pedicellatus* through four generations in artificial sea water without additional food but was unable to get *Teredo navalis* to reproduce, though the adults lived for about three years. This may be an indication of a difference in food requirements for the successful spawning of young. These observations suggest that the adults of some species may require planktonic food, at least during the breeding period, and some may be capable of surviving on plankton only, as do many other bivalves. This must be the case with *Kuphus* and is probably true of *Teredora* and *Uperotus.* As suggested by Dore and Miller (1923), all species probably require some plankton because of its high protein content, needed for growth, though survival without it is no doubt possible for long periods of time. In fact, Lasker and Lane (1953) showed that in *Teredo bartschi* the wood supplies the carbohydrates and certain of the essential amino acids but that the remaining amino acids essential for maximum growth are obtained from the plankton.

Lane *et al.* (1952), Greenfield (1953), Lane (1955), and others have demonstrated that teredos are capable of storing large amounts of glycogen, particularly in the posterior portion of the mantle, the muscles, gills, and imbedded larvae. The fact that they can utilize it under anaerobic conditions helps explain the ability of many species to survive adverse conditions for long periods of time, sealed in their burrows.

As a result of the anatomical work done for this report, several problems arose concerning the functional morphology and physiology of the mantle-shell, the gills and feeding mechanisms, the digestive system, and the circulatory system. The following discussion is devoted to a comparison of these systems in the various genera and the problems involved.

Mantle/Shell

The earliest studies on the Teredinidae were concerned with boring, and date back to Sellius (1733), the interest clearly stimulated by the destruction of man-made structures. A rasping type of boring accomplished by the valves has been discussed fully by Miller (1924) and is briefly described in the "Introduction to the Family" given here. The method is apparently the same throughout the family except in the genus *Kuphus.*

The nearly smooth, greatly reduced valves of *Kuphus* are tightly bound posteriorly by a strong muscular collar which surrounds the animal (Fig. 6 B). This suggests that the valves are used as chisels rather than as rasps; the contraction of the collar forces them forward, the front edges cutting into the substrate. This also suggests that the reduced posterior adductor muscle functions to spread the valves anteriorly and to prevent the slipping of the valves upon each other when they are pushed forward by the contraction of the muscular collar.

The structure and function of the mantle in this family are virtually unknown. Sigerfoos (1908) described the mantle of *Bankia gouldi,* Nair (1957b) that of *Bankia indica,* and Bade, Masurekar and Bal (1961) illustrated and described that of *Bankia minima* (cf. *B. australis* Calman). Anteriorly, the mantle secretes the valves and is similar to that in the pholads, but posterior to the valves, particularly on the dorsal and ventral surfaces, it is often thickened. This is especially true in *Kuphus* (Fig. 7), though it is also thicker in *Neoteredo, Bactronophorus* and *Nausitora* than in other genera.

The structure of the mantle, except for the thickness of the middle layer, is similar throughout the family. It is composed of thin outer and inner, longitudinal and circular muscle layers, separated by a layer of transverse, widely spaced, irregularly branching fibers, the interspaces being filled with a milky suspension. The solid phase of this suspension is white and granular. Sigerfoos (1908) stated that the granules were soluble in water but insoluble in

FIGURE 13

Semidiagrammatic drawings of the musculature of the siphons and pallets of three genera to show basic similarity within the family, and in E and F to show variation within the genus.

A-C. *Neoteredo reynei* (Bartsch), from mouth of Nickerie River, N of Nieuw Nickerie, District of Nickerie, Surinam.

- A. Ventral view of posterior end of animal before dissection to show the ends of the muscles which attach to the tube. The dorsal lappets have been spread to the sides.
- B. View of left side of posterior end with a section of the mantle cut out to show the muscles of the pallets.
- C. Ventral view of posterior end opened by a median longitudinal incision and spread flat. The retractor muscles of the siphon (9) insert medially and had to be cut in order to open the animal and lay out the three retractor muscles of the pallets. The pallet collar was also removed to show accessory pallet retractor muscles (5a). These are not found in the other genera examined.
- D. A poorly preserved specimen of *Nototeredo edax* (Hedley), from Mombasa, Kenya, showing the end of the calcareous tube with the concamerations which are added, as needed, to allow the pallets to fit snugly. The siphonal retractor (9) which has pulled away from the side of the tube, is similar to that in *Bankia gouldi* (Bartsch).
- E. *Bankia gouldi* (Bartsch), from Gulfport, Mississippi. Ventral view of posterior end of animal (dissected as in C) showing the lateral insertions of the siphonal retractor muscles, the similarity of the pallet retractors to those in *reynei* and *setacea,* and the large protractor muscles of the pallets.
- F. *Bankia setacea* (Tryon), from Street Car Reef, Redondo, Palos Verdes, Los Angeles County, California. Dissection as in C and E showing the paired, but more centrally inserted, siphonal retractor muscles and the smaller pallet protractors.

Key to Numbers

1. Incurrent siphon
2. Excurrent siphon
3. Pallets
4. Mantle collar surrounding pallets and siphons
5. Protractor muscles of the pallets

5a. Accessary protractor muscles of the pallets

6. Attachment area of the protractor muscles of the pallets

7a. Anterior retractor muscle of the pallet

7b. Median retractor muscle of the pallet

7c. Posterior retractor muscle of the pallet

8. Adductor muscles of pallets
9. Retractor muscles of siphons
10. Attachment area of retractor muscles of siphons
11. Gills
12. Dorsal lappets
13. Mantle
14. Pallet collar
15. Pallet sheath
16. Calcareous tube
17. Concamerations at opening of tube
18. Cut end of siphon

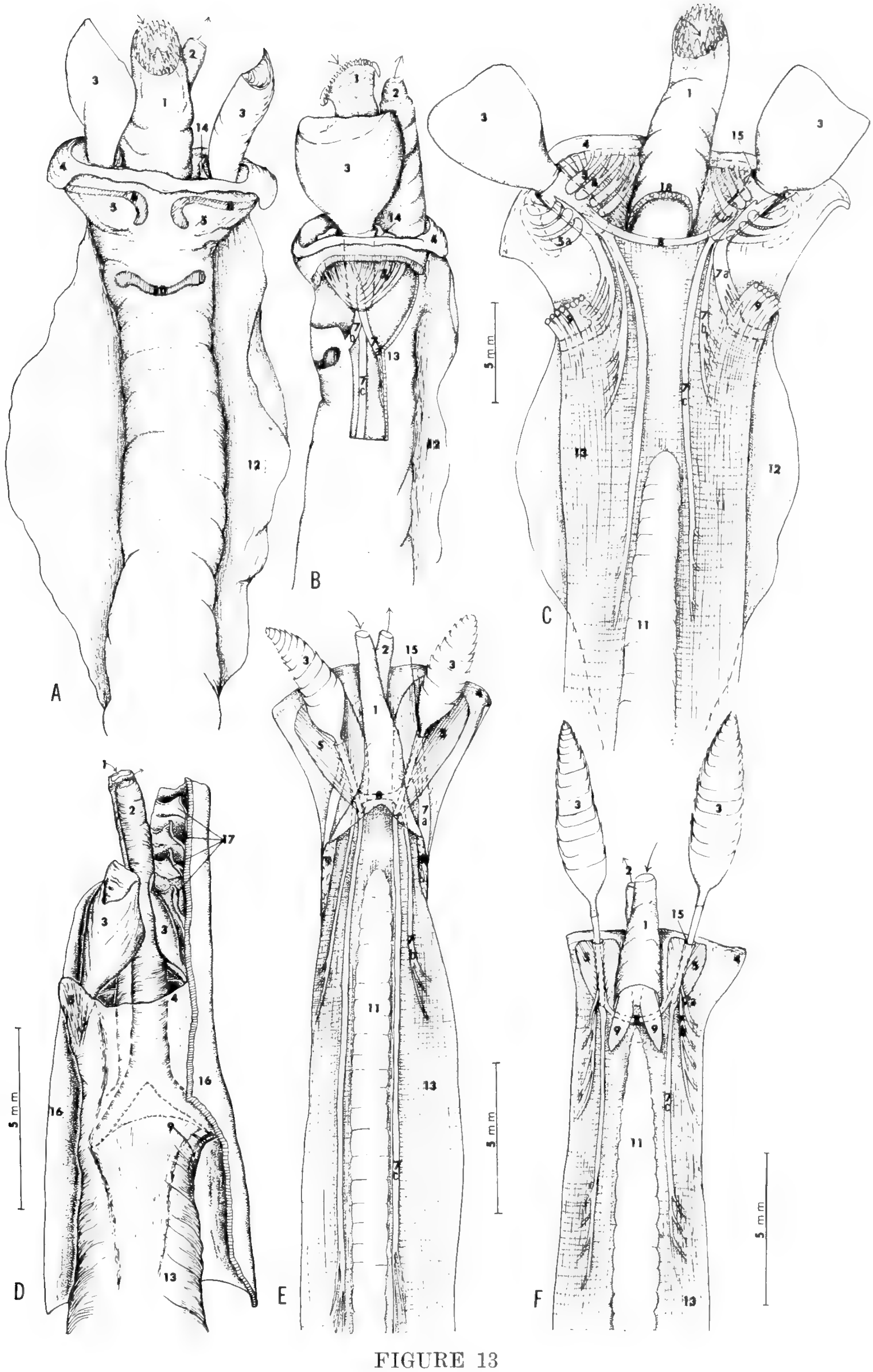


FIGURE 13

TABLE 1. Tabulation of the more important anatomical features of the species dissected. The data given here are based on a few specimens of each species and some were rather poorly preserved. Consequently changes will no doubt be necessary when living material is studied.

	Kuphus polythalamia	Bactronophorus thoracites	Neoteredo reynei	Dicyathifer manni	Teredothyra matocotana	dominicensis	Teredora princesae	malleolus	Uperotus clavus	rehderi	Psiloteredo megotara	healdi	senegalensis form petitii	Teredo furcifera	fulleri	clappi	navalis
Siphons																	
United (except at tip)		x	x				x	x	x	x		x	x				
Partially separate											x						
Separate	x			x	x	x								x	x	x	x
Gills																	
Blade-like (V or U shaped)							x	x	x	x	x		x	x	x	x	x
Broad and flat	x	x	x	x	x	x						x					
Branchial Groove																	
Well developed	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x
Weak			x														
Labial Palps																	
Attached	x	x	x	x	x	x						x	x	x	x	x	x
Free at end							x	x	x	x	x						
Stomach																	
Globular	x	x	x	x	x	x			x	x	x	x					
Globular-elongate							x	x					x				
Elongate														x	x	x	x
Caecum																	
Small				x	x												
Moderate		x	x			x	x	x	x	x	x	x	x	x	x	x	x
Large																	
Intestine																	
Looping over style sac		x	x	x	x	x	x	x	x	x	x	x	x				
Not looping over style sac														x	x	x	x
Anal Canal																	
Open							x	x	x	x	x	x	x	x	x	x	x
Closed		x	x	x	x	x											
Heart																	
Anterior		x	x	x	x	x	x	x	x	x	x	x	x		x		
Median	x													x		x	x
Posterior																	
Auricles																	
Heavily pigmented	x	x	x	x								x					
Lightly pigmented					x								x				
Not pigmented							x	x	x	x	x			x	x	x	x
Young																	
Fertilization external											x						
Eggs held					x?												
Larviparous														x	x	x	x
Heart/Body Length	.3	.4	.8	.5	.37		.17	.21	.22	.19	.1	.4	.3	.1	.2	.2	.14
Gill/Body Length	.8	.4	.1	.4	.46		.9	.9	.9	.9	.6	.4	.4	.6	.7	.6	.54
Visceral Mass/Body Length	.1	.4	.8	.6	.37		.4	.56	.5	.56	.3	.4	.4	.3	.5	.3	.3
Heart/Gill Length	.4	.8	7.0	1.2	.8		.17	.25	.2	.19	.6	.9	.7	.2	.4	.3	.3

TABLE 1 (*Continued*)

	Toredo poculifer	Lyrodus massa	pedicellatus	takanoshimensis	medilobata	Nototeredo norvagica	knoxi	edax	Spathoteredo spatha	obtusa	Nausitora fusticula	hedleyi	dunlopei	Bankia gouldi	australis	setacea	campanellata
Siphons																	
United (except at tip)								x		x							
Partially separate						x	x		x		x	x	x		x	x	
Separate	x	x	x	x	x									x			x
Gills																	
Blade-like (V or U shaped)	x	x	x	x	x				x	x		x	x	x	x	x	x
Broad and flat						x	x	x			x						
Branchial Groove																	
Well developed	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x
Weak												x	x				
Labial Palps																	
Attached	x	x	x	x	x				x	x	x	x	x	x	x	x	x
Free at end						x	x	x									
Stomach																	
Globular						x	x	x									
Globular-elongate																	
Elongate	x	x	x	x	x				x	x	x	x	x	x	x	x	x
Caecum																	
Small							x										
Moderate	x	x	x	x	x	x		x	x	x	x			x	x	x	x
Large												x	x				
Intestine																	
Looping over style sac						x	x										
Not looping over style sac	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x
Anal Canal																	
Open	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Closed																	
Heart																	
Anterior			x	x	x									x	x	x	x
Median	x	x				x	x	x	x	x							
Posterior											x	x	x				
Auricles																	
Heavily pigmented										x			x				
Lightly pigmented						x			x		x	x					
Not pigmented	x	x	x	x	x		x	x						x	x	x	x
Young																	
Fertilization external						x							x	x	x	x	
Eggs held																	
Larviparous	x	x	x	x	x												
Heart/Body Length	.12	.15	.2	.14	.2	.08		.17	.1	.1	.1	.2	.1	.2	.17	.4	.31
Gill/Body Length	.66	.6	.7	.5	.5	4		.41	.4	.5	.3	.2	.2	.6	.59	.4	.31
Visceral Mass/Body Length	.2	.4	.3	.4	.5	.3		.45	.1	.24	.6	.5	.7	.5	.47	.5	.48
Heart/Gill Length	.2	.2	.5	.4	.5	2		.42	.3	.3	.3	.7	.7	.4	.3	1.04	1.0

alcohol and acid, but at the same time suggested that "they are probably to be regarded as constituting a reserve of calcium containing material of some sort for rapid use, as occasion may require, in the formation and thickening of the calcareous tube which lines the burrow." Nair (1957b) believed it to be glycogen, stating that the material turns "russet when treated with iodine."

Carefully washed samples of this material were tested by Dr. B. M. Twarog of the Biological Laboratories, Harvard University, and it was found that the granules were insoluble in both hot and cold alcohol, soluble in acid (0.1 N. HCl), in base (0.1 N. NaOH), and in distilled water. They did not change color when treated with iodine. This material does not appear to be glycogen because it is insoluble in hot alcohol and, in addition, does not change color in iodine. A few rare forms of glycogen do not give a positive test when treated with iodine and a check should be made for these. On prolonged heating, a carbon residue remains, suggesting that it is, at least in part, organic. Further work using material taken from living specimens is essential.

In all species having a thick mantle there were also clusters of red-brown, berry-like structures on the transverse fibers of the middle layers posterior to the posterior adductor muscle. Is this a reserve of glycogen? Further research on the structure and function of the mantle is certainly needed.

It is interesting to note that *Kuphus, Bactronophorus, Neoteredo* and *Nausitora,* genera with species generally living in mangrove and brackish water areas, all have thickened mantles. This suggests the influence of some common factor in the environment, because these forms are not closely related systematically.

Gills: Respiration and Feeding Mechanisms

As the gills in most bivalves function in both feeding and respiration, the two will be discussed together here. The basic microscopic structure of the gills of all teredines is typically eulamellibranch, but the length and shape (when seen in a cross-section through the posterior end of the animal) vary greatly. In *Teredora* and *Uperotus* the gills extend the entire length of the animal from the base of the siphons to the mouth, and in cross-section are typically blade- or ribbon-like with a well-developed food groove. In all other genera of the Teredinidae, including *Kuphus,* the length of the gills is reduced, the main portion extending from the siphonal area anterior to and usually overlapping the posterior end of the visceral mass to some extent. From this point the food grooves, or branchial or oral grooves as they are variously called, continue forward along the sides of the visceral mass and connect with the anterior portions of the gills and the mouth. The anterior gills vary greatly in size, and in some species appear to be absent, though this should be checked on living or well-preserved material. That portion of the gill to the side of the visceral mass is always more or less blade-like, though there is a great range in the length of the lamellae. Posterior to the visceral mass the gills vary greatly in shape, and it is this portion which is compared here.

Only the inner demibranch of the typical eulamellibranch gill is present, though a vestige of the outer demibranch can be found in some species. Sigerfoos (1908) illustrated the lamellae of *Bankia gouldi* as forming a V with the ciliated food groove at the base of the V (Fig. 14 A, B), and the outer or descending limb fused to the side of the circular tube formed by the mantle. Posterior to the visceral mass, the inner or ascending limb is continuous with that of the opposite gill. Thus the posterior end of the animal is divided into a dorsal or epibranchial cavity and a ventral, infrabranchial cavity by the two long V-shaped wedges.

Nair (1957b) stated that in *Bankia indica* the descending arms of the "lamellae of the demibranchs pass laterally first and then vertically downwards," while Ridewood (1903) described the gills of *Teredo navalis* as follows: "the direct lamellae descends, but the reflected lamellae pass horizontally inward and unite with one another in the median line. This junction consists of a large mass of rather firm tissue traversed by a longitudinal blood cavity. The filaments have plate-like interlamellar extensions of considerable size [Fig. 14 D] recalling those of *Lucina.* The inner edges of the extensions, which, in the absence of an interlamellar cavity, form the floor of the suprabranchial chamber, are swollen, and have large ciliated epithelial cells. The filaments proper are quite normal.''

Even greater differences are found when other genera are studied. For example, in *Bactronophorus,* the descending limb of a lamella is nearly straight, while the ascending limb extends laterally before bending upward, and thus forms a U-shaped lamella with a lateral food groove at the base of the descending limb. In *Neoteredo* the gills are so broad and flattened that they form little more than a septum between the infra- and epibranchial cavities. The general shape and length of the gills for each of the species dissected is given in the anatomical section.

The ability to feed by filtering plankton from sea water probably decreases with reduction in length of the gill and the size of the gill lamellae. It is quite likely that *Neoteredo reynei* and *Nausitora dunlopei,* which have relatively short gills with truncate lamellae, depend largely on wood for food, while *Teredora,* with very long gills and long lamellae, may feed almost entirely on plankton. *Nausitora fusticula* has short truncate gills, but this species appears to have secondarily returned to filter-feeding to some degree by adding the filtering mechanism to the end of the incurrent siphon (Fig. 12), a method unique among the bivalves so far as I can determine. In some species of teredinids the reduction of the gill surface has reached such an extreme as to appear to limit respiration. Either most gas exchange takes place through the mantle, or the animals depend to a large extent on glycolysis. Manwell (1963) reported high concentrations of myoglobin [muscle hemoglobin] in the adductor muscles of *Teredo* and *Bankia.* It is currently thought that this pigment facilitates the transfer of oxygen from the hemolymph to the site at which it is utilized in the tissue.

Molluscan muscles containing myoglobin are pink or red in living specimens (a light tan to dark brown in preserved material) depending on the concentration. It is particularly evident in the dark red color of the active radular muscles of many gastropods. In all teredinids dissected for this report the posterior adductor muscles were a medium to dark brown. It is possible that this is, to some extent, an adaptation to low oxygen tension in the environment but it more likely reflects the tremendous activity of the adductor muscles when the animal is boring.

Digestive System

Three general types of stomachs are present in the Teredinidae:

Type 1, found in *Kuphus,* is entirely unique. The esophagus passes through the muscular collar, and the stomach is located at the posterior end of the visceral mass. It has no accessory pouches or caeca except the large crystalline style sac. The digestive glands adhere closely to the surface of the stomach but do not appear to have any lumen into which the contents of the stomach may pass.

Type 2, found in *Bactronophorus, Dicyathifer, Neoteredo, Nototeredo, Psiloteredo, Teredora,* and *Teredothyra,* is globular, and located anterior to the posterior adductor muscle. This type is similar to that found in some pholads, as described by Purchon (1960). The stomach has two or more pouches (called caeca by Purchon), in addition to the crystalline style sac and the posterior wood-storing caecum (called appendix by Purchon). The intestine extends anteriorly and dorsally from the midgut and loops over the crystalline style sac.

Type 3 is elongate, and is found in the genera *Teredo, Lyrodus, Spathoteredo, Nausitora* and *Bankia.* It was described and figured by Lazier (1924). The greatly elongated stomach extends well beyond the posterior adductor muscle; the intestine, on leaving the midgut, immediately turns posteriorly and ventrally in most species, and never extends anteriorly beyond the ventral condyle. This elongation of the stomach is probably a specialization for increased efficiency in the digestion of wood. If this is so, species in other genera, such as *Dicyathifer, Teredora* or *Psiloteredo* should show greater dependence upon plankton as a source of food.

The size and internal structure of the caecum is probably a direct reflection of the extent to which wood is utilized as food. The caecum is lacking in *Kuphus,* is only about 0.06 the length of the animal in *Dicyathifer manni* (Fig. 7 C), 0.6 the total length of *Nausitora dunlopei* (Fig. 11 C), but only 0.3 the total length of *Nausitora fusticula,* another indication that this last species has probably returned to filter-feeding (Fig. 12). It is realized, of course, that these proportions are based on limited observations and that they vary with age, type of preservation, and probably with ecological conditions. The presence of the large typhlosole in the caecum of *Teredo, Bankia* and *Nausitora* is probably another indication of increased efficiency in the utilization of wood (Fig. 14 A).

The intestine may vary in length from that of *Teredothyra matocotana* which makes a simple loop around the small caecum (Fig. 8 C) to that of *Nototeredo norvagica*. In the latter species the numerous convolutions of the intestine cover the digestive glands and the caecum (Fig. 10). Species which produce fecal pellets have long intestines, usually with a well developed typhlosole, probably a reflection of the more complete utilization of wood and hence a reduction in the amount of waste. In *Lyrodus* and *Teredo* the production of fecal pellets may also have arisen in response to the fertilization of the eggs in the epibranchial cavity and hence the necessity of having a milieu in which the sperm can function successfully. Fertilization must occur in the epibranchial cavity of *Lyrodus, Teredo*, and species of *Bankia* which apparently have direct fertilization, as suggested by Clapp (Fig. 14 E-G). Adaptations of the dorsal surface of the gills to form brood pouches, and the habit of retaining the young, probably developed in *Lyrodus* and *Teredo* concomitantly with fertilization in the epibranchial cavity and the production of fecal pellets.

In most genera the anus is simple and is located in the anterior end of the open anal canal. Just how the fecal material is carried down the long anal canal to the epibranchial cavity is not understood and requires investigation.

In *Dicyathifer, Bactronophorus, Neoteredo* and *Teredothyra*, the anal opening is expanded or funnel-shaped and often muscular, and opens in the normal position into a closed anal canal or "posterior intestine." In these genera the opening at the posterior end of the anal canal is controlled by muscular folds or, as in *Neoteredo reynei* (Fig. 8 A), by a well-developed sphincter muscle. As a result, the waste products, consisting of a loose mass of wood fragments, minute sand grains and diatom tests, are retained within the canal, often swelling it

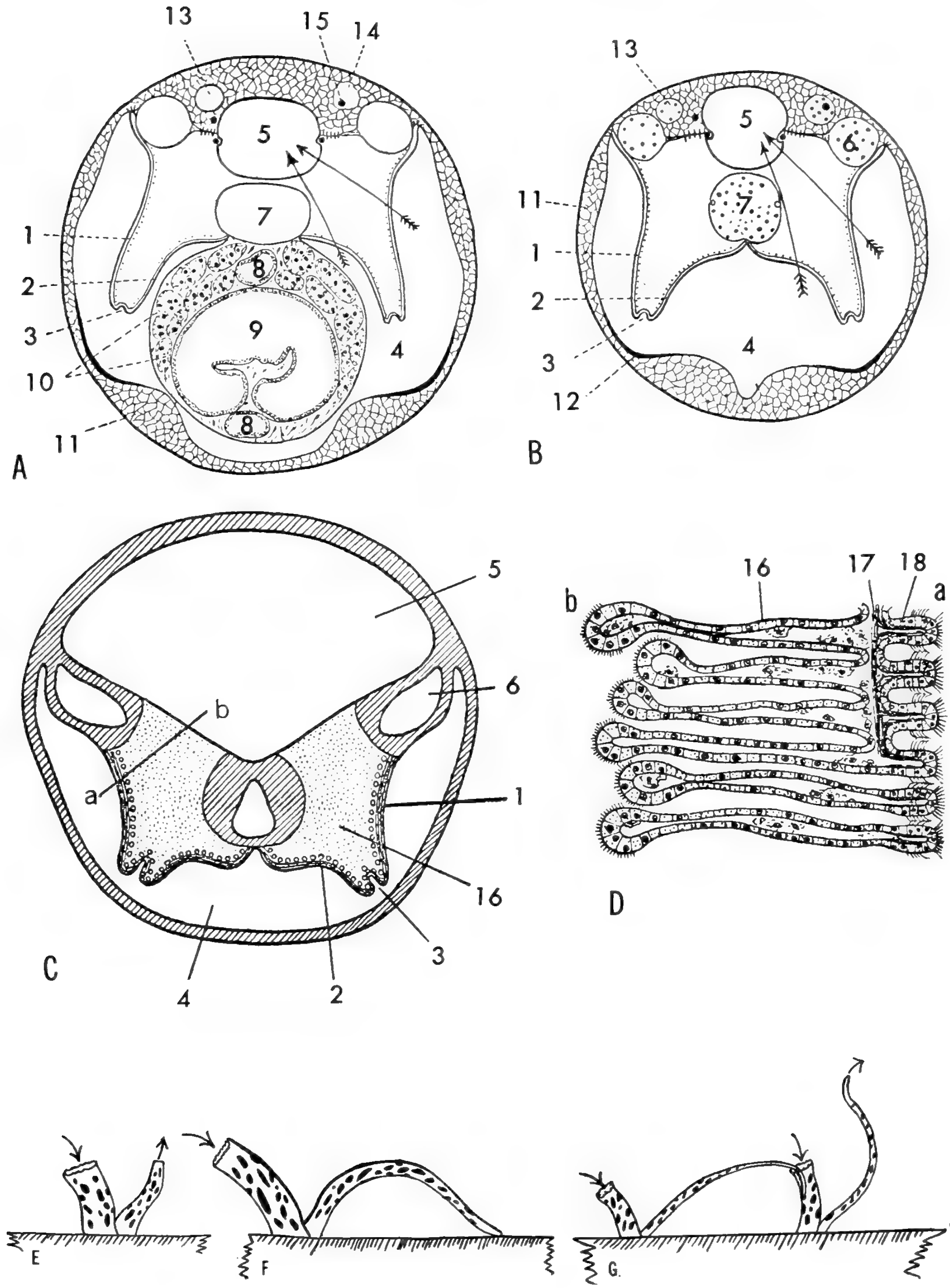
FIGURE 14

A-D. The gills of the Teredinidae
- A. *Bankia gouldi* (Bartsch). Section near the posterior end of the visceral mass showing the extension of the gills ventrally over the sides of the visceral mass. The arrows indicate the path of the water from the infrabranchial to the epibranchial cavity (from Sigerfoos, 1908, pl. 15, fig. 31).
- B. *Bankia gouldi* (Bartsch). Section posterior to the visceral mass showing the major blood vessels (with corpuscles indicated as black dots) (from Sigerfoos, 1908, pl. 15, fig. 32).
- C. *Teredo navalis* Linnaeus. Section posterior to the visceral mass (from Ridewood, 1903, p. 260, fig. A).
- D. *Teredo navalis* Linnaeus. Section of descending lamella taken in the direction a-b of C (from Ridewood, 1903, p. 260, fig. B).

E-G. Activities of the siphons of *Bankia gouldi* (Bartsch) (from Clapp, 1951).
- E. Siphons in normal position.
- F. Extended siphons at the beginning of "mating activity," the excurrent siphon of the male probing the surrounding area in search of the incurrent siphon of a female.
- G. Excurrent siphon of the male inserted in the incurrent siphon of the female at the time of possible transfer of sperm. (See section on Reproduction).

Key to Numbers

1. Descending arm of filament
2. Ascending or reflected arm of filament
3. Branchial or food groove
4. Pallial, infrabranchial or mantle cavity
5. Suprabranchial or epibranchial cavity
6. Efferent branchial vein
7. Afferent branchial vein
8. Intestine
9. Caecum with ventral typhlosole
10. Gonads
11. Mantle
12. Mantle groove
13. Dorsal artery
14. Afferent renal vein
15. Pallial or mantle nerve
16. Interlamellar junction
17. Interfilamentar junction
18. Filament


13
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b
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D
E
F
G.

FIGURE 14

to enormous size. At present no explanation can be given for this. Further reduction of the wood by bacteria cannot be ruled out, but this seems unlikely since the walls of the canal are thin and muscular and are not provided with conspicuous glandular areas or blood vessels. It is possible that the retention of the feces is a mechanism for the control of pressure within the tube or it may be for sanitary purposes, so that the feces are not extruded when there is a possibility of contaminating the incurrent stream.

Circulatory System

The general morphology of the circulatory system has been described for species of *Teredo* and *Bankia,* but to my knowledge no experimental work has ever been done on the physiology of the teredinid heart. In all genera studied to date the heart lies in an elongate pericardium on the apparently dorsal but morphologically ventral side of the intestine, as explained here in the section on Anatomy (p. 18). Great variation is exhibited in the size of the heart, its proximity to the posterior adductor muscle, the size and shape of the ventricle, the length of the auricles and the type of aorta (Figs. 5, 7-11). It is probable that equally marked differences in physiology will also be found. Sigerfoos (1908) described the elongate, tubular structure of the anterior end of the ventricle in *Bankia gouldi* and considered that the valves separating the tubular portion from the aorta marked the anterior end of the ventricle. It was not possible to locate the valves mentioned by Sigerfoos in the specimens used in this study, but otherwise my observations agree with his for this species.

In *Teredo poculifer* and *Nototeredo norvagica* the anterior end of the pericardium appears to be about midway on the dorsal surface of the visceral mass, the tubular aorta extending anteriorly from this and branching just posterior to the posterior adductor muscle. In *Spathoteredo* and *Nausitora* the aorta immediately expands into a broad, thin-walled vessel which spreads over the dorsal surface of the visceral mass. In *Kuphus* there is within the pericardium a definite bulbous area anterior to the ventricle, called here the ventricular bulb. It is separated by a large valve from the ventricle; the aorta opens from its dorsal surface and the intestine passes through it. The ventricular bulb is thin-walled and non-muscular, and at present no explanation can be offered as to its function. It probably represents a less specialized condition, for *Kuphus* is the only genus in which there is any connection between the heart and the intestine.

It is equally difficult to explain the differences in the length of the ventricle in relation to that of the auricles: for example, the ventricle is short, broad and inflated in *Dicyathifer manni,* but long and thin in *Bactronophorus thoracites,* while both species have similar auricles. The posterior end of the auricles always slightly overlaps the anterior end of the gill, so that a reduction in the length of the gills usually results in a lengthening of the auricles, the ventricle remaining in close proximity to the posterior adductor muscle. In *Nausitora,* however, the gills are greatly reduced and the heart is small and posteriorly located.

The length of the heart in relation to the total length of the animal varies from the tremendously elongate heart of *Neoteredo reynei,* which is 0.8 the total length of the animal, to that in *Nausitora dunlopei,* which is only 0.2 the total length. Both species have reduced gills, but in *reynei* the auricles have lengthened to reach the gills, while in *dunlopei* the entire heart has moved posteriorly with them. It is impossible at this time to attempt any explanation of these vast differences in the size and proportions of the heart, other than to say that they follow along phylogenetic lines and presumably correlate in some way with the biology of the groups in which they are found.

Other Systems

The nervous system was not studied in detail because limited observations showed it to be basically similar throughout the family and because such studies are best done on fresh material. The major features of the system are given here at the beginning of the section on "Anatomy of the Soft Parts."

The kidneys vary greatly in size, but their location is the same throughout the family, except in *Kuphus.* Odhner reviewed the work on the nephridia of teredinids up to 1912; little has been done since then.

Similarities and differences in the musculature of the siphons and pallets are illustrated in Figure 13.

Life History

Reproductive System

The position of the gonads appears to be primarily a matter of available space. In those species with a small caecum the main body of the gonads is posterior (Fig. 8), while in those with a large caecum the gonads extend along its dorsal surface (Fig. 11). Thus in *Nausitora dunlopei* Wright the gonads are dorsal to the caecum, and in *Nausitora fusticula* (Jeffreys) they are largely posterior to it. Observations on dissected specimens show that the caecum is usually empty when the gonads are swollen in those species with the gonads on the dorsal surface. The wooden tube in which the animals are confined cannot stretch as the gonads develop, but room can be made by emptying the caecum. Consequently during this period such species may be almost entirely dependent upon plankton for food. The location of the genital pore at the posterior end of the pericardial cavity appears to be typical for the family, except possibly for *Kuphus.*

Breeding Behavior

One would not expect a pattern of breeding behavior in animals whose siphons only extrude into the water, and to my knowledge none is known in bivalves except possibly in the case of *Bankia gouldi.* Dr. William F. Clapp (1951) made the following observations on this species at the Harbor Island Test Station, Wilmington, North Carolina:

> "During periods of normal activity, the two siphons of a specimen of *Bankia gouldi* . . . extend beyond the surface of the wood for a distance of approximately one-fifth of an inch. The principal movements in the incurrent siphon are occasional contractions and retractions during which material unsuitable for food, or obnoxious to the animal, is pushed out of the siphon. This material is frequently carried back in with the incurrent flow of water and is immediately rejected from this siphon. This may occur a number of times before it is finally permanently disposed of [Fig. 14 E].

"The normal activity of the excurrent siphon is similar, but with this siphon the contractions and retractions are mainly for the purpose of ejecting the excrement and powdered wood. With *Bankia gouldi* this material is expelled with considerable velocity in the form of elongated cylinders approximately 1.0 mm in diameter and frequently 25 mm in length. The force with which these cylinders are ejected is sufficient to carry the material a considerable distance from the siphons, frequently for more than 25 mm. As a result, there is little chance that this excrement will be carried into the incurrent siphon.

"At irregular intervals, occasionally of several days duration, an entirely different form of siphonal activity occurs.

"Test panels frequently show the paired siphons of ten or more mature *Bankia gouldi* to the square inch. During the periods of increased activity, the twenty or more siphons which may occur in this area have the appearance of a miniature snake pit, the occupants of which have been disturbed and are writhing violently in all directions as though in search of an enemy or endeavoring to escape.

"The excurrent siphons are most active, probing in all directions as much of the surface of the wood as can be reached. With the tip of the siphon minute fragments of wood are torn away, but no apparent use is made of this material.

"This probing and tearing activity of the excurrent siphon is quite violent. The siphon arches and waves wildly in all directions with gyrations which might be likened to those of the trunk of a very active miniature elephant. Fragments of wood or other material may be firmly held for several minutes by the tip of the siphon, while it continues to thoroughly investigate everything in the vicinity [Fig. 14 F].

"During the periods of great siphonal activity, the excurrent siphon eventually comes in contact with an incurrent siphon. Occasionally this may belong to the same specimen, in which case no apparent effect results from this contact. On the other hand, if, as is generally the case, the contact is made with the incurrent siphon of another individual, both siphons immediately show greatly increased and violent activity. The excurrent siphon probes wildly at the surface of the other siphon, and attempts to reach the opening at the top. The incurrent siphon tries to retract and avoid this contact. This struggle may persist for several minutes. When shaken off, the excurrent siphon returns at once and continues the effort.

"In spite of the struggles of the incurrent siphon, the excurrent siphon generally eventually succeeds in pushing the tip end for a considerable distance down the inside of the incurrent siphon and is able to maintain a firm attachment there, in spite of the frantic opposition of the host [Fig. 14 G]. After a few seconds, active resistance by the incurrent siphon ceases, and the excurrent siphon may then remain in this position for several minutes. During this period, a minute amount of a somewhat transparent fluid may clearly be seen through the transparent walls of both siphons, being ejected spasmodically from the excurrent siphon into the incurrent siphon. As many as six injections have been seen during one of these periods, lasting for three or four minutes. Frequently two, and occasionally three, excurrent siphons have been observed simultaneously entering a single incurrent siphon.

"Occasionally during the struggle between the two siphons, portions of the incurrent siphon may be torn away by the excurrent siphon. The torn fragment may remain quite firmly attached to the tip of the excurrent siphon for several minutes after it has been withdrawn from the siphon it has entered.

"In a 6″ x 4″ test panel showing approximately 100 pairs of the siphons of *Bankia gouldi,* as many as 75 excurrent siphons have been observed entering the intake siphons of other specimens. In no case has any contact been observed between the siphons of the same individual. In no case has the transfer from one siphon to the other of any material been observed other than the minute quantities of the translucent fluid."

Unfortunately none of the fluid seen moving down the siphon was collected and examined microscopically to confirm the fact of sperm transfer. This possible use of the excurrent siphon as an intromittent organ can be compared with the prosbosciform intromittent organ of *Chthamalus stellatus stellatus* (Poli), a sessile barnacle, as described by Tenerelli (1958, 1959). In *Chthamalus* the intromittent organ is vermiform and its behavior is entirely comparable to that described for *Bankia gouldi.* The sperm is transferred into the mantle cavity of the female where the eggs are fertilized.

Sperm transfer in *Bankia gouldi* should be confirmed and observations made on other species in the Teredinidae. This is not only of great biological interest, but its implications in the local control of some species of shipworms are obvious. The breeding period is usually determined by the presence of the larvae in the plankton. This, from a control point of view, is almost too late, for the young are out and ready to penetrate. By observing the activity of the siphons it should be possible to determine the breeding season at its inception. If this is feasible, it would then be worthwhile to investigate the possibilities of preventing sperm transfer or of destroying the concentrated sperm in the mantle cavity, thus precluding reproduction. Control measures of this sort would probably be most effective in enclosed bays or areas of little tidal movement.

Sexual Phases

Early students of the embryology of the teredinids, lacking a knowledge of protandry, were often puzzled by inequalities in the numbers of males and females in the populations with which they were working.

Sigerfoos (1908) first postulated the idea of protandry because he found that the sexes were separate in adult *Bankia gouldi* while the young were hermaphroditic, the male phase occurring first. Histological proof of protandry was provided by Yonge (1926) in his work on *Teredo* [*Nototeredo*] *norvagica.*

Coe (1933-1941) studied *Teredo navalis, Bankia setacea* and *Lyrodus diegensis* [=*pedi-*

cellatus] and found that they were all protandrous. He stated that in the species studied there is a "graded series of ambisexual or hermaphroditic conditions." In the young there are two types of males, those which soon change to females and those which remain males for a long period, often nearly the life of the animal. He found that : 1) in *Lyrodus diegensis* functional hermaphroditism is common, and the sexual phases are not sharply demarcated; 2) in *Teredo navalis* functional hermaphroditism is not unusual, although the gonads are histologically ambisexual during the change of sexual phases; and 3) in *Bankia setacea* functional hermaphroditism occurs occasionally in the primary male phase, but subsequent sexual phases are clearly defined and there is often a resting stage between them. Results of studies on two other species of *Bankia* [*gouldi* Sigerfoos (1908) and *indica* Nair (1956a,b)] agree in general with Coe's observations on *setacea*.

Examination of the gonads of *Nausitora dunlopei* (Smith, 1963) showed that the sexes are separate in this species, at least in older specimens. Our knowledge of the sexual phases in *Teredo, Lyrodus, Nototeredo, Nausitora* and *Bankia* is based on only one or two species in each genus, so that general conclusions cannot be made at a generic level at this time. Nothing is known concerning this interesting facet of teredinid life history in other genera.

Fertilization

In the Teredinidae there are two, and probably three, ways in which fertilization can occur: 1) the sexual products may be extruded into the water separately, and fertilization takes place externally; 2) the sperm may be extruded into the water and then be taken into the mantle cavity of the female in the incurrent stream, in which case fertilization occurs in the epibranchial cavity; and 3) it possibly may be direct, with the excurrent siphon of the male transferring the sperm directly into the incurrent siphon of the female and fertilization again taking place in the epibranchial cavity. (See section on breeding behavior.)

Fertilization is external in *Bankia setacea* (Coe, 1941; Quayle, 1953), *B. indica* (Nair, 1956a,b), *Nausitora dunlopei* (Smith, 1963), and *Teredo* [*Nototeredo*] *norvagica* (Lebour, 1938, 1946). Sigerfoos (1908) stated that fertilization in *B. gouldi* was external, but Clapp (1951) observed the insertion of the excurrent siphon into the incurrent siphon of the female and witnessed apparent direct transfer of sperm.

Fertilization must occur in the epibranchial cavity of the female in *Lyrodus* and *Teredo* because all species in these genera, so far as known, brood the young. The following species have been studied and figured: *Lyrodus pedicellatus* (Roch, 1940; Becker, 1959), *L. diegensis* [=*pedicellatus*] (Kofoid and Miller, 1927), *L. medilobata* (Edmondson, 1942), *Teredo navalis* (Grave, 1928), *T. poculifer* (Smith, 1963) and *L. pedicellatus* [cf. *T. bartschi*] (Isham and Tierney, 1953). Specimens taken from test boards with the young larvae still in the brood pouch of the parent prove that fertilization also occurs in the epibranchial cavity in *T. furcifera, T. parksi, T. somersi, T. clappi, L. affinis,* and *L. massa*. Fertilization in the epibranchial cavity possibly occurs also in *Teredothyra matocotana* and *Teredothyra dominicensis*, as the eggs seen in test-board specimens are large and appear to be produced in strings.

Roch (1940) stated that, in the Mediterranean, *T. utriculus* [=*Nototeredo norvagica*] has an oviparous phase in the winter and a larviparous phase in the summer. This is very unusual and should be investigated further. If this is the case, it would mean that fertilization must take place in the epibranchial cavity of the female and that in warm weather the young are retained, but the eggs are released immediately after fertilization in cold weather. It seems likely that Roch was actually dealing with two species.

Roch (1940) and Becker (1959) reported on the breeding of *Lyrodus pedicellatus* in the laboratory. At Berlin-Dahlem, Becker successfully reared this species through the fourth generation, in artificial sea water held at 20° C, and found that they showed a marked lunar periodicity when spawning. This is in accordance with the earlier observations of Roch, who worked at Rovigno d'Istria, using running sea water. Cultural methods used in rearing *Lyrodus* and *Limnoria* were described by Becker and Schulze (1950).

Eggs and Larval Development

The excellent and detailed instructions for rearing bivalve mollusks, by Loosanoff and Davis (1963), will be indispensable to anyone attempting to study teredinid larvae. The methods developed by Loosanoff and his staff at the U.S. Bureau of Fisheries Laboratory, Milford, Connecticut, should make it possible to raise these larvae in the laboratory for life history studies or for use in experiments designed to test their reaction to various types of natural and treated wood. It may also make it possible, by carrying on breeding experiments, to test the validity of some of the questionable species now recognized.

Walne (1964) also discussed the rearing of bivalve larvae, and in addition to treating laboratory cultures in which he referred his readers to the "exhaustive review by Loosanoff and Davis," he described briefly cultural methods in ponds and outdoor tanks.

Species with external fertilization produce vast numbers of very minute eggs, usually less than 45 μ in diameter. Sigerfoos (1908) estimated that a specimen of *Teredo dilatata* [=*Psiloteredo megotara*] produced over 100 million eggs in one spawning. Observations on other species agree with this, though actual estimates were not made. Development of the egg is rapid and appears to be similar for all species studied. The trochophore stage is reached in about 12 hours and the veliger in about 24 (Sigerfoos, 1908; Nair, 1956b). The duration of the veliger stage varies with the species, temperature, and the availability of wood. It is about 3 to 4 weeks in *Bankia setacea* (Coe, 1941; Quayle, 1953) and *B. gouldi* (Sigerfoos, 1908), species found in temperate waters, while the tropical species *B. indica* is free swimming for only 17 days (Nair, 1956b). The only other species having external fertilization which have been studied are *Teredo* [*Psiloteredo*] *megotara* (Sigerfoos, 1908; Nair, 1962) and *Teredo* [*Nototeredo*] *norvagica* (Lebour, 1938, 1946; Nair, 1962), and these also have minute eggs, develop rapidly, and have a free-swimming period of about 4 weeks.

Species retaining the young within the brood pouch of the female produce larger and fewer eggs. Those of *Teredo navalis* are white and 55 to 60 μ in diameter (Costello *et al.*, 1957). Loosanoff and Davis (1963) reared the larvae of *navalis* past metamorphosis, in the laboratory, and in their account they compared their results with those of earlier workers. Spawning occurred when the temperature reached 14° C and the larvae were released at 16 to 20° C. At the time of release the larvae measured about 85 to 95 μ and at the time of metamorphosis between 190 and 200 μ in length. The duration of the free-swimming period was about 20 days. The larvae of *Teredo poculifer* studied by Smith (1963) were well developed at the time of release and had a free-swimming period of only 24 hours.

From an examination of the size of the young in the brood pouch of specimens found in test boards, it would appear that all species of *Lyrodus* retain the young until the late veliger stage. Lebour (1946), probably working with *Lyrodus pedicellatus,* found this species had a free-swimming period of only 36 hours. Isham and Tierney (1953) reported that *Lyrodus pedicellatus* [cf. *bartschi*] began settlement within 18 to 24 hours after release from the parent.

So far as is known, all species of teredinids reach sexual maturity within a short time after penetrating the wood. Becker (1959) reported 8 weeks for *L. pedicellatus,* and Edmondson (1942) described specimens of *Teredo* [*Lyrodus*] *medilobata* only 10 mm long which were distended with young.

The series of larval valves of *Bankia setacea* illustrated by Quayle (1953), and of *Teredo navalis* by Sullivan (1948), are very similar; both show the allometric growth of the valves from the early straight hinge stage, when they are longer than high, to those at the time of settlement, when they are higher than long. Both also show the bold, dark rim on the outer edge of the valves which is characteristic of all stages and "appears to mark the inner edge of the mantle musculature," according to Quayle. The proportions of the valves and the hinge dentition, with three teeth in the right valve and two in the left, agree with the observations of Rancurel (1951) on *Lyrodus pedicellatus,* and appear to be typical for the family.

Photographs and sketches of the larvae of a "teredo" [probably *bartschi*], showing the use of the foot during settlement and early penetration of the wood, are given by Lane (1961).

Unfortunately, the young appear to be issuing from the incurrent siphon. Isham and Tierney (1953) describe in detail the behavior of the larvae at the time of settlement and penetration.

It is well known that teredinid veliger larvae reach a stage when they are capable of settling, metamorphosing to the adult and penetrating wood. As shown above, the average length of veliger life is constant for a given species at a given locality, being shorter in tropical water than in colder areas. However, if wood is not available, the larval life may continue for several days, though the ability to penetrate wood apparently decreases with the aging of the larvae (Lane 1959b). Coe (1941), however, reported that some *Lyrodus diegensis* [=*pedicellatus*] had a very short free-swimming period, attaching themselves to the surface of the wood almost immediately on being released from the parent, while others in the same brood remained on the surface for two weeks or more feeding on minute organic material before metamorphosing. Thus, it would appear that the feeding habits of the larvae and the availability of sufficient food would have a great deal to do with their ability to survive beyond the time when metamorphosis is first possible.

Quayle (1959a) emphasized the need of comparing planktonic and test board studies, because there may be spawning without settlement and penetration of wood, the latter being the measure of breeding success.

Sigerfoos (1908) described and figured the metamorphosis of larval *Bankia gouldi*, beginning with the loss of the velum and attachment to the surface of the wood by a single byssus thread. This is followed by the fusion of the ventral margins of the mantle, the development of the siphons, the production of the calcareous shell with anterior denticulated ridges, and the extension posteriorly of the visceral mass. The gradual movement posteriorly of the gills and the heart in *Nausitora* can be readily seen if large series are studied. The length of the gills in relation to the total length of the animal appears to decrease with age in all genera except *Teredora* and *Uperotus,* and this must be taken into consideration when comparing species.

Distribution and Dispersal

Factors Controlling Distribution

Temperature, salinity, and the presence of wood are the main factors controlling the distribution of the Teredinidae. Other factors, such as strong currents, tides, pollution, turbidity, and bottom or fouling communities, are also involved, but these are often more difficult to detect and are usually local in effect.

In areas where little wood is available, the populations of Teredinidae are small. Thus an important step in controlling them is the elimination of all unnecessary wood. Temperature and salinity requirements and the range tolerated differ with the species. Those which can withstand wide ranges in temperature and salinity are generally well distributed, while those with a narrow range of tolerance have a more restricted distribution.

Temperature is particularly important during the breeding season, each species having an optimum temperature for the spawning and survival of the young. For example, *Bankia setacea* spawns at Ladysmith Harbour, British Columbia, when the temperature of the water reaches 10° C (Quayle, 1959a), and at Puget Sound between 7-12° C (Johnson and Miller, 1935), while the spawning of *Bankia gouldi* in Chesapeake Bay, Maryland, does not occur until the water temperature reaches 27-28° C (Scheltema and Truitt, 1954). Adult teredinids, however, can tolerate wide ranges in temperature and thus can be carried through areas which are either above or below the optimum without ill effects.

Salinity requirements are equally varied. For example, *Teredo navalis* is active and reproduces in salinities ranging from normal sea water to as low as 9‰ (Miller, 1926), and can survive for a month at 4‰ (Blum, 1922). Specimens living for long periods of time at these lower salinities are usually somewhat malformed. This great range of tolerance probably explains the wide distribution of *navalis* as an established member of the breeding community. Some species are found only in brackish water, as is the case with most *Nausitora*. Test-board studies have shown that populations of *Nausitora dunlopei* and *Teredo poculifer* shift up and down the Brisbane River with changes in salinity resulting from the pronounced rainy season. *Psiloteredo healdi* is a freshwater species found in Miraflores Lake, Panama, Lake Maracaibo, Venezuela, and other freshwater lakes and streams on the north coast of South America.

Most species of Teredinidae require normal marine conditions for successful spawning, but adults may withstand long periods under a variety of extreme conditions by closing the burrow and becoming relatively inactive. Their ability to utilize stored glycogen under anaerobic conditions is undoubtedly an important factor in their survival at such times.

The vertical distribution of the adults and larvae in shallow water has been studied in great detail in some areas. It is well known from general observations and has been proven by the testing programs that the greatest attack on piling is normally near the mud line. Under unusual circumstances the water may be stratified into layers of differing temperature or salinity or both, and rarely the more saline water may be on top. In such cases the teredinids will be found in that stratum which is most suitable to them. Quayle (1956) stated that during the summer the larvae of *Bankia setacea* occur at deeper levels than in the winter, a reflection of temperature preference. Research recently conducted by the British Columbia Research Council at Vancouver (Tidelines, vol. 5, no. 2, Feb. 1963) has shown that "since most submerged wood containing adult borers lies on the sea floor, newly hatched larvae are found first near the mud line. As the breeding season progresses, and the density of larvae increases, they move towards the surface and, as weeks pass, floating wooden structures are subject to attack. Eventually the larvae become fairly uniformly distributed from the mud line to the water surface. After the peak of the breeding season the distribution trend reverses and the larvae become less numerous and disappear from the surface." Though this work was done on *Bankia setacea*, the vertical distribution of the larvae is probably similar for many other species. Graphs given by Scheltema and Truitt (1954) for the vertical distribution of the set of *B. gouldi,* and by Greenfield (1952) for *L. pedicellatus* Quatrefages (probably *T. clappi* Bartsch), indicate a similar distribution of the larvae for these species.

So far as known, the larvae of river species, such as certain *Nausitora,* remain near the bottom (probably because the larvae are positively geotropic or negatively phototropic or both), a habitat which is no doubt advantageous, as the current near the bottom is less rapid and the danger of being swept out to sea is thus reduced. Greenfield (1952) reported the same situation for species of *Teredo* living under river conditions.

Studies of the effect of light intensity on the movement and settlement of larvae by Isham, Smith and Springer (1951), Owen (1953), and Quayle (1959a), all working with different species in widely separated localities, have shown that: 1) there is a diurnal migration with a higher concentration of larvae near the surface at night, and 2) settling is usually more concentrated in shaded areas. Schwarz (1932) assumed that the larvae of *Teredo navalis* were photopositive because, in the area he studied, the settlement was heaviest on the south side of the piling. Rancurel (1951) reported that *Lyrodus pedicellatus* was positively phototropic throughout its larval life, even during the pediveliger or creeping stage.

Nair (1962) found both *Teredo* [*Psiloteredo*] *megotara* and *Teredo* [*Nototeredo*] *norvagica* common in western Norway, and he made an interesting study of the problem of competition for space. The answer proved to be a difference in time of breeding and level of boring. Veligers of *megotara* settle in the summer and prefer the upper levels of the piling or under surface of floating objects. Those of *norvagica* settle in the autumn or early winter near the base of the piling. The early settlement of *megotara* veligers allows them to get established in the upper levels before the development of the fouling community. By the time *norvagica* spawns, the upper levels are thickly covered and so the larvae can only settle in the clear areas near the base of the piling. Perhaps the larvae were distributed equally throughout the water and only those at the lower levels were successful in penetrating, giving the impression of concentration at this level. It is more likely, however, that a tendency toward positive geotropism is characteristic of late spawners, for most species are to some extent negatively phototropic.

Thorson (1964) reported at length on the importance of light on the movements and settling of marine invertebrate larvae. Little mention was made of the Teredinidae in this report, but the factors involved in the settling of larvae and the principles discussed should be considered when studying the settlement of species in this family.

Dispersal of Teredinids

It is relatively easy to study a shipworm in its natural habitat or in a laboratory and to determine the requirements for its survival. However, dispersal, though related to distribution, is far more difficult to study and very little experimental work has been done on it. The obvious means of dispersal by driftwood or wooden ships has been recognized for a long time. As indicated previously, conditions must be satisfactory for spawning, for survival of the larvae, and for successful penetration of wood before a species can become an established member of the fauna.

In 1946 Edmondson discussed briefly the dispersal of shipworms in the central Pacific, mentioning that while specimens from drift logs may serve as "a legitimate record for the locality, they may not represent established fauna." In his 1962 paper on Teredinidae as ocean travelers he stated, "Although some species of Teredinidae appear to be restricted in their distribution, investigation reveals that many have become dispersed over vast areas of the ocean, apparently limited only by temperature, salinity or lack of dependable transportation." Wishing to determine the distance to which the larvae could spread from inshore installations, Edmondson placed wooden panels at 1, 1.5 and 2 miles from shore in 70, 70 and 85 feet of water, respectively. The panel at 1.5 miles was heavily attacked, while the one at 2 miles from shore was only moderately infested. Unfortunately, he could not carry the test out to the limit of larval dispersal.

Panels placed on lightships by the W. F. Clapp Laboratories Inc. indicate that the veliger larvae can be carried considerable distances by ocean currents. A total of six stations were made in cooperation with the U.S. Coast Guard between Sandy Hook, New Jersey, and Cape Hatteras, North Carolina. Panels at all stations were attacked, and at most of the stations a heavy infestation occurred at some time during the period in which the tests were conducted. The boards on Diamond Shoals Lightship, 13 nautical miles east of Cape Hatteras, North Carolina, were heavily attacked. This ship is in the path of the Gulf Stream and the larvae could have come from infested drift wood as it passed by. This was probably the case for the two tropical species (*Bankia fosteri* and *Bankia carinata*) removed from the boards. The larvae probably could not have traveled in the plankton from the Caribbean, though pelagic planktotrophic larvae may be transported by currents for great distances. The other species removed from the boards at this station occur on the adjacent coast. The possibility of larvae rising from infested wood lying on the bottom cannot be overlooked, however. (See the discussion on Teredinidae in the deep sea to follow.)

The type of larval life (i.e. oviparous, short-term larviparous or long-term larviparous), when considered along with temperature and salinity requirements, may help explain the known distribution of many species and allow the prediction of possible range extensions or of the species that may be expected to occur in an unknown area. For example, species in the genus *Nausitora* are generally confined to brackish water and, so far as known, fertilization is external. *Nausitora dunlopei,* the only species in the genus studied to date, is most active and breeds when the salinity is below 10‰ (Watson, 1936; Smith, 1963). It would, therefore, appear likely that the larvae are intolerant of high salinities and those carried into the open sea would perish. Consequently, the various populations are isolated, and colonization of a new area is probably accomplished by the adults, carried in floating wood, which must reach another brackish water area within the life of the adult. Our present knowledge of the genus seems to support this theory because the species are far more restricted in their range than other teredinids. Thus *Nausitora dunlopei* and *N. hedleyi* are restricted to the tropical Indo-Pacific; *N. dryas* and *N. excolpa* to the tropical Eastern Pacific; and *N. fusticula* to the tropical Western Atlantic. The genus *Nausitora* does not occur in the Eastern Atlantic.

Species in the genus *Bankia* are also oviparous, but they generally occur in marine or only slightly brackish water situations. All temperate and cold water species are somewhat restricted in their range, but a few tropical species have become established around the world and others may be expected to do so. Thus, *Bankia setacea* is restricted to the eastern and northern Pacific, *B. gouldi* to the northern Western Atlantic, and *B. martensi* to the colder waters around southern South America and South Africa. The tropical species *B. carinata, B. campanellata* and *B. bipennata,* however, have succeeded in becoming established around the world in tropical and subtropical waters.

Marine species in other genera known to have oviparous young include *Psiloteredo megotara* and *Nototeredo norvagica,* temperate species restricted to the northern Atlantic and Mediterranean; *Teredora malleolus* occurs in the warm temperate to tropical Eastern and Western Atlantic; and the closely allied *princesae* is found in the tropical and subtropical Indo-Pacific.

All marine species with larviparous young are, or can become, widely distributed for the following reasons: 1) in common with other shipworms the adults can be transported great distances in ships or floating wood; 2) the young are protected within the parents during the early critical stages of development; 3) the larvae are not spawned unless optimal conditions for their survival exist; 4) being further developed, the young are less sensitive when extruded; 5) the larvae are ready to settle shortly after they are extruded and so are not carried away from the floating log or ship from which they emerged; and 6) most wooden ships and pieces of drift wood are covered with a good growth of hydroids, bryozoans, algae, and other organisms which form a protective "forest" cover within which the larvae can swim until the time of settlement.

All species of *Lyrodus,* so far as known, have long-term, larviparous young, all require normal marine salinities or nearly so, and all are widely distributed. In the genus *Teredo,* four species (*furcifera, clappi, somersi* and *bartschi*) are known to be long-term larviparous and all are world-wide in distribution in tropical and subtropical seas. *Teredo navalis,* a short-term larviparous species is also widely distributed, but its success is probably due, in part at least, to the great ranges of temperature and salinity which it can tolerate. So far as known, *Teredo poculifer* is the only larviparous species having a restricted range, and this is readily explained by the fact that *poculifer* is a brackish water species found well up the rivers of Queensland, Australia. In this case the protection of the larvae to the late veliger stage and their ability to settle within 24 hours of emergence from the parental pouch is probably of benefit in saving the young from being swept out to sea.

No definite generalizations can be made as yet, for we know the larval life of so few species. However, on the basis of the above it would appear that: 1) marine species with larviparous young can be expected to spread and become established around the world within a zone of their temperature requirements; 2) brackish or freshwater species with oviparous or larviparous young have a restricted range; and 3) oviparous marine species in the tropics may become circumtropical, but warm to cold temperate species are usually restricted to large ocean provinces such as the northern Atlantic or northern Pacific.

Specimens removed from badly infested planking taken from the M-G-M ship *Bounty II* support the theory that larviparous species are most easily distributed by ships and floating wood. The *Bounty II* left Tahiti in September 1961 after making the film "Mutiny on the Bounty." The following brief account of the voyage of the *Bounty II* was received through the kindness of Mr. James C. Havens of Metro-Goldwyn-Mayer.

"Departed Tahiti for Los Angeles via Honolulu, Sept. 1961. Drydocked at Hawaiian Dredging Co., Honolulu where some but not complete work was done to repair damage by shipworms. Departed Honolulu for San Pedro, Calif., for layup until the following Spring. Drydocked at Craig Shipbuilding Co., Long Beach, Calif., before departing for Victoria and Vancouver, B.C., Seattle, Wash., San Francisco, Calif., Panama Canal, New Orleans, La., Miami, Fla., Boston, Mass., Calais, France, various ports in England, Tenerife, Canary Islands, New York City, then to Washington, D. C., and finally for layup at Jakobson Shipyard at Oyster Bay, Long Island, N. Y."

The *Bounty II* arrived at Oyster Bay in November 1962. Her bottom was copper painted at that time to protect her from the local shipworms, but this did not disturb the worms already in the planking. She lay alongside the pier of the Jakobson shipyard until October 23, 1963, when she was hauled up for bottom work and painting. It was found at this time that some of the planking was badly riddled and, through the kindness of Mr. Irving Jakobson and Mr. James C. Havens, pieces of it were sent to me for study.

Mr. Jakobson in a letter wrote, "I would have thought that all the worms in the boat would have been killed by the severe freezing that took place during last winter and was quite surprised to find that some of the worms were alive when the planking was removed in October."

To my surprise and delight the only worms found in the wood were *Teredo furcifera,* a tropical, long-term larviparous species. The tubes of most of the specimens were filled with larval shells, which means that at some time during the summer of 1963 the temperature in Oyster Bay warmed up sufficiently for fertilization to take place, but that it did not remain warm long enough for the successful spawning of the larvae.

Thus we have the replica of a square-rigged ship, repeating what must have happened continually in the days of wooden sailing ships, and proof that the adults of these tropical species can survive freezing temperatures. This means that the trip around the "Horn" or through the Straits of Magellan was no barrier to their dispersal in the 17th and 18th centuries.

Occurrence of Teredinidae in Deep Water

The distribution of the Teredinidae in the deep sea has never been given much attention. There have been numerous records of specimens taken from wood dredged from great depths. Roch (1940) records *utriculus* [=*norvagica* Spengler] taken from the jute layer of a cable which was lying on the bottom at 700 meters. Bartsch (1927) described 16 new species from wood dredged by the *Albatross* Philippine expedition in depths ranging from 51 to 548 meters. All specimens were dead; four species were based on shells only and so cannot be recognized. Of the remaining 12, only one, *Bankia barthelowi* Bartsch (of which *davaoensis* Bartsch is probably a synonym), has not been found in shallow water. This is the only paper entirely on teredinids from deep water, and, at least in the Philippines, there does not seem to be a distinctive deep water fauna.

An examination by the author of preserved wood dredged by the Danish research vessel *Galathea* revealed living *Bankia carinata* (Gray) at 7488 meters in the Banda Sea, *Uperotus clavus* (Gmelin) from pandanus fruit taken at the same station, living *Lyrodus bipartita* (Jeffreys) from the Gulf of Panama in 3710 meters, and living *Teredothyra smithi* (Bartsch) from 5050 meters in the Sulu Sea.

Dr. Adam of the Brussels Museum kindly made available all of the wood dredged by the Atlantique Sud Expedition; and a piece from station 147 found near Port Gentil, Congo (0° S, 8° 58′ E), in 250 meters was heavily infested with living *Bankia carinata* (Gray). *Xylophaga*, a deep water bivalve in the Pholadidae, was taken from the same piece of wood, which would indicate that the shipworms were able to survive at this depth at least long enough for the *Xylophaga* to enter the wood and grow to maturity. At station 133, about 40 miles WSW of Mouta Secca Point, Congo (6° 20′ S, 11° 35′ 30″ E), in 200 meters, wood was dredged which contained numerous specimens of *B. carinata,* both young and adult, as well as a species of *Adula.* This *Bankia* was also taken from wood dredged at station 33, about 35 miles W of Ambrizette, Congo (7° 16′ S; 12° 17′ E), in 145 meters.

Examination of a piece of preserved wood that had been in the British Museum since 1882 revealed numerous specimens of *Nototeredo norvagica* which must have been alive at the time they were dredged from 944 meters by the *HMS Triton* at station 10, off the north coast of Scotland (59° 40′ N; 7° 21′ W). Though the specimens were stenomorphic, they were in good condition. This wood was also bored by *Xylophaga,* and had attached to the surface several small mytilids, *Ida argentea* Jeffreys, and a pycnogonid, all known deep water animals, suggesting that it had been on the bottom for some time.

From the above records it is clear that Teredinidae are capable of living and growing for considerable periods of time at great depths, but there is no proof that the teredos entered the wood after it reached the bottom.

The U. S. Naval Oceanographic Office has recently been conducting bottom tests at a site about 2 miles east of Fort Lauderdale, Florida (26° 04′ N; 80° 04′ W), in depths of 100 meters. Specimens taken from these boards included *B. carinata, Teredothyra atwoodi* and *matocotana,* as well as numerous *Xylophaga* (Pholadidae). Such tests are particularly important because, other than the work of Edmondson (1962) discussed previously, this is the first time that new wood has been submerged in deep water at some distance from land. These tests prove that at least at depths of 100 meters the veliger larvae can settle, metamorphose to the adult form, penetrate, grow to maturity and breed. How much deeper they can do this we do not know. The title of the paper ‘Deep Teredo’ by H. J. Turner (1961) was unfortunate, for he was actually reporting on a *Xylophaga* penetrating new wood at a depth of 3000 meters. Species in this genus are typically found in great depths and occur commonly in the wood samples exposed on the Submersible Test Units placed in 1731 meters of water off San Miguel, Santa Barbara Islands, California, but no teredinids have been found.

Major Groups in the Teredinidae

Studies of the anatomy, life history, and the structure and development of the pallets, indicate that there are six main groups in the Teredinidae. These groups are outlined briefly here so that the discussion of the major trends of evolution to be considered in the next section may be more easily understood. It must be remembered that transitional forms may be found when additional species are studied, necessitating some changes in the groups. Refinement of the definitions of the groups may be needed when, for example, the early embryology and larval development is completely known for all groups.

Group I—*Kuphus.* Shell and adductor muscles reduced; animal with a strong muscular collar at the posterior end of the valves; esophagus long, passing through the muscular collar; stomach small, globular, and located at the posterior end of the visceral mass; intestine short, traversing the ventricular bulb of the heart; heart very long and located posterior to the visceral mass; pallets solid, non-segmental in structure.

Group II—*Bactronophorus, Neoteredo, Dicyathifer* and *Teredothyra.* Stomach globular and anterior to the posterior adductor muscle; intestine making a loop over the crystalline style sac; caecum present but small; anal opening in normal position but enlarged; anal canal closed posteriorly; gonads posterior to the caecum; heart very long, extending from the posterior adductor muscle to the posterior end of the visceral mass; pallets variable but non-segmental in structure.

Group III—*Teredora, Psiloteredo* and *Uperotus.* Stomach globular; intestine making a loop over the crystalline style sac; caecum moderate in size; anal opening not enlarged; intestine extending down the anal canal; anal canal open; heart extending from the posterior adductor muscle to the posterior end of the visceral mass; gonads dorsal to the caecum; pallets paddle-shaped, non-segmental in structure and often with a thumbnail-like depression.

This group may have to be divided because in *Teredora* and *Uperotus* the gills extend without reduction from the siphons to the mouth, while in *Psiloteredo* the main portion of the gill extends only to the visceral mass.

Group IV—*Lyrodus* and *Teredo.* Stomach elongate; intestine not making a loop over the crystalline style sac; caecum moderate to large; intestine not extending down the anal canal; anal canal open posteriorly; young held in brood pouch; pallets variable, but non-segmental in structure, and in *Lyrodus* with a pronounced periostracal cap.

Group V—*Nototeredo.* Stomach globular; intestine making a loop over the crystalline style sac; caecum present but rather small; intestine very long and convoluted; anal canal open posteriorly; gonads posterior to the caecum; pallets paddle-like but segmental in structure, with lateral awns, particularly in young specimens.

Group VI—*Spathoteredo, Nausitora* and *Bankia.* Stomach elongate; intestine not making a loop over the crystalline style sac; caecum large; anal canal open posteriorly; position of the heart variable; gonads dorsal to the caecum (except in *N. fusticula*); young planktonic; pallets segmental in structure, the segments fused or as distinct cones.

The Subfamilies

Further combining of the six groups results in the division of the Teredinidae into three subfamilies, two of which were recognized by Tryon (1862) and Lamy (1926):

(1) Subfamily Kuphinae Tryon.—This includes only Group I.

(2) Subfamily Teredininae [=Teredinae of Tryon 1862].—This name was used by Tryon to include all teredinids except *Kuphus* but is restricted here to include only Groups II, III and IV, in which the pallets are non-segmental in structure. In this subfamily there is a trend toward increased protection of young, culminating in *Lyrodus* which retains the young to the late veliger stage.

(3) Subfamily Bankiinae—*subfam. nov.*—This is introduced to include Groups V and VI, having segmented pallets, external fertilization, with one possible exception, and a planktonic larval stage.

Trends in Evolution

Definite statements concerning the origin and evolution of the Teredinidae cannot be made at this time because sufficient living species have not been studied and our knowledge of the fossil history is still too meager. Several trends are evident, however, and seem worthy of note. There is no doubt that the Teredinidae arose from some pholad or a common ancestor which gave rise to both the Pholadidae and the Teredinidae. Though *Xylophaga* has been suggested as an ancestor of the Teredinidae, the resemblance is superficial, and they are not closely related, since *Xylophaga* lacks apophyses. The Teredinidae are probably more closely related to *Teredina* (Plate 64 I), a genus of fossil pholads having teredo-like shells with apophyses and long calcareous tubes closely joined to the valves. Of the living pholads, the teredinids are most similar to *Martesia,* a genus of wood-borers having apophyses and, in the young stage, teredo-like valves.

It is possible that the Kuphinae have a somewhat remote ancestry, and are not closely related to the rest of the Teredinidae, or that they are simply highly specialized, the strong muscular collar having pushed the main portion of the digestive system to its posterior position. Nothing is known of reproduction in *Kuphus,* and, in the single specimen available for dissection, even the gonads could not be located with certainty. The pallets are like those in the Teredininae.

Following the development of the caecum, and the separation of the intestine from the heart, a major divergence occurred. This was in response to the need for an efficient mechanism to close the opening of the burrow. One line accomplished this by adding new segments to the proximal end of the pallet (the segmented pallet line: the Bankiinae), and the other by depositing new material over the entire surface of the pallet (the non-segmented pallet line : the Teredininae). Many species, particularly in the Teredininae, also deposit additional material on the inner surface of the tube, producing concamerations, longitudinal ridges, or both, but so little is known of the distribution of these characters in the various genera that presently they cannot be used in a discussion of evolutionary relationships.

If the method of growth of the pallets is fundamental, and it seems to be (see section on pallets following), then it becomes necessary to explain the independent development of the elongate stomach in the Teredininae and the Bankiinae. The elongate stomach is basically similar to the globular one, as explained by Purchon (1960) and its occurrence in both lines probably indicates parallel development in response to the increased use of wood as food. Therefore, it would appear that there were two early groups of teredinids with globular stomachs: one which increased the size of the pallets by adding material to the entire surface, and the other which added segments only at the proximal end. These diverged, differentiated, and independently gave rise to species with elongate stomachs. It is hoped that further anatomical and histological studies of the stomachs of *Teredo* and *Lyrodus* in the Teredininae, and *Spathoteredo, Nausitora* and *Bankia* in the Bankiinae, will show consistent differences in the detailed structure of the stomach in these two groups.

The Segmented Pallet Line

Evolution in this line appears quite direct, beginning with *Nototeredo,* the pallets of which are known from the Paleocene, and the early members of which were probably plankton feeders. Studies are needed on Recent species in this genus to determine the extent to which they are dependent upon wood for food. The greater length of the intestine and the smaller caecum suggest that they probably differ from other genera in the subfamily in this respect.

The pallets of *Spathoteredo,* though still compact, are more definitely segmented than in *Nototeredo,* and lateral awns are usually present on the basal segments of fresh specimens. The stomach, though not as extended as in *Nausitora* and *Bankia,* is elongate, the caecum has enlarged, and the gonads are dorsal to it.

The pallets in *Nausitora* have become greatly elongated and, though the segments are still fused, they are clearly marked. Lateral awns are usually evident on the basal segments of fresh specimens and the stalk often protrudes from the distal end of the blade, resulting from the loss of the early segments.

The development of the pallets has reached its greatest specialization in *Bankia*. The segments are definitely separated as individual cone-like elements "threaded on the stalk," which, in dried specimens, can be readily removed, like beads from a string. In this genus, the wide periostracal margin of the cones has become highly specialized, closing the entrance to the burrow in a more effective manner. The edges are usually serrated and long lateral awns are often present. These allow the two pallets to interlock when brought together, and, in addition, the periostracum is flexible so that the greater the external pressure the more the cones expand and the tighter they are pressed against the side of the tube.

The transition from pallets with fused segments to those with distinct cones can be seen in the juvenile pallets of *Bankia carinata* (Gray). In this species the early cones are fused and covered by a common periostracal cap (Fig. 22), while in most other species of the genus the early cones, though closely spaced, are distinct (Fig. 19 B, C). The genus could be divided into two subgenera on this basis, the name *Lyrodobankia* being available for the species with fused cones in the juvenile pallet. However, at the present time, it is not possible to assign many species to the proper subgenus because the early stages of the pallets are unknown. Likewise many subgenera, proposed on the basis of the differences in the spacing and structure of the cones, appear invalid because there are many intergrades. Consequently, taxa of subgeneric rank are not being used in this report.

So far as is known, fertilization is external in all genera in the "segmented pallet line." If direct sperm transfer occurs in *Bankia gouldi,* as suggested by Clapp (1951), the eggs are fertilized as soon as they are laid in the epibranchial cavity and spawned almost immediately.

The Non-Segmented Pallet Line

The course of evolution in this line is much more difficult to discern than in the "segmented pallet" line. Yet, it is possible to separate the genera into three groups and show relationships between them. A great deal of additional information, particularly on anatomy, reproduction and pallet development is needed before some genera can be definitely assigned. Until such data are available, we can only speculate, and by so doing, focus attention on problems in need of study.

Genera in this line were probably derived from a *Teredora*-like species with complete gills and simple, paddle-shaped pallets, probably with shallow, medially divided cups. The gills in living *Teredora* and *Uperotus* are the least specialized among the Teredinidae. As will be discussed, species in other genera in this line may have medially divided pallets in the early stages of development similar to the young of *Teredora malleolus* (Fig. 17). *Teredora* and *Uperotus* are very closely related, and it is difficult at this time to say which evolved first. It is possible that *Uperotus* first bored into the soft inner fibers of nuts, and later developed the wood-boring habit and gave rise to *Teredora.* Deriving *Psiloteredo* from *Uperotus* or *Teredora* presents no problems as the general anatomy is very similar, the main difference being the reduction in the length of the gills. Even the high posterior slope of the valves is similar.

On the basis of pallets alone, the relation of *Teredothyra* to *Teredora* is obvious (Fig. 19). However, *Teredothyra* must be related to *Bactronophorus, Neoteredo* and *Dicyathifer* because it is improbable that the closed anal canal would have developed independently on two occasions. Therefore, it becomes necessary to derive these four genera from some stock closely related to *Teredora,* having simple pallets with a median cleft on the distal margin and a tendency to retain the feces in the anal canal.

The youngest pallet of *Neoteredo reynei* available for study has a small thumbnail-like depression on the outer face, and this is still evident on specimens with worn, thickened pallets such as the ones figured (Fig. 8 A). It is, therefore, possible that the development is similar to that in *Teredora*. The pallets of *Bactronophorus* are unique, and it is as yet impossible to speculate on their early development or to envisage the function of the 'dagger' (Pl. 25 C). The pallet of *Dicyathifer* (Fig. 7 C) shows the rudiments of the early division and, in some specimens, the ridge is sufficiently high and extends anteriorly far enough to meet the outer margin of the shallow cup so as to divide it. It thus appears that the inferred relationship of these genera to each other, and to *Teredora,* is quite plausible. So far as I can determine, *Bactronophorous* and *Neoteredo* have become highly specialized and have not given rise to other groups, although some species of *Teredo* may have stemmed from *Dicyathifer.*

If the foregoing deductions approximate the course of evolution within the Teredinidae, then it follows that the various species nominally assigned to the genus *Teredo* may not in fact have arisen from the same stem form. On the one hand, it is probable that species with double cupped pallets (such as *Teredo fulleri,* Pl. 12 A) stemmed from *Teredothyra,* whereas those with single cupped pallets may well have evolved from *Dicyathifer* or from *Psiloteredo.* Again, it is quite possible that the elongation of the stomach, the simplification of the pallets, and the brooding of the young may have evolved locally in genetically isolated populations on more than one occasion. For example, there is considerable similarity between the pallets of *Dicyathifer manni* and *Teredo poculifer,* the former species found in mangrove and brackish water areas of Australia and the East Indies, whereas the latter is known only from the rivers of southern Queensland, Australia, both situations of low salinities. Hence it is quite possible that *Teredo,* as presently constituted, is a polyphyletic assemblage, derived partly from *Teredothyra* and partly from *Dicyathifer* and *Teredora.*

Lyrodus probably stemmed from *Teredothyra* with *massa* as a transitional species. The pallets of *massa* (Pl. 18 D) are like those of *Teredothyra,* except that the inner cup is single, rather than double, and is composed almost entirely of periostracum. In addition, there is a wide band of periostracum around the distal end of the basal cup. The fusion of the periostracal border of the basal cup with that of the inner cup would produce a condition similar to that in *Lyrodus affinis* (Pl. 6 D). It is for this reason, and because the anal canal is open, the feces are produced in pellets, and the young are held in the gill pouches until the late veliger stage, that *massa* is here placed in the genus *Lyrodus.* As mentioned in the anatomical section there is evidence that *Teredothyra* retain the eggs until they are quite large, but there is no evidence of their being implanted in brood pouches on the dorsal surface of the gills. It is quite likely that *Teredothyra* is transitional between groups which spawn the eggs immediately upon fertilization and those which brood their young.

Lyrodus probably represents the most highly evolved group in this line, since, as in *Bankia,* the pallets are flexible with the distal portions almost entirely composed of periostracum; and the young in all species are retained until the late veliger stage.

Characters Used in Identification

In the section on anatomy it has been shown that the morphology of the soft parts is important in the generic classification of this family. Diagnoses of both living and fossil species, however, are based on the valves, tubes and pallets, so the following discussion will be concerned mainly with them. They are easier to obtain, preserve, and study, and so are far more useful in the rapid determination of species. Consequently, a correlation between the soft and hard parts is essential.

The Shell

Though strikingly different in appearance, the shells of the Teredinidae are homologous with those of all other Bivalvia, for the division of the valves into three areas is basic throughout this class. It is easy to follow the development of the highly specialized teredinid shell from the less specialized shells of *Barnea* and *Zirfaea* in the Pholadidae; and the resemblance of these to those of *Petricola* (Veneracea) is striking. Figure 15 illustrates the parts of typical bivalves (*Musculus* and *Petricola*) and the corresponding parts in various increasingly specialized genera of the Pholadidae and the Teredinidae. On this comparative basis the anterior slope in the Teredinidae extends to the posterior margin of the denticulated ridges; the disc extends from this line to the beginning of the auricle; and the auricle is equivalent to the posterior slope of typical bivalves. On the inner surface of the teredinid shell the anterior slope extends to the ventral condyle (the attachment point of the ventral adductor muscle in pholads not having an umbonal-ventral sulcus or ventral condyle). The disc extends from the condyle to the shelf. Thus the terms used by many authors may be compared with those used by malacologists in general, as follows:

Terms generally used	*Specialized terms used in the Teredinidae*
Anterior slope	Anterior area Anterior median area
Disc	Middle median area Posterior median area
Posterior slope	Auricle

The determination of genera and species in most bivalves is based on the shape of the valves and the characters of the hinge, ligament, muscle scars, pallial line, sculpture, periostracum and color. In the Teredinidae, however, the use of such characters has not proved satisfactory. Many attempts have been made to classify the Teredinidae on the basis of the shells, using the relationship of the anterior slope to the disc; the shape, position and size of the posterior slope (auricle); the sculpture; apophyses, and the condyles. Miller (1922) demonstrated conclusively the tremendous variation exhibited in the valves of *Teredo navalis* Linnaeus. Figure 16 shows this variation (A-E) as compared with valves from species in five genera (F-J). When discussing this variation in *Teredo navalis,* Kofoid and Miller (1927) stated, "the outline of the shell and the relation of various parts to each other are frequently markedly dissimilar in different specimens. This is particularly true with reference to the auricle, which may be reduced or very prominent, rounded or quadrate, or elongated and reflected; its position varies between posterior and posterior-dorsal." The position of the posterior slope is often a factor of age. It is high, prominent, and posterior-dorsal in young specimens, but becomes low, proportionately smaller and posterior-median in adult specimens. Nair (1959) illustrated a series of valves of *Nototeredo norvagica* from western Norway showing similar variations.

In a few cases, such as in *Uperotus clavus,* the valves differ from other teredinids, but even here one wonders if the reduced shells are a reflection of habitat. Do the larvae which perchance settle on wood develop a more typical teredinid shell? The pallets of *Uperotus lieberkindi* and *U. rehderi,* which inhabit wood, are certainly similar to those of *clavus* found living in nuts, but the shells are more typically teredinid (See Pl. 23 B, G and also text under *Uperotus,* p. 28.)

Occasionally the shells may be an aid in identification when used in conjunction with the pallets: for example in differentiating *Psiloteredo megotara* (Hanley) from *Nototeredo norvagica* (Spengler). The pallets of the two species, particularly if they are worn, could be

FIGURE 15

Homologies of the Teredinid Shell

The division of the valves into three areas is basic throughout the Bivalvia and these areas are often clearly set off by marked differences in sculpture. Any one of the three may be reduced, but all are always present, except in attached forms such as the Ostraeidae, Chamidae and Anomiidae. The anterior adductor muscle scar is always on the anterior slope; the posterior adductor muscle scar on the posterior slope.

A-B. *Musculus impactus* (Hermann) [Mytilidae]
The anterior and posterior slopes are strongly sculptured, the disc smooth.

C-D. *Petricola pholadiformis* (Lamarck) [Petricolidae]
Posterior slope reduced and not clearly set off from the disc.

E-F. *Zirfaea crispata* (Linnaeus) [Pholadidae]
Anterior slope separated from the disc by the umbonal sulcus (E) and ridge (F). Posterior slope reduced and not clearly set off.

G-H. *Parapholas acuminata* (Sowerby) [Pholadidae]
All three areas clearly defined. Anterior slope separated from the disc by the umbonal-ventral ridge.

I-J. *Martesia striata* (Linnaeus) [Pholadidae]
The young, working or teredo-like form. Anterior slope separated from disc by an umbonal-ventral ridge; the posterior slope reduced and not clearly defined.

K-L. *Bankia setacea* (Tryon) [Teredinidae]
Anterior slope separated from disc by the umbonal-ventral ridge. Posterior slope enlarged and often overlapping the disc to form a shelf (see Fig. 2).

Key to Numbers

1. Anterior slope
2. Disc
3. Posterior slope
4. Posterior adductor muscle scar
5. Apophysis
6. Ventral condyle
7. Umbonal-ventral ridge

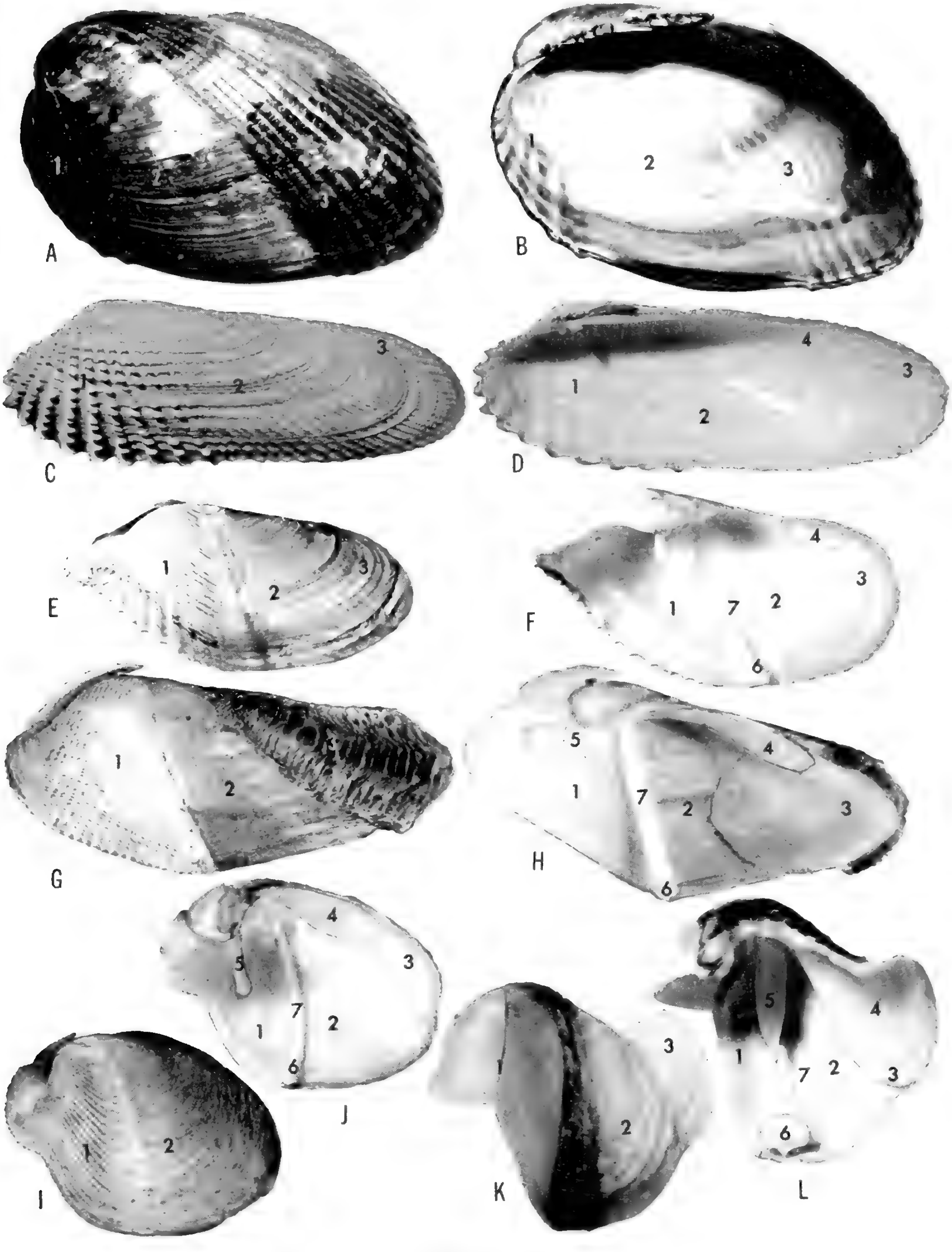


FIGURE 15

confused, but the prominent condyles and the large, high posterior slope on the valves of *megotara* readily distinguish that species. (Pls. 24 and 25 A, B). Since other species have shells similar to *megotara,* isolated valves cannot be determined.

For a time it was thought that the spacing of the denticulated ridges on the anterior slope might be a means of distinguishing species. William F. Clapp, wishing to prove this point, took great care to measure and describe these ridges, and accumulated sufficient data to prove that as a taxonomic character they were of little value. Temperature, salinity, rest periods, the hardness of the wood in which the animals are boring, and numerous other factors have such a bearing on the deposition of the denticulated ridges that the variation in spacing and number in different populations precludes any possibility of their being used to distinguish species. It is probably true that, of all shell characters, the denticles are the least variable, but they are so nearly identical in shape and size in widely separated species that they cannot be used as a means of classification.

Miller (1922) also demonstrated the variation in the number and spacing of the denticulated ridges on the anterior slope, as well as the variation in the denticles themselves. Kofoid and Miller (1927) pointed out that there was some ecological significance to these variations, but that they were certainly not worthy of even subspecific recognition. In fact, they stated that should recognition be given to such differences "it might even be necessary in some cases to establish subspecies for teredos from the top and bottom of the same pile."

May (1930) felt that the dorsal and ventral tubercles (condyles) of the valves and the muscle scars were more reliable characters for systematic work. To check this, a study was made for this report of growth series of several species, and it was soon evident that variation due to age and ecological conditions was such that identification to species or even to genus could not be made with certainty.

The size, shape and apparent point of origin of the apophyses are as variable as all other parts of the shell. In young specimens they are usually long, slender, with smooth edges, and extend from beneath the umbos. In most older specimens they increase in width, often become extremely irregular in shape, and their point of origin often appears to be progressively more posterior. In extreme cases the apophyses may appear to protrude from the middle of the shelf. In reality, however, with growth the apophyses have arched posteriorly along the dorsal margin and become fused with it. The genus *Eoteredo* Bartsch (1927) was described on the basis of such a shell, the distinguishing character being the protrusion of the apophyses from beneath the middle of the shelf (Pl. 22 E). Since the pallets were missing, and since this condition can be found in old specimens of several genera, the genus cannot be recognized.

The Tube

The extent and thickness of the calcareous lining of the burrow varies somewhat with the species but is also a reflection of the type of wood in which the animal bores. If the wood is smooth, the lining is usually thin, but the roughness of coarse-grained wood is covered by a thicker calcareous lining. All tubes are thickened at the posterior end, and it is here that characters which may be used in systematic work are found.

Periostracal or calcareous siphonal sheaths which extend beyond the surface of the wood are produced by many species. Jeffreys (1860b) described the thin periostracal sheath surrounding the siphons of *Teredo navalis,* and the calcareous tubes built by *Teredo* [probably *Nototeredo norvagica*] were described by Yonge (1927); those of *utriculus* [=*norvagica*] by Roch (1940); and *Teredo* [*Teredothyra*] *dominicensis* and *T. sigerfoosi* [=*Nototeredo knoxi*] by Clapp (1951).

The flexible, transparent periostracum of the newly formed sheaths is later rendered opaque and rigid by the deposition of calcareous particles in most species. These paired calcareous tubes can often be seen extending from the surface of the wood and when destroyed are soon replaced. They protect the partially extended siphons during normal activities, prevent the entrance of foreign particles or predators between the mantle and the lining of the burrow (Roch 1940), and if sediment collects on the surface of the wood they are raised above it to reach clear water (Yonge 1927).

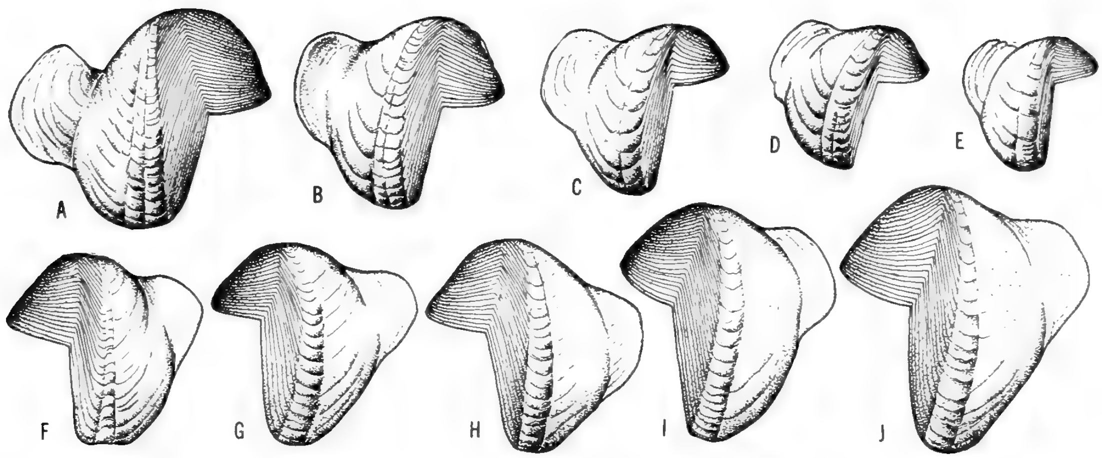


FIGURE 16

Similarity and Variation in Teredinid Shells

Because of the variation exhibited in the valves of a single population and the great similarity between the valves of species in different genera the shells alone cannot be used in classification in this family.

A-E. Series of valves to show the range and type of variation that can be found in *Teredo navalis* Linneaus. This growth series is from a single locality. (After Miller, 1922, pl. 15, fig. 4.)

F-J. Series of valves to show similarity among genera.

F. *Nototeredo knoxi* (Bartsch)

G. *Lyrodus pedicellatus* (Quatrefages)

H. *Nausitora dunlopei* Wright [young]

I. *Teredo fulleri* Clapp

J. *Bankia carinata* (Gray)

One of the greatest dangers to a shipworm is the enlargement of the posterior end of the burrow due to external erosion of the wood and the breaking of the calcareous tube. The tube may also be eroded internally by the friction of the pallets as they are moved forcibly into the opening. If the pallets do not fit tightly into the end of the tube, the shipworms are exposed to unfavorable conditions and predators. Throughout the family various methods appear to have been developed to combat this danger. When sufficient material is available for study, it may be possible to use the characters of the tubes as an aid in determining species, as well as to indicate relationships and evolutionary trends. However, at the present time it is only possible to postulate a theory based on limited observations.

Species with the pallet in one piece, as in the genus *Teredo,* cannot quickly enlarge the pallet to fit the aperture, but they can thicken the tube on its inner surface and thus reduce the aperture to fit the pallet. Many species with flattened pallets (*Teredora*, *Nototeredo*) produce concamerations which extend inward from the sides of the tube, and it is against these that the pallets fit. In this group a series of concamerations is produced as the animal grows, so that the pallets of adult specimens close the tube some distance anterior to the aperture. The siphons are long and extrusable, and muscular attachments of the siphons and the pallets are anterior to the concamerations (Fig. 13 D).

In other species such as *Teredothyra dominicensis* (Bartsch) the posterior end of the tube is partially or completely divided longitudinally by a calcareous partition which may become greatly thickened (Pl. 17 A, B). In such species the siphons are separate, long and extrusable, the incurrent siphon extending out of one half, the excurrent siphon out of the other half of the divided tube. The attachments of the muscles controlling the siphons and the pallets are anterior to the division. The siphons can be completely retracted, and the pallets then close the

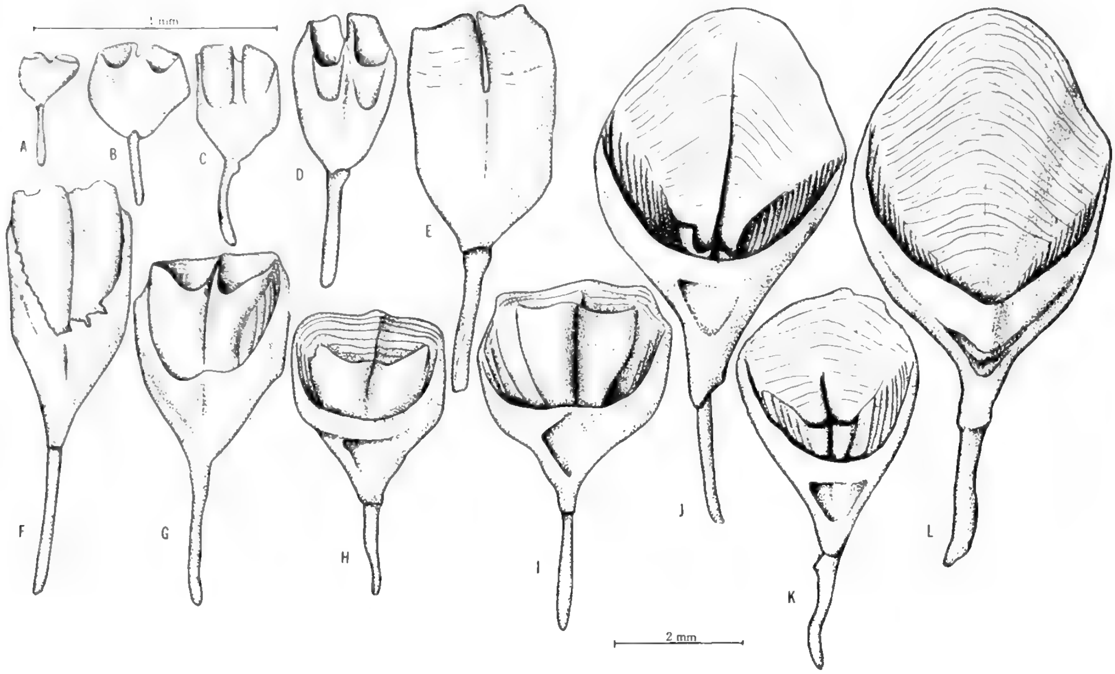


FIGURE 17

Growth stages of the pallets of *Teredora malleolus* (Turton), from the Ivory Coast. (After Rancurel, 1955, text figs. 1-4.)

The young pallets (A-G) have double tubes and may easily be confused with those of species in *Teredothyra* and with *Teredo fulleri* Clapp. [See section on evolutionary trends.] Developing specimens (H-K) show the gradual broadening of the blade of the pallet and reduction of the tubes as a result of the thickening of the base. In the adult (L) all signs of the double tubes are lost.

tube some distance from the surface, well beyond the reach of predators.

In the genera *Bankia* and *Nausitora* this problem is met by adding new, larger segments or cones to the proximal or anterior end of the pallet. The *Nototeredo* are transitional in this respect. They add new segments to the anterior end of the pallet, as well as additional calcareous deposits to the tube (Fig. 13 D).

The Pallets

Unlike the shells, the differences exhibited by the pallets are very striking, and classification at the generic and particularly the specific level is based upon them. It is impossible to explain these remarkable differences because the pallets in all species function for the same purpose in basically the same way. It is perhaps an example of "experimentation" on the part of the shipworms in response to the stresses of the environment, and the various types which proved successful have persisted.

In addition to the genetic variation, the appearance of the pallets may be greatly affected by ecologic conditions. They are easily damaged if the surface of the wood is hit a severe blow, and should the ends of the pallets protrude beyond the surface of the wood as a result of an enlarged aperture to the burrow, they are soon broken or nibbled by browsing fish. They may be corroded by acids in the wood or water; discolored by the wood, by oil or other pollutants in the water; or they may be misshapen by overcrowding, by contact with knots and nails, or as a result of the fusion of detritus to the distal end. The constant forcing of the pallets into the constricted opening of the tube causes considerable wear, and in specimens living under adverse conditions the blade may be eroded and the stalk enlarged, knobby and distorted. Often the opposing pallets of a single pair are so unlike each other, that had they not been taken from an entire specimen, one would not believe that they were mates.

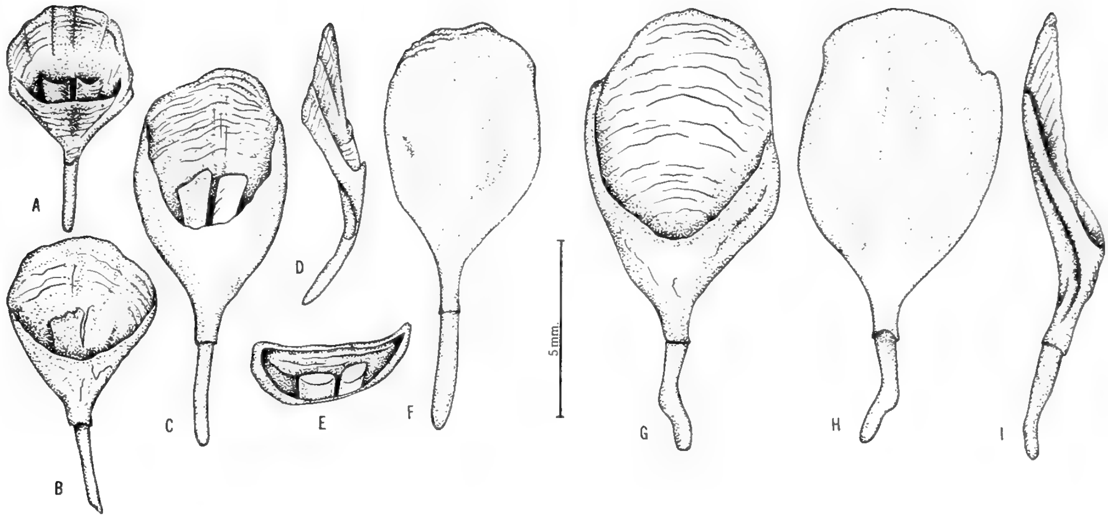


FIGURE 18

Pallets of *Teredora malleolus* (Turton), from Bastia, Corsica (Brussels Mus. 9219).
A-B. Young specimens with broad blades, showing the tubes at the base. In B, the tubes have been broken off but the attachment lines are still evident.
C-F. An older specimen with more elongate blade.
C. Outer face showing the thickened base but with the two tubes still evident.
D. Side view of pallet showing curvature and thumbnail-like depression.
E. View from distal end looking into the tubes.
F. Inner face.
G-I. An adult specimen.
G. Outer face showing the thickened base and the concentric growth lines on the blade.
H. Inner face showing the thickened central ridge which usually extends the length of the blade.
I. Side view of an adult.

There are two principal ways in which the pallets increase in size. Species with pallets composed of a single element, as in *Teredo, Psiloteredo, Neoteredo, Teredora, Dicyathifer* and *Kuphus,* accomplish this by the addition of material over the entire surface and the extension of the blade laterally and distally. Sections through such pallets show the layered structure, which is thickest near the stalk. May (1929) interpreted this concentric incremental growth in *Teredo navalis* as fused segments. However, in the adults of species having pallets of this type there is no evidence of the embryonic pallets remaining, for usually the general shape of the pallet remains the same throughout life; but if there is a difference, the young form is embedded in the thickened proximal end of the blade (Figs. 17, 18). This type of growth is apparently a relatively slow process and so, as mentioned previously, species in these genera often adjust the tube to fit the pallets, for they cannot rapidly increase the size of the pallets to fit the suddenly enlarged aperture.

In *Bankia, Nausitora, Spathoteredo* and *Nototeredo,* the stalk extends the length of the blade and growth is confined to the proximal end. The pallet is enlarged by the addition of segments or cones and each new element is slightly larger than the preceding one (Fig. 19 A-C). Pallets which grow in this manner are usually much longer than wide, but the distal elements are often lost. If the aperture of the burrow becomes enlarged, the earlier, small elements protrude beyond the surface of the wood as the pallet is forced into the opening until it fits tightly. The protruding portion is soon broken off and new elements are added to the base.

Adult *Bankia* are easily recognized by the elongate pallets, composed of numerous cone-shaped elements supported on a stalk which extends the length of the blade. The characters of the periostracal border and the shape of the

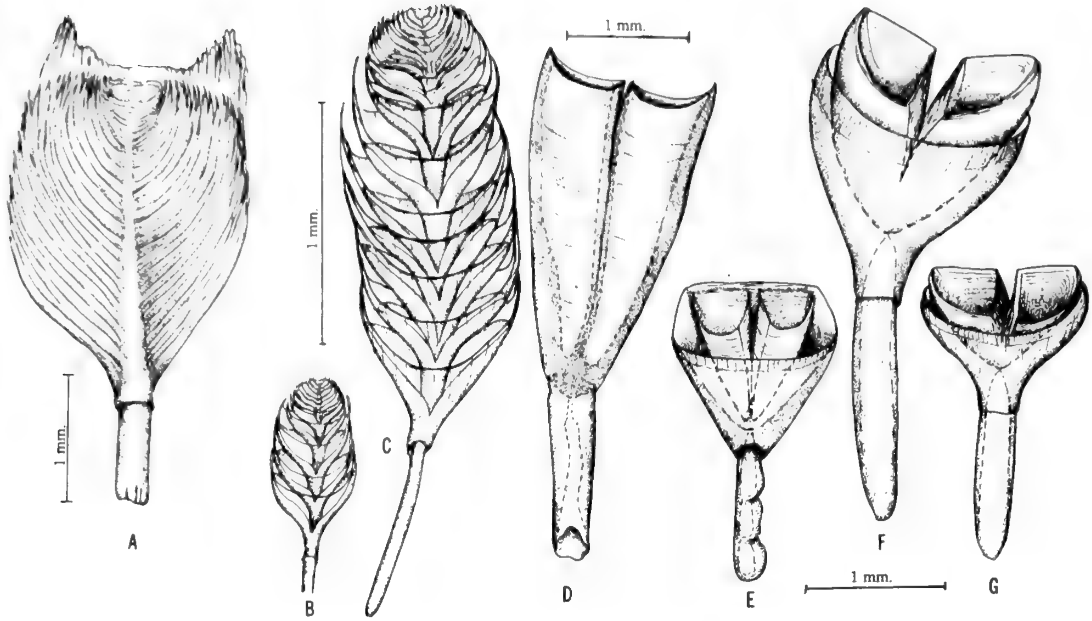


FIGURE 19

The structure of pallets as seen in cleared or young specimens when viewed with transmitted light.

A. *Nototeredo knoxi* (Bartsch), from Pivers Island, Beaufort, North Carolina.

B-C. *Bankia setacea* (Tryon), from Cowichan Bay, British Columbia, showing the V-shaped outer margin of the calcareous portion (stippled area) of the cones at this stage and the separate cones at the tip.

D. *Teredothyra dominicensis* (Bartsch), from Puerto Plata, Santo Domingo, showing the double cupped blade and the hollow stalk.

E-G. *Teredothyra matocotana* (Bartsch), from Coco Solo, Canal Zone, Panama.

E. A young specimen with the inner double tubes not developed beyond the outer basal cup and, at this stage, closely resembling young *Teredora*.

F. A young specimen with tubes extending well beyond the basal cup.

G. A specimen probably of the same age as F but stunted.

cones are the bases for subgeneric and specific classification (Fig. 24). In most species the embryonic cones, though minute and closely spaced, are distinct (Fig. 19 B, C), but in *Bankia carinata* (Gray) the young pallets are *Lyrodus*-like in appearance and could easily be confused with species in *Lyrodus* (Fig. 22). Other variations in *Bankia* include the presence of a secondary 'bract' at the base of the cones (Fig. 23) and the presence of a double periostracal border on the cones as in *Bankia orcutti* Bartsch (Pl. 44 A).

The pallets of young *Nototeredo* have clearly defined cone-like elements, and the stalk of the pallet extends through the blade to the tip. Periostracum covers the surface of the blade uniting the cones, but distinct awns are present even in some adult specimens; and cleared pallets of older specimens show that the calcareous base of the pallet is segmented.

Variations in the size and shape of the pallets of *Teredo* [*Nototeredo*] *norvagica* from western Norway were illustrated by Nair (1959), and of *Teredo navalis* from San Francisco Bay, California, by Miller (1923). Variation in the amount of deterioration which can take place in the pallets of living specimens (as expressed in the paratype series of *Bankia* (*Nausitora*) *jamesi* Bartsch) is shown in Plate 38 C. When comparing this series with the illustrations of the holotype specimen of *Nausitora dryas* Dall (Pl. 38 A) and the holotype of *B. jamesi* Bartsch (Pl. 38 B), one can readily see that these are the same species, though the two holotypes look remarkably different. Such transitional forms, due to age and wear, should be visualized, and a diligent search made for them before new species are described.

No studies have been made on the growth of pallets in *Bactronophorus, Teredothyra* or *Lyrodus,* but they are of the non-segmented type. Cleared pallets of *Teredothyra* (Fig. 19 D, E; Pl. 19 E) and *Lyrodus massa* (Pl. 18 D) show that the stalk extends only to the base of the inner element and is usually hollow.

Recent studies on the development of pallets have shown some remarkable changes in shape as a result of age and have indicated the need for further work. Monod (1952) illustrated with 79 figures the developmental stages and variation in the pallets of *Teredo* [*Psiloteredo*] *senegalensis* Blainville and showed that *petitii* Récluz is in fact only the young stage and ecologic form of *senegalensis* (Pl. 33 C). These two forms had previously been placed in separate subgenera by Moll and Roch. A similar study on *Teredora malleolus* (Rancurel, 1955) showed the similarity of the pallets of young *malleolus* to those of *Teredothyra* and young *Teredo fulleri* Clapp (Figs. 17, 18, 19 D-G; Pl. 12 A-C). Edmondson (1942) illustrated the growth stages of *Teredo trulliformis* Miller [*Teredo clappi* Bartsch], the young stage of which is also similar to young *fulleri.*

The pallets of species in the genus *Lyrodus* are particularly variable and, of the numerous species described, most of them appear to be forms of *Lyrodus pedicellatus* (Quatrefages) (Pls. 1-5). These variations are a reflection of age, ecologic conditions and wear (Fig. 20), or are the result of drying and exfoliation of the periostracal cap (Fig. 21).

Many species of teredinids have been described on the basis of pallets which had been dried out, and, as a result, it is often impossible to equate living material with them. This has been done, in some cases, by obtaining good material from the type locality of the species in question and "deteriorating" it to match the types. Figure 21 illustrates the striking difference in appearance between dried and preserved pallets of *Lyrodus pedicellatus* (Quatrefages). Equally striking examples could be given for many other species, especially those with a large amount of periostracum.

Thus, it is evident that when determining species, and especially when describing new ones, it is essential to have a large series of living or well preserved specimens.

THE SIPHONS

Siphons have not been used in systematic work but they are characteristic and will probably prove useful in determining species. Siphonal characters which may be of taxonomic value include the length, the extent to which they are separated, the number and size of the papillae, the color and color pattern. The extent of genetic variation, as well as the amount of variation occurring with age and resulting from varying ecologic conditions, must be worked out for each species. It is important that studies on the siphons be made, because they are the only means of determining species in the field and it would be of great help to ecologists, engineers, and others who need to know the species with which they are working but cannot or do not wish to disturb the animal. Such studies must be made on living material, for in preserved specimens the papillae are contracted and the color lost.

The only published work on the siphons is that of Roch (1940), in which he showed cross sections of the incurrent siphons of three species belonging to three different genera. Species in the same genus probably would not show such marked differences. He also illustrated the peculiar papillae on the excurrent siphon of *T. utriculus* [=*Nototeredo norvagica*]. Clapp (1951) observed a somewhat similar pair of papillae on the excurrent siphons of *T. sigerfoosi* [=*Nototeredo knoxi*], thus strengthening the idea that the morphological structure of the siphons can be used in systematic work. Clapp also noted that variation in pigmentation in the siphons of *Bankia gouldi* was too great for positive identification and was similar to that of *Teredo bartschi,* a species often found with *gouldi.*

Siphonal differences illustrated in this report include the "tentacles" on the incurrent siphon of *Nausitora fusticula* (Fig. 12), the united siphons of *Teredora malleolus* (Fig. 5), and the pigmented and partially separated siphons of *Bankia rochi* (Fig. 23).

FIGURE 20

Growth stages and variation in *Lyrodus pedicellatus* (Quatrefages). A series taken from a single test board submerged at Port Hueneme, California.

- A. A young specimen showing the periostracal cap extending down over the conical calcareous base.
- B-C. Specimens showing the beginning of the bubble-like cavity in the periostracal cap.
- D. Specimen with bubble broken.
- E. Specimen with the periostracal cap so dark and heavy that the inner structure cannot be seen.
- F-G. Specimens showing variation in shape of the calcareous base.
- H. Specimen with detritus fused to the end of pallet.
- I. Nearly perfect specimen with well developed bubble-like cavity.
- J. Specimen with cavity broken and filled with debris.
- K. Old worn specimen with periostracal cap worn away exposing the calcareous base.
- L. Specimen with cavity filled with solidified debris so that it appears to be part of the pallet. Additional wearing of the pallet would leave the debris extending as a knob. The genus *Teredops* was based upon specimens in this condition.

FIGURE 21

Variation in, and effects of, drying on pallets of *Lyrodus pedicellatus* (Quatrefages), from Townsville, Queensland, Australia. Paired series of pallets (i.e., A-a; B-b; C-c) from a single test board.

- A-E. Outer and inner faces, respectively, of the members of each pair, which were preserved in glycerine-alcohol.
- a-e. Outer and inner faces, respectively, of the opposite members of each pair which were allowed to dry for several weeks.

In the dried series the periostracum appears much darker; much of it has cracked and fallen away and what remains is not nearly as transparent as in living or preserved specimens. Even the calcareous portion of the dried pallets shriveled considerably and changed in shape so that in most cases it is no longer possible to match the pairs.

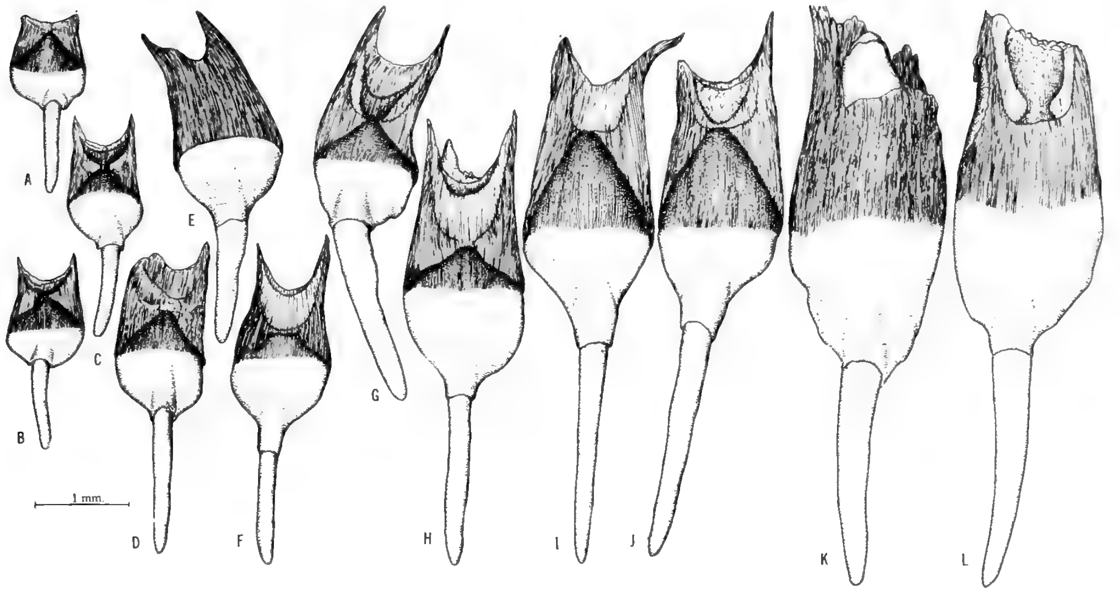


FIGURE 20

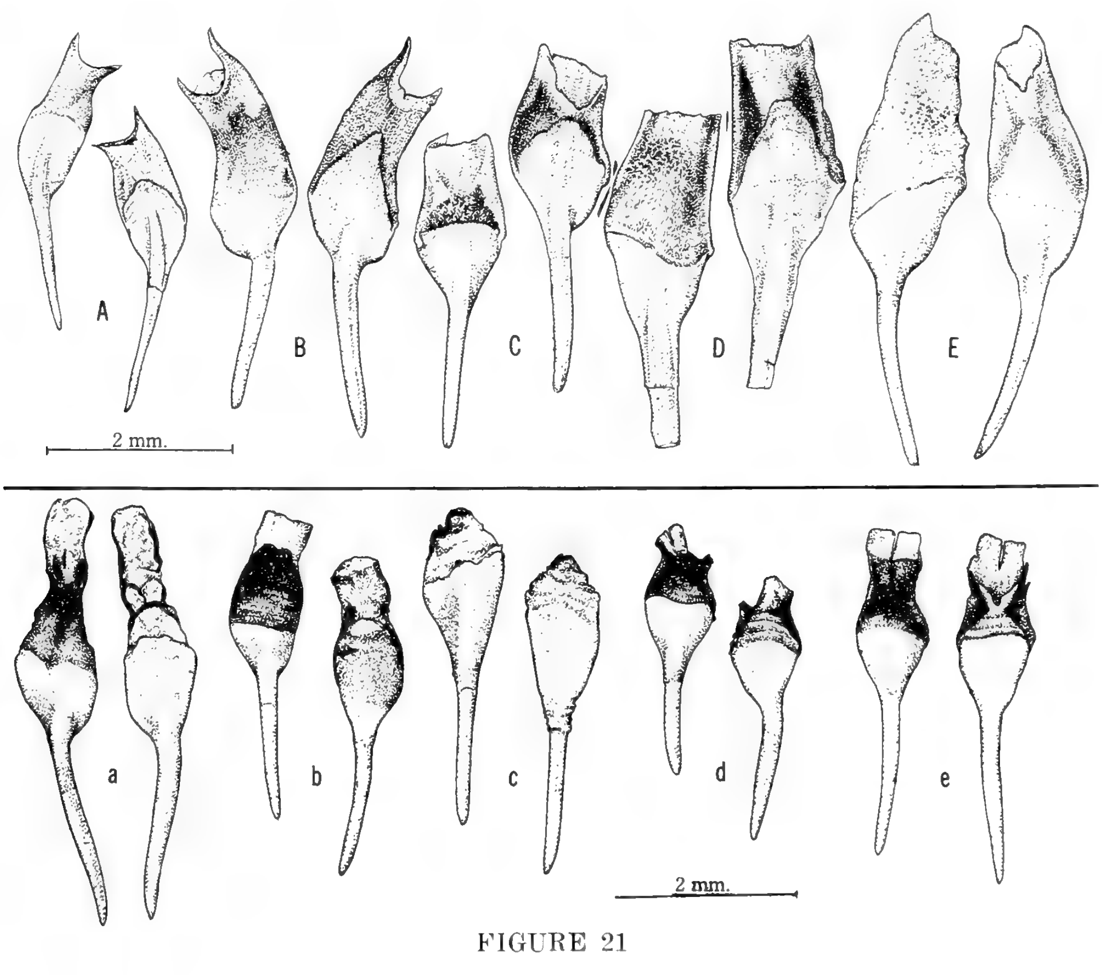


FIGURE 21

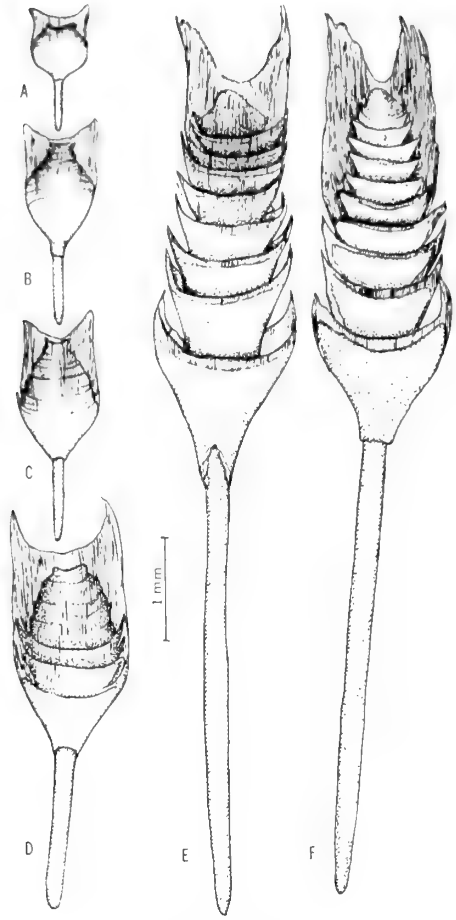


FIGURE 22

Growth stages in the pallets of *Bankia carinata* (Gray). All specimens were taken from a single board in which no other species of *Bankia* and no *Lyrodus* were found. They are from a board submerged 3 miles off Fort Lauderdale, Florida, in 300 feet, and received through the kindness of the U. S. Naval Oceanographic Laboratory.

A. A very young *Lyrodus*-like stage with a calcareous base and periostracal cap.
B. Beginning of segmentation in the calcareous base.
C. First lateral awns.
D. Three distinct cones which are still covered by a periostracal cap and so are not entirely separated.
E. Outer face of young pallet which is large enough to be definitely determined as *carinata*.
F. Inner face of pallet showing the extent to which the periostracal cap covers the early cones.

Genera of the Teredinidae

Just how many genera and subgenera should be recognized in the Teredinidae is and has been a matter of individual opinion. As pointed out in the historic account, Gray (1851) recognized four genera, while H. and A. Adams (1856) used only one genus divided into three subgenera. Though the number of genera and subgenera described since that time has increased beyond all reason, the proportional number of groups recognized by the various workers has remained about the same. There have been at least 42 genera and subgenera described, most of them since 1920. Moll (1952) recognized 27 generic group names, three of which he described as new subgenera (pp. 81-86) and all of which he later treated as genera (pp. 121-123). In another section of the same report, Monod and Nicklès (1952) grouped the West African species into two genera and 18 subgenera. Okada (1958), when considering the Teredinidae of Japan, recognized ten genera with two subgenera in *Bankia,* five in *Teredo,* and three in *Psiloteredo.* None of these classifications agree.

The system proposed here is based on the anatomy of the soft parts and the structure and manner of growth of the pallets.

In the following diagnosis, only the author, date, and type species of the genera are given. The complete citation can be found in the catalogue. Fourteen genera are recognized, but, at present, subgenera are not being used because in most cases there are transitional species between them.

The genus *Zachia* has not been included because 1) the original material has not been studied for this report, 2) the description and figures of the two included species were inadequate, and 3) additional material has not been collected.

Reference should also be made to the section on anatomy, because only those characters essential to identifying the genera are given here.

Only the names of valid species are given under "Included species"; for synonyms check these names in the Catalogue.

Subfamily KUPHINAE Tryon 1862

(See p. 57)

Genus KUPHUS Guettard

Figs. 6 B, 7 A-B

Kuphus Guettard 1770—*Serpula polythalamia* Linnaeus [Also spelled *Cuphus, Cyphus* and *Kyphus*].
Furcella Lamarck 1801—*Serpula polythalamia* Linnaeus.
Septaria Lamarck 1818 (non Férussac 1807)—*Septaria arenaria* Lamarck [=*polythalamia* Linnaeus].
Clossonaria Férussac 1822. Refers to the cloissonnaire and *Septaria* of Lamarck.
Clausaria Menke 1828. Refers to *Septaria* Lamarck.

Diagnosis. Pallets simple, solid, almost entirely calcareous, more or less triangular in outline and with a long heavy stalk. Blade flat on the inner face, convex on the outer face, and with a shallow cup. Shell small, anterior margin of the valves sinuate, anterior slope nearly smooth, posterior slope reduced and covered by the heavy muscular collar which surrounds the animal just posterior to the valves. Tube thick, solid and divided posteriorly. Siphons long and separate. (For anatomy, see p. 20.)

Mud borers, restricted to the mangrove areas of the Indo-Pacific.

Included species. K. polythalamia (Linnaeus).

Subfamily TEREDININAE Rafinesque 1815

(See p. 57)

Genus BACTRONOPHORUS Tapparone-Canefri

Fig. 8 B; Plate 25 C-D

Calobates Gould 1859 (non Temminck 1832)—*Teredo thoracites* Gould.
Bactronophorus Tapparone-Canefri 1877. New name for *Calobates* Gould 1859 (non Temminck 1832).

Diagnosis. Pallets asymmetric, the basal portion of the blade more or less triangular in outline with a shallow cup from which issues a pustulose, calcareous, dagger-like extension. Siphons relatively short and united for most of their length. (For anatomy, see p. 23.)

Wood borers, found in the mangrove and brackish water areas of the Indo-Pacific.

Included species. B. thoracites (Gould).

Genus NEOTEREDO Bartsch

Figs. 6 A, 8 A, 13 A-C; Plate 32 C

Neoteredo Bartsch 1920—*Teredo reynei* Bartsch

Diagnosis. Pallets simple, broadly oval, solid, heavy, slightly cupped at the distal end in young and perfect specimens, but often eroded to a rounded posterior margin. Posterior end of the animal with two long fleshy lobes or lappets on the dorsal surface.

Species in this genus are among the largest in the family; preserved specimens of *reynei* from Surinam measured over 54 cm (21 inches) in length. (For anatomy, see p. 23.)

At present the genus is known from Antigua, Lesser Antilles, the north coast of South America from

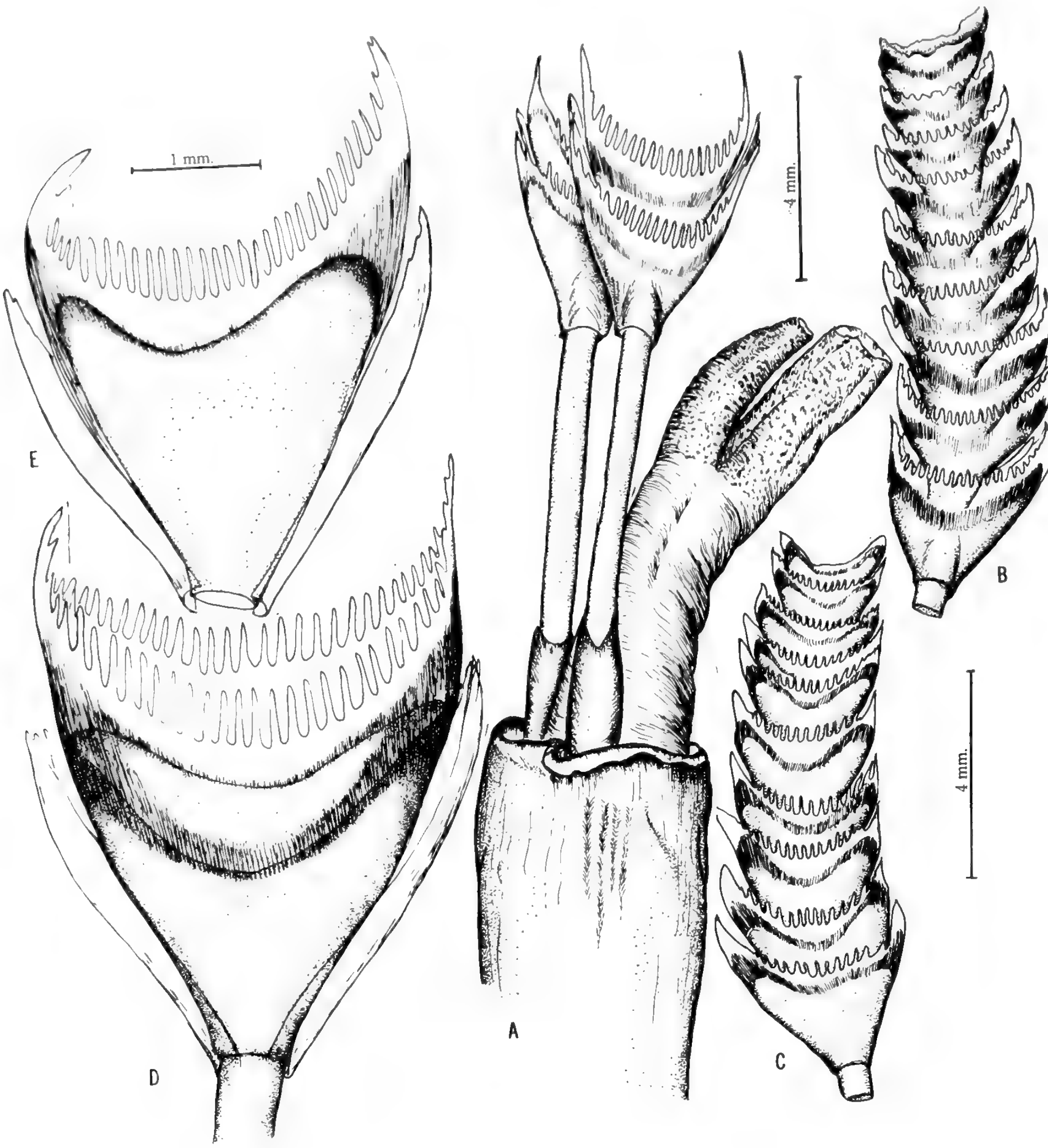


FIGURE 23

Bankia rochi Moll, from mangrove, Fishermans Island, Brisbane River, Queensland, Australia.

A. Posterior end of the animal, showing the siphons which are divided at the end and marked with red-brown reticulations and spots. The stalk of the pallet is long and the sheath extends well up the stalk.

B. Outer face of a section of the blade of the pallet showing the broad periostracal border of the cones, which is very light, and was called ''gleaming white'' by Moll, but usually has a brownish band just at its junction with the calcareous portion of the cone.

C. Inner face of blade of the pallet.

D. Outer face of a single cone with the secondary ''bracts'' at the base.

E. Inner face of a single cone.

Surinam to São Paulo, Brasil, and the coast of Africa from Sierra Leone to the Congo.

Included species. N. reynei (Bartsch).

Genus DICYATHIFER Iredale

Fig. 7 C, D; Plate 36 D

Dicyathifer Iredale 1932—*D. caroli* Iredale [=*manni* Wright].

Pseudodicyathifer Tchang, Tsi and Li 1958—*Teredo manni* (Wright).

Diagnosis. Pallets simple, solid, almost entirely calcareous, more or less triangular in outline and with a long heavy stalk. Inner face of blade flat, outer face convex, cup shallow and partially to almost completely divided by a median longitudinal ridge. Shell relatively large, anterior slope of the valves broad and strongly sculptured, posterior slope reduced. Siphons separate; animal lacking a muscular collar posterior to the valves.

Dicyathifer was formerly considered a synonym of *Kuphus,* but anatomical differences reported here have shown it to be a distinct genus. (For anatomy, see p. 24.)

Wood borers, confined to the brackish water, mangrove areas of the Indo-Pacific.

Included species. D. manni (Wright).

Genus TEREDOTHYRA Bartsch

Figs. 8 C, 19 D-G; Plates 16, 17, 19

Teredothyra Bartsch 1921—*Teredo dominicensis* Bartsch.

Ungoteredo Bartsch 1927—*Teredo matocotana* Bartsch.

Idioteredo Taki and Habe 1945—*Teredo smithi* Bartsch.

Diagnosis. Pallets composed of a broad to elongate basal cup with a secondary inner cup which is divided medially. The stalk, which is sheathed by the basal cone, extends into the blade only as far as the base of the inner cup. The structure of the pallets may best be seen on young or cleared specimens using transmitted light. Siphons relatively long and separated. (For anatomy, see p. 26.)

So far as known, all species in this genus are small. The genus is world-wide in distribution in tropical and subtropical seas.

Included species. T. dominicensis (Bartsch), *excavata* (Jeffreys), *matocotana* (Bartsch), *smithi* (Bartsch).

Genus TEREDORA Bartsch

Figs. 5 C, 17, 18; Plates 20, 21

Malleolus Gray 1847 (non Rafinesque 1815; non Ehrenberg 1838)—*Teredo malleolus* Turton.

Teredora Bartsch 1921—*Teredo malleolus* Turton.

Diagnosis. Pallets solid, almost entirely calcareous, oval to broadly oval in outline and with a short stalk. Blade thick at the base, thin at the distal margin, convex on the outer and concave on the inner face. Outer face with a small to large, deep, thumbnail-like depression which is marked with broadly curved, concentric growth lines. The thickened area at the base and on the sides of the depression is smooth. Blades of the pallets in the young are double-cupped, the two cups often remaining as tubes at the base of the depressions in older specimens. Stalk extending only to the base of the depression (usually best seen in young specimens or cleared adult specimens when viewed with transmitted light). Valves with the posterior slope small, high, and with the ventral margin of the shelf forming a nearly right angle to the dorsoventral axis of the valves. Tubes probably concamerated at the posterior end. Siphons united, gills extending without reduction from the siphons to the mouth.

There is much variation in the pallets of species in this genus, even within a single lot. Young specimens may have pallets which are wider than long; the depression may be deep or rather shallow, with or without a slight cavity under the smooth basal portion. A median rib may extend the length of the blade on the inner face, and fine radiating wrinkles may be present on the outer face. These radiating wrinkles should not be confused with the strong regular radiating ribs of *Uperotus.* Rancurel (1955) discussed and illustrated the differences in the growth of pallets in these two genera.

See also the discussion of the problems concerning the pallets of *Nototeredo.* (For anatomy, see p. 28.)

Teredora is world-wide in distribution, ranging from tropical to warm temperate waters.

Included species. T. malleolus (Turton), *princesae* Sivickis.

Genus UPEROTUS Guettard

Plate 23

Uperotus Guettard 1770—*Teredo clava* Gmelin.

Fistulana Lamarck 1799—*Teredo clava* Gmelin.

Guetera Gray 1840—*Fistulana corniformis* Lamarck [=*clavus* Gmelin].

Glumebra Iredale 1936—*Glumebra elegans* Iredale [=*clavus* Gmelin].

Hyperotus Herrmannsen 1847—Emendation for *Uperotus* Guettard.

Diagnosis. Pallets oval to rectangular in outline with a short, heavy stalk. The basal portion of the blade nearly smooth, the distal portion with pronounced radiating ribs. Shells with the anterior and posterior slopes greatly reduced, or typical in shape with the posterior slope high. Tube of all species probably concamerated at the opening. Gills extending without reduction from the siphons to the mouth.

At the time he proposed the name *Teredora,* Bartsch designated *Teredo malleolus* Turton as the type species. Unfortunately, he also included in the description species which had radiating ribs on the pallets and typical teredinid shells.

Rancurel (1955) showed the structure and development of the pallets of *Teredo lieberkindi* Roch (a species with *Uperotus*-like pallets and *Teredora*-like valves) to be very different from that of *Teredora malleolus* (Turton) and suggested that the two species were not closely related. The difference in shell characters of various species in *Uperotus* probably results from the material in which they are living. All species found in nuts have a narrow shell, while others with very similar pallets, living in the same general area, but boring into wood, have a more typically shaped shell. Observations made by the author on *Uperotus* found in the vicinity of Madras and Mandapam Camp, India, indicate that *clavus* (nut borer) and *rehderi* (wood borer) are probably the same species, for it was possible to get transition forms: the valves of specimens boring into soft wood being much closer in appearance to the nut borers than those taken from harder wood. This cannot be stated definitely, however, until it has been shown experimentally that the young of *clavus*, when boring into wood, mature to look like *rehderi*. (For anatomy, see p. 28.)

All records of species in this genus are from material obtained by dredging or from drift cast upon the beach. *Uperotus* is probably not an intertidal group, and this may account for the apparent rarity of all species belonging to this genus.

This genus is circumtropical in distribution.

Included species. U. clavus (Gmelin), *panamensis* (Bartsch), *rehderi* (Nair) [probably only an ecologic wood-boring form of *clavus*], *lieberkindi* (Roch) [is possibly *panamensis*].

Genus PSILOTEREDO Bartsch

Fig. 9 A-C; Plates 25 A-B, 26 A-E, 27 A-C, 33 A,C

Psiloteredo Bartsch 1922—*Teredo dilatata* Stimpson [=*megotara* Hanley].
Dactyloteredo Moll 1941—*Teredo megotara* Hanley.

Diagnosis. Pallets solid, almost entirely calcareous, broad to elongate oval in outline, and with a short stalk. Blade thick at the base, becoming thin at the distal margin, slightly concave on the inner face and convex on the outer. Outer face with a moderate to deep thumbnail-like depression or a slight depression with two finger-like projections extending from it in the young stage, the pallets becoming paddle-like in the adult (Pl. 33 C). Valves with prominent condyles and moderate to large, ear-shaped posterior slopes which are usually flaring. Tubes of all species probably concamerated at the posterior end. Siphons united except at the tip. Gills reduced to the food groove only over the visceral mass. (For anatomy, see p. 28.)

Psiloteredo is world-wide in distribution in tropical and temperate seas, with one species occurring in brackish to fresh water.

Included species. P. healdi (Bartsch), *megotara* (Hanley), *senegalensis* (Blainville).

Genus TEREDO Linnaeus

Fig. 11 A; Plates 7-15

Teredo Linnaeus 1758—*Teredo navalis* Linnaeus.
Austroteredo Habe 1952—*Teredo parksi* Bartsch.
Coeloteredo Bartsch 1923—*Teredo mindanensis* Bartsch.
Pingoteredo Iredale 1932—*Teredo shawi* Iredale [=*bartschi* Clapp].
Zopoteredo Bartsch 1923—*Teredo clappi* Bartsch.

Diagnosis. Pallets variable, but with the blade always in one piece, usually with a small cup which may be divided medially. Periostracum usually thin and closely adhering to the calcareous portion, but if extending beyond the calcareous portion as a border, it is never in the form of a cap as is *Lyrodus*. Blade usually sheathing the stalk for a short distance, the stalk varying in length but solid. The shells cannot be distinguished from those of *Lyrodus* and *Bankia*. The siphons are long, and separate. The young are retained within the female until the veliger stage. (For anatomy, see p. 29.)

This is the largest and most variable genus in the family and may eventually be split into two or more genera. See section on Trends in Evolution.

The genus *Teredo* is found throughout the world, usually in marine conditions, though a few species are found in brackish water.

Included species. T. aegypos Roch, *bartschi* Clapp, *clappi* Bartsch, *fulleri* Clapp, *furcifera* von Martens,

FIGURE 24

Pallets of the type species of subgenera used in the genus *Bankia*. Figures marked with capital letters are of the outer faces and those marked with lower case letters are of the inner faces of the pallets.

A a. *Bankia (Bankia) bipalmulata* (Lamarck)
B b. *Bankia (Bankiella) mexicana* Bartsch [=*gouldi* Bartsch]
C c. *Bankia (Bankiopsis) caribbea* Clench and Turner [=*carinata* Gray]
D d. *Bankia (Lyrodobankia) kamiyai* Roch [=*carinata* Gray, a young specimen]
E e. *Bankia (Liliobankia) katherinae* Clench and Turner [=*campanellata* Moll and Roch]
F f. *Bankia (Neobankia) zeteki* Bartsch
G g. *Bankia (Plumulella) fimbriatula* Moll and Roch
H h. *Bankia (Clupibankia) barthelowi* Bartsch

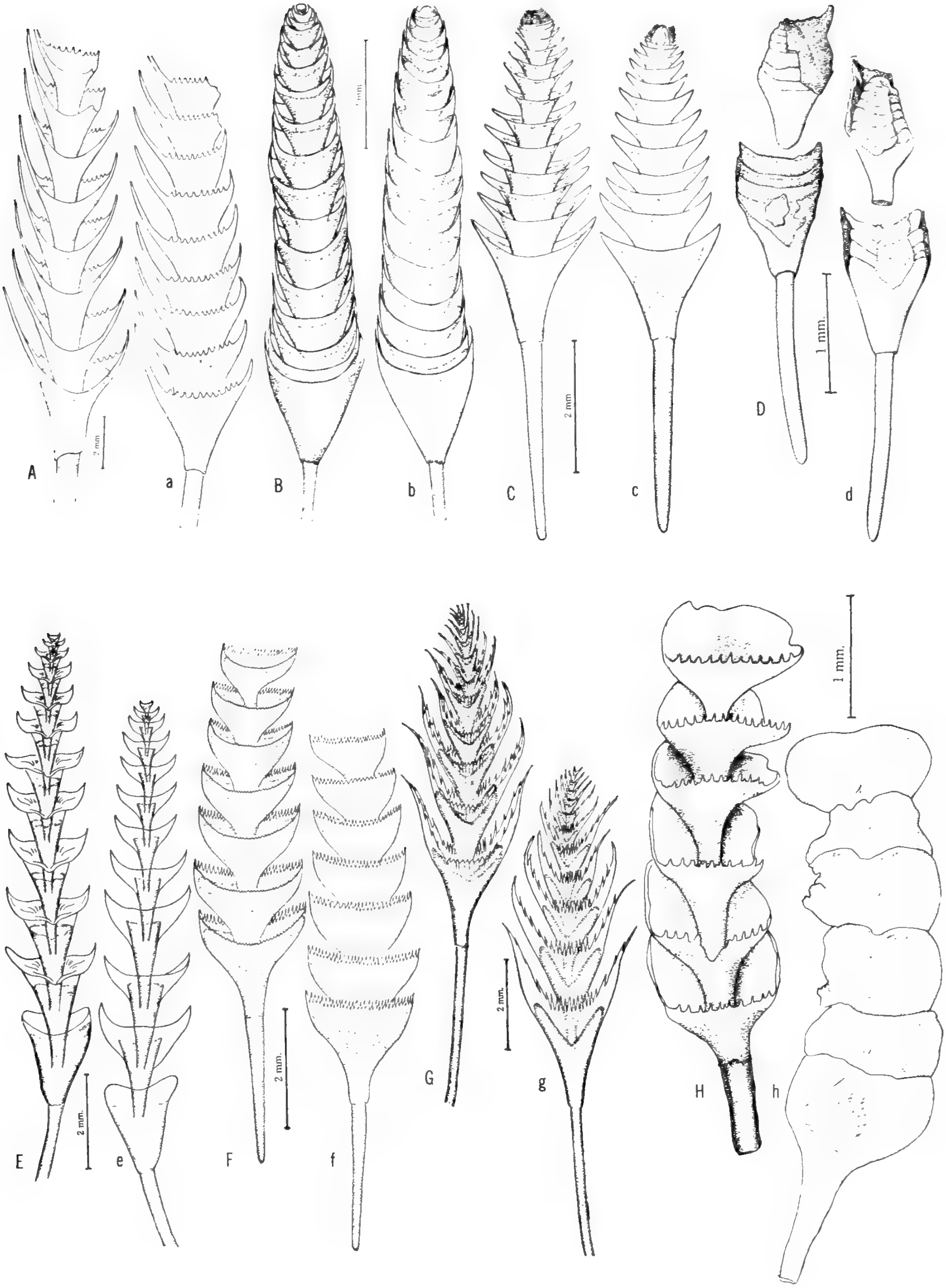


FIGURE 24

johnsoni Clapp, *mindanensis* Bartsch, *navalis* Linnaeus, *poculifer* Iredale, *portoricensis* Clapp, *somersi* Clapp, *triangularis* Edmonson.

Genus LYRODUS Gould

Figs. 20-21; Plates 1-6

Lyrodus Gould 1870—*Teredo chlorotica* Gould [=*pedicellatus* Quatrefages].
Teredops Bartsch 1921—*Teredo diegensis* Bartsch [=*pedicellatus* Quatrefages].
Cornuteredo Dall, Bartsch and Rehder 1938—*Teredo* (*Cornuteredo*) *milleri* Dall, Bartsch and Rehder [=*affinis* Deshayes].

Diagnosis. Pallets with a calcareous base and a pronounced brown to nearly black periostracal cap which can readily be separated from the base or with a periostracal cup set in calcareous base. The calcareous portion is narrowly to broadly rounded at the distal end and is often marked by concentric growth lines. The distal margin of the periostracal portion may be straight, broadly curved, or may have lateral horns. It may be solid or with a bubble-like cavity, which in old specimens breaks open, allowing the cavity to become filled with debris which solidifies to produce a knob-like process. The shells cannot be distinguished from those of *Teredo* and *Bankia*. Siphons relatively short and separate. The young are carried by the female until the late veliger stage. (For anatomy, see p. 29.)

The genus is world-wide in distribution in tropical and warm temperate seas.

Included species. L. affinis (Deshayes), *bipartita* (Jeffreys), *massa* (Lamy), *medilobata* (Edmondson), *pedicellatus* (Quatrefages), *takanoshimensis* (Roch).

Subfamily BANKIINAE new subfamily

(See p. 57)

Genus NOTOTEREDO Bartsch

Figs. 10, 13 D, 19 A; Plates 24, 28, 29 A, B, E, 30-31

Nototeredo Bartsch 1923—*Teredo edax* Hedley.
Phylloteredo Roch 1937—*Teredo norvagica* Spengler.

Diagnosis. Pallets oval to broadly oval in outline with a short stalk. Blade thin, convex on the outer, and concave on the inner face. Blade composed of a soft, friable calcareous material laid down in closely packed segments, separated by thin layers of periostracum. In the young of some species, the periostracum may be seen extending to form small awns, particularly at the distal end of the pallet. Entire surface of the blade covered by a pale yellow-brown periostracum which extends as a border distally. Periostracum often worn away in old specimens, the blade often scaling and flaky. Closely packed segments near the tip of the blade appear concentrically arranged, and in some species form a small, shallow, indefinitely marked depression. The pallets of young or cleared adult specimens, viewed with transmitted light, show the segmented structure of the pallets and the stalk extending the length of the blade, with the rib-like segments emanating from it.

The shells are like those of *Teredo, Lyrodus* and *Bankia*. Siphons, in species examined, rather short, separate, and about equal in length. The tubes are concamerated at the posterior end. (For anatomy, see p. 29.)

The genus *Nototeredo* is world-wide in distribution, occurring in fully marine conditions and ranging from tropical to cold temperate seas.

Included species. N. edax (Hedley), *knoxi* (Bartsch), *norvagica* (Spengler).

Genus SPATHOTEREDO Moll

Fig. 11 B; Plate 36 A-C

Spathoteredo Moll 1928—*Teredo bataviana* Moll and Roch [=*obtusa* Sivickis].

Diagnosis. Pallets more or less rectangular in outline, with a pustulose, calcareous incrustation at the distal end, and a dark band of periostracum at the mid-portion. Stalk extending through the blade (best seen in cleared specimens viewed with transmitted light). Segments of the blade very closely packed, the brown periostracum covering them extending laterally as awns, particularly in young specimens. Valves similar to those in *Teredo*. The siphons (in preserved specimens) short, united for about half their length. (For anatomy, see p. 30.)

So far as we now know, this genus is restricted to tropical and subtropical waters of the Indo-Pacific and the Western Atlantic, with one record from the Cameroons.

Included species. S. obtusa (Sivickis), *spatha* (Jeffreys).

Genus NAUSITORA Wright

Figs. 11 C, 12; Plates 37-43

Nausitora Wright 1864—*N. dunlopei* Wright.
Inequarista Iredale 1932—*Nausitora messeli* Iredale [=*dunlopei* Wright].
Nausitorella Moll 1952—*Teredo fusticulus* Jeffreys.

Diagnosis. Pallets elongate, composed of closely packed and fused, cone-like elements built upon a central stalk. Periostracal covering often extending as awns on the basal portion of the blade, particularly in young specimens. Distal portion of the blade of many and perhaps all species with a papillose, calcareous covering which may be worn off in old specimens. Valves large. Siphons short, united for at least half their length. (For anatomy, see p. 30.)

The genus *Nausitora* is restricted to tropical and subtropical waters and is usually found in mangrove

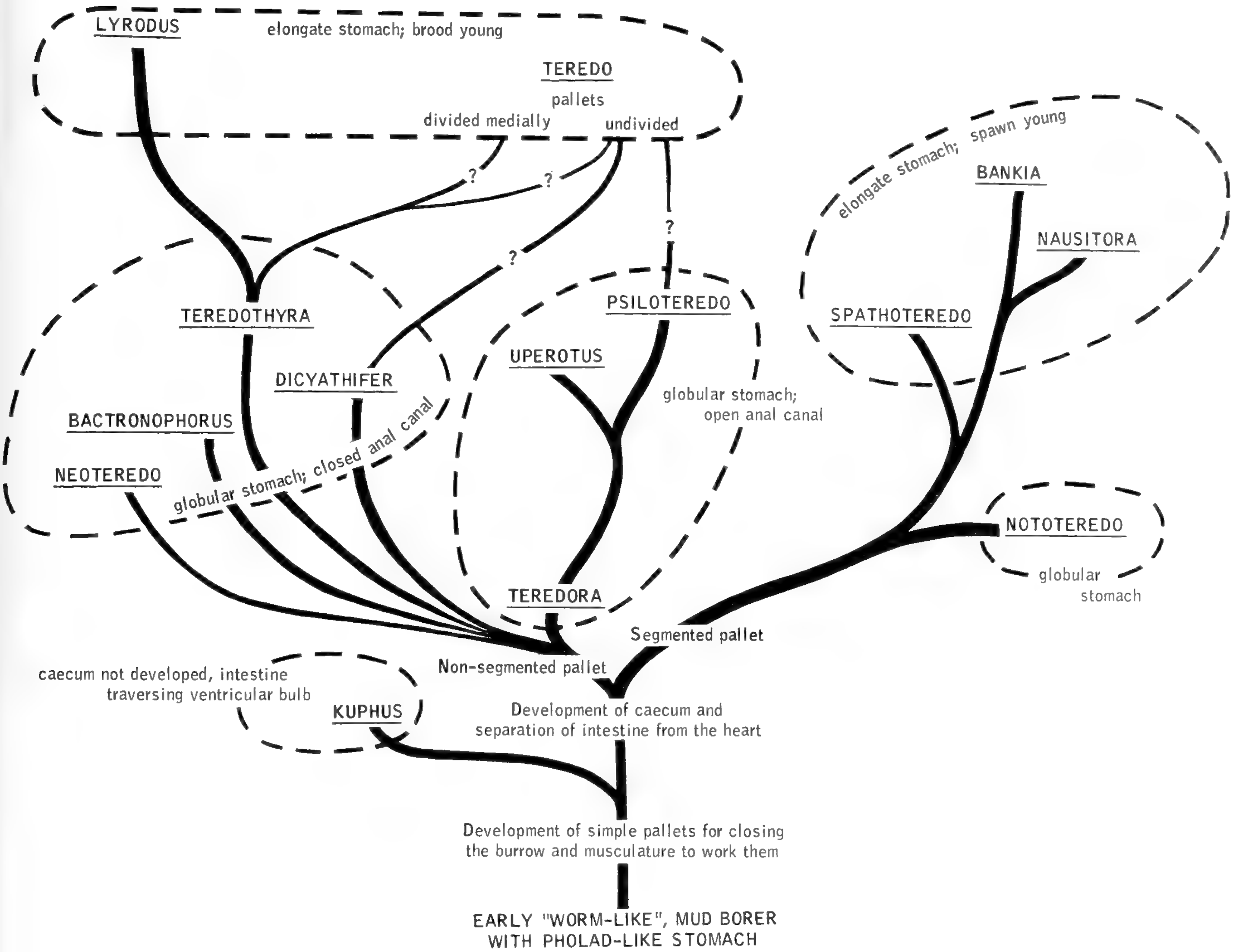


FIGURE 25

A diagrammatic presentation of the relationships of the various genera as discussed in the section "Trends in Evolution."

Note: After this plate had been made up specimens of *Uperotus* were obtained and the anatomy proved that this genus is much more closely related to *Teredora* than to *Psiloteredo*, as is indicated in the diagram.

areas in the Indo-Pacific, Eastern Pacific and Western Atlantic.

Included species. N. dryas Dall, *dunlopei* Wright, *excolpa* (Bartsch), *fusticula* (Jeffreys), *hedleyi* Schepman.

Genus BANKIA Gray

Figs. 13 E-F, 19 B-C, 22-24; Plates 44-63

Bankia Gray 1842—*Teredo bipalmulata* Lamarck.
Bankiura Moll 1952—*Teredo bipalmulata* Lamarck.

Subgenera of *Bankia* based on pallet structure:

Bankiella Bartsch 1921—*Bankia mexicana* Bartsch [=*gouldi* Bartsch].
Clupibankia Moll 1952—*Bankia barthelowi* Bartsch.
Deriobankia Iredale 1932—*Bankia debenhami* Iredale [=*australis* Calman].
Liliobankia Clench and Turner 1946—*Bankia katherinae* Clench and Turner [=*campanellata* Roch and Moll].
Lyrodobankia Moll 1941—*Nausitora kamiyai* Roch [=*Bankia carinata* (Gray)]. Syn. *Bankiopsis* Clench and Turner 1946—*Bankia caribbea* Clench and Turner [=*carinata* (Gray)]
Neobankia Bartsch 1921—*Bankia zeteki* Bartsch.
Plumulella Clench and Turner 1946—*Bankia fimbriatula* Moll and Roch.

Diagnosis. This is a large genus which has been divided into eight subgenera on the basis of the structure of the pallets. These subgenera appear to be invalid because transitional species are found between them. A monographic study of the genus *Bankia* will no doubt reduce the number of subgenera, if not eliminate them completely (with the possible exception of *Lyrodobankia,* which would include those species having the early cones of the pallet closely packed and covered by a common periostracal cap).

Pallets greatly elongate, blade composed of numerous cone-like elements on a central stalk, cones separate and easily removed from the stalk, particularly in dried specimens. Cones with a calcareous base covered with periostracum which extends as a border. The width and ornamentation of the periostracal border varies greatly; it may be smooth, coarsely to finely serrated, or produced laterally as awns. Siphons fairly long and separated. Young not retained within the parent. (For anatomy, see p. 32.)

The genus *Bankia* is found throughout the world, largely restricted to tropical and warm temperate waters, with only two species, *setacea* and *martensi,* extending into colder waters.

Included species. B. anechoensis Roch, *australis* Calman, *barthelowi* Bartsch, *bipalmulata* (Lamarck), *bipennata* (Turton), *brevis* (Deshayes), *campanellata* Moll and Roch, *carinata* (Gray), *cieba* Clench and Turner, *destructa* Clench and Turner, *fimbriatula* Moll and Roch, *fosteri* Clench and Turner, *gouldi* (Bartsch), *gracilis* Moll, *martensi* (Stempell), *nordi* Moll, *orcutti* Bartsch, *philippinensis* Bartsch, *rochi* Moll, *setacea* (Tryon), *zeteki* Bartsch.

Key to the Genera

The following key is based largely on the pallets, though the valves are used occasionally in conjunction with the pallets. The soft parts are used only to supplement the characters of the pallets and valves or when essential to identification. The key is designed for use in the generic placement of fresh or well preserved adult specimens in good condition; dried, worn, stenomorphic or young specimens may prove difficult. In such cases, reference should be made to the generic diagnoses preceding the key and to the text figures and plates mentioned there.

1a. Pallets with blade broadly oval to greatly elongate, composed of segments built on a stalk which extends the length of the blade; segments may be: a) closely packed, fused and indistinct [best seen with transmitted light], blade paddle-like, b) closely packed and fused but distinct, c) separated as distinct cones 2

1b. Pallets variable in shape, not segmented 5

2a. Blade elongate, segments separated as distinct cones (Fig. 24) .... *Bankia*

2b. Blade broadly oval or elongate, segments fused, sometimes with a papillose calcareous incrustation on the distal end 3

3a. Blade elongate, segments fused but distinct, often with a calcareous incrustation on the distal end, or with the stalk protruding beyond the tip from loss of early segments (Fig. 11 C; Pl. 38) .... *Nausitora*

3b. Blade broadly oval, segments fused and indistinct, with or without a calcareous incrustation distally, periostracum covering the entire blade or in a band around the mid-portion 4

4a. Blade with a dark band of periostracum around the mid-portion and a calcareous incrustation distally, lateral awns evident on proximal segments, particularly in young specimens (Fig. 11 B; Pl. 36 A-C). .... *Spathoteredo*

4b. Blade entirely covered by a yellowish periostracum, calcareous incrustation lacking, lateral awns evident on all segments in young specimens, older specimens often worn, lacking awns and appearing chalky, a small thumbnail-like depression evident at distal end (Fig. 19 A; Pl. 24) .... *Nototeredo*

5a. Blade composed of a basal cup with an inner element protruding or a second medially divided cup inserted. 6

5b. Blade composed of a single piece 7

6a. Basal cup with a dagger-like extension (Fig. 8 B; Pl. 25 C,D) .... *Bactronophorus*

6b. Basal cup with a second medially divided cup inserted, stalk of pallet extending into blade only to the base of the inner cup [seen with transmitted light] (Fig. 19 D-G; Pls. 17, 19) .... *Teredothyra*

7a. Distal half of blade composed of a brown to nearly black periostracal cap which overlaps the calcareous basal portion, or with a periostracal cup inserted in a basal, mainly calcareous one (*L. massa* only). The young are brooded (Figs. 20-21; Pls. 6, 18D) .. *Lyrodus*

7b. Blade variable in shape, almost entirely calcareous, the periostracal covering thin, following the outline of the calcareous portion, not extending beyond or only slightly so in young specimens 8

8a. Blade broadly oval to sub-rectangular, basal portion thickened, distal portion with prominent radiating ribs (Pl. 23) .... *Uperotus*

8b. Blade variable, not as above 9

9a. Blade broadly oval with prominent thumbnail-like depression or a shallow depression with two finger-like projections or paddle-shaped 10

9b. Blade not as above 11

10a. Blade with prominent thumbnail-like depression, posterior slope of valves small, high and set at nearly right angles to the dorsoventral axis; gills extending from the siphons to the mouth without reduction (Figs. 5, 17; Pl. 20) .... *Teredora*

10b. Blade with a slight to moderate thumbnail-like depression or a slight depression with two finger-like projections extending from it or paddle-shaped; posterior slope of the valves large, ear-shaped and usually flaring; gills reduced (Fig. 9; Pls. 27, 32 A-B, 33 A,C) .... *Psiloteredo*

11a. Pallets large, solid, triangular in outline, tapering toward the stalk and slightly to moderately cupped .. 12

11b. Pallets variable, not as above 13

12a. Pallets with slight cup; valves small, anterior slope nearly smooth and reduced; anterior margin sinuous; posterior slope reduced. Animal large, with strong muscular collar at posterior end of valves. Mud borers (Figs. 6 B, 7 A,B) .... *Kuphus*

12b. Pallets moderately cupped, with medial ridge which may partially or completely divide it; anterior slope of valves broad, strongly sculptured, anterior margin with a right-angled notch. Wood borers (Fig. 7 C-D; Pl. 36 D) ....*Dicyathifer*

13a. Pallets large, heavy, paddle-shaped, with a slight depression distally in young specimens. Posterior end of animal with two longitudinal lappets on the dorsal surface (Figs. 6 A, 8 A; Pl. 32 C) .... *Neoteredo*

13b. Pallets small, variable in shape, broadly oval to elongate, usually slightly to deeply cupped, cup divided or not, distal margin of the inner face straight, rounded, V- or U-shaped; periostracum covering the distal half of the blade but not extending beyond the calcareous portion. Brood the young (Fig. 11 A; Pls. 10-15) .... *Teredo*

PART II

ILLUSTRATED CATALOGUE OF THE TEREDINIDAE

Catalogue of Fossil and Living Teredinidae

In the following Catalogue all generic and specific names which have been used in the Teredinidae are listed alphabetically. The original citation, type locality (in parentheses), and the location of the type specimens are given for each taxon at the species-group level. Notes concerning systematic problems are also given where needed and the present status of the name is indicated whenever possible. The type specimens of nearly all of the species and their synonyms are illustrated, and a reference to the plates which follow the Catalogue is given with each name. *Nomina nuda* and *nomina dubia* are included to complete the record and to save others the time of searching out a reference to a name only to find that it is a *nomen nudum.* Names published by one author but credited by him to another are cited in the Catalogue, with the name of the author to which credit is given in single quotes. This tells the reader immediately that, though it would appear that the author of the paper was not responsible for the name indicated, he in fact was. Such names are usually taken from unpublished manuscripts or museum labels, are misidentifications, or misspellings. They are included for completeness and to save others the time involved in proving that, for example, *Teredo naviliwili* 'Sivickis' Moll was a misinterpretation and misspelling on Moll's part and that Sivickis never published such a name. Only in the original citation are both 'authors' indicated; in subsequent references to the name only the author responsible for its publication is used except in a few complicated cases.

The original citation, type species, and, when possible, its present status are given for each of the generic names listed. The following abbreviations or popular names are used in referring to the various institutions.

ANSP—Academy of Natural Sciences, Philadelphia, Pennsylvania
Amsterdam Mus.—Zoölogisch Museum, Amsterdam, Netherlands
Australian Mus.—Australian Museum, Sydney, Australia
Berlin Mus.—Institut für spezielle Zoologie und zoologisches Museum der Humboldt-Universität, East Berlin, East Germany
BM(NH)—British Museum (Natural History), London, England
BPBM—B. P. Bishop Museum, Honolulu, Hawaii
Brussels Mus.—Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium
CAS—California Academy of Sciences, San Francisco, California
Copenhagen Mus.—Universitetets Zoologiske Museum, Copenhagen, Denmark
IGPS—Institute of Geology and Paleontology, Sendai, Japan
Leiden Mus.—Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands
MCZ—Museum of Comparative Zoology, Cambridge, Massachusetts
Paris Mus.—Muséum National d'Histoire Naturelle, Paris, France
Stockholm Mus.—Naturhistoriska Riksmuseet, Stockholm, Sweden
Univ. Zool. Lab.—University Zoological Laboratory, University of Madras, Madras, India
USNM—United States National Museum, Washington, D. C.
Zool. Surv. India—Museum of the Zoological Survey, Calcutta, India

adami Moll, **Teredo**: 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 221 (Marigot de Diabakar, Sénégal). Description only, not fig. 34 and 34, abb.1.

Holotype, Brussels Mus. Plate 32 B

In the description of this species Moll states that he found in the Brussels Museum a number of specimens similar to the ones he had called *Teredo senegalensis* in his publication on the Teredinidae in the British Museum (1931, p. 206, pl. 22, fig. 9). These specimens, he said, allowed him to distinguish *adami* from *senegalensis* Blainville. He described the pallets as similar to *T. norvagica* Spengler and the shells as similar to *Kuphus arenaria* Linnaeus (=*K. polythalamia* Linn.) with the type locality as "Marigot de Diabakar, Sénégal." The description agrees with the specimen from Marigot de Diabakar, Sénégal, labeled *T. senegalensis* in the Brussels Museum, but this is not the one he figured with the description of *adami.* Figure 34 abb. 1, which was labeled "Museum Brussels, *Teredo adami* n.sp.," depicts the shells only and is of the same specimen he figured in his paper on the Teredinidae in the Brussels Museum (1940, p. 2, fig. 5, 5a) as *Teredo petitii* Récluz. Here he showed both shells and pallets, and they do not fit the description of *adami.* In the latter paper he also figured a specimen from Marigot de Diabakar (fig. 2, 2a) which he labeled *senegalensis* Blv. This fits the description of *adami* and must be regarded as the type. The situation is further complicated because his figure 34 in the original description is that of a specimen in the British Museum, the same one he used in his paper on the Teredinidae of the British Museum, mentioned above. In correspondence, Dr. Adam pointed out this mixture of figures which Dr. Moll admitted but never corrected in print. Monod and Nicklès (1952, pp. 16-19) considered *adami* Moll a synonym of *T. senegalensis* Blainville. Rancurel (1954, pp. 438-454, figs. 1-12) stated that though the pallets of *adami* Moll are close to those of *senegalensis*, the anatomical characters of *adami* are distinctive. Examination of the specimens involved shows that the specimen in the British Museum (fig. 34 of the original description of *adami*, the figure Rancurel probably used in determining his material) is *Neoteredo reynei* Bartsch. The specimen in the Brussels Museum (fig. 34 abb. 1 of the original description and fig. 5, 5a of Moll's 1940 paper) is *T. senegalensis*, form *petitii* Récluz, as discussed in the paper by Monod and Nicklès mentioned above.

Teredo adami Moll, based on his description and the specimen from Marigot de Diabakar, Sénégal, in the Brussels Museum, is a malformed *Psiloteredo senegalensis* (Blainville) 1828.

adanensis Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 265, pl. 1, fig. 3 (Port Aden, Aden Protectorate).

Holotype, Berlin Mus. Plate 11 F

Is *Teredo clappi* Bartsch 1923.

aegypos Moll, **Teredo**: 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 225, fig. 32b (Beira, Südostafrika [Mozambique]).

Holotype, Berlin Mus. Plate 9 C
Paratype, MCZ 170753.

aegyptia Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 267, pl. 1, fig. 5 (Port Said and Ismailia [Suez Canal, Egypt]).

Lectotype, Berlin Mus. (here selected).
Paratype, MCZ 170763. Plate 9 D

Is *Teredo bartschi* Clapp 1923.

aegyptiaca 'Mayer-Eymar' Oppenheim, **Fistulana**: 1906, Palaeontographica **30** (3): 204, pl. 19, figs. 10-11 (fossil, Alttertiärer Faunen in Mokattam, Egypt).

Name based on tubes only.

aemula Laws, **Bankia**: 1944, Trans. Proc. Roy. Soc. New Zealand **73**: 303, fig. 11 (fossil, Neogene at Pakaurange Point, Kaipara, New Zealand).

Name based on a single, poorly preserved valve. In general outline it appears to belong in *Xylophaga* (Pholadidae).

affinis Deshayes, **Teredo**: 1863, Catalogue des Mollusques de l'Île de la Réunion. [*In*] Maillard, Notes sur l'Île de la Réunion, ed. 2, **2**, annexe E, p. 6, pl. 1, figs. 8-12 (Réunion).

Neotype, CAS 12384. Plate 6 C-D

Miller (1924b, p. 148, pl. 11, figs. 26-30) described and figured a species which he called *Teredo affinis* Deshayes, and in 1927 (Final Report of the San Francisco Bay Marine Piling Committee, p. 202) he stated that the type specimen of *affinis* was lost. He figured a specimen from Nawiliwili, Kauai, Hawaiian Islands, to represent the species and deposited it in the California Academy of Sciences. Moll and Roch (1931, p. 216) considered *affinis* of Miller distinct from *affinis* Deshayes, and, on this basis, Dall, Bartsch and Rehder (1938, p. 210) renamed it *Teredo* (*Cornuteredo*) *milleri*. In 1941 Moll (Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 188), having changed his mind, designated Miller's specimen in the California Academy of Sciences from Nawiliwili as the neotype of *affinis* Deshayes. I searched the collections of the Muséum National d'Histoire Naturelle and of the École des Mines in Paris for the type of *affinis* and it is without doubt lost. Therefore, since Miller's use of *affinis* is the same as that of Deshayes, I agree with Moll's selection of the neotype. This specimen is, of course, the holotype of *Teredo milleri* Dall, Bartsch and Rehder.

Is *Lyrodus affinis* (Deshayes).

aggregata Moll, **Teredo**: 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 153, 195.

Nomen nudum, included in the synonymy of *Uperotus clavus* (Gmelin) 1791.

agypos Moll, **Teredo**. See *aegypos*.

alfredensis van Hoepen, **Teredo**: 1941, Tydskrif vir Wetenskap en Kuns **2**: 176, pl. 10, figs. 3-6 (Port Alfred [Union of South Africa]).

Holotype, van Hoepen collection
at Hluhluwe, Natal. Plate 21B
Paratype, MCZ 237922 (single valve).

Is probably *Teredora princesae* (Sivickis) 1928.

alpina Traub, **Teredo**: 1938, Palaeontographica **88A**: 64, pl. 5, fig. 6 (fossil, Thanetien, Tertiary, Salzburg, Austria).

Types, Bayern Staatssammlung, München.

Name based on shells only.

amboinensis Taki and Habe, **Psiloteredo (Phylloteredo)**: 1945, Venus **14**: 120, figs. 1-6 (Amboina [Molucca Ids.]).

Is *Spathoteredo obtusa* (Sivickis) 1928.

americana Gabb, **Gastrochaena**: 1860, Jour. Acad. Nat. Sci. Philadelphia (2) **4**: 393, pl. 68, fig. 20; 1861, Proc. Acad. Nat. Sci. Philadelphia, p. 366 as *Polarthus americana* (fossil, yellow limestone of Timber Creek and brown marl of Burlington Co., New Jersey).

Included in the Teredinidae by Meek 1864, Smithson. Misc. Coll. No. 177, p. 16. Is probably a *Gastrochaena* (Gastrochaenidae).

amphisbaena Goldfuss, **Serpula**: 1831, Petrefacta Germaniae [1826-33] **1**: 239, pl. 70, fig. 16 (fossil, Grünsand, Bochum [Germany]).
Name based on tubes only.

anceps Schauroth, **Serpula**: 1865, Verzeichniss der Versteinerungen im Herzogl. Naturaliencabinet zu Coburg, p. 259, pl. 27, fig. 5 (fossil, Nummulitienkalk, Priabona [Italy]).
Type, Naturaliencabinet, Coburg (Moll, 1941).
Name based on tube only.

ancilla Barnard, **Teredo**: 1964, Ann. South African Mus. **47**: 568, text fig. (Umlalazi estuary, Zululand, from a log in mangrove swamp).
Holotype, Univ. Cape Town, South Africa.
Is *Dicyathifer manni* (Wright) 1866.

anechoensis Roch, **Bankia**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 18, pl. 2, fig. 18 ([Anecho], Togo).
Lectotype, Berlin Mus. (here selected).
Paratype, MCZ 170755. Plate 52 D

anguina Linnaeus, **Serpula**: 1758, Systema Naturae, ed. 10, p. 787 (India). Refers to Rumphius, 1705, D'Amboinsche Rariteitkamer, pl. 41, fig. H.
Though often listed in the Teredinidae, this species belongs to the Vermetidae.

anguina Gmelin, **Serpula** var. β: 1791, Systema Naturae, ed. 13, p. 3743 (in mari indico). Refers to Lister, 1770, Historiae sive Synopsis Methodicae Conchyliorum, pl. 1056, fig. 3; Seba, 1758, Thesaurus **3**, pl. 94.
Is *Kuphus polythalamia* (Linnaeus) 1767.

anguinea 'Sandberger' Mayer-Eymar, **Teredo**: 1893, Bull. Soc. Géol. France (3) **21**: 21.
Emendation for *anguinus* Sandberger.

anguinus Sandberger, **Teredo**: 1856, Neues Jahrb. Min. Geogn. Geol. Petref., p. 534 (fossil, Tertiär, Mainzerbecken, Wiesbaden [Germany]); 1863, Die Conchylien Mainzer Tertiärbecken-Wiesbaden, p. 275, pl. 21, fig. 1-1b.
Name based on tubes only.

angulata 'Stinton' Salisbury, **Teredo (Psiloteredo)**: 1960, Zool. Rec. **94** (for 1957), Sect. 9, Mollusca, p. 134.
Error for *ungulata* Stinton.

angusta Deshayes, **Teredo**: 1860, Description des Animaux sans Vertèbres Découverts dans le Bassin de Paris **1**: 116, pl. 2, fig. 28 (fossil, Calcaire grossier, Chaussy, Mouchy, Brasles [France]).
Types, École des Mines, Paris.
Name based on a fragment of tube only.

annularis Parkinson, **Teredo ?**: 1819, Trans. Geol. Soc. London **5**: 54 (fossil, from the chalks with few flints near Dover and Folkestone, England).
Name based on fragments of tubes only.

annularis 'Smith' J. deC. Sowerby, **Teredo**: 1846, Mineral Conchology of Great Britain **7**: 17.
A manuscript name of Rev. G. E. Smith in the synonymy of *T. amphisbaena* Goldfuss.

annulata Boettger, **Teredina**: 1875, Palaeontographica, Suppl. **3** (1): 24, pl. 4, figs. 28, 29a-b, 30a-c, 31a-c (fossil, [Eocene] in ächten nummulitenführenden Kalkstein (Étage 2) bei Pengaron, Borneo).
Type, Boettger collection.
Name based on tubes only.

annulata Doncieux, **Teredo**: 1911, Ann. Univ. Lyon (N.S.) **1**, Sci. Med., Fasc. 30: 130, pl. 15, figs. 19-22 (fossil, nummulitique de l'Aude et de l'Hérault. Lutétien inférieur de Montlaur; Fontcouverte; Fabrezan, France).
Types, University of Lyon.
Name based on tubes only.

antarctica Hutton, **Teredo**: 1873, Catalogue of the Marine Mollusca of New Zealand, Wellington, p. 59 (Auckland, New Zealand).
Types, Colonial [Dominion] Mus., Wellington, New Zealand.
Nomen dubium. Name based on shells only.

antenante 'Sowerby' Deshayes, **Teredo**: 1824, Description des Coquilles Fossiles des Environs de Paris **1**: 19.
Error for *antenautae* Sowerby.

antenautae J. deC. Sowerby, **Teredo**: 1815, Mineral Conchology of Great Britain **1**: 231, pl. 102, figs. 1-8 (fossil, London clay at Highgate [England], in fossil wood).
Is *Teredina personata* Lamarck (Pholadidae).

antenuata 'Sowerby' von Schlotheim, **Teredo**: 1832, Systematisches Verzeichniss der Petrefakten—Sammlung . . . . Schlotheim. (Gotha), p. 48.
Error for *antenautae* Sowerby.

antillarum 'Roch' Moll, **Bankia**: 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 200.
Nomen nudum.

antinautae 'Sowerby' Wetherell, **Teredo**: 1836, London, Edinburgh Phil. Mag. Jour. Sci. **9**: 464.
Error for *antenautae* Sowerby.

antiqua M'Coy, **Teredo?**: 1844, Synopsis of the Characters of Carboniferous Limestone Fossils of Ireland, p. 47, pl. 8, fig. 1 (fossil, Carboniferous limestone system of Ireland).
Name based on tubes only. Not a teredinid.

antiquatus d'Orbigny, **Teredo**: 1849 [Jan. 1850], Prodrome Palaéontologie **1**: 251 (fossil, Jurassique, Étage Toarcien, Thouars, France).

Types, Palaeo. Lab., Paris Mus., no. 1988A of the d'Orbigny collection.

Name based on tubes only.

apendiculata Sivickis, **Teredo**: 1928, Philippine Jour. Sci. **37**: 295, pl. 3, fig. 16 (from wood exposed at low tide in Puerto Princesa, Palawan, Philippine Islands).

Types, Philippine Bur. Sci., Manila, destroyed in World War II.

Is *Nototeredo edax* (Hedley) 1895.

appendicularis 'Sivickis' Okada, **Teredo**: 1958, Damage and the Method of Protection against Wood-boring Animals, published by Japanese Assoc. Adv. Sci., p. 63 [in Japanese].

Error for *apendiculata* Sivickis.

appenninica Stöhr, **Teredo**: 1869, An. Soc. Nat. Modena **4**: 280 (fossil, Terziarii superiori, Montegibio [Italy]).

Nomen nudum.

arabica Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 269, pl. 1, fig. 8 (Port Aden).

Lectotype, Berlin Mus. (here selected). Plate 5 A

Is probably *Lyrodus pedicellatus* (Quatrefages) 1849.

archimima Iredale, **Bankia**: 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 35, pl. 4, figs. 5-8 (Pyrmont, Port Jackson, Sydney Harbour, New South Wales, Australia).

Holotype, Australian Mus. Plate 63 B

Is *Bankia australis* (Calman) 1920.

arenaria Linnaeus, **Serpula**: 1758, Systema Naturae, ed. 10, p. 787; *ibid.* 1767, ed. 12, p. 1266 (in Indiis). Refers to Bonanno, 1684, Recreatio, 1705, D'Amboinsche Rariteitkamer, pl. 41, fig. part 1, pl. 20, fig. C [Vermetidae]; Rumphius, E. [Teredinidae]; Gualtieri, 1742, Index Testarum, pl. 10, figs. L, N [Vermetidae].

In the 10th edition of the Systema, Linnaeus gave three references, two of which were to vermetids; the third was to a teredinid (*Kuphus*) described and figured in Rumphius. In the 12th edition, Linnaeus placed the reference to Rumphius under the name *polythalamia*, leaving the two vermetid references under *arenaria*. Hanley, 1855, Ipsa Linnae Conchylia, restricted *arenaria* to the Vermetidae. See under *S. polythalamia* Linnaeus.

arenaria Bergius, **Teredo**: 1765, K. Svenska Vetenskapsakad. Handl. (Stockholm) **26**: 230 (Yarmouth, England and Dieppe, France). Refers to Ellis, 1756, Essai d'Histoire Naturelle des Corallines, p. 90, pl. 36.

Is a coralline worm, *Tubularia arenosa anglica* Ellis.

arenaria Forskäl, **Teredo**: 1775, Descriptiones Animalium, p. 99 (Öresund, Denmark).

Is an annelid.

arenaria Catlow and Reeve, **Teredo**: 1845, Conchologist's Nomenclator, p. 2. Refers to Linnaeus, 1758, Systema Naturae, ed. 10, p. 787.

This is not a new species, though listed by Sherborn and others as such.

arenaria Lamarck, **Septaria**: 1818, Histoire Naturelle des Animaux sans Vertèbres **5**: 437 (L'Ocean des Grandes Indes dans les Sables). Refers to *Serpula polythalamia* Linnaeus and *Solen arenarius* Rumphius 1705, D'Amboinsche Rariteitkamer, pl. 41, figs. D-E.

Is *Kuphus polythalamia* (Linnaeus) 1767.

arenata 'Lamarck' Sowerby, **Kuphus**: 1887, Thesaurus Conchyliorum **5**, pl. 469, fig. 20.

Error for *arenaria* Lamarck.

argentinica Moll, **Bankia**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 274, pl. 2, fig. 5 (Buenos Aires, Argentina).

Holotype, Berlin Mus. Plate 61 A

Is *Bankia martensi* (Stempell) 1899.

argonnensis Buvignier, **Teredo**: 1842 [*in*] Sauvage, Statistique Minéralogique et Géologique du Département des Ardennes, Misieri, p. 531, pl. 5, figs. 6-8 (fossil [Middle Cretaceous], dans les bois fossiles du Gault, Varennes, Grandpré, Argonne, France); Buvignier, 1843, Mem. Soc. Philom., Verdun **2**, pl. 3, figs. 1-3; Buvignier, 1852, Statistique Géologique, Minéralogique, Minérallurgique, et Paléontologique du Département de la Meuse (Paris), Atlas, p. 6, pl. 6, figs. 33-39.

Name based on tubes and shells only. Probably not in the Teredinidae but in the Xylophaginae (Pholadidae).

articulata J. deC. Sowerby, **Teredo**: 1840, Mineral Conchology of Great Britain **7** (107), pl. 618; Feb. 1843, *ibid.* **7** (109), p. 17.

Sowerby believed this to be an earlier name for *amphisbaena* Goldfuss and engraved it on the plate, but not being able to find the authority, used *amphisbaena* Goldfuss in the text which was published in 1843.

artiguayi Moll, **Teredo**: 1952, Inst. Franc. Afr. Noire, Cat. 8, p. 95 (fossil, southern France).

Nomen nudum. Probably an error for *artiguei* Benoist.

artiguei Benoist, **Teredo**: 1877, Actes Soc. Linn. Bordeaux **31**: 318, pl. 20, fig. 5a-b (fossil, Miocène inférieur de Bourg et de Cenon, Sud-Ouest, France).

Name based on fragments of tubes only.

atwoodi Bartsch, **Teredo (Teredothyra)**: 1923, Proc. Biol. Soc. Washington **36**: 97 (Guantanamo, Cuba).

Holotype, USNM 348186. Plate 17 A

Is *Teredothyra dominicensis* (Bartsch) 1921.

aurita Hedley, **Nausitoria** [*sic*]: 1899, Mem. Australian Mus. (8) **3**: 507, fig. 56 (Funafuti, from beach log and Noumea, New Caledonia).

Holotype, Australian Mus., C. 6201.

Nomen dubium, described on the basis of shells only.

austini Iredale, **Teredo**: 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 29, pl. 1, figs. 1-4 (Camp Cove, Sydney, Port Jackson, New South Wales, Australia).

Holotype, Australian Mus. Plate 15 E
Paratype, MCZ 229499.

Is *Teredo navalis* Linnaeus 1758.

australasiatica Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 268, text fig. 6 (Singapore).

Lectotype, Berlin Mus.
(here selected). Plate 10 E

Is *Teredo furcifera* von Martens 1894.

australis Wright, **Calobates**: 1866, Trans. Linn. Soc. London **25**: 564, pl. 64, figs. 1-5 (Freemantle [Fremantle], Western Australia).

Lectotype, BM(NH) 66·4·13·3.
(here selected) Plate 25 D

Is *Bactronophorus thoracites* (Gould) 1856.

australis Moore, **Teredo**: 1870, Quart. Jour. Geol. Soc. London **26**: 255, pl. 12, fig. 11 (fossil, Mesozoic, Oolitic age, Western Australia).

Name based on fragments of shell impressions only. They are not of *Teredo,* but probably a pholad.

australis Calman, **Xylotrya**: 1920, Proc. Zool. Soc. London, p. 397, text figs. 6-8 (Auckland, New Zealand; Brisbane, Queensland, Australia).

Types, BM(NH), not seen. Plate 63 A, D

Is *Bankia australis* (Calman).

This is the *Calobates saulii* of Hedley and *Teredo* (*Xylotrya*) *saulii* of Suter, not *Nausitora saulii* Wright. In the original description of *saulii,* Wright gave the locality as Port Phillip, Australia, rather than Callao, Peru. Calman believed that it was this error of locality rather than any resemblance of the species that caused Australian workers to use the name *saulii* for the common Australian-New Zealand *Bankia.*

See also the following: *archimima* Iredale; *debenhami* Iredale; *gabrieli* Cotton; *grenningi* Iredale; *occasiuncula* Iredale; *rosenthali* Iredale.

austriaca Rolle, **Teredina**: 1859, Sitzungsber. Akad. Wiss. Wien **35**: 193, pl. 1, figs. 1-2 (fossil, Eocene, Neulengbach [Austria]).

Is in the Pholadidae.

Austroteredo Habe: 1952, Genera of Japanese Shells, Pelecypoda, no. 3, p. 249.

Type species, *Teredo parksi* Bartsch, original designation.

bacillum Brocchi, **Teredo**: 1814, Conchiologia Fossile Subapennina, p. 273, pl. 14 [15], fig. 6 (fossil, Piacenza, Italy).

Is not in the Teredinidae, but is a *Clavagella* (von Schauroth, 1865, Verzeichniss der Versteinerungen im Herzogl. Naturaliencabinet zu Coburg, p. 220; Moll, 1941, Fossilium Catalogus I: Animalia, pars 95, p. 20).

Bactronophorus Tapparone-Canefri: 1877, An. Mus. Civico Storia Nat. Genova **9**: 290.

New name for *Calobates* Gould 1862; non Kaup 1829; non Temminck 1832.

bagidaensis Roch, **Bankia**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 18, pl. 2, fig. 17 ([Bagida], Togo).

Lectotype, Berlin Mus.
(here selected). Plate 51 D

Is probably young *Bankia bipennata* (Turton) 1819.

balatro Iredale, **Teredo**: 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 31, pl. 2, figs. 4-7 (Pyrmont, Port Jackson, Sydney Harbour, New South Wales, Australia).

Holotype, Australian Mus. Plate 8 D

Is *Teredo bartschi* Clapp 1923.

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

Type species, *Teredo bipalmulata* Lamarck, subsequent designation Gray 1847.

Bankiella Bartsch 1921, Proc. Biol. Soc. Washington **34**: 25-26.

Type species, *Bankia* (*Bankiella*) *mexicana* Bartsch, original designation.

Bankiopsis Clench and Turner 1946, Johnsonia **2**: 16.

Type species, *Bankia* (*Bankiopsis*) *caribbea* Clench and Turner, original designation.

Bankiura Moll 1952, Inst. Franc. Afr. Noire, Cat. 8, pp. 42 and 85.

Type species, *Teredo bipalmulata* Lamarck, original designation.

Is *Bankia* Gray 1842.

barthelowi Bartsch, **Bankia (Neobankia)**: 1927, Bull. U.S. Natl. Mus. **100** (2), pt. 5: 537, pl. 58, figs. 1-3 (*Albatross*, Station 5266, Batangas Bay, Luzon, Philippine Islands in 100 fms.).

Holotype, USNM 310968. Plate 62 E

See also *davaoensis* Bartsch.

bartoniana Mayer-Eymar, **Teredo (Septaria)**: 1887, Beitr. Geol. Karte Schweiz, Bern **24** (2): 52, pl. 4, fig. 4 (fossil, Eocene, Bartonian, Leimbach L.; Neiderhorn [Switzerland]).

Name based upon a small segment of a tube which has pronounced rings and is probably not in the Teredinidae.

bartschi Clapp, **Teredo (Teredo)**: 1923, Proc. Boston Soc. Nat. Hist. **37**: 33, pls. 3-4 (Port Tampa, Florida); non Sivickis 1928.

Holotype, MCZ 45301. Plate 8 A

See also the following: *aegyptia* Roch; *balatro* Iredale; *batilliformis* Clapp; *fragilis* Tate; *grobbai* Moll; *hiloensis* Edmondson; *shawi* Iredale.

bartschi Sivickis, **Teredo**: 1928, Philippine Jour. Sci. **37**: 292, pl. 3, fig. 13 (from old piles, Sir J. Brooke Point, Palawan, Philippine Islands); non Clapp 1923.

Types, Philippine Bur. Sci. Manila, destroyed in World War II.

Is *Dicyathifer manni* (Wright) 1866.

bataviana Moll and Roch, **Teredo**: 1931, Proc. Malac. Soc. London **19**: 207, pl. 23 (Batavia).

Holotype, BM(NH) 50·2·26·40. Plate 35 C

New name for *Teredo batavus* Sowerby 1875; non Spengler 1792.

Is *Spathoteredo obtusa* (Sivickis) 1928.

batavus Sowerby, **Teredo**: 1875, Conchologia Iconica **20**, Teredo, pl. 3, fig. 12a-c (Batavia); non Spengler 1792.

Holotype, BM(NH) 50·2·26·40. Plate 35 C

Renamed, *bataviana* Moll and Roch 1931.

Is *Spathoteredo obtusa* (Sivickis) 1928.

batavus Spengler, **Teredo**: 1792, Skr. Naturhist. Selskab. Copenhagen **2**: 103, pl. 2, fig. C (Holland); non Sowerby 1875.

Holotype, Copenhagen Mus. (shells only). Plate 29 C

Is *Teredo navalis* Linnaeus 1758.

batilliformis Clapp, **Teredo (Teredo)**: 1924, Proc. Amer. Acad. Arts Sci. **59**: 282, pl. 1, figs. 1-6; pl. 3, figs. 13-14 (St. George's, Bermuda).

Holotype, MCZ 45305. Plate 8 B

Is a young *Teredo bartschi* Clapp 1923.

bayani Fabiani, **Teredo**: 1905, Atti R. Inst. Veneto Sci., Lett., Arti **64** (2): 1800, 1838 (fossil, Eocene, Ipresiano, Nanto, Mossano, Italy).

Types, Univ. Padua, according to Moll 1941.

Nomen nudum.

bayeri Roch, **Teredo (Coeloteredo)**: 1955, Zool. Meded. Rijksmus. Natuur. Hist., Leiden **34** (8): 130, fig. 4a-g (Tandjoeng-Pinang [Bintan Island] Rhiouw-Archipel [Sumatra, Indonesia]).

Lectotype, Leiden Mus. (here selected). Plate 12 E

Is probably a deformed *Teredo mindanensis* Bartsch 1923.

beachi Bartsch, **Teredo (Teredo)**: 1921, Proc. Biol. Soc. Washington **34**: 29 (San Pablo Bay, California).

Holotype, USNM 341155. Plate 14 D

Is *Teredo navalis* Linnaeus 1758.

beaufortana Bartsch, **Teredo (Teredo)**: 1922, Bull. U.S. Natl. Mus. **122**: 22, pl. 32, fig. 1 (Rivers Island, Beaufort, North Carolina).

Holotype, USNM 345346. Plate 14 B

Is *Teredo navalis* Linnaeus 1758.

bengalensis Nair, **Bankia (Bankia)**: 1954 [1956], Rec. Indian Mus. **52**: 388, fig. 1a-c (Mylapore, Madras Coast, India, in fishing float).

Holotype, Zool. Survey India, Calcutta, M17 445/3.

Paratypes, Univ. Zool. Lab. Madras, not found. Plate 48 B

Examination of the holotype showed this to be *Bankia campanellata* Moll and Roch 1931.

bengalensis Nair, **Teredo (Zopoteredo)**: 1956, Rec. Indian Mus. **52**: 411, fig. 10a-c (Madras Beach, Madras, India, in drift).

Holotype, Zool. Survey India, Calcutta, M17 440/3. Plate 16 C

The holotype has been virtually destroyed by formalin.

Is *Teredothyra smithi* (Bartsch) 1927.

bensoni Edmondson, **Teredo (Teredo)**: 1946, Occ. Pap. B.P. Bishop Mus. **18** (15): 214, fig. 1a-d (from wooden guard rail of dredger *Benson*, removed in Honolulu after the boat had been working in Canton Island).

Holotype, BPBM 100. Plate 13 D

Paratype, MCZ 232058.

Is *Teredo furcifera* von Martens 1894.

beyrichi Mayer and Gümbel, **Septaria**: 1861 [*in*] Gümbel, Geognostische Beschreibung des bayerischen Alpengebirges und seines Vorlandes, p. 674 (fossil, Eocän, Jüngere Nummulitengruppe der östlichen Alpen).

Name based on tubes only.

Bicornia May 1929, Zeitschr. Morph. Ökol. Tiere, Abt. A, **15**: 642, 665.

This was used as a descriptive term for the pallet of *Teredo affinis* Deshayes. Is a hypothetical genus excluded from zoological nomenclature. See Article 1 of the International Code of Zoological Nomenclature, 1961.

bicorniculata Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 265, pl. 1, fig. 2 (San Diego-Suarez; Vintano, auf Sainte-Marie bei Madagaskar).

Lectotype, Berlin Mus.
(here selected). Plate 12 C
Paratype, MCZ 170761.

Is *Teredo fulleri* Clapp 1924.

bilobatus Buvignier, **Teredo**: 1852, Statistique Géologique, Minéralogique, Minérallurgique et Paléontologique du Département de la Meuse (Paris), p. 521, Atlas, p. 6, pl. 6, figs. 49-50 (fossil, Cretaceous, Dept. Meuse, France).

Name based on tubes only.

bipalmata Delle Chiaje, **Teredo**: 1829, Memorie sulla Storia e Notomia degli Animali senza Vertebre del Regno di Napoli **4**: 28, 32, 115, pl. 54, figs. 18, 22-24 (Napoli [Italy]).

Is *Bankia carinata* (Gray) 1827.

bipalmulata Delle Chiaje, **Teredo**: 1829, Memorie sulla Storia e Notomia degli Animali senza Vertebre del Regno di Napoli **4**: 32; non Lamarck 1801.

Delle Chiaje's use of the word 'bipalmulata' was in the vernacular for his species *Teredo bipalmata*. It has, however, been considered a scientific name by many authors and so is included here.

bipalmulata Lamarck, **Teredo**: 1801, Système des Animaux sans Vertèbres, p. 129 (no locality given by Lamarck, but Lamy [1927, Jour. Conch. (Paris) **70**: 267] gave the locality as Pondichery, India, based on Lamarck's label in the Paris Museum); non Delle Chiaje 1829.

Holotype, Paris Mus. 81. Plate 50 C

Is *Bankia bipalmulata* (Lamarck). See also the following: *hawaiiensis* Edmondson; *konaensis* Edmondson; *palmulata* 'Adanson' Blainville; *palmulatus* Lamarck; *rubra* Sivickis.

bipartita Jeffreys, **Teredo**: 1860, Ann. Mag. Nat. Hist. (3) **6**: 123 (in *Cedrela odorata* thrown ashore by the Gulf Stream, at Guernsey, England).

Lectotype, Jeffreys Collection,
USNM 194268 (here selected). Plate 6 A

Is *Lyrodus bipartita* (Jeffreys).

bipartita Martin, **Siliquaria**: 1880, Die Tertiärschichten auf Java, p. 79, pl. 14, fig. 17 (fossil, Miocene, Java).

This species was based on the end of a tube which is teredinid. On page 90, and on the plate caption of the same paper, Martin considers it a synonym of *arenaria* Lamarck [=*polythalamia* Linnaeus].

bipennata Turton, **Teredo**: 1819, A Conchological Dictionary of the British Islands, p. 184, figs. 38-40 (from drift timber at the mouth of the river Ex [Exmouth], Devonshire, England).

Lectotype, Turton Collection, in Jeffreys Collection USNM 194256 (here selected).
Plate 58 C

Is *Bankia bipennata* (Turton). See also the following: *carinata* Sowerby; *cucullata* Jeffreys; *denticuloserrata* Daniel; *johnsoni* Bartsch; *kingyokuensis* Roch; *lineata* Nair; *pennatifera* Blainville.

bipinnata 'Turton' Fleming, **Teredo**: 1828, History of British Animals (Edinburgh), p. 454; Jeffreys 1865, British Conchology **3**: 182.

Error or emendation for *bipennata* Turton.

bisiphites 'Lesueur' Roch, **Teredo**: 1931, Arkiv Zool. (Stockholm) **22 A** (13): 11 (St. Thomas, Virgin Islands, West Indies).

Holotype, Copenhagen Mus. Plate 28 A

The name *bisiphites* Lesueur was mentioned in print by Lamarck, Deshayes, Lamy (1927, Jour. Conch. [Paris] **70**: 243, footnote), and Moll, but it was never described, and the original material cannot be found. Roch (1931) described and figured specimens in the Copenhagen Museum under the name of *bisiphites* Lesueur and selected the Copenhagen specimens as types. This name must therefore date from Roch 1931. For a complete discussion of the name see Roch, 1931, pp. 11-13, as given above.

Is *Nototeredo knoxi* (Bartsch) 1917.

borealis Roch, **Teredo navalis**: 1931, Arkiv Zool. (Stockholm) **22 A** (13): 27, fig. 18 (Type locality here restricted to Drøbak, Norway).

In his original description Roch listed Drøbak and Hvitsten, Norway; and Lysekil, Fiskebäckskil and Gothenburg, Sweden, but did not select one as the type locality. Is an elongate form of *Teredo navalis* Linnaeus 1758.

bormidiana 'Mayer' Moll, **Teredo**: 1941, Fossilium Catalogus I: Animalia, Pars 95, p. 22.

Nomen nudum.

borogica Hörnes, **Teredo**: 1870, Verhandl. K. K. Geol. Reichsanst. Wien **3**: 477.

Error in index for *norvagica* Spengler.

braziliensis Bartsch, **Bankia (Nausitora)**: 1922, Bull. U. S. Natl. Mus. **122**: 15, pl. 20, fig. 3; pl. 31, fig. 1 (Santos, Brazil).

Holotype, USNM 110435. Plate 37 C

Is *Nausitora fusticula* (Jeffreys) 1860.

brevis Deshayes, **Teredo**: 1863, Catalogue des Mollusques de l'Île de la Réunion. [*In*] Maillard, Notes sur l'Île de la Réunion, ed. 2, **2**, annexe E, p. 6, pl. 1, figs. 4-7 (Réunion).

Holotype, École des Mines, Paris. Plate 52 C

Is *Bankia brevis* (Deshayes).

bruguierii Delle Chiaje, **Teredo**: 1829 [1830], Memorie sulla Storia e Notomia degli Animali senza Vertebre del Regno di Napoli **4**: 28, 32, 115, pl. 54, figs. 6, 12-13 (Napoli [Italy]).

Is *Nototeredo norvagica* (Spengler) 1792.

bulbosus Reagan, **Teredo**: 1908, Trans. Kansas Acad. Sci. **22**: 172, 189, pl. 3, fig. 22 (fossil, Oligocene-Miocene, at East Clallam, Olympic Peninsula, Washington).

Name based on casts of tubes only.

burtini Deshayes, **Teredo**: [1839] 1842, Traité élémentaire de Conchyliologie **1** (2): 59 (fossil, Terrain tertiaire inférieur de la Belgique et aux environs de Paris).

Nomen nudum.

burtini 'Deshayes' Nyst, **Teredo**: 1845, Mém. Cour. Acad. R. Sci. Belgique (4⁰) **17**: 38 (fossil, Tertiaires inférieurs: le calcaire de Melsbroeck, d'Affighem, de Dieghem, de Schaerbéck, de Woluwe-St. Étienne, de Savethem, de Leo, de St. Gilles et Audenarde, Belgium). Refers to Galeotti, 1837, Mém. Cour. Acad. R. Sci. Belgique **12**: 160, and Burtin, 1784, Oryctographie, pls. 23-29.

Name based on tubes only.

burtini 'Deshayes' Ryckholt, **Teredo**: 1852, Mém. Cour. Acad. R. Sci. Belgique (4⁰) **24**: 113, pl. 5, figs. 11-12 (fossil, [Eocene] Tertiaire du Brabant, Belgium); non Nyst 1845.

Types, Brussels Mus.? Plate 64 G

Name based on tube and pallets. Is a *Bankia*, possibly *parisiensis* Deshayes. See also *devoluta* Vincent; *tumida* Stinton.

calamitoides 'Gabb' Meek, **Teredo**: 1864, Smithson. Misc. Coll. No. 177, p. 16.

Error for *calamoides* Gabb.

calamitoides 'Gabb' Conrad, **Teredo**: 1866, Smithson. Misc. Coll. No. 200, p. 16.

Error for *calamoides* Gabb.

calamoides Gabb, **Teredo**: 1861, Proc. Amer. Phil. Soc., Philadelphia **8**: 230.

New name for *calamus* Tuomey 1855; non Lea 1843.

calamus H. C. Lea, **Teredo**: 1843, Proc. Amer. Phil. Soc., Philadelphia **3**: 163 *nomen nudum;* Lea 1846, Trans. Amer. Phil. Soc., Philadelphia **9**: 234 [p. 8 of reprint], pl. 34, fig. 4 (fossil, Tertiary, Petersburg, Virginia).

Probably not a teredinid. Description based on tubes taken from madrepore coral.

calamus Tuomey, **Teredo**: 1855, Proc. Acad. Nat. Sci. Philadelphia, p. 170 (Columbus, Mississippi); non Lea 1843. Renamed *calamoides* by Gabb in 1861.

Nomen dubium. This species was not figured and was inadequately described.

calmani Roch, **Teredo**: 1931, Proc. Malac. Soc. London **19**: 208, pl. 23, fig. 15 (Port Lincoln, South Australia).

Holotype, Berlin Mus. Plate 3 D

Though Roch (1931) and Moll (1941) state that the type is in the British Museum (Nat. Hist.), I was unable to find a specimen there which matched the one figured in the original description. The specimen figured here was found in the Berlin Museum and the label states that it was from the British Museum. It is certainly the same specimen as that figured in the original description and is without question the holotype. A complete specimen of this species was found in a mixed lot from Port Lincoln, South Australia, in the spirit collection of the BM(NH) 1925·11·10·12-17, but this could not have been seen by Roch for he states that the valves are unknown.

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

Calobates Gould 1862, Proc. Boston Soc. Nat. Hist. **8**: 283; non Kaup 1829; Temminck 1832; Hartig 1857.

Type species, *Teredo thoracites* Gould, original designation.

Is *Bactronophorus* Tapparone-Canefri 1877.

campanellata Moll and Roch, **Bankia**: 1931, Proc. Malac. Soc. London **19**: 215, pl. 25.

New name for *Teredo campanulata* 'Deshayes' Sowerby 1875; non 'Deshayes' Jeffreys 1860; Clench and Turner 1949, Johnsonia **2** (19): 27. See also the following: *bengalensis* Nair; *katherinae* Clench and Turner.

campanula 'Deshayes' Sowerby, **Teredo**: 1887, Thesaurus Conchyliorum **5**, pl. 469, fig. 9.

Error on plate caption for *campanulata* 'Deshayes' Sowerby 1875.

Is *Bankia campanellata* Moll and Roch 1931.

campanulata 'Deshayes' Jeffreys, **Teredo**: 1860, Ann. Mag. Nat. Hist. (3) **6**: 217; non Sowerby 1875.

Manuscript name given as a synonym of *Teredo stutchburyi* Blainville 1828.

Is *Bankia carinata* (Gray) 1827.

campanulata 'Deshayes' Sowerby, **Teredo**: 1875, Conchologia Iconica **20**, TEREDO, pl. 2, fig. 9a-c (locality unknown); 1887, Thesaurus Conchyliorum **5**: 124, pl. 469, fig. 9; non Jeffreys 1860.

Types, BM(NH) 50·2·26·42-43. Plate 48 A

Deshayes did not describe this species, though apparently he left the name on specimens in the collection of the BM(NH) and elsewhere, and subsequent workers variously interpreted it, re-

resulting in the confusion which usually results in such cases.

Is *Bankia campanellata* Moll and Roch 1931.

campanullata 'Moll and Roch' Tchang, Tsi and Li, **Bankia** (**Bankiella**): 1958, Acta Zool. Sinica **10** (3): 244.

Error for *campanellata* Moll and Roch.

canalis Bartsch, **Bankia**: 1944, Smithson. Misc. Coll. **104** (8): 1, pl. 1 (Balboa and Cristobal, Canal Zone, Panama).

Holotype, USNM 568817. Plate 56 B

Is *Bankia fimbriatula* Moll and Roch 1931.

capensis Calman, **Xylotrya**: 1920, Proc. Zool. Soc. London, p. 402, text figs. 9-11 (Simon's Town, [Simonstown] South Africa).

Holotype, BM(NH) 1921·5·19·39. Plate 62 A

Is *Bankia martensi* (Stempell) 1899.

caribbea Clench and Turner, **Bankia (Bankiopsis)**: 1946, Johnsonia **2**: 16, pl. 10 (Fort Pickens, Pensacola, Florida).

Holotype, MCZ 121065. Plate 45

Is *Bankia carinata* (Gray) 1827.

carinata Gray, **Teredo**: 1827, Phil. Mag. (N.S.) **2**: 411 (Sumatra); non Sowerby 1875.

Types, BM(NH), not found. Plate 46 A

Gray's material was from Sumatra, collected by Mr. Stuchbury [*sic*] and is without doubt the same material upon which *carinata* 'Leach' Blainville 1828 and *stutchburyi* 'Leach' Blainville 1828 were based. In his description of *carinata,* Blainville stated that the "palmules [pallets] semblables à celles du *T. stutchburyi.* De Sumatra, comme la précédente [*stutchburyi*], dont elle est fort rapprochée."

Is *Bankia carinata* (Gray). See also the following: *bipalmata* Delle Chiaje; *caribbea* Clench and Turner; *edmondsoni* Nair; *indica* Nair; *kamiyai* Roch; *kuronunii* Roch; *minima* Blainville; *nakazawai* Kuronuma; *navalis* Spengler; *orientalis* Roch; *palmulata* Philippi; *philippi* Gray; *segaruensis* Roch; *stutchburyi* Blainville; *syriaca* Roch.

carinata 'Gray' Sowerby, **Teredo**: 1875, Conchologia Iconica **20,** TEREDO, pl. 2, fig. 6a-c (driftwood in the British Channel); non Gray 1827; non Blainville 1828.

Holotype, BM(NH). Plate 58 A

Is *Bankia bipennata* (Turton) 1819.

carinata 'Leach' Blainville, **Teredo**: 1828, Dict. Sci. Nat. **52**: 269 (Sumatra); non Sowerby 1875.

Types, BM(NH), not found.

Is *Bankia carinata* (Gray) 1827.

caroli Iredale, **Dicyathifer**: 1936, Queensland Forest Service Bull. No. 12, p. 38, pl. 1, figs. 16-25 (from Boat Passage, mouth of Brisbane River, Queensland, Australia).

Holotype, Australian Mus. Plate 35 A

Paratype, MCZ 168012.

Is *Dicyathifer manni* (Wright) 1866.

causoniana d'Orbigny, **Teredo**: 1847 [Nov. 1850], Prodrome Paléont. **2**: 421 (fossil, Tertiaire, 25ᵉ Étage, Parisien [France]).

Types, Lab. de Paléont., Paris Mus., d'Orbigny Collection 9426.

Name based on fragments of tubes only.

chamberlaini Bartsch, **Teredo (Ungoteredo)**: 1927, Bull. U.S. Natl. Mus. **100** (2) pt. 5: 546, pl. 54, figs. 1-2; pl. 57, fig. 5; pl. 60, figs. 9-11 (*Albatross,* Sta. 5252, off Linao Point, Gulf of Davao, Mindanao, Philippine Islands, in 28 fathoms).

Holotype, USNM 312922. Plate 19 A

Is *Teredothyra matocotana* (Bartsch) 1927.

chilensis Philippi, **Teredina?**: 1887, Die tertiären und quartären Versteinerungen Chiles. Leipzig, p. 172, pl. 42, fig. 6; 1887,[1] Los Fósiles Terciarios i Cuartarios de Chile. Santiago de Chile, p. 165, pl. 42, fig. 6 (Cretaceous, Chile).

Types, Mus. Santiago, Chile.

Name based on tubes only, and though described as a *Teredina,* it has often been considered a *Teredo.* On the basis of the description and figure it is impossible to tell to which genus it really belongs.

chiloensis Bartsch, **Bankia (Bankia)**: 1923, Rev. Chilena Hist. Nat. **27**: 147 (Chiloé Island, Chile).

Holotype, USNM 348498. Plate 62 B

Is *Bankia martensi* (Stempell) 1899.

chlorotica Gould, **Teredo**: 1870, Invertebrata of Massachusetts, p. 33, fig. 360 (Massachusetts—from ships that have cruised in the Pacific).

Types, lost, Johnson, 1964, Bull. U. S. Natl. Mus. **239**: 54.

This is the type species of the genus *Lyrodus.* Is *Lyrodus pedicellatus* (Quatrefages) 1849.

chrysodon Bergius, **Teredo**: 1765, K. Svenska Vetenskapsakad. Handl. (Stockholm) **26**: 228 (Habitat in Pelago, unde ingenti procella ad littora Capensia projecta).

Not in the Teredinidae. Is an annelid.

cieba Clench and Turner, **Bankia (Plumulella)**: 1946, Johnsonia **2** (19): 25, pl. 16, figs. 1-4 (Balboa, Canal Zone, Panama).

Holotype, MCZ 168097. Plate 53

[1] The Spanish edition apparently appeared shortly after the German. It is identical except for the pagination and the addition of "Errata" following the Index on page 256 of the Spanish edition. The German edition is 266 pages, the Spanish 256.

cincta Deshayes, **Teredo**: 1860, Description des Animaux sans Vertèbres Découverts dans le Bassin de Paris **1**: 115, pl. 3, figs. 7-9 (fossil, Tertiaire sables du calcaire grossier supérieur de Maulette, Houdan [Seine-et-Oise, France]).

Types, École des Mines, Paris.

Name based on shells only.

circula Aldrich, **Teredo**: 1886, Bull. Geol. Surv. Alabama **1**: 36, 43 (fossil, Tertiary, Choctaw Bluff, Alabama and Wayne Co., Mississippi, in white limestone, Vicksburg Group).

Name based on shelly tubes only.

clappi Bartsch, **Teredo (Zopoteredo)**: 1923, Proc. Biol. Soc. Washington **36**: 96 (Key West, Florida, from keel of ship).

Holotype, USNM 348189. Plate 11 A, C
Paratypes, MCZ 120711.

See also the following: *adanensis* Roch; *hermitensis* Roch; *horsti* Moll; *renschi* Roch; *trulliformis* Miller.

clausa Sowerby, **Kuphus**: 1875, Conchologia Iconica **20**, KUPHUS, fig. 2a-c (no locality given); Sowerby 1887, Thesaurus Conchyliorum **5**: 125, pl. 469, fig. 21.

Nomen dubium. The description was based on the end of the tube only; the shells and pallets are unknown. Is probably *Kuphus polythalamia* (Linnaeus) 1767.

Clausaria 'Férussac' Menke: 1828, Synopsis Methodica Molluscorum, ed. 1, p. 73. Refers to *Septaria* Lamarck.

Is *Kuphus* Guettard 1770.

clava Gmelin, **Teredo**: 1791, Systema Naturae, ed. 13, p. 3748 (in *Xylocarpi granati* [no further data given]). Refers to Walch 1777, Naturforscher (Halle) **10**: 38, pl. 1, figs. 9-10; Spengler 1779, Naturforscher (Halle) **13**: 53, pl. 1, figs. 1-2; pl. 2, figs. 12-14; Schroeter 1784, Einleitung in die Conchylienkenntniss **2**: 574, pl. 6, fig. 20; non von Martens.

Syntypes, Copenhagen Mus. Plate 23 C

Is *Uperotus clavus* (Gmelin).

The type locality is here designated as Tranquebar, Madras, India, the locality given by Spengler. This is the type species of the genus *Uperotus* Guettard 1770, by subsequent designation (Lamy 1927). Moll, 1941, page 195, stated that cotypes of this species were in the museum in Copenhagen. The specimens, figured by Walch (pl. 1, figs. 9, 10) to which Gmelin referred, are in Copenhagen and may be considered syntypes. They are probably the specimens to which Moll referred.

See also the following: *clavata* Oken; *cornicula* Lamarck; *corniformis* Gray; *corniformis* Lamarck; *cucurbita* Meuschen; *elegans* Iredale; *foliiformis* Laurent; *gregaria* Blainville; *gregata* Lamarck; *nucivorus* Spengler; *plumiformis* Laurent; *rehderi* Nair; *retorta* Mawe; *shionomisakiensis* Habe; *vattanansis* Nair and Gurumani.

clava Lamarck, **Fistulana**: 1801, Système des Animaux sans Vertèbres, p. 129.

Refers to the Encyclopédie Méthodique, p. 167, figs. 17-22.

Not Teredinidae, but Gastrochaenidae.

clava 'Gmelin' von Martens, **Teredo (Hyperotis)**: 1894 [*in*] Semon, Zoologische Forschungsreisen in Australien und dem Malayischen Archipel **5** (1), Mollusken, p. 95, pl. 14, fig. 10 (Amboina [Molucca Ids.]); non Gmelin 1791.

Holotype, Berlin Mus. Plate 36 B

Renamed *semoni* by Moll (1931). Is *Spathoteredo obtusa* (Sivickis) 1928.

clavata Oken, **Fistulana**: 1815, Lehrbuch der Naturgeschichte **3** (1): 219; Oken 1843, Allgemeine Naturgeschichte für alle Stande, Atlas, Zoologie, pl. 6, fig. 3 (in *Xylocarpus gronatum*).

This work was rejected by the International Commission on Zoological Nomenclature, Opinion 417 (1956), but the name is included here for completeness.

Is *Uperotus clavus* (Gmelin) 1791.

clavata 'Brocchi' Blainville, **Teredo**: 1817, Dict. Sci. Nat. **9**: 367.

Nomen nudum. De Blainville referred to a fossil shell which "M. Brocchi décrit et figure sous le nom de *teredo clavata*, dans sa Conchyliologie subapennine." Blainville must have seen this in manuscript, for the name does not appear in Brocchi's published work. Sacco (1901, I. Molluschi dei Terreni Terziarii del Piemonte e della Liguria, part 29, p. 145) and others were in error in crediting the reference in the Dict. Sci. Nat. **9**: 367 to Defrance; the authorship is clearly indicated at the end of the article on *Clavagelle* as 'De B.' Sacco considered *T. clavata* 'Brocchi' de B. a synonym of *Clavagella brocchii* Lamarck 1818 (Clavagellidae).

clavata Roemer, **Teredina**: 1841, Die Versteinerungen des norddeutschen Kreidegebirges, p. 76, pl. 10, fig. 10 (Fossil, Oberer Kreidemergel bei Quedlinburg [Germany]).

Is a *Teredina* (Pholadidae).

clavatus Leymerie, **Teredolites**: 1840, Mém. Soc. Géol. France **4**: 341 (*nomen nudum*); 1842, Mém. Soc. Géol. France **5**: 2, pl. 2, figs. 4-5 (fossil, Cretaceous, Dept. de l'Aube, France, in lignites).

Is close to *Uperotus clavus* (Gmelin) 1791.

Cloisonnaria 'Férussac' Adams 1858, The Genera of Recent Mollusca [Appendix] **2**: 648.

Error for *Clossonnaria* Férussac.

Cloissonaria 'Férussac' Paetel 1890, Catalog der Conchylien-Sammlung **3**: 6.

Error for *Clossonnaria* Férussac.

Clossonaria 'Férussac' Paetel 1875, Familien- und Gattungsnamen der Mollusken, p. 46.

Error for *Clossonnaria* Férussac.

Clossonnaria 'Lamarck' Férussac 1822, Tableaux Systématiques des Animaux Mollusques, Paris, p. xlv. Refers to the cloisonnaire and *Septaria* of Lamarck.

Is *Kuphus* Guettard 1770.

Clupibankia Moll 1952, Inst. Franc. Afr. Noire, Cat. 8, pp. 42, 85.

Type species, *Bankia barthelowi* Bartsch, original designation.

Coeloteredo Bartsch 1923, Proc. Biol. Soc. Washington **36**: 99.

Type species, *Teredo* (*Coeloteredo*) *mindanensis* Bartsch, original designation.

communis Osler, **Teredo**: 1826, Phil. Trans. Roy. Soc. London **116** (3): 371, pl. 4, fig. 10 (no locality given).

Nomen dubium. Name based on shell only.

conchilega Förskal, **Teredo**: 1775, Descriptiones Animalium, p. 99 (Lohajae [Yemen]).

Not in the Teredinidae. Is probably an annelid.

congoensis Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 270, pl. 1, fig. 10 (Belgisch-Kongo [Belgian Congo]).

Lectotype, Berlin Mus. (here selected). Plate 29 A

Paratype, MCZ 170754.

Is *Nototeredo knoxi* (Bartsch) 1917.

consularis Moll, **Bankia**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 273, text fig. 9 (Singapore).

Holotype, Berlin Mus. Plate 42 D

Is probably a young *Bankia carinata* (Gray) 1827.

contorta Gabb, **Teredo** (**Uperotis?** [*sic*]): 1861, Proc. Acad. Nat. Sci. Philadelphia, p. 323 (fossil, Cretaceous, Burlington, New Jersey).

Types, ANSP.

Name based on shells only. Is *Teredo irregularis* Gabb 1860, according to Weller, 1907, Geol. Surv. New Jersey, Paleontology **4**: 656.

contortuplicata Mawe, **Serpula**: 1823, Linnean System of Conchology, p. 193, pl. 34, fig. 4 (no locality given).

Name based on a cluster of worm tubes. Not in the Teredinidae.

conulus d'Eichwald, **Teredo**: 1868, Lethaea Rossica, Stuttgart **2**: 796, pl. 27, fig. 18 (fossil, terrain Crétace supérieur près de Kotêitschi, Moscou, [Russia]).

Name based on tubes only. Probably a *Gastrochaena*.

corallensis Buvignier, **Teredo**: 1852, Statistique Géologique, Minéralogique, Minérallurgique et Paléontologique du Département de la Meuse (Paris), p. 263, Atlas, p. 5, pl. 6, figs. 21-26 (fossil, Upper Jurassic, dans les polypiers du coral-rag de Douaumont, Dept. Meuse, France).

Name based on shells only. Is probably a *Teredina* (Pholadidae).

cornicula Lamarck, **Fistulana**: 1801, Système des Animaux sans Vertèbres **5**: 129 (no locality given). Refers to Favanne, 1780, pl. 5, fig. N [*in*] D'Argenville, La Conchyliologie, ed. 3. In 1818 Lamarck also referred his *Fistulana corniformis* to Favanne, pl. 5, fig. N.

Is *Uperotus clavus* (Gmelin) 1791.

corniformis Gray, **Guetera**: 1851, Ann. Mag. Nat. Hist. (2) **8**: 386. Refers to *Fistulana corniformis* Lamarck.

Is *Uperotus clavus* (Gmelin) 1791.

corniformis Lamarck, **Fistulana**: 1818, Histoire Naturelle des Animaux sans Vertèbres **5**: 435 (L'Océan des Grandes Indes). Refers to the Encyclopédie Méthodique, pl. 167, fig. 16; and Favanne, 1780, pl. 5, fig. N [*in*] D'Argenville, La Conchyliologie, ed. 3.

Lamarck's reference to Favanne is the same as that for his *Fistulana cornicula*; and the reference to the Encyclopédie Méthodique is the same as that given for his *Fistulana gregata*.

Is *Uperotus clavus* (Gmelin) 1791.

corniformis 'Lamarck' Phipson, **Teredo**: 1857, C. R. Acad. Sci. Paris **45**: 30 (fossil, l'étage éocène moyen, dans les sables calcarifères des terrains tertiaires de Bruxelles [Belgium]); non *corniformis* Lamarck 1818.

Is in the genus *Uperotus,* but probably not Lamarck's species.

Cornuteredo Dall, Bartsch and Rehder 1938, Bull. B. P. Bishop Mus. **153**: 209.

Type species, *Teredo* (*Cornuteredo*) *milleri* Dall, Bartsch and Rehder, original designation.

Is *Lyrodus* Gould 1870.

cossmani Vincent, **Teredo**: 1927, Bull. Acad. Roy. Belgique (5) **13**: 363 (fossil, la base du Tertiaire, Campine [Belgium]).

Type, Brussels Mus.

Name based on a single valve.

crassula Stoliczka, **Teredo**: 1871, Palaeontologia Indica (6) **3**: 16, pl. 1, fig. 2 (fossil, Cretaceous, Ootatoor Group, in fossil wood impregnated with calcareous matter at Ootatoor, southern India).

Name based on shells and tubes only.

crassus 'Matheron' Mongin, **Teredo**: 1952, Mém.

Mus. Natl. Hist. Nat. (Paris) (N.S.) C **2** (2): 193, pl. 2, fig. 39 (fossil, Burdigalien de Plan d'Aren, France).

Name based on tubes only.

cretacea Gabb, **Bivonia**: 1876, Proc. Acad. Nat. Sci. Philadelphia, p. 302 (fossil, Cretaceous, Pataula Creek, Georgia); Johnson 1905, Proc. Acad. Nat. Sci. Philadelphia **57**: 18.

Types, ANSP.

Based on tubes only, but name often listed in the Teredinidae.

cucullata Jeffreys, **Teredo**: 1860, Ann. Mag. Nat. Hist. (3) **6**: 125 (drift, fir-wood at Guernsey, England).

Lectotype, Jeffreys Collection,
USNM 194262 (here selected). Plate 58 B

Is *Bankia bipennata* (Turton) 1819.

cucurbita Meuschen, **Vermiculus**: 1787, Museum Geversianum, p. 239 (Tranquebar [India]). Refers to Naturforscher (Halle) **10**, pl. 1, fig. 10; **13**, pl. 1, figs. 1-14; pl. 2, figs. 12-14.

The references cited above are the same as those for *T. clava* Gmelin 1791. Mörch (1853, Cat. Conch. Comes de Yolde **2**: 2) places *cucurbita* in the genus *Uperotis* [*sic*] Guettard and rightly considers *clavus* Gmelin 1791, *nucivorus* Spengler 1792, and *gregatus* Lamarck 1801 as synonyms. It is difficult to know why this was not followed by subsequent authors, but the name *cucurbita* seems to have been overlooked. Lamy (1927) and Moll (1941) placed it in the synonymy of *clavus* Gmelin, the name applied to this species by all recent authors. Consequently it seems best to consider *cucurbita* a *nomen oblitum* and continue the use of *Uperotus clavus* (Gmelin) for this species.

As suggested by Turner and Boss, 1962 (Johnsonia **4**: 92), this work of Meuschen should be placed on the Official Index of Rejected and Invalid Works in Zoological Nomenclature by the International Commission because most generic names are in the plural form.

cuneiformis 'Deshayes' Moll, **Teredo**: 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 157.

Error for *corniformis* Lamarck. In the Traité Élémentaire de Conchyliologie **1** (2): 31 [not p. 55 as given by Moll], Deshayes, in the vernacular, mentions "La Fistulane cunéforme." This was an error for 'corniformé', again in the vernacular. Lamy (1927, Jour. Conch. [Paris] **70**: 242, footnote) points this out but does not consider it a scientific name. Unfortunately, in the index to volume 70 of the Journal de Conchyliologie it is listed as *Teredo cuneiformis* Deshayes, and it is undoubtedly from here that Moll took the name.

cupedia Laws, **Bankia**: 1944, Trans. Proc. Roy. Soc. New Zealand **73**: 303, fig. 12 (fossil, Pakaurangi Point, Kaipara, New Zealand).

The general outline and wide umbonal reflection of the single right valve on which this was based indicate that this species probably belongs to the genus *Xylophaga* (Pholadidae).

Cuphus 'Guettard' Agassiz 1846, Nomenclatoris Zoologici Index Universalis, p. 108; Gray, 1847, Proc. Zool. Soc. London, p. 188.

Emendation for *Kuphus* Guettard 1770.

cylindracea Serres, **Septaria**: 1845, Actes Soc. Agricole Sci. Litt. Pyrénées-Orient. **6** (2): 88 (fossil, Tertiaire, Parma, Italy).

Name based on the tubes only.

cylindrica 'Serres' Moll, **Septaria** 1941, Fossilium Catalogus I: Animalia pars 95, p. 26.

Error for *cylindracea* Serres.

Cyphus 'Guettard' Fischer 1887, Manuel de Conchyliologie p. 1158.

Emendation for *Kuphus* Guettard 1770.

Dactyloteredo Moll 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 193; Moll 1952, Inst. Franc. Afr. Noire, Cat. 8, p. 83.

Type species, *Teredo megotara* Hanley, subsequent designation, Moll 1952.

Moll introduced this name as "*Teredo* (*Dactyloteredo*) *megotara* Hanley" without further comment or indication that it was new. He did not describe it until 1952 when he credited the name to Roch.

Is *Psiloteredo* Bartsch 1922.

dagmarae Roch, **Teredo**: 1931, Arkiv Zool. (Stockholm) **22A** (13): 16, pl. 3, fig. 7 (Brazil).

Holotype, Gothenburg Mus.
Paratypes, Berlin Mus. Plate 2 A

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

daleani 'Benoist' Dollfus and Dautzenberg, **Teredo**: 1902, Mém. Soc. Géol. France (4) **10**: 57 [Paleont. Mem. no. 27, p. 57].

Error for *daleaui* Benoist.

daleaui Benoist, **Teredo**: 1873, Actes Soc. Linn. Bordeaux **29**: 17; 1877, *Ibid.*, **31**: 317, pl. 20, figs. 1-3 (fossil, Miocene supérieur à Martignas, Sud-Ouest, France).

The shells, pallets and tube were described and figured.

Is a *Nototeredo*.

dalli 'Watson' Moll and Roch, **Teredo**: 1931, Proc. Malac. Soc. London **19**: 208, fig. 17 (Madeira); Moll, 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin, 1941: 185.

Holotype, Berlin Mus. Plate 2 H

Watson (1897) definitely stated that the pallets of *dallii* were unknown. As the holotype of Watson's species is still in existence, even though it is not sufficient to define the species, Moll (1941) could not legally select a neotype. It is impossible to prove that Watson (1897) and Moll and Roch (1931) were referring to the same species; therefore, they must be treated separately, *dallii* being a *nomen dubium*, and *dalli* Moll and Roch a synonym of *Lyrodus pedicellatus* (Quatrefages) 1849.

dallii Watson, **Teredo**: 1897, Jour. Linn. Soc. London **26**: 266, pl. 20, fig. 35a-c (southeastern coast of Madeira Island).

Holotype, BM(NH). Plate 2 G

Nomen dubium. Name based on shells only.

davaoensis Bartsch, **Bankia (Bankiella)**: 1927, Bull. U.S. Natl. Mus. **100** (2) pt. 5: 537, pl. 53, figs. 2, 4; pl. 56, fig. 3; pl. 58, figs. 4-6 (*Albatross*, station 5252, from off Linao Point, Gulf of Davao, Philippine Islands, in 28 fathoms).

Holotype, USNM 310973. Plate 44 E

Is *Bankia barthelowi* Bartsch 1927.

debenhami Iredale, **Bankia**: 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 34, pl. 3, figs. 5-8 (Pyrmont, Port Jackson, Sydney Harbour, New South Wales, Australia).

Holotype, Australian Mus. Plate 63 C
Paratypes, MCZ 229349.

Is *Bankia australis* (Calman) 1920.

dendrolestes Brown and Pilsbry, **Teredo**: 1911, Proc. Acad. Nat. Sci. Philadelphia **13**: 372, text fig. 3, pl. 22, fig. 11 [not pl. 1, fig. 10 as given in the text] (fossil, Oligocene, Gatun Formation, Panama).

Name based upon fossilized tubes and fragments of valves only.

dendrotestes 'B. and P.' Bartsch, **Teredo**: 1930, Science (N.S.) **71**: 460.

Error for *dendrolestes* Brown and Pilsbry.

dentatus Roemer, **Teredo**: 1841, Die Versteinerungen des norddeutschen Kreidegebirges, p. 76, pl. 10, fig. 9 (fossil, Kreide [Cretaceous], Hilsconglomerat, Essen, Germany).

Name based on fragments of tubes only; the inner margin of the tube being dentate at the smaller end.

denticulata Gray, **Teredo**: 1851, Ann. Mag. Nat. Hist. (2) **8**: 386 (Greenland).

New name for *Teredo navalis* Möller; non Linnaeus 1758. *Teredo navalis* Möller is a *nomen nudum*, because Möller 1842 (Index Molluscorum Groenlandiae, Naturhist. Tidskrift **4** (1):94) lists '*T. navalis* Lin.?' without further comment or description. Consequently *denticulata*, based only on this listing, is also a *nomen nudum*. Roch's reference (1931, Arkiv Zool. (Stockholm) **22A** (13): 13) to *T. denticulata* Gray 1827, Phil. Mag. **2**: 409-411 is in error. Gray did not use the name *denticulata* until 1851. There is in the collection of the British Museum a specimen from Greenland, labeled "*Teredo navalis?*" in Möller's handwriting, and *denticulata* in Gray's. It is on the basis of this specimen that Gray created the new name, but neither he nor Möller ever described it. Fischer first described this species as indicated in the next entry. The *Teredo denticulata* described by Sowerby in the Conchologia Iconica was not based on the same specimen.

denticulata 'Gray' Fischer, **Teredo**: 1856, Jour. Conch. (Paris) **5**: 135 (Greenland).

Holotype BM(NH) 43·6·30·395. Plate 27 C

Fischer in his description of this species stated that, though *denticulata* was named by Gray, it had never been described. Fischer did not see the specimen, but took the description from the notes of Deshayes who had studied the collection in the BM(NH). Therefore, as noted above under *denticulata* Gray, Möller's specimen from Greenland is the type of this species.

Is *Psiloteredo megotara* (Hanley) 1848.

denticulata 'Gray' Sowerby, **Teredo**: 1875, Conchologia Iconica **20**, TEREDO, pl. 4, fig. 18a-c (Britain?).

Holotype, BM(NH), Cuming Collection. Plate 27 A

Is *Psiloteredo megotara* (Hanley) 1848.

denticuloserrata Daniel, **Bankia (Neobankia)**: 1956, Jour. Madras Univ. (B) **26**: 593 (Madras Coast, India).

Holotype, Zool. Surv. India, not found.
Paratypes, Univ. Zool. Lab. Madras, not found. Plate 51 A

Is *Bankia bipennata* (Turton) 1819.

deshaiesii 'Quatrefages' Laurent, **Teredo**: 1850, Jour. Conch. (Paris) **1**: 351.

Error for *deshaii* Quatrefages.

deshaii Quatrefages, **Teredo**: 1849, Ann. Sci. Nat., (3) Zool. **11**: 26 (la rade d'Alger [Algiers, Algeria]).

New name for *Teredo navalis* Deshayes 1839; non Linnaeus 1758.

Is *Nototeredo norvagica* (Spengler) 1792.

deshayesi Archiac, **Teredo**: 1854, Bull. Soc. Géol. France (2) **11**: 208, pl. 6, fig. 6a-b (fossil, [Cretaceous], environs des Bains de Rennes, France).

Name based on shells only.

deshayesi 'Quatrefages' Lamy, **Teredo**: 1926, Jour. Conch. (Paris) **70**: 248.

Emendation for *deshaii* Quatrefages.

destructa Clench and Turner, **Bankia (Neobankia)**:

1946, Johnsonia **2** (19): 20, pl. 13, figs. 1-4 (La Cieba, Honduras).

Holotype, MCZ 123303. Plate 54

Deviobankia Iredale 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 33.

Type species, *Bankia debenhami* Iredale [=*B. australis* (Calman)], original designation.

Is *Neobankia* Bartsch 1921.

devoluta Vincent, **Xylotria** [*sic*]: 1924 [1925], Ann. Soc. Roy. Zool. Belgique **55**: 21, text fig. (fossil, Eocene, Sables de Wemmel, Neder-over-Heembeek, Belgium); Glibert, 1936, Mém. Mus. Hist. Nat. Belgique **78**: 189.

Holotype, Brussels Mus. 126. Plate 60 C

Name based on shell and pallet. Is in the genus *Bankia*. See also *parisiensis* Deshayes.

diazi Philippi, **Teredo?**: 1887, Die tertiären und quartären Versteinerungen Chiles. Leipzig, p. 171, pl. 51, fig. 10; 1887, Los Fósiles Terciarios i Cuartarios de Chile. Santiago de Chile, p. 165, pl. 51, fig. 10 (fossil, Terciario, Chiloé Id., Chile).

Types, Mus. Santiago, Chile.

Name based on tubes only.

dicroa Roch, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 14, pl. 2, fig. 13 (Togo).

Lectotype, Berlin Mus.
(here selected). Plate 7 B

Is probably *Lyrodus takanoshimensis* (Roch) 1929.

Dicyathifer Iredale 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 28.

Type species, *Teredo mannii* Wright of Calman 1920 [=*D. caroli* Iredale], original designation. See Iredale, 1936, Queensland Forest Service Bull. No. 12: 38.

diederichseni Roch, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 6, pl. 1, fig. 2 (Reise von Manila [Philippine Ids.] nach der Sundastrasse [Java]).

Holotype, Berlin Mus. Plate 21 D

Is *Teredora princesae* (Sivickis) 1928.

diegensis Bartsch, **Teredo**: 1916, Nautilus **30**: 48 (San Diego, California); Bartsch, 1922, Bull. U.S. Natl. Mus. **122**: 29, pl. 22, fig. 3; pl. 34, fig. 3.

Holotype, USNM 74219. Plate 3 A

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

digitalis Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 271, pl. 1, fig. 11 (Belgisch-Kongo [Belgian Congo]).

Types, Berlin Mus., not found.

The shell is unknown and the pallets are very briefly described as close to *megotara*, but is probably young *congoensis* Roch [=*Nototeredo knoxi* (Bartsch)] from the same locality.

dilatata Stimpson, **Teredo**: 1851, Proc. Boston Soc. Nat. Hist. **4**: 113 (Lynn, Massachusetts, from pine buoy for lobster pots).

Holotype, ANSP 50985. Plate 27 B

Is *Psiloteredo megotara* (Hanley) 1848.

directa Hutton, **Cladopoda**: 1876 [1877], Trans. New Zealand Inst. **9**: 597, pl. 16, fig. 13; Suter, 1914, New Zealand Geol. Surv. Palaeont. Bull. no. 2, p. 54 [as *Teredo directa* Hutton]; Suter, 1915, *ibid.* no. 3, p. 61 (fossil, Tertiary, Canterbury, New Zealand).

Types, Otago Mus., Dunedin, New Zealand, lost, according to Suter, 1915.

Name based on tubes only. Is *Teredo heaphyi* Zittel, according to Suter 1915.

divaricata 'Deshayes' Fischer, **Teredo**: 1856, Jour. Conch. (Paris) **5**: 137, pl. 7, figs. 7-9 (Sicily).

Holotype, Paris Mus. Plate 33 B

Fischer took this name from a specimen label in the Deshayes collection. Though Fischer did not figure the pallets, he described them as being close to *norvagica*. Jeffreys considered it a stunted form of *norvagica*, and Lamy, 1927, p. 251, recognized it as a variety of *norvagica*.

Is a worn, malformed specimen of *Nototeredo norvagica* (Spengler) 1792.

divisa Ryckholt, **Teredo**: 1851, Mém. Cour. Acad. R. Sci. Belgique (4°) **24**: 113, pl. 5, fig. 13 (fossil, [Eocene], dans le grès tertiaire du Brabant [Belgium]).

Types, Brussels Mus.? Plate 64 F

Is *Xylotrya* [=*Bankia*] *burtini* 'Deshayes' (Ryckholt), according to Glibert, 1933, p. 166.

dominicensis Bartsch, **Teredo (Teredothyra)**: 1921, Proc. Biol. Soc. Washington **34**: 30; Bartsch, 1922, Bull. U. S. Natl. Mus. **122**: 23, pl. 21, fig. 2; pl. 33, fig. 1 (*Blake*, station 192, off Dominica, Lesser Antilles, in 138 fathoms).

Holotype, USNM 341129.
Paratypes, USNM 635841. Plate 17 B

Is *Teredothyra dominicensis* (Bartsch). See also *atwoodi* Bartsch.

dorsalis Turton, **Teredo**: 1819, A Conchological Dictionary of the British Islands, p. 185 (thrown up on the Devonshire coast, England).

Is *Xylophaga dorsalis* (Turton) (Pholadidae). See Turner, 1955, Johnsonia **3**: 146.

dorsata Gray, **Teredo**: 1827, Phil. Mag. (London) **2**: 411 (no locality given).

Types, BM(NH), not found.

Is in the Pholadidae, probably the genus *Xylophaga*.

dryas Dall, **Xylotrya**: 1909, Proc. U.S. Natl. Mus. **37**: 162, pl. 25, figs. 2, 3, 5-7 (from stems of living mangrove at Estero dell Palo, Santo Tumbes, Peru).

Holotype, USNM 207695. Plate 38 A

Is *Nauistora dryas* (Dall). See also *jamesi* Bartsch 1941.

dubia Sivickis, **Teredo**: 1928, Philippine Jour. Sci. **37**: 293, pl. 3, fig. 14 (large colony in hard sand near Puerto Galera, Mindoro, Philippine Islands).

Types, Philippine Bur. Sci., destroyed in World War II.

Is *Kuphus polythalamia* (Linnaeus) 1767.

dunlopei Wright, **Nausitora**: 1864, Trans. Linn. Soc. London **24**: 453, pl. 46, figs. 1-12 (freshwater below Fureedpore, Comer River, a branch of the Hurreegonga, a branch of the Ganges, Bengal [India]).

Holotype, BM(NH) 64·3·4·2. Plate 39 A
Paratypes, Zool. Mus., Univ. Dublin?

See also the following: *fluviatilis* Hedley; *globosa* Sivickis; *lanceolata* Rajagopal; *madagassica* Roch; *madrasensis* Nair; *messeli* Iredale; *pennaanseris* Roch; *quadrangularis* Sivickis; *queenslandica* Iredale; *schneideri* Moll; *smithi* Bartsch; and *triangularis* Sivickis.

duplicata Stinton, **Teredo (Psiloteredo)**: 1957, Proc. Malac. Soc. London **32**: 170, pl. 25, figs. 15-17 (fossil, Upper Eocene, Middle Barton Beds, Horizon C, Highcliffe, Hampshire, England).

Holotype, BM(NH) L87335.

Name based on 3 pallets only. Probably an adult *ungulata* Stinton 1957.

dutemplei 'Deshayes' Moll, **Teredo**: 1941, Fossilium Catalogus I: Animalia, pars 95, p. 28; 1942, Palaeontographica **94A**: 137.

Moll stated that he found in the collection of the École des Mines, Paris, a specimen labeled *Teredo dutemplei* Deshayes from the Lutetien, Fleury, but that he could not find a published description. He said it was a *Pholas*. This is undoubtedly what Deshayes published as *Pholas dutemplei* in 1860 (Description des Animaux sans Vertèbres Découverts dans le Bassin de Paris **1**: 141, pl. 10, figs. 4-6).

Is a *Nettastomella* (Pholadidae).

echinata 'Lamarck' Brocchi, **Teredo**: 1814, Conchiologia Fossile Subapennina, p. 270, pl. 14 [15], fig. 1a-b. Refers to *Fistulana echinata* Lamarck 1808, Ann. Mus. Natl. Hist. Nat. Paris **12**, pl. 43, fig. 9a-c.

Not in the Teredinidae; named *Clavagella brocchi* by Lamarck, 1818, Histoire Naturelle des Animaux sans Vertèbres **5**: 432.

edax Hedley, **Teredo**: 1895, Proc. Linn. Soc. New South Wales (2) **9**: 501, pl. 32, figs. 1-5 (Port Adelaide, South Australia, in eucalyptus piling).

Holotype, Australian Mus. C713.

Paratypes, BM(NH) 1904·5·10·80. Plate 31 A

Is *Nototeredo edax* (Hedley). See also the following: *apendiculata* Sivickis; *hydei* Sivickis; *juttingae* Roch; *kirai* Taki and Habe; *pentagonalis* Taki and Habe; *remifer* Iredale; *septa* Mawatari and Kitamura; *tondiensis* Nair and Gurumani; and *yakushimae* Habe.

edmondsoni Nair, **Bankia (Bankiella)**: 1956, Rec. Indian Mus. **52**: 396, fig. 4a-e (Madras Beach, Madras, India, in logs of *Bamboosa* and teak).

Holotype, Zool. Surv. India, Calcutta M17441/3. Plate 46 D

An examination of the holotype showed this to be young *Bankia carinata* (Gray) 1827.

edulis Sivickis **Bactronophorus**: 1928, Philippine Jour. Sci. **37**: 289, pl. 2, fig. 7 (New Washington, Capiz Prov., Panay, Philippine Islands).

Types, Philippine Bur. Sci., destroyed in World War II.

Is *Bactronophorus thoracites* (Gould) 1856.

elegans Iredale, **Glumebra**: 1936, Queensland Forest Service Bull. No. 12: 43, pl. 2, figs. 22-28 (Green Island, off Cairns, North Queensland, Australia).

Holotype, Australian Mus. Plate 23 B

Is *Uperotus clavus* (Gmelin) 1791.

elevata 'Gould' Lamy, **Teredo megotara**: 1927, Jour. Conch. (Paris) **70**: 246.

A *nomen nudum* created by Lamy, based on the remark of Gould (1870, Invertebrata of Massachusetts, p. 31) that *Teredo denticulata* Gray was a large elevated form of *megotara* Hanley.

ellipticus Theobald, **Teredo**: 1892, Index to Genera and Species described in Palaeontologia Indica up to the Year 1891, p. cxxvi.

This name was erroneously included under the genus *Teredo*. There is no species by this name.

elongata Quatrefages, **Teredo**: 1849, Ann. Sci. Nat., (3) Zoologie **11**: 28 (Mers de l'Inde).

Holotype, Paris Mus. Plate 9 B

Pallets unknown. On the basis of the limited anatomical work which Rancurel could do on the Quatrefages specimen, this species could be a *Lyrodus;* however, it is probably best to consider *elongata* a *nomen dubium*. For a discussion of this species and redescription of the holotype see Rancurel, 1954, Bull. Inst. Franc. Afr. Noire, no. 16 A, pp. 455, 456, 9 figs.

elongatus 'v. Münster' Braun, **Teredo**: 1840, Verz. Kreis-nat.-samml. zu Bayreuth befindlichen Petrefakten. Leipzig, p. 60 (fossil, Oberer Jura, Steitberg [Germany]); non *elongata* Quatrefages 1849.

Nomen nudum.

emacerata Whitfield, **Teredo**: 1885, Brachiopoda and Lamellibranchiata of the Raritan Clays and Greensand Marls of New Jersey, Monogr. U.S. Geol. Surv. **9**: 242, pl. 30, fig. 25 (fossil, Upper Cretaceous, upper layers of the upper Marl, Shark River, New Jersey). Also published in identical form in 1886 in the Geol. Surv. New Jersey, Paleont. **1**: 242, pl. 30, fig. 25.

Holotype, State Mus., Trenton, N.J., 7854, according to Palmer, 1965, Bull. Amer. Paleont. **48** (218): 315.

Name based on closely packed cluster of tubes.

Eoteredo Bartsch 1923, Proc. Biol. Soc. Washington **36**: 98.

Type species, *Eoteredo philippinensis* Bartsch, original designation. The pallets of the type species are unknown, making both the species and the genus *nomina dubia.* Bartsch created this new genus because the apophysis arose from the "middle of the shelf formed by the inward projection of the auricle" instead of the normal position from the umbonal area. This position of the apophysis is, however, an age factor which may be exhibited by species in several genera.

erecta von Salis, **Serpula**: 1793, Reisen in verschiedene Provinzen des Königreichs Neapel **1**: 358; von Salis 1795, Travels through various Provinces of the Kingdom of Naples in 1789, p. 448 [translated from the German by Anthony Aufrere] (Taranto, Italy). Refers to Martini, 1769, Conchylien-Cabinet (1) **1**, pl. 2, fig. 12a.

Nomen dubium. Name based on tubes only.

escarceoana Bartsch, **Teredo? (Psiloteredo?)**: 1927, Bull. U.S. Natl. Mus. **100** (2) pt. 5: 549, pl. 54, figs. 3, 9; pl. 57, fig. 4 (*Albatross* station 5294, off Escarceo Point, northern Mindoro, Philippine Islands, in 244 fathoms).

Holotype, USNM 312931. Plate 22 C

Nomen dubium. Name based on shell only.

excavata Jeffreys, **Teredo**: 1860, Ann. Mag. Nat. Hist. (3) **6**: 123 (drift fir, Guernsey, England).

Lectotype, Jeffreys Collection, USNM 194257 (here selected). Plate 19 F

Is *Teredothyra excavata* (Jeffreys). See also the following: *linearis* Nair; *palauensis* Edmondson; *subicensis* Edmondson; and *tritubulata* Moll.

excisa Jeffreys **Teredo megotara**: 1865, British Conchology **3**: 177 (British Isles).

Lectotype, Jeffreys Collection, USNM 194252 (here selected). Plate 26 A

Is a deformed specimen of *Psiloteredo megotara* (Hanley) 1848.

excisa von Koenen, **Teredo**: 1894, Abhandl. Geol. Spezialkarte Preuss. Thuring. Staaten. K. Preuss. Geol. Landesanst. **10** (6): 1334, pl. 95, fig. 6a-c, 7a-b, 8 (fossil, Unter- Oligocän, Lattorf [Germany]); non Jeffreys 1865.

Not in the Teredinidae; is probably a *Jouannetia* (Pholadidae).

excolpa Bartsch, **Bankia (Nausitora)**: 1922, Bull. U.S. Natl. Mus. **122**: 13, pl. 8, fig. 2; pl. 31, fig. 4 (from Spanish cedar, Gulf of California).

Holotype, USNM 98763. Plate 37 A

Is possibly *Nausitora fusticula* (Jeffreys) 1860.

eysdenensis Vincent, **Teredo**: 1930, Mém. Mus. Hist. Nat. Belgique no. 43, p. 28, pl. 4, fig. 6 (fossil, Eysden, 218m, Zwartberg-Paleocene du Limbourg, tubes dans les lignites).

Types, Dept. Invert. Paleont. Brussels Mus.

Name based on tubes only.

falunicus de Morgan, **Teredo**: 1916, Bull. Soc. Géol. France (4) **15**: 237, fig. 21 (fossil, Falunien [Middle Miocene], Vallon de Charenton, à Pont-Levoy, France).

Name based on shell only.

farcelloides 'Gray' Clessin, **Teredo**: 1893, Conchylien-Cabinet (2) **11** (4), **Pholadea**, p. 76.

Error for *T. furcelloides* Gray.

fatalis Quatrefages, **Teredo**: 1849, Ann. Sci. Nat., (3) Zool. **11**: 23, pl. 1, fig. 1; pl. 2, fig. 2 (les Passages, [Saint-Sebastién], La Rochelle etc. [France]).

Types, Paris Mus., not found.

Is *Nototeredo norvagica* (Spengler) 1792.

faujasi Bronn, **Teredo**: 1848, Handbuch einer Geschichte der Natur **3**: Index palaeontologicus, p. 1259 (fossil, Upper Cretaceous, Maestrichtian beds, la Montagne de St. Pierre [France]). Refers to Faujas-Saint-Fond, 1799, Histoire Naturelle de la Montagne de Saint-Pierre de Maestricht, p. 181, pl. 33 [p. 129, pl. 33 of the large folio edition].

Name based on tubes in fossilized wood.

fileoti 'Sivickis' Miller, **Bactronophorous** [*sic*]: 1956, Proc. 8th Pacific Sci. Congress **3A**: 1576.

Error for *filoteoi* Sivickis.

filoteoi Sivickis, **Bactronophorus** 1928, Philippine Jour. Sci. **37**: 290, pl. 2, fig. 8 (one specimen sent from Cebu, Philippine Islands).

Holotype, Philippine Bur. Sci. Manila, destroyed in World War II.

Is a stenomorphic *Bactronophorus thoracites* (Gould) 1856.

fimbriata Defrance, **Teredo?**: 1828, Dict. Sci. Nat. **52**: 269 (fossil, près de Bruxelles [Belgium] dans un sable blanc quarzeux).

Name based on tubes only.

fimbriata Jeffreys, **Teredo**: 1860, Ann. Mag. Nat. Hist. (3) **6**: 126 (in teak-wood, Leith, Scotland); non Defrance 1828.

Lectotype, Jeffreys Collection, USNM 194214 (here selected). Plate 56 A

New name for *T. palmulata* Forbes and Hanley 1853; non Lamarck 1818; non Philippi 1836.

Is *Bankia fimbriatula* Moll and Roch 1931.

fimbriatula Moll and Roch, **Bankia**: 1931, Proc. Malac. Soc. London **19**: 213, pl. 25, fig. 37.

New name for *Teredo fimbriata* Jeffreys 1860; non Defrance 1828. Plates 55, 56 A

See also the following: *canalis* Bartsch; *palmulata* Forbes and Hanley.

firmus Sequenza, **Psygmobranchus**: 1880, Atti R. Accad. Lincei, Ser. 3, Mem. vol. **6**, pl. 12, fig. 11 (fossil, Terziarie nella Provincia di Reggio (Calabria) [Italy]).

Name based on tubes only. Though described as an annelid, it has been placed with the Teredinidae and so is included here. Moll (1941, Fossilium Catalogus I, Animalia, pars 95, p. 26) considered it a synonym of *cylindrica* [*sic*] Serres.

fistula H. C. Lea, **Teredo**: 1843, Proc. Amer. Phil. Soc., Philadelphia **3**: 163 [*nomen nudum*]; Lea, 1846, Trans. Amer. Phil. Soc., Philadelphia **9**: 234 [p. 8 of reprint], pl. 34, fig. 5 (fossil, Tertiary, Petersburg, Virginia).

Name based on tubes only.

Fistulana Lamarck 1799, Mém. Soc. Hist. Nat. Paris, p. 90; non Müller 1776; non Bruguière 1789.

Type species, *Teredo clava* Gmelin, monotypic.

Is *Uperotus* Guettard 1770.

Fistulanigenus Renier 1807, Tavole per servire alle Classificazione e Connoscenza degli Animali, Padua, Tav. VII.

This work of Renier was placed on the Official Index of Rejected and Invalid Works in Zoological Nomenclature by the International Commission in 1956, Opinion 427.

fleuriausus d'Orbigny, **Teredo**: 1847 [Nov. 1850] Prodrome Paleont. **2**: 157 (fossil, Terrains Crétacés, 20ᵉ Étage Cénomanien; Gross espèce des lignites de l'Île d'Aix et du Mans [France]).

Types, Dept. Paleont., Paris Mus., d'Orbigny collection 6269A.

Name based on tubes only.

floridana Bartsch, **Teredo (Teredops)**: 1922, Bull. U.S. Natl. Mus. **122**: 28, pl. 22, fig. 1; pl. 34, fig. 1 (Tampa, Florida).

Holotype, USNM 193031. Plate 1 B

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

fluviatilis Hedley, **Calobates**: 1898, Proc. Linn. Soc. New South Wales **23**: 93, figs. 1-6 (Rewa and Navua Rivers, Viti Levu, Fiji Islands).

Holotype, Australian Mus. Plate 41, A, D
Paratypes, BM(NH)98·9·26·7; MCZ 32425.

Is *Nausitora dunlopei* Wright 1864.

foliiformis 'Valisnieri and Sellius' Laurent, **Teredo**: 1848, Dict. Univ. Hist. Nat. **12**: 359.

Nomen nudum in the synonymy of *Teredo nucivora* Spengler 1792, which equals *Uperotus clavus* (Gmelin) 1791.

fossilis 'Phipson' Moll, **Teredo**: 1914, Naturwiss. Zeitschr. Forst Landwirt. **12**: 518; Moll, 1941, Fossilium Catalogus I: Animalia, pars 95, p. 30.

Moll (1941) stated that *fossilis* was an error for *corniformis* Phipson.

fosteri Clench and Turner, **Bankia (Plumulella)**: 1946, Johnsonia **2** (19): 24, pl. 15, figs. 1-4 (Santa Marta, Colombia).

Holotype, MCZ 122536. Plate 57

Is close to *bipennata* (Turton), but because of the consistent differences mentioned on the plate caption the two species are held separate, at least for the present.

fragilis Tate, **Teredo**: 1888, Trans. Roy. Soc. South Australia **11**: 60, pl. 11, fig. 13 a-c (Port Adelaide, South Australia, in wharf).

Types, South Australian Mus., not seen.

Until the types of this species have been studied it is impossible to place it definitely, for the description and figures are poor. Iredale has considered his *T. balatro* and *T. shawi* as synonyms of *fragilis* Tate. These two species of Iredale are here considered synonyms of *bartschi* Clapp. Consequently, it is possible that *bartschi* Clapp is the same as *fragilis* Tate.

franziusi Roch, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 11, pl. 1, fig. 10 (Mittelmeer [Mediterranean Sea]).

Lectotype, Berlin Mus. (here selected). Plate 2 F

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

frugicola Ryckholt, **Teredo**: 1851 Mém. Cour. Acad. R. Belgique (4°) **24**: 112 (dans de gros fruits ligneux, Belgique). Refers to Burtin, 1784, Oryctographie de Bruxelles, pl. 26.

Is *Xylotrya* [=*Bankia*] *burtini* (Deshayes), according to Glibert, 1933, Mém. Mus. Roy. Hist. Nat. Belgique, No. 53:166.

fuchsii Vassel, **Teredo**: 1882, Nature (Paris) **10** (471): 29, text fig. (fossil, quaternaire, les sables marines du plateau de Kabret, isthme de Suez).

Is probably a *Nototeredo* close to *norvagica* Spengler 1792.

fulleri Clapp, **Teredo (Zopoteredo)**: 1924, Trans. Acad. Sci. St. Louis **25** (1): 12, pl. 3, figs. 16-22 (Christiansted, St. Croix, Virgin Islands).

Holotype, MCZ, lost.

Neotype, MCZ 169626, from Lameshur Bay, St. John, Virgin Islands, from Clapp Collection (here selected). Plate 12 A

See also the following: *bicorniculata* Roch and *indomalaiica* Roch.

furcata Moll, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 267, pl. 1, fig. 4 (Colombo, Ceylon).

Holotype, Berlin Mus. Plate 13 C

Is *Teredo furcifera* von Martens 1894.

Furcella 'Oken' Gray 1857 [1858], Proc. Zool. Soc. London, p. 243. Refers to Oken, 1815, Lehrbuch der Naturgeschicte, **3** Zoologie (1): 216-219.

Type species, *Furcella gigantea* Gray [= *Kuphus polythalamia* (Linnaeus)], monotypic.

Is *Kuphus* Guettard 1770.

Furcella Lamarck 1801, Système des Animaux sans Vertèbres, p. 104.

Type species, *Serpula polythalamia* Linnaeus, monotypic.

Is *Kuphus* Guettard 1770.

furcelloides Gray, **Teredo**: 1861, Proc. Zool. Soc. London, p. 314 (Dutch colonies of the Indian Ocean).

Types, BM(NH), not found.

Is *Bactronophorus thoracites* (Gould) 1856.

furcifera von Martens, **Teredo**: 1894, [*in*] Semon, Zoologische Forschungsreisen in Australien und dem Malayischen Archipel **5**, Mollusken, p. 95, pl. 4, fig. 9 (Amboina [Molucca Ids.]).

Holotype, Berlin Mus. Plate 13, B,E

See also the following: *australasiatica* Roch; *bensoni* Edmondson; *furcata* Moll; *furcillatus* Miller; *krappei* Moll; *laciniata* Roch; *parksi* Bartsch and *parksi madrasensis* Nair.

furcillatus Miller, **Teredo**: 1924, Univ. California Publ. Zool. **26**: 149, pl. 10, figs. 16-20 (Tutuila, Samoa).

Holotype, CAS 1729. Plate 13 A

Paratypes, ANSP 134323 and USNM 361887.

Is *Teredo furcifera* von Martens 1894.

fusticulus Jeffreys, **Teredo**: 1860, Ann. Mag. Nat. Hist. (3) **6**: 125 (from drift at Leith, Scotland, in *Cedrela odorata*).

Lectotype, Jeffreys collection, USNM 194267 (here selected). Plate 37 B

Is *Nausitora fusticula* (Jeffreys), and is the type species of the subgenus *Nausitorella* Moll. See also the following: *braziliensis* Bartsch and *excolpa* Bartsch.

gabrieli Cotton, **Bankia**: 1934, Rec. South Australian Mus. **5** (2): 178, figs. 5-7 (Dennekin Slip, Port Adelaide, South Australia); non Nair 1955.

Holotype, South Australian Mus. D.10970.

Is *Bankia australis* (Calman) 1920.

gabrieli Nair, **Bankia (Nausitora)**: 1955 [1958], Rec. Indian Mus. **53** (1-2): 262, text fig. 1a-d (from hull of discarded country canoe made of teakwood at Ernakulam, west coast, South India); non Cotton 1934.

Holotype, Zool. Surv. India, Calcutta, M17443/3. Plate 42 B

Is *Nausitora hedleyi* Schepman 1919.

gaultiana 'Woods' Moll, **Teredo**: 1914, Naturwiss. Zeitschr. Forst. Landwirt. **12**: 518.

Error for *gaultina* Woods.

gaultina Woods, **Teredo**: 1909, Monograph of the Cretaceous Lamellibranchia of England **2**: 237, pl. 38, fig. 21 (fossil, Cretaceous, Gault, Folkestone, England).

Name based on shells only. Is probably a *Xylophaga* (Pholadidae).

gazellae Roch, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 6, pl. 1, fig. 1 (Malaiischer Archipel [Malay Archipelago]).

Holotype, Berlin Mus. Plate 21 C

Is *Teredora princesae* (Sivickis) 1928.

gelyanus Buvignier, **Teredo**: 1852, Statistique Géologique, Minéralogique, Minérallurgique et Paléontologique du Département de la Meuse (Paris), Atlas, p. 5, pl. 6, figs. 27-32 (fossil, Jurassique, assises inférieures de l'oxford-clay, Bouvron (Meurthe) [France]).

Name based on shells only. Is probably a *Teredina* (Pholadidae).

gibberosa 'Staadt' Cossmann and Pissarro, **Teredina**: 1913, Iconographie Complète des Coquilles Fossiles de l'Éocène des Environs de Paris, pl. 62, fig. 6-3 (fossil, Thanétien, Éocène, Châlons-sur-Vesle, France); Cossmann 1913, Catalogue Illustré des Coquilles Fossiles de l'Éocène des Environs de Paris, Appendice no. 5, Ann. Soc. Zool. Malac. Belgique **49**: 23 [p. 9 of reprint], pl. 1, fig. 6-3.

Name based on shells and tubes. Is a *Teredina* (Pholadidae), though it has been included with the Teredinidae.

gigantea Gray, **Furcella**: 1857 [1858], Proc. Zool. Soc. London, p. 248, pl. 39, figs. 1-3 (locality not given).

Is *Kuphus polythalamia* (Linnaeus) 1767.

gigantea Sowerby, **Kuphus**: 1875, Conchologia Iconica **20,** KUPHUS, fig. 1 (no locality given); Sowerby 1887, Thesaurus Conchyliorum **5**: 125, pl. 469, fig. 20.

Is *Kuphus polythalamia* (Linnaeus) 1767.

gigantea Home, **Teredo**: 1806, Phil. Trans. Roy. Soc. London, **96,** p. 277 (Padang Island, off Sumatra).

Is *Kuphus polythalamia* (Linnaeus) 1767.

"gigantea Schröter **Serpula"**: 1784, Einleitung in die Conchylienkenntniss **2**: 557.

This name was first mentioned by P. Fischer 1857, Jour. Conch. (Paris) **5**: 132, where he includes it in the synonymy of *Teredo gigantea* but gives no reference. Lamy (1927, Jour. Conch. [Paris] **70**: 281), Moll (1941, Fossilium Catalogus **1**: Animalia, pars 95, p. 31) and others following Fischer have credited the name to Schröter with the reference as given above. On page 557 of his "Einleitung" Schröter referred to the large teredo, but he did not use the word *gigantea.* As generally understood, this is *Kuphus polythalamia* (Linnaeus) 1767.

globosa Sivickis, **Bankia**: 1928, Philippine Jour. Sci. **37**: 288, pl. 1, fig. 5 (from old piles at Sir J. Brooke Point, Palawan, Philippine Islands).

Types, Philippine Bur. Sci., Manila, destroyed in World War II.

Unfortunately the photographic illustrations given by Sivickis are not sufficiently clear to copy. Miller (1956, 8th Pacific Sci. Congress **3A**: 1575) examined the type specimens and believed them to be young *quadrangularis* Sivickis. The latter species is certainly the same as *Nausitora dunlopei* Wright.

Is *Nausitora dunlopei* Wright 1864.

globosa Meek and Hayden, **Teredo**: 1858, Proc. Acad. Nat. Sci. Philadelphia **10**: 53 (fossil, Fort Clark on the Missouri, Dakota Territory; in the Fort Pierre Group or formation no. 5 of the upper Missouri Cretaceous); Meek and Hayden 1876, Report U. S. Geological Survey of the Territories **9**: 264, pl. 30, fig. 13, text figs. 31-32. Types, USNM 422.

Name based on tubes only.

glomerans Stoliczka, **Teredo** (**Uperotes?** [*sic*]): 1871, Palaeontologia Indica (6) **3**: 17, pl. 1, figs. 4-5 (fossil, Cretaceous, Arrialoor Group, Comarapolliam [southern India] in a grayish coarse sandstone).

Name based on tubes only.

Glumebra Iredale 1936, Queensland Forest Service Bull. No. 12: 42.

Type species, *Glumebra elegans* Iredale, [=*Uperotus clavus* (Gmelin)] original designation.

Is *Uperotus* Guettard 1770.

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

Holotype, USNM 27415. Plates 59, 60 F

Is *Bankia gouldi* (Bartsch). See also the following: *mexicana* Bartsch; and *schrencki* Moll.

gracilis Moll, **Bankia**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 274, text fig. 10 (Singapore).

Holotype, Berlin Mus. Plate 52 A

grandis Holzapfel, **Teredo**: 1889, Palaeontographica **35**: 142, pl. 8, fig. 8; pl. 12, fig. 15 (fossil, Cretaceous, aus dem Aachener Sand vom Konigsthor [Germany]).

Name based on tubes only.

gregaria 'Lamarck' Blainville, **Fistularia**: 1820, Dict. Sci. Nat. **17**: 83. Refers to the Encyclopédie Méthodique, pl. 167, figs. 6-14. These are the same figures as those to which Lamarck referred.

Error for *gregata* Lamarck. Is *Uperotus clavus* (Gmelin) 1791.

gregaria Philippi, **Teredo**: 1887, Die tertiären und quartären Versteinerungen Chiles, Leipzig, p. 171, pl. 42, fig. 7; Philippi, 1887, Los Fósiles Terciarios i Cuartarios de Chile. Santiago de Chile, p. 165, pl. 42, fig. 7 (fossil, Terciario, Navidad, Matanzas i cerca de Ancud, Chile).

Types, Santiago Mus., Chile.

Name based on tubes only.

gregata Lamarck, **Fistulana**: 1801, Système des Animaux sans Vertèbres, p. 129 (locality unknown). Refers to Encyclopédie Méthodique, pl. 167, figs. 6-16; Lamarck, 1818, Histoire Naturelle des Animaux sans Vertèbres **5**: 435. Refers to Encyclopédie Méthodique, pl. 167, figs. 6-14 only. Figure 16 of this plate is the sole reference which Lamarck gave for his *corniformis,* which he introduced as new on p. 435 of the Histoire Naturelle, mentioned above.

Types, Paris Mus. Plate 23 D

Is *Uperotus clavus* (Gmelin) 1791.

gregoryi Dall, Bartsch and Rehder, **Teredo (Teredora)**: 1938, Bull. B. P. Bishop Mus. **153**: 212, pl. 55, figs. 1-5 (from drift log, Keaukaha, Hilo, Hawaii, Hawaiian Islands).

Holotype, USNM 337316. Plate 22 A

Is *Teredora princesae* (Sivickis) 1928.

grenningi Iredale, **Bankia**: 1936, Queensland Forest Service Bull. No. 12, p. 37, pl. 2, figs. 1-7 (Sandgate, Moreton Bay, Queensland, Australia).

Holotype, Australian Mus.

Is *Bankia australis* (Calman) 1920.

grobbai Moll, **Teredo (Teredo)**: 1937, Mitt. Zool. Mus. Berlin **22**: 182 (Basra [Iraq]).

Holotype, Berlin Mus. Plate 8 F

Paratype, MCZ 170759.
Is *Teredo bartschi* Clapp 1923.

Guetera Gray 1840, Synopsis of the Contents of the British Museum, ed. 42, p. 154 [*nomen nudum*]; Gray 1847, Proc. Zool. Soc. London, p. 188.
Type species, *Fistulana corniformis* Lamarck [=*Uperotus clavus* (Gmelin) 1791], monotypic.
Is *Uperotus* Guettard 1770.

Guettera 'Gray' Adams 1856, Genera of Recent Mollusca **2**: 333; also Paetel, 1890, Catalog der Conchylien-Sammlung **3**: 6.
Emendation for *Guetera* Gray.

haushamensis Hölzl, **Teredo**: 1957, Geologica Bavarica **29**: 69, pl. 7, fig. 12 (fossil, Miozän, Cyrenenschichten, Grube Hausham [Austria]).
Holotype, O. Hölzl collection no. B/192, Samml. des Bayer. Geol. Landesamtes, München.
Paratype no. 1924, same collection.
Name based on tube only.

hawaiensis [*sic*] Dall, Bartsch and Rehder, **Teredo (Teredops)**: 1938, Bull. B. P. Bishop Mus. **153**: 213, pl. 55, figs. 6-8 (*Albatross* station 3810, off south coast of Oahu, Hawaiian Islands, in 211-253 fathoms).
Holotype, USNM 335077. Plate 1 F
Is *Lyrodus pedicellatus* (Quatrefages) 1849.

hawaiiensis Edmondson, **Bankia (Neobankia)**: 1942, Occ. Pap. B. P. Bishop Mus. **17** (10): 136, fig. 11a-c (Honolulu Harbor, Oahu, Hawaiian Islands).
Holotype, BPBM 109. Plate 50 D
Is *Bankia bipalmulata* (Lamarck) 1801.

healdi Bartsch, **Teredo (Neoteredo)**: 1931, Proc. U. S. Natl. Mus. **79** (8): 2, pl. 1, figs. 1-5 (from piling at Cabimas, about 20 miles SE of Maracaibo, Venezuela).
Holotype, USNM 381921. Plate 33 A
Is *Psiloteredo healdi* (Bartsch). See also *miraflora* Bartsch.

heaphyi Zittel, **Teredo**: 1864, Reise der österreichischen Fregatte Novara, Geologischer Theil **1** (2): 45, pl. 14, fig. 4 (fossil, Tertiary [Miocene], Rodney Point, New Zealand); Suter, 1915, New Zealand Geol. Surv. Palaeont. Bull. No. 3, p. 61.
Types, K. K. Hofmuseum, Vienna (according to Suter, 1915).

heberti Deshayes, **Teredina**: 1860, Description des Animaux sans Vertèbres Découverts dans le Bassin de Paris **1**: 131, pl. 4, figs. 12-14 (fossil, Gisement Terraine marin inférieur).
Types, École des Mines, Paris.
Name based on shells and cast of tube only. Is probably a *Teredina* (Pholadidae), but has been considered a *Teredo*.

hedleyi Schepman, **Nausitoria** [*sic*]: 1919, Nova Guinea **13**, Zoologie, p. 195, pl. 7, fig. 3 (Merauke, New Guinea, from wood of pier).
Holotype, Amsterdam Mus. Plate 42 C
See also *gabrieli* Nair.

helleniusi Moll, **Teredo**: 1936, Mitt. Ges. Vorratsschutz E. V., Berlin-Steglitz **12** (1): 4 (Port Said and Ismailia [Egypt]).
Lectotype, Berlin Mus.
(here selected). Plate 2 E
Is *Lyrodus pedicellatus* (Quatrefages) 1849.

hemicalix Tauber, **Bankia (Bankiella) minima**: 1954, Wiss. Arb. Burgenland, No. 3, p. 25, pl. 1, fig. 1a-c (fossil, Tortonien, [Upper Miocene] Kalksburg, Austria).
Holotype, Nat. Mus. Wien Paläont. Syst. Nr. 187. LIV. 46.
Paratypes, A. F. Tauber collection 1084.
Numerous pallets were obtained and figured.

henrici Benoist, **Septaria**: 1877, Actes Soc. Linn. Bordeaux **31** [(4) **1**]: xxiii (fossil, Miocène inférieur, Gironde [France]).
Name based on tube only.

hermitensis Roch, **Teredo**: 1929, Mitt. Zool. Staatsinst., Zool. Mus. Hamburg **44**: 14, pl. 2, fig. 14 (Hermit Inseln [Bismarck Archipelago]).
Holotype, Berlin Mus. Plate 11 G
Is *Teredo clappi* Bartsch 1923.

hibicola Kuronuma, **Teredo (Lyrodus)**: 1931, Venus **2** (6): 295, pl. 8, fig. 4; pl. 9, figs. 20-22 (Kusatsu, Hiroshima Pref., Japan).
Is probably *Lyrodus pedicellatus* (Quatrefages) 1849.

hiloensis Edmondson, **Teredo (Teredo)**: 1942, Occ. Pap. B. P. Bishop Mus. **17** (10): 113, fig. 4d-h (Hilo, Hawaii, Hawaiian Islands).
Holotype, BPBM 106. Plate 8 E
Is *Teredo bartschi* Clapp 1923.

hoffmanni Philippi, **Teredina**: 1846, Palaeontographica **1** (1): 44, pl. 7, fig. 2 (fossil, Tertiär, Steinkern von Osterweddingen, Magdeburg, Germany).
Name based on valve only. Is probably a *Teredina* (Pholadidae), though it has been included in the Teredinidae.

honoluluensis Edmondson, **Teredo (Teredo)**: 1946, Occ. Pap. B. P. Bishop Mus. **18** (15): 222, fig. 4a-c (from test block, Honolulu Harbor, Oahu, Hawaiian Islands).
Holotype, BPBM 101. Plate 5 D
Is *Lyrodus pedicellatus* (Quatrefages) 1849.

horsti 'Roch' Moll, **Teredo**: 1941, Sitzungsber. Ges. Naturforsch. Fr. Berlin 1941: 160, 176 (Curaçao [Dutch West Indies]).
Nomen nudum. Roch 1955 (Zool. Meded.

Rijksmus. Natuur. Hist., Leiden **34** (8): 129) in a footnote mentions *horsti* and states that it equals *Teredo clappi* Bartsch 1923.

hydei Sivickis, **Teredo**: 1928, Philippine Jour. Sci. **37**: 294, pl. 3, fig. 15 (in large numbers in mangrove stumps on the shore at Dalahican, Cavite, Luzon, Philippine Islands).

Types, Philippine Bur. Sci., Manila, destroyed in World War II.

Is *Nototeredo edax* (Hedley) 1895.

hyder 'Sivickis' Mawatari and Kitamura, **Psiloteredo (Nototeredo)**: 1960, Misc. Rep. Res. Inst. Natur. Resources, Tokyo, No. 52/53, p. 72.

Error for *hydei* Sivickis.

Hylotrya 'Leach' Clessin 1893, Conchylien Cabinet (2) **11** (4) PHOLADEA, p. 82.

Error for *Xylotrya* Gray.

Hyperotis 'Guettard' Paetel 1875, Familien- und Gattungsnamen der Mollusken, p. 99.

Error for *Hyperotus* Herrmannsen.

Hyperotus Herrmannsen 1847, Indicis Generum Malacozoorum **2** (6): 671.

Emendaton for *Uperotus* Guettard.

Idioteredo Taki and Habe 1945, Venus **14**: 115.

Type species, *Kuphus* (*Idioteredo*) *smithi* Bartsch, original designation.

Is *Teredothyra* Bartsch 1921.

incrassatus Gabb, **Kuphus**: 1873, Trans. Amer. Phil. Soc. Philadelphia **15**: 246 (fossil, Miocene, earthy shale east of Guayubin, Santo Domingo); 1881, Jour. Acad. Nat. Sci. Philadelphia (2) **8**: 342, pl. 44, fig. 12a-c.

Holotype, ANSP 2785.

Name based on tubes only.

indica Nair, **Bankia (Bankiella)**: 1954 [1956], Rec. Indian Mus. **52**: 393, fig. 3a-d (test blocks off Mylapore, Madras, India).

Holotype, Zool. Surv. India, Calcutta, M17438/3. Plate 46 E

Examination of the holotype showed this to be *Bankia carinata* (Gray) 1827.

indica Nair, **Teredo (Teredo)**: 1955 [1958], Rec. Indian Mus. **53**: 268, text fig. 4a-d (test plank, Madras Harbour, South India).

Holotype, Zool. Surv. India, Calcutta, M17434/3. Plate 15 D

An examination of the type specimen has shown this to be *Lyrodus pedicellatus* (Quatrefages) 1849.

indomalaiica Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 264, text fig. 2 (Singapore).

Lectotype, Berlin Mus. (here selected). Plate 12 B

Paratype, MCZ 170760.

Is *Teredo fulleri* Clapp 1924.

Inequarista Iredale 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 37.

Type species, *Nausitora messeli* Iredale [=*N. dunlopei* Wright], original designation. Is *Nausitora* Wright 1864.

infundibulata Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 265, text fig. 3 (Singapore).

Holotype, Berlin Mus., not found. Plate 18 C

Is *Lyrodus massa* (Lamy) 1923.

intestinoides Cossmann and Pissarro, **Teredo**: 1927, Palaeontologia Indica, Mem. Geol. Surv. India (N.S.) **10** (2): 30, pl. 2, fig. 39; pl. 4, fig. 35 (fossil, Eocene, Upper Ranikot, 3 miles east of Leynean old coal-pit Band Vero plain east; Jhirak; left bank of Indus River, opposite Jhirak [Pakistan]).

Name based on tubes only.

irregularis Gabb, **Teredo**: 1860, Jour. Acad. Nat. Sci. Philadelphia (2) **4**: 393, pl. 68, fig. 19 (fossil, Cretaceous, brown marl of Burlington Co., New Jersey).

Types, ANSP.

Name based on a section of tube and a portion of a valve. See also *Teredo contorta* Gabb 1861.

jaffaensis Roch, **Teredo**: 1936 [*in*] Moll, Mitt. Ges. Vorratsschutz E. V., Berlin-Steglitz **12** (1): 3 (Jaffa [Israel]; Port Said [Egypt]).

Holotype, Berlin Mus., not found.

Is *Teredora malleolus* (Turton) 1822, according to Moll, 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 196.

jamaicensis Bartsch, **Teredo (Psiloteredo)**: 1922, Bull. U. S. Natl. Mus. **122**: 42, pl. 29, fig. 1; pl. 35, fig. 1 (Jamaica).

Holotype, USNM 194283. Plate 30 B

Is *Nototeredo knoxi* (Bartsch) 1917.

jamesi Bartsch, **Bankia (Nausitora)**: 1941, Smithson. Misc. Coll. **99** (21): 1, pl. 1 (near drydocks, Balboa, Bay of Panama, Panama).

Holotype, USNM 513762. Plate 38 B, C

Paratypes, USNM 537895.

Is *Nausitora dryas* (Dall) 1909.

japonica Clessin, **Teredo**: 1893, Conchylien-Cabinet (2) **11** (4), PHOLADEA, p. 78, pl. 20, figs. 9-11 (Japan).

Holotype, Berlin Mus. Plate 15 A

Is *Teredo navalis* Linnaeus 1758.

johnsoni Bartsch, **Bankia (Neobankia)**: 1927, Bull. U. S. Natl. Mus. **100** (2) pt. 5: 536, pl. 53, figs. 5, 13; pl. 56, fig. 7; pl. 58, figs. 10-12 (*Albatross*, station 5266, Batangas Bay, Luzon, Philippine Islands, in 100 fathoms).

Holotype, USNM 310966. Plate 51 E

Is probably *Bankia bipennata* (Turton) 1819.

johnsoni Clapp, **Teredo (Zopoteredo)**: 1924, Trans. Acad. Sci. St. Louis **25** (1): 7, pl. 2, figs. 8-15 (Guantanamo, Cuba).

Holotype, MCZ 45306, lost. Plate 19 D

Neotype, MCZ 121632, from Guantanamo, Cuba. Clapp collection (here selected).

juttingae Roch, **Teredo (Dactyloteredo)**: 1955, Zool. Meded. Rijksmus. Natuur. Hist., Leiden **34** (8): 135, fig. 6 (Rhiouw-Archipel, Sumatra).

Holotype, Leiden Mus. Plate 31 C

Is *Nototeredo edax* (Hedley) 1895.

juttingi [*sic*] 'Roch' Moll, **Teredo (Dactyloteredo)**: 1952, Inst. Franc. Afr. Noire, Cat. 8, pp. 37, 102 [*nomen nudum*]; Roch, 1955, Zool. Meded. Rijksmus. Natuur. Hist., Leiden **34** (8): 137.

Roch (1955) considered *juttingi* Moll, even though definitely a nude name, as distinct from *juttingae* Roch and referred it to *digitalis* Roch.

kamiyai Roch, **Nausitora**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 17, pl. 2, fig. 16 (Kingyoku, Takanoshima, Japan).

Holotype, Berlin Mus. Plate 44 B

Paratype, MCZ 170757.

Is young *Bankia carinata* (Gray) 1827.

karsteni Haas, **Teredo**: 1889, Schr. Naturwiss. Ver. Schleswig-Holstein **7** (2): 15, pl. 4, fig. 5 (fossil, Mitteloligocän, Rupelthone, Itzehoe, Schleswig-Holstein, [Germany]).

Name based upon fragment of one valve only.

katherinae Clench and Turner, **Bankia (Liliobankia)**: 1946, Johnsonia **2** (19): 18, pl. 11, figs. 1-6 (Bahia, Brasil, from a test block).

Holotype, MCZ 168023. Plate 47

Is *Bankia campanellata* Moll and Roch 1931.

kauaensis 'Bartsch' Moll, **Teredo**: 1941, Venus **11**: 17.

Error for *kauaiensis* Dall, Bartsch and Rehder.

kauaiensis Dall, Bartsch and Rehder, **Teredo (Teredops)**: 1938, Bull. B. P. Bishop Mus. **153**: 214 (Nawiliwili [Kauai], Hawaiian Islands). Refers to Miller, 1924, Univ. California Publ. Zool. **26**: 148.

This name was proposed for the Hawaiian populations of *Lyrodus diegensis* Bartsch [=*pedicellatus* Quat.] which differ slightly from the typical form found in San Diego, California. Dall, Bartsch and Rehder quoted Miller's brief remarks and stated that, "From what we know of the distribution of shipworms, we are disinclined to believe that this is *T. diegensis*. It is unfortunate that we have not had specimens of this species for examination."

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

kiiensis Taki and Habe, **Kuphus (Idioteredo)**: 1945, Venus **14**: 115 (Kii, Japan).

This species was not figured and I have not seen a type specimen. However, on the basis of the brief description and the statement that it is closely related to *tanonensis* Bartsch, it is probably a synonym of *Teredothyra smithi* (Bartsch) 1927.

kingyokuensis Roch, **Bankia**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 20, pl. 2, fig. 21 (Kingyoku, Takanoshima, Japan).

Holotype, Berlin Mus. Plate 51 B

Is *Bankia bipennata* (Turton) 1819. Clench and Turner (1946, Johnsonia **2** (19): 9) considered this a synonym of *Bankia bipalmulata* Lamarck, but a study of the type specimen proved this to be wrong.

kirai Taki and Habe, **Psiloteredo (Phylloteredo)**: 1945, Venus **14**: 114 (off Doza-wan, Kochi-ken [Japan] in 200 fathoms); 1958 [*in*] Okada, Damage and the Method of Protection against Wood-boring Animals, Japanese Assoc. Adv. Sci. p. 63, pl. 4, fig. 19 [in Japanese].

Paratype, USNM 596195. Plate 29 B

Both references mentioned above are entirely in Japanese and I am grateful to Mr. Ju-Shey Ho, Biology Department, Boston University, for the translations. Though only a single locality was mentioned in the original description, a specimen in the USNM, received from Taki and Habe and labeled as a paratype, is from Shikoku, Japan. It is this specimen which is figured here.

Is *Nototeredo edax* (Hedley) 1895.

knoxi Bartsch, **Teredo**: 1917, Bull. Public Works Navy No. 28, p. 47, 7 figs. (Naval Station, Guantanamo Bay, Cuba); Bartsch, 1921, Bull. U. S. Natl. Mus. **122**: 41, pl. 29, fig. 2; pl. 34, fig. 2.

Holotype, USNM 216919. Plate 30 A

Is *Nototeredo knoxi* (Bartsch). See also the following: *bisiphites* 'Lesueur' Roch; *jamaicensis* Bartsch; *rosifolia* Moll; *sigerfoosi* Bartsch; *stimpsoni* Bartsch; *tryoni* Bartsch.

komaii Taki and Habe, **Bankia (Bankia)**: 1945, Venus **14**: 117 (Suzaki-tyo, Takaoka-gun, Kochi-ken [Japan]); 1958 [*in*] Okada, Damage and the Method of Protection against Wood-boring Animals, Japanese Assoc. Adv. Sci. p. 54, pl. 3, fig. 3 [in Japanese].

Is possibly *Bankia rochi* Moll 1931.

konaensis Edmondson, **Bankia (Neobankia)**: 1942, Occ. Pap. B. P. Bishop Mus. **17** (10): 134, fig. 10a-c (from submerged algaroba branch in Kealakekua Bay, Kona, Hawaii, Hawaiian Islands).

Holotype, BPBM 108, pallets only. Plate 50 E

Is *Bankia bipalmulata* (Lamarck) 1801.

krappei Moll, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 268, pl. 1, fig. 6 (São Francisco, Brasil).

Lectotype, Berlin Mus.

(here selected). Plate 10 B

Is young *Teredo furcifera* von Martens 1894.

kressenbergensis 'Naegeli' Schlosser, **Schafhäutlia**: 1925, Abhandl. Bayer. Akad. Wiss. **30** (7): 75, 161.

Schlosser was in error in placing the name *Schafhäutlia kressenbergensis* Naegeli as used by Schafhäutl (1863, Süd-Bayerns Lethaea Geognostica, Leipzig, p. 29, pl. 65, fig. 1a-e) in the synonymy of *Teredo tournali* Leymerie. This is definitely a fossil plant and Schafhäutl recognized it as such. Possibly the mistake arose because the figure of another *Schafhäutlia,* which Schafhäutl illustrated (pl. 1, fig. 1) but did not mention in his text, resembles a piece of wood bored by teredinids.

Kuphus Guettard 1770, Mémoires sur Differentes Parties des Sciences et Arts, Paris, **3**: 139, pl. 69, fig. 8.

Type species, *Serpula polythalamia* Linnaeus, subsequent designation, Gray 1847, p. 188.

kurdistanensis Elliott, **Bankia (Bankiella)**: 1963, Palaeontology **6** (2): 316, pl. 51, figs. 1-3; pl. 52, figs. 1-2 (fossil, Palaeocene, Kolosh Formation, Dohuk, Mosul Liwa, northern Iraq).

Holotype, BM(NH) LL30332.

Paratypes, BM(NH) LL30333-5 incl.

Name based on shells, pallets and tube.

kuronunii Roch, **Bankia**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 19, pl. 2, fig. 19 (Kingyoku, Takanoshima, Japan).

Holotype, Berlin Mus. Plate 48 C

Is *Bankia carinata* (Gray) 1827.

Kyphus 'Guettard' Herrmannsen 1847, Indicis Generum Malacozoorum **1**: 569.

Emendation for *Kuphus* Guettard.

laciniata Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 269, pl. 1, fig. 7 (San Diego-Suarez, Madagaskar; Vintano auf Sainte-Marie bei Madagaskar; Réunion).

Holotype, Berlin Mus. Plate 10 D

Paratypes, BM(NH) 1933·5·8·4; Berlin Mus.; Paris Mus.

Is young *Teredo furcifera* von Martens 1894.

lagenula Lamarck, **Fistulana**: 1801, Système des Animaux sans Vertèbres, p. 129. Refers to the Encyclopédie Méthodique, pl. 167, fig. 23.

This species has been considered a teredinid and so is included here. Is a *Gastrochaena.*

lamarana Stephenson, **Terebrimya**: 1952, U. S. Geol. Surv. Prof. Pap. 242: 141 (fossil, Cretaceous, Woodbine Formation, in fossil wood, Templeton member near old Slate Shoals, Red River, 8 miles E of Arthur City, Lamar Co., Texas).

Holotype, USNM 105600.

Paratypes, USNM 105601, 105602, Conlin's private collection.

Name based on shells only.

lamyi Roch, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 10, pl. 1, fig. 6 (Neapel [Italy]).

Holotype, Berlin Mus. Plate 2 D

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

lanceolata Rajagopal[aiengar] **Nausitora**: 1964, Jour. Bombay Nat. Hist. Soc. **61** (1): 109, figs. 1-3 of Plate and text fig. 1 (about 13 km south of the Sajnakhali Forest Office; 22° 7′ N; 88° 50′ E, Sajnakhali, 24-Parganas District, West Bengal, India).

Holotype, Zool. Surv. India, Calcutta, M16841.

An examination of the holotype showed this to be *Nausitora dunlopei* Wright 1864.

lanceolata Moll, **Teredo (Phylloteredo)**: 137, Mitt. Zool. Mus. Berlin **22**: 171, fig. 2 (vermutlich Deutsch-Ostafrika [probably German East Africa; now Tanganyika]).

Holotype, MCZ 170752. Plate 34 F

In the original description, Moll stated that this species was based on only a single pallet. I could not locate this in the Berlin Museum. It was later found at the William F. Clapp Laboratories, Duxbury, Mass. The original label in Moll's handwriting was with it, and it is without doubt the specimen figured by Moll. It was sent by Moll to Dr. Clapp in 1949.

Is *Teredothyra smithi* (Bartsch) 1927.

lapidaria Bergius, **Teredo**: 1765, K. Svenska Vetenskapsakad. Handl. (Stockholm) **25**: 229 (Italiae littora). Refers to Linnaeus 1758, Systema Naturae, ed. 10, p. 651.

This name is included here because it is often listed and credited to Bergius. Is an annelid.

lapidaria Linnaeus, **Teredo**: 1758, Systema Naturae, ed. 10, p. 651 (Italiae littora). Refers to "Kähler, act. Stockh. 1754, p. 144, pl. 3, fig. A-F."

I have not seen the Kähler paper to which Linnaeus referred, but on the basis of his brief description it is an annelid worm. In the 12th edition of the Systema Naturae, Linnaeus removed *lapidaria* from the genus *Teredo.*

libyca 'Mayer-Eymar' Oppenheim, **Teredo**: 1906, Palaeontographica **30** (3): 206, pl. 27, fig. 16 (fossil, alttertiärer Faunen in Aegypten Plateau von Kharachaff zwischen den Oasen Farafrah und Dachel).

Types, München Mus.
Name based on tubes only.

lieberkindi Roch, **Teredo**: 1931, Arkiv Zool. (Stockholm) **22A** (13): 15, pl. 2, fig. 5 (N.L. 24° 15′; W.L. 21° 24′ [about 356 miles W of Durnford Point, Rio de Oro, Africa]).
Holotype, Copenhagen Mus. Plate 23 F
Is possibly *Uperotus panamensis* (Bartsch) 1922. See also Rancurel, 1955, Bull. Inst. Franc. Afr. Noire (A) **17** (4): 1153-1156, fig. 5.

lignaui Bulatoff and Rjabtschikoff, **Zachsia**: 1933, Zool. Anz. **104**: 171, fig. 6 (in den Wurzeln von *Phylospadix ruprechti*, Vladivostok [USSR]).
Holotype, Zool. Mus., Moscow State University.
Nomen dubium. Name based on shells only.

lignicola d'Eichwald, **Teredo**: 1846, Géognosie de Russie, pp. 510, 514; 1856, Mém. Soc. Géogr. Russe **21**: 143, pl. 8, fig. 2; 1868, Lethaea Rossica, Stuttgart **2**: 795 (fossil, néocomien ferrugineux des villages de Pestrowko de Stalypino).
Name based on tube in fossil wood only.

lignitorum Coquand, **Teredo**: 1865, Mém. Soc. Emul. Provence **3**: 277, pl. 7, figs. 1-2 (fossil, dans les couches supérieures de l'étage aptien [Cretaceous] à Utrillas (Aragon) . . . dans un tronc de bois fossile).
Name based on shells and tube only.

Liliobankia Clench and Turner 1946, Johnsonia **2** (19): 17.
Type species, *Bankia* (*Liliobankia*) *katherinae* Clench and Turner [=*campanellata* Moll and Roch], original designation.

linaoana Bartsch, **Teredo (Lyrodus)**: 1927, Bull. U. S. Natl. Mus. **100** (2) pt. 5: 548, pl. 55, figs. 1, 4; pl. 57, fig. 6; pl. 59, figs. 4-6 (*Albatross*, station 5252, off Linao Point, Gulf of Davao, Mindanao, Philippine Islands, in 28 fathoms).
Holotype, USNM 312917. Plate 4 E
Is probably *Lyrodus pedicellatus* (Quatrefages) 1849.

lincolnensis Durham and Zullo, **Bankia**: 1961, Veliger **4**: 1, figs. 1-3 (fossil, Middle Oligocene, Lincoln formation near Porter, Washington).
Holotype, Univ. California Mus.
Paleont. 34672. Plate 60 E
Name based on tube and pallets. Is very close to, if not identical with, *Bankia setacea* (Tryon) 1863.

linearis Nair, **Teredo (Teredothyra)**: 1955 [1958], Rec. Indian Mus. **53** (1-2): 272, text fig. 6a-d (three specimens from floating Maruthu wood, Royapuram, South India).
Holotype, Zool. Surv. India,
Calcutta, M17439/3. Plate 17 E
Examination of the holotype showed this to be young *Teredothyra excavata* (Jeffreys) 1860.

lineata Nair, **Bankia (Neobankia)**: 1955, Jour. Madras Univ. (B) **25** (1): 109, text fig. a-f (from wooden logs washed ashore on Madras beach, India).
Holotype, Zool. Surv. India,
Calcutta, M17444/3. Plate 51 C
Examination of the holotype showed this to be *Bankia bipennata* (Turton) 1819.

lomensis Roch, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 11, pl. 1, fig. 9 (Togo).
Holotype, Berlin Mus. Plate 2 B
Is *Lyrodus pedicellatus* (Quatrefages) 1849.

luzonensis Bartsch, **Teredo?**: 1927, Bull. U. S. Natl. Mus. **100** (2) pt. 5: 553, pl. 55, figs. 2, 6; pl. 57, fig. 2 (*Albatross*, station 5269, off Matocot Point, western Luzon, Philippine Islands, in 220 fathoms).
Holotype, USNM 311063. Plate 22 D
Nomen dubium. Name based on shells only.

Lyrodobankia Moll 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 200.
Type species, *Nausitora kamiyai* Roch [=*Bankia carinata* (Gray)] (here selected).

Lyrodus Gould 1870, Invertebrata of Massachusetts, p. 34; non Döring 1885.
Type species, *Teredo chlorotica* Gould [=*pedicellatus* (Quatrefages)], monotypic.

madagassica Roch, **Nausitora**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 271, pl. 2, fig. 2 (Port Choisel, Maroantsetra, Madagaskar).
Holotype, Berlin Mus. Plate 40 A
Is *Nausitora dunlopei* Wright 1864.

madrasensis Nair, **Bankia (Nausitora)**: 1954 [1956], Rec. Indian Mus. **52**: 399, fig. 5a-d (Royapuram, Madras, India).
Holotype, Zool. Surv. India,
Calcutta, M17442/3. Plate 43 B
Paratypes, Univ. Zool. Lab. Madras, not found; collection, Dr. N. B. Nair
Is *Nausitora dunlopei* Wright 1864. The holotype is a young specimen, but the paratypes in the collection of Dr. Nair (Oceanographic Laboratory, University of Kerala, Ernakulam, Kerala State, India) are mature and are definitely *Nausitora dunlopei* Wright.

madrasensis Nair, **Teredo (Teredo)**: 1954 [1956], Rec. Indian Mus. **52**: 401, fig. 6a-c (Mylapore, Madras, India); non *Teredo parksi madrasensis* Nair 1958.
Holotype, Zool. Surv. India,
Calcutta, M17437/3. Plate 15 F
Paratypes, Univ. Zool. Lab. Madras, not found.
An examination of the type specimen shows

this to be *Lyrodus pedicellatus* (Quatrefages). The valves are completely gone and the pallets are in poor condition from having been in formalin, allowed to dry out, and then put into alcohol.

madrasensis Nair, **Teredo (Teredo) parksi**: 1955 [1958], Rec. Indian Mus. **53**: 265, text fig. 2a-c (from test block in boat basin at Madras Harbour, India); non *T. madrasensis* Nair 1956.

Holotype, Zool. Surv. India, Calcutta, not found. Plate 10 C

Is a young, light colored form of *Teredo furcifera* von Martens 1894.

malaccana Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 269, text fig. 7 (Singapore).

Holotype, Berlin Mus. Plate 5 B

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

maleolus 'Turton' Clessin, **Teredo**: 1893, Conchylien-Cabinet (2) **11** (4), PHOLADEA, p. 69.

Error for *malleolus* Turton 1822.

malleolata 'Turton' Locard, **Teredo**: 1886, Prodrome de Malacologie Française. Paris, p. 364.

Emendation for *malleolus* Turton 1822.

Malleolus Gray 1847, Proc. Zool. Soc. London **15**: 188; non Rafinesque 1815; non Ehrenberg 1838.

Type species, *Teredo malleolus* Turton, original designation.

Is *Teredora* Bartsch 1921.

malleolus Turton, **Teredo**: 1822, Conchylia Insularum Britannicarum, p. 255, pl. 2, fig. 19 (from timber in Torbay, England).

Lectotype, Jeffreys Collection, USNM 194213 (here selected). Plate 20 B

Is *Teredora malleolus* (Turton). See also the following: *nana* Turton; *thomsonii* Tryon.

mannii Wright, **Kuphus?**: 1866, Trans. Linn. Soc. London **25**: 565, pl. 65, figs. 1-8 (New Harbour, Singapore).

Lectotype, BM(NH) 66·4·13·4 (here selected). Plate 36 D

Is *Dicyathifer manni* (Wright). See also the following: *ancilla* Barnard; *bartschi* Sivickis; *caroli* Iredale; *sivickisi* Miller.

marina 'Sellius' Jeffreys, **Teredo**: 1860, Ann. Mag. Nat. Hist. (3) **6**: 124, 291. Refers to Linnaeus, 1758, Systema Naturae, ed. 10, p. 651.

Jeffreys stated that "Sellius used the binomial appellation throughout, although the date of his valuable and interesting monograph is long anterior to Linnaeus" and for this reason he felt justified in restoring the "prior and appropriate name of *marina*."

Is *Teredo navalis* Linnaeus 1758.

maritima 'Lovén' Paetel, **Teredo**: 1890, Catalog der Conchylien- Sammlung **3**: 6.

A *nomen nudum* in the synonymy of *Teredo norvegica* (=*norvagica*) Spengler 1792.

maritima 'Lovén' Clessin, **Teredo**: 1893, Conchylien-Cabinet (2) **11** (4), PHOLADEA, p. 65.

Name listed by Clessin in the synonymy of *Teredo norvagica* Spengler with the following reference "Ind. Moll. Sk., p. 50." This refers to Lovén 1846, 'Index Molluscorum litora Scandinaviae occidentalia habitantium,' which appeared in Öfversigt K. Svensk. Vet.-Akad. Förhandl. **3** (6): 204 [p. 50 of reprint]. However, *maritima* is not among the species of *Teredo* mentioned by Lovén on these pages. This species was never described or mentioned in print by Lovén.

Is a *nomen nudum*.

martenseni 'Stempell' Clapp and Kenk, **Teredo (Xylotrya)**: 1963, Marine Borers, an Annotated Bibliography. Office of Naval Research, Dept. of the Navy, Washington, D. C. Acr-74, p. 940.

Error for *martensi* Stempell 1899.

martensi Stempell, **Teredo (Xylotrya)**: 1899, Zool. Jahrb., Suppl. **5**: 240, pl. 12, figs. 24-27 (Punta Arenas, Chile).

Types, Berlin Mus., not found. Plate 61 B

Is *Bankia martensi* (Stempell). See also the following: *argentinica* Moll; *capensis* Calman; *chiloensis* Bartsch; *odhneri* Roch; *valparaisensis* Moll.

massa 'Jousseaume' Lamy, **Teredo**: 1923, Bull. Mus. Natl. Hist. Nat. (Paris) **29**: 176, text fig. (Aden [and] Massaouah, Mer Rouge [Arabia]).

Holotype, Paris Mus. Plate 18 A,D

Is *Lyrodus massa* (Lamy). See also *infundibulata* Roch and *singaporeana* Roch.

matacotana Bartsch, **Teredo (Ungoteredo)**: 1927, Bull. U.S. Natl. Mus. **100** (2), pt. 5: 544.

Error for *matocotana* Bartsch in the designation of the type species of *Ungoteredo*.

matocotana Bartsch, **Teredo (Ungoteredo)**: 1927, Bull. U.S. Natl. Mus. **100** (2), pt. 5: 545, pl. 53, figs. 8-9; pl. 56, fig. 2; pl. 60, figs. 5-7 (*Albatross*, station 5266, off Matocot Point, Luzon, Philippine Islands, in 102-135 fathoms).

Holotype, USNM 312930. Plate 19 C

Is *Teredothyra matocotana* (Bartsch). See also the following: *chamberlaini* Bartsch; *pujadana* Bartsch; *unguiculata* Roch.

matsushimaensis Hatai, **Teredo**: 1951, Short Papers, Inst. Geol. Paleont., Sendai [Japan] No. 3, p. 29, pl. 5 (fossil, Lower Cretaceous, Matsushima, Taro-mura, Shimohei-gun, Iwate Pref. [Japan], E. Hiraiga sandstone formation).

Syntypes, IGPS 73697.

Name based on shells and tubes.

maverickensis Gardner, **Teredo**: 1923, U.S. Geol.

Surv. Prof. Pap. 131-D: 114, pl. 32, fig. 11 (fossil, Eocene, Midway Formation, Station 1/277, Rio Grande, Lower end of Maverick County, Texas).

Holotype, USNM 352272, according to Palmer 1965, Bull. Amer. Paleont. **48** (218): 315.

Name based on tubes only.

medilobata Edmondson, **Teredo (Cornuteredo)**: 1942, Occ. Pap. B. P. Bishop Mus. **17**: 119, fig. 6a-h (Kawela Bay, Kahana Bay, Kaneoho Bay, Hanauma Bay, Waikiki, and Honolulu Harbor, Oahu; beach at Burns Airport, Kauai and Maalaea Bay, Maui, Hawaiian Islands).

Holotype, BPBM 105. Plate 6 B
Paratype, MCZ 228105.

Is *Lyrodus medilobata* (Edmondson).

mediterranea 'Matheron' Deshayes, **Septaria**: 1839, Traité élémentaire de Conchyliologie **1**: 46, pl. 2, figs. 9-10 (Mediterranean Sea).

Deshayes refers to "cloisonnaire de la Mediterranée Mathéron [1832], Mém. sur la Cloissonnaire, Ann. des Sc. et de l'indust. du midi de la France t. **1**, p. 77 et t. **2**, p. 312, planche 1." I have not seen this publication, but according to Deshayes the pallets resemble those of *Teredo navalis*. This use of *navalis* equals *norvagica* Spengler (see Deshayes, *ibid.*, pl. 3, figs. 1-7).

mediterranea Risso, **Septaria**: 1826, Histoire Naturelle de l'Europe Méridionale **4**: 379 (dans notre port [French coast, Mediterranean Sea]).

Types, Paris Mus., not found.

This species has been listed in the Teredinidae but cannot be determined on the basis of the description. Lamy 1927 (Jour. Conch. [Paris] **70**: 247) placed it in the synonomy of *norvagica* Spengler.

mediterraneus Catlow and Reeve, **Teredo**: 1845, The Conchologist's Nomenclator, p. 3. Refers to Deshayes, 1893, Traité élémentaire de Conchyliologie, pl. 2, figs. 9-10.

Name based on tubes only.

megathorax 'Gould' Roch and Moll, **Bankia**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 19 (Réunion).

Nomen nudum.

megathorax 'Gould' Sowerby, **Teredo**: 1875, Conchologia Iconica **20**, TEREDO, pl. 2, fig. 8a-b (North America).

Holotype, BM (NH) Plate 26 G
Cuming collection.

Nomen dubium. Name based on shells only.

megotara Hanley, **Teredo**: 1848 [*in*] Forbes and Hanley, A History of British Mollusca **1**: 77, pl. 1 [not plate 4 as given in the text], fig. 6; pl. 18, figs. 1-2 (Herne Bay, Kent, England); Jeffreys 1865, British Conchology **3**: 176-181; **5**, pl. 54, fig. 4.

Lectotype, BM (NH) Plate 25 A, B
(here selected).

The plates and captions of Forbes and Hanley's "History of British Mollusca" were published in 1848, the text in 1853. Is a new name for *Teredo nana* Turton, which Hanley considered inappropriate. Actually *nana* was based on inadequate material and is a *nomen dubium.*

Is *Psiloteredo megotara* (Hanley). See also the following: *denticulata* Fischer; *denticulata* Sowerby; *dilatata* Stimpson; *mionota* Jeffreys; *navalis* Turton; *striatior* Jeffreys; *subericola* Jeffreys; *subericola microtara* Jeffreys; *subericola minor* Jeffreys.

melitensis Bergius, **Teredo**: 1758, K. Svenska Vetenskapsakad. Handl. (Stockholm) **26**: 229 (Mari Mediterraneo ad Melitam). Refers to Linnaeus, 1758, Systema Naturae, ed. 10, p. 788 [under the name of *Serpula penicillus*], and Ellis, 1756, Essai d' Histoire Naturelle des Corallines, p. 92, pl. 34.

Is a segmented tube worm with feathery gills.

melitensis Meuschen, **Serpula**: 1778, Museum Gronovianum, p. 48.

This publication was rejected by the International Commission on Zoological Nomenclature, Opinion no. 260, 1954.

melitensis Gmelin, **Serpula**: 1791, Systema Naturae, ed. 13, **1**: 3746. Refers to Schroeter, 1784, Einleitung in die Conchylienkenntniss **2**: 570, pl. 6, fig. 19.

Is in the Vermetidae.

messeli Iredale, **Nausitora**: 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 37, pl. 4, figs. 9-12 (Port Jackson and Cattai Creek, Hawkesbury River drainage, New South Wales, Australia).

Holotype, Australian Mus.
Paratypes, MCZ 168010, Plate 40 B
MCZ 229513.

Is *Nausitora dunlopei* Wright 1864.

mexicana Bartsch, **Bankia (Bankiella)**: 1921, Proc. Biol. Soc. Washington **34**: 27 (Sinaloa, Mexico).

Holotype, USNM 194176a. Plate 50 B

Is *Bankia gouldi* (Bartsch) 1908. See Clench and Turner 1946, Johnsonia **2** (19): 13, 15.

microtara Jeffreys **Teredo subericola**: 1860, Ann. Mag. Nat. Hist. (3) **6**: 123 (Aberdeen [Scotland], in cork).

Jeffreys did not intend to propose this name but only mentioned that Lukis had called it "microtara" [small ear] as against *megotara* [large ear]. However, Lamy (1927, Jour. Conch. (Paris) **70**: 245) used it in italics as a scientific name.

Is *Psiloteredo megotara* (Hanley) 1848.

Microvexillum May 1929, Zeitschr. Morph. Ökol. Tiere, Abt. A, **15**: 642, 665.

A hypothetical genus, excluded from zoological nomenclature. See Art. 1 of the International Code of Zoological Nomenclature, 1961.

midwayensis Edmondson, **Teredo (Teredops) diegensis**: 1946, Occ. Pap. B. P. Bishop Mus. **18** (15): 220, text fig. 3a-b (Midway Island).

Holotype, BPBM 103. Plate 5 C

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

miliacea 'Jousseaume' Lamy, **Teredo**: 1923, Bull. Mus. Natl. Hist. Nat. (Paris) **29**: 177 (Aden, Arabia).

Holotype, Paris Mus. Plate 29 F

Nomen dubium. Name based on the shells only.

milleri Dall, Bartsch and Rehder, **Teredo (Cornuteredo)**: 1938, Bull. B. P. Bishop Mus. **153**: 210, pl. 54, figs. 1-2 (Nawiliwili, Oahu [Kauai], Hawaiian Islands).

Holotype, CAS 12384. Plate 6 D

New name for *T. affinis* 'Deshayes' Miller 1924; non Deshayes 1863. This name is unnecessary, as Miller's use of *affinis* is certainly the same as that of Deshayes. This specimen is also the neotype of *Teredo affinis* Deshayes as selected by Moll 1941. See also under *affinis* Deshayes.

mindanensis Bartsch, **Teredo (Coeloteredo)**: 1923, Proc. Biol. Soc. Washington **36**: 99 (*Albatross*, station 5252, off Linao Point, Gulf of Davao, Mindanao, Philippine Islands, in 28 fathoms); Bartsch 1927, Bull. U.S. Natl. Mus. **100** (2) pt. 5: 539, pl. 53, figs. 10, 12; pl. 56, fig. 6; pl. 60, figs. 4, 8, 12.

Holotype, USNM 310975. Plate 12 D

See also *T. bayeri* Roch.

mindorana 'Bartsch' Clapp and Kenk, **?Teredo**: 1963, Marine Borers, an Annotated Bibliography, Office of Naval Research, Dept. of the Navy, Washington, D.C. Acr-74, p. 129.

Error for *mindoroana* Bartsch.

mindoroana Bartsch, **Teredo?** (Subgenus?): 1927, Bull. U.S. Natl. Mus. **100** (2) pt. 5: 552, pl. 55, figs. 3, 5; pl. 57, fig. 1 (*Albatross*, station 5294, off Escarceo Point, northern Mindoro, Philippine Islands).

Holotype, USNM 312933. Plate 22 F

Nomen dubium. Name based on shell only.

minima Blainville, **Teredo**: 1828, Dict. Sci. Nat. **52**: 268 (locality unknown [probably Mediterranean Sea]).

Holotype, not seen. Plate 46 C

Is *Bankia carinata* (Gray) 1827. For a series of figures showing the range of variation within the species see Monod, 1952, Inst. Franc. Afr. Noire, Cat. 8, pp. 36-38, figs. 102-114.

minor Jeffreys, **Teredo subericola**: 1860, Ann. Mag. Nat. Hist. (3) **6**: 122 (Aberdeen [Scotland], in cork; Swansea and Carmarthen Bay [Wales], in fishermen's cork net floats).

Lectotype, USNM 194211 (here selected). Plate 26 D

Is *Psiloteredo megotara* (Hanley) 1848.

minori Nair, **Teredo (Teredora)**: 1955 [1958], Rec. Indian Mus. **53**: 274, text fig. 7a-d (five specimens in floating log on Madras Coast, South India).

Holotype, Zool. Surv. India, Calcutta, M17446/3. Plate 22 B

Is *Teredora princesae* (Sivickis) 1928. The 'holotype' specimen in Calcutta is not the one figured by Nair. The valves are very different and the pallets are missing.

minoris Nair, **Teredo (Teredora)**: 1955 [1958], Rec. Indian Mus. **53**: 275, text fig. 7.

Error in caption of text figure for *minori* Nair.

mionota Jeffreys, **Teredo megotara**: 1865, British Conchology **3**: 177 (British Isles).

Lectotype, Jeffreys Collection, USNM 194218 (here selected). Plate 26 F

Is a small form of *Psiloteredo megotara* (Hanley) 1848.

miraflora Bartsch, **Teredo (Neoteredo)**: 1922, Bull. U.S. Natl. Mus. **122**: 31, pls. 24-25 (Mira Flores Lake, Pedro Miguel, Canal Zone, Panama).

Holotype, USNM 344661. Plate 32 D

Nomen dubium. Name based on the shells only. The pallets were not known until Bartsch in the introduction to his description of *Teredo (Neoteredo) healdi* (1931) wrote, "When I published my monograph of the American shipworms I did not have the pallets of *Teredo (Neoteredo) miraflora*. These have since come to hand. I am, therefore, now able to give comparative data of shell and pallet characters." Concerning the pallets the only comparative statement he made was that "the outside of the blade is also less deeply cut in *Teredo (Neoteredo) healdi* than in *Teredo (Neoteredo) miraflora* which it most resembles. The sulcus below the cup is also less defined in the present species." This can hardly constitute a description in this variable group of animals. Consequently, even page precedence cannot validate the name *miraflora* and it must remain a *nomen dubium*. Only a single species is found in the fresh waters of Mira Flores Lake, and it is the same as that described by Bartsch as *healdi* in 1931.

mississippiensis Conrad, **Teredo**: 1854 [*in*] Wailes, Report on the Agriculture and Geology of Mississippi, p. 289, pl. 16, fig. 8 (fossil, Tertiary, Green-sand marl-bed of Jackson, Mississippi).

Holotype, ANSP 13192, according to Palmer, 1965, Bull. Amer. Paleont., **48** (218): 315.

Name based on a fragment of a tube only.

modica Deshayes, **Teredo**: 1860, Déscription des Animaux sans Vertèbres Découverts dans le Bassin de Paris **1**: 117, pl. 2, fig. 27 [not 2-7 as given in the text] (fossil, sables inférieur, Cuise-la-Motte, France [tubes only]); Raincourt, 1877, Bull. Soc. Géol. France (3) **5**: 330, pl. 4, fig. 7.

Raincourt, also working at Cuise-la-Motte, found the shells of this species, which he described and figured.

See also *Teredo simplex* Deshayes.

molli Roch, **Teredo**: 1931, Arkiv Zool. (Stockholm) **22A** (13): 16, pl. 3, fig. 6 (Atlantischer Ozean, in Treibholz gefunden auf einer Reise von Kopenhagen nach Brasilien). The type locality is here restricted to San Juan, Puerto Rico, a locality from which this species is known.

Holotype, Copenhagen Mus. Plate 36 C

Is *Spathoteredo spatha* (Jeffreys) 1860.

morsei Bartsch, **Teredo (Teredo)**: 1922, Bull. U.S. Natl. Mus. **122**: 21 (Manhattan Beach, Long Island, New York).

Holotype, USNM 346333. Plate 14 E

Is *Teredo navalis* Linnaeus 1758.

mosensis Ryckholt, **Teredo**: 1851, Mém. Cour. Acad. R. Belgique (4°) **24**: 112, 114 (fossil, Sénonienne, St. Pierre, Belgium).

Nomen nudum.

murrayi Moll, **Teredo**: 1931, Proc. Malac. Soc. London **19**: 208, pl. 23 (Christmas Island, off Java).

Holotype, BM(NH) 1909·5·7·38. Plate 35 B

Is *Spathoteredo obtusa* (Sivickis) 1928.

Myaceorum 'Agassiz' Herrmannsen 1847, Indicis Generum Malacozoorum **1**: 569.

Nomen nudum in the synonymy of *Kuphus* Gray. Agassiz used the name *Myacaea* in the Nomenclatoris Zoologici as an ordinal name, not as a genus, but so far as can be determined he never used the term *Myaceorum*.

nakanoshimensis Moll, **Teredo**: 1952, Inst. Franc. Afr. Noire, Cat. 8, p. 110.

In a discussion of the distribution of the Teredinidae, Moll referred to *T. nakanoshimensis*. I have been unable to locate this name elsewhere. It is probably an error for *takanoshimensis* Roch.

nakazawai Kuronuma, **Bankia (Bankia)**: 1931, Venus **2** (6): 296, pl. 8, fig. 8; pl. 9, figs. 32-34 (from test boards at Takanoshima, Tateyama Bay, Chiba Pref., Japan).

Is *Bankia carinata* (Gray) 1827.

nama 'Turton' Tryon, **Teredo**: 1862, Proc. Acad. Nat. Sci. Philadelphia, p. 463 [p. 107 of reprint].

Error for *T. nana* Turton.

nambudalaiensis Nair and Gurumani, **Teredo (Nototeredo)**: 1957, Jour. Washington Acad. Sci. **47** (5): 157, figs. 1-2 (from log washed ashore at Nambudalai, Ramnad District, east coast, Madras, India).

Types, Zool. Surv. India, Calcutta, M17447/3. Plate 16 E

An examination of the type specimen showed this to be *Teredothyra smithi* (Bartsch) 1927.

nana Turton, **Teredo**: 1822, Conchylia Insularum Britannicarum, pp. 16, 257, pl. 2, figs. 6-7 (from wood at Torbay, England).

Types, Turton collection, in Jeffreys collection, USNM 19258 Plate 20 D

Nomen dubium. Described from fragments without pallets. It has been variously considered, but it is impossible to place the species definitely without knowledge of the pallets.

See also under *megotara* Hanley.

Naucitora 'Wright' Sowerby 1887, Thesaurus Conchyliorum **5**: pl. 469, fig. 3.

Error for *Nausitora* Wright.

Nausitora Wright 1864, Trans. Linn. Soc. London **24**: 452, pl. 46.

Type species, *Nausitora dunlopei* Wright, monotypic.

Nausitorella Moll 1952, Inst. Franc. Afr. Noire, Cat. 8, p. 84.

Type species, *N. fusticula* (Jeffreys) [=*Teredo fusticulus* Jeffreys], original designation.

Is *Nausitora* Wright 1864.

Nausitoria 'Wright' Roch and Moll 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 17.

Error for *Nausitora* Wright.

navalis Deshayes, **Teredo**: 1839, Traité élémentaire de Conchyliologie **1** (2): 59, pl. 3, figs. 1-9 (Seas of Europe); non Linnaeus 1758.

Is *Nototeredo norvagica* (Spengler) 1792, according to Lamy 1926, Jour. Conch. (Paris) **70**: 248. Deshayes' use of *navalis* in 1848 probably equals *Nototeredo knoxi* (Bartsch). See section on Anatomy, p. 18.

navalis Linnaeus, **Teredo**: 1758, Systema Naturae, ed. 10: 651 (intra Naves et palos marinos, [Netherlands, based on Sellius]). Refers to Sellius, 1733, Historia Naturalis Teredinis, pl. 1; Linnaeus, 1767, Systema Naturae, ed. 12: 1267.

Type figure, from Sellius. Plate 14 A

See also the following: *austini* Iredale; *batavus* Spengler; *beachi* Bartsch; *beaufortana* Bartsch; *borealis* Roch; *japonica* Clessin; *morsei* Bartsch; *novangliae* Bartsch; *pocilliformis* Roch; *sinensis* Roch; *teredo* Müller; *troscheli* Troschel.

navalis Möller, **Teredo**: 1842, Naturhist. Tidsskr. **4** (1): 94 [p. 21 of reprint] (Greenland); non Linnaeus 1758.

Nomen nudum. This was the reference upon which Gray based his new name *T. denticulata.*

navalis Montagu, **Teredo**: 1803, Testacea Britannica, p. 257 (Plymouth, England); non Linnaeus 1758.

Is *Nototeredo norvagica* (Spengler) 1792. Unfortunately many early authors referred to *norvagica* and other species as *navalis* and this caused a great deal of confusion in the early literature.

navalis Spengler, **Teredo**: 1792, Skr. Naturhist. Selskab., Copenhagen **2**: 100, pl. 2, figs. 1-3 (locality unknown); non Linnaeus 1758.

Types, Copenhagen Mus. Plate 46 B

Is *Bankia carinata* (Gray) 1827.

navalis Turton, **Teredo**: 1822, Conchylia Insularum Britannicarum, p. 257, pl. 2, fig. 3 (Torbay, England); non Linnaeus 1758.

Lectotype, USNM 194261
(here selected). Plate 26 B

Is *Psiloteredo megotara* (Hanley) 1848.

naviliwili 'Sivickis' Moll, **Teredo**: 1941, Venus **11**: 16.

Nomen nudum. Moll stated that Miller had examples of *T. naviliwili* Sivickis from the Philippines which were identical with *bartschi* Clapp. Sivickis never described a species by this name. In his paper "Woodboring Mollusks from Hawaii, Samoa, and Philippine Islands" (Univ. California Publ. Zool. 1924, **26**: 147), Miller wrote that specimens found in blocks from Nawiliwili, Kauai, compared closely with paratypes of *bartschi.* Moll apparently thought that Nawiliwili was a scientific name, and in referring to it misspelled it as *naviliwili* and placed it in the Philippine Islands rather than in the Hawaiian Islands.

Neobankia Bartsch 1921, Proc. Biol. Soc. Washington **34**: 25.

Type species, *Bankia* (*Neobankia*) *zeteki* Bartsch, original designation.

Neoteredo Bartsch 1920, Proc. Biol. Soc. Washington **33**: 69.

Type species, *Teredo* (*Neoteredo*) *reynei* Bartsch, original designation.

nigra Blainville, **Teredo**: 1828, Dict. Sci. Nat. **52**: 267 (Sur les côtes d'Angleterre, dans la carasse d'un navîre venant de l'Inde). Refers to Quarterly Review, pl. 1, fig. 23a-c [not seen].

Types, BM(NH), not found.

Is *Nototeredo norvagica* (Spengler) 1792, according to Lamy, 1926, p. 247.

nivalis 'Linnaeus' Tate, **Teredo**: 1888, Trans. Proc. Roy. Soc. South Australia **11**: 71.

Error for *navalis* Linnaeus.

nodosa Roch, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 14, pl. 2, fig. 12 (Neapel [Italy]); non Noszky 1939.

Holotype, Berlin Mus. Plate 3 E

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

nodosa Noszky, **Teredo anguinea**: 1939, Ann. Mus. Natl. Hungar. (Budapest) **32**: 85, pl. 3, fig. 27 (fossil, Oligocene, Hungary); non Roch 1929.

Based on fragments of tubes only.

nordi Moll, **Bankia**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 272, text fig. 8 (Singapore).

Holotype, Berlin Mus. Plate 44 C

Is possibly *Bankia orcutti* Bartsch 1923. See also *sajnakhaliensis* Rajagopal.

nortonensis Benett, **Teredo**: 1831 [*in*] Hoare, The History of Modern Wiltshire **3** (2): 122 (fossil, Upper Chalk, Norton, England).

Nomen nudum.

norvagicus Spengler, **Teredo**: 1792, Skr. Naturhist. Selskab., Copenhagen **2**: 102, pl. 2, figs. 4-7 and B (Friedriksvaernshavn [Norway]).

Types, Copenhagen Mus.,
not found. Plates 24, 29 E

Though this species name has often been spelled with an 'e', there is no evidence that the name *norvagicus* resulted from a *lapsus calami* or a printer's error. Spengler did not change it, and in the more important works such as Hanley (1853), Tryon (1862), and Lamy (1927), the original orthography has been followed.

Is *Nototeredo norvagica* (Spengler). See also the following: *adami* Moll; *bruguierii* Delle Chiaje; *deshaii* Quatrefages; *divaricata* Fischer; *fatalis* Quatrefages; *navalis* Deshayes; *senegalensis* Laurent; *utriculus* Gmelin; *utriculus* Hanley.

norvegica Schumacher, **Teredo**: 1817, Essai d'un Nouveau Système des Habitations des Vers Testacés. Refers to Spengler 1792, Skr. Naturhist. Selskab., Copenhagen **2**: 102, pl. 2, figs. 4-6; B.

Error for *norvagica* Spengler.

norwegica 'Spengler' Paetel, **Teredo**: 1890, Catalog der Conchylien-Sammlung **3**: 6.

Error for *norvagica* Spengler.

Nototeredo Bartsch 1923, Proc. Biol. Soc. Washington **36**: 100.

Type species, *Teredo edax* Hedley, original designation.

novalis 'Deshayes' Clessin, **Teredo**: 1892, Conchylien-Cabinet (2) **11** (4), PHOLADEA, p. 65.

Error for *navalis* Deshayes; non Linnaeus 1758.

novangliae Bartsch, **Teredo (Teredo)**: 1922, Bull. U.S. Natl. Mus. **122**: 19, pl. 21, fig. 3; pl. 32, fig. 3 (Woods Hole, Massachusetts).

Holotype, USNM 74499. Plate 14 C

Is *Teredo navalis* Linnaeus 1758.

noxi 'Bartsch' Moll, **Teredo**: 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 192.

Error for *T. knoxi* Bartsch.

nucifraga 'Spengler' von Martens, **Teredo**: 1894 [*in*] Semon, Zoologische Forschungsreisen in Australien und dem Malayischen Archipel **5** (1): 95.

Error for *nucivorus* Spengler, included in the synonymy of *Teredo clava* von Martens; non Gmelin.

Is *Spathoteredo obtusa* (Sivickis) 1928.

nucivorus Spengler, **Teredo**: 1792, Skr. Naturhist. Selskab., Copenhagen **2**: 105, pl. 2, fig. D (Tranquebar [India]). Refers to Spengler, 1779, Naturforsch. (Halle) **13**: 53, pl. 1, figs. 1-11.

Holotype, Copenhagen Mus. Plate 23 A

Is *Uperotus clavus* (Gmelin) 1791.

nummulitica Gümbel, **Teredo**: 1861, Geognostische Beschreibung des bayerischen Alpengebirges und seines Vorlandes, p. 663 (fossil, Eocän, untere Nummulitengruppe, Bayerischen Alpen, Schichten der Eisenerzflötze am Kressenberge [Germany]).

Name based on tube only.

nuvicora 'Spengler' Clessin, **Teredo**: 1893, Conchylien-Cabinet (2) **11** (4), PHOLADEA, p. 72.

Error for *T. nucivorus* Spengler.

oahuensis Edmondson, **Bankia (Nausitora)**: 1942, Occ. Pap. B. P. Bishop Mus. **17** (10): 134, fig. 9g-k (submerged branches of an algaroba tree in shoal water of Kalihi Entrance, Oahu, Hawaiian Islands).

Holotype, BPBM 110. Plate 43 C

Is a young *Nausitora*.

obtusa Sivickis, **Teredo**: 1928, Philippine Jour. Sci. **37**: 290, pl. 2, fig. 9 (from old pile at Sir J. Brooke Point, Palawan, Philippine Islands).

Types, Philippine Bureau Sci., Manila, lost in World War II. Plate 34 A

Is *Spathoteredo obtusa* (Sivickis). See also the following: *amboinensis* Taki and Habe; *bataviana* Moll and Roch; *murrayi* Moll; *palula* Roch; *semoni* Moll; *variegata* Sivickis.

occasiuncula Iredale, **Bankia**: 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 36, pl. 4, figs. 1-4 (Goat Island, Port Jackson, New South Wales, Australia).

Holotype, Australian Mus. Plate 62 C
Paratype, MCZ 168016.

Is *Bankia australis* (Calman) 1920.

occlusa Jeffreys, **Teredo navalis**: 1865, British Conchology **5**: 172 (British Isles).

Types, USNM? Not found in the Jeffreys collection.

This is a stunted form of *Teredo navalis* Linnaeus 1758.

odhneri Roch, **Bankia**: 1931, Arkiv Zool. (Stockholm) **22A** (13): 20, pl. 4. fig. 10 (Port William, Falkland Islands); 1931, Proc. Malac. Soc. London **19**: 215, pl. 25 (Falkland Islands).

Holotype, Stockholm Mus. 5094. Plate 61 C

This species was introduced as new in both of the above mentioned publications. The same figures of the Stockholm specimen are used for both descriptions. A type specimen said to be in the Manchester Museum could not be found.

Is *Bankia martensi* (Stempell) 1899.

oligannulata Sacco, **Teredo**: 1901, Molluschi dei Terreni Terziarii del Piemonte e della Liguria, part 29, p. 58, pl. 14, figs. 33-34 (fossil, Terziarii, Tongriano, Piemonte [Italy]).

Type, Museo Geologico, Torino.

Name based on fragments of tubes only.

opalina Gürich, **Teredina**: 1901, Neues Jahrb. Min., Geol., Pal. Suppl. **14**: 488, pl. 19, fig. 4a-c (fossil, Jurassic, White Cliffs, Australia, burrowing in opalized wood).

Name based on shells only. Is in the Pholadidae.

orcutti Bartsch, **Bankia (Neobankia)**: 1923, Proc. Biol. Soc. Washington **36**: 95 (Bacochibampo Bay, Sonora, Mexico).

Holotype, USNM 348191. Plate 44 A

See also *nordi* Moll; *sajnakhaliensis* Rajagopal.

orientalis Roch, **Nausitoria** [*sic*]: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 17, pl. 2, fig. 15 (Kingyoku, Takanoshima, Japan).

Holotype, Berlin Mus. Plate 44 D
Paratype, MCZ 170756.

Is probably young *Bankia carinata* (Gray) 1827.

See also *Nauistora kamiyai* Roch 1929.

ornata Schafhäutl, **Teredo**: 1863, Süd-Bayerns Lethaea Geognostica, Leipzig, p. 177, pl. 44, fig. 5a,c (Kressenberg [Austria]). Also listed as "*Gastrochaena ornata* mihi," in small print on same page.

Name based on tubes only. Is not a teredinid but is in the family Gastrochaenidae.

ornatissimus Frič, **Teredo**: 1893, Arch. Naturwiss. Landesdurch-forsch. Böhmen **9** (1): 95, fig. 112 (fossil, no locality given).

Name based on shells only.

oryzaformis Sivickis, **Bankia**: 1928, Philippine Jour. Sci. **37**: 286, pl. 1, fig. 2 (in wood, *Xylocarpus* sp., exposed at low tide at Puerto Princesa, Palawan, Philippine Islands).

Types, Philippine Bur. Sci., Manila, lost during World War II.

Is *Bankia carinata* (Gray) 1827.

osumiensis Mawatari and Kitamura, **Bankia (Neobankia**: 1960, Misc. Rept. Res. Inst. Natur. Resources (Tokyo), No. 52/53, pp. 70, 75, text fig. 3a-d, pl. 5, figs. 13-15 (Kagoshima Pref., Japan).

Is probably *Bankia setacea* (Tryon) 1863.

oweni Deshayes, **Teredina**: 1860, Description des Animaux sans Vertèbres Découverts dans le Bassin de Paris, p. 130, pl. 5, figs. 1-4 (fossil, Sables marins inférieurs horizon de Bracheux Châlons-sur-Vesles, France).

Name based on shells and tubes. Is in the Pholadidae.

palauensis Edmondson, **Teredo (Teredothyra)**: 1959, Occ. Pap. B. P. Bishop Mus. **22** (11): 203, fig. 1a-d (Koror, Palau Islands [Caroline Islands], from infested hull of wrecked ship).

Holotype, BPBM 111.

Paratypes, USNM. Plate 17 C

Is probably *Teredothyra excavata* (Jeffreys) 1860.

palmata 'Locard' Clessin, **Teredo**: 1893, Conchylien-Cabinet (2) **11** (4) Pholadea, p. 74.

Error made by Clessin in referring to Locard's use of *palmulata* Lamarck.

palmulata 'Adanson' Blainville, **Teredo**: 1828, Dict. Sci. Nat. **52**: 268 (Pondichéry [India]).

Adanson did not use the name *palmulata* as indicated by Blainville. In the Mém. Acad. Roy. Sci. (Paris), 1759, **3**: 327, pl. 9, figs. 11-12 Adanson refers to the "Taret de Pondicheri" in the vernacular.

Is *Bankia bipalmulata* (Lamarck) 1801.

palmulata 'Lamarck' Forbes and Hanley, **Teredo**: 1853, History of British Mollusca **1**: 86, pl. 2, figs. 9-11 (Ireland, from timber of a vessel returned from a foreign voyage); non Lamarck 1818; non 'Adanson' Blainville 1828; non 'Leach' Blainville 1828; non Philippi 1836.

Jeffreys (1860) recognized this as a different species and named it *T. fimbriata* [non Defrance 1828].

Is *Bankia fimbriatula* Moll and Roch 1931. See Clench and Turner, 1946, Johnsonia **2** (19): 22.

palmulata 'Lamarck' Philippi, **Teredo**: 1836, Enumerato Molluscorum Siciliae, p. 2, pl. 1, fig. 8 (frequens in lignis Siciliae); non Lamarck 1818; non Blainville 1828; non Forbes and Hanley 1853. This was renamed *philippi* by Gray in 1851.

Is *Bankia carinata* (Gray) 1827.

palmulata 'Leach' Blainville, **Teredo**: 1828, Dict. Sci. Nat. **52**: 269 (mers de l'Inde).

This manuscript name was taken from a museum label and was included by Blainville in the original description of *T. pennatifera* Blainville.

Is *Bankia bipennata* (Turton) 1819.

palmulatus Lamarck, **Teredo**: 1818, Histoire Naturelle des Animaux sans Vertèbres **5**: 440 (l'Océan des Grandes Indes). Refers to "*Teredo bipalmulata*. Système des Animaux sans Vertèbres, p. 129"; non Blainville 1828; non Philippi 1836; non Forbes and Hanley 1853.

Is *Bankia bipalmulata* (Lamarck) 1801.

palmulatus Osler, **Teredo**: 1826, Phil. Trans. Roy. Soc. London **116** (3): 360, 371, pl. 15, fig. 9 (no locality given).

Nomen dubium. Only the anterior end of the animal and shells were described and figured. It is not certain that Osler intended to introduce a new species, but it has been treated as such by several authors and so is included here.

palula Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 271, pl. 1, fig. 12 (Vintano auf Sainte-Marie, bei Madagaskar).

Types, Berlin Mus., not found.

Is *Spathoteredo obtusa* (Sivickis) 1928.

panamensis Bartsch, **Teredo (Teredora)**: 1922, Bull. U. S. Natl. Mus. **122**: 34, pl. 27, figs. 3-4; pl. 35, fig. 2 (*Albatross*, station 2805, Panama Bay, in 51½ fathoms).

Holotype, USNM 212591. Plate 23 E

Is *Uperotus panamensis* (Bartsch). See also *lieberkindi* Roch.

parisiensis Deshayes, **Teredo**: 1860, Description des Animaux sans Vertèbres Découverts dans le Bassin de Paris **1**: 115, pl. 3, figs. 1-4 (fossil [Upper Eocene], Chaumont, France; Calcaire grossier inférieur).

Type, École des Mines, Paris.

Is in the genus *Bankia*. See also the following: *burtini* Ryckholt; *devoluta* Vincent and *tumida* Stinton. These are possibly all the same species, as explained in the section on fossils in the Introduction.

parksi Bartsch, **Teredo (Teredo)**: 1921, Proc. Biol. Soc. Washington **34**: 28 (Pearl Harbor, Oahu, Hawaiian Islands).

Holotype, USNM 341132. Plate 10 A

Is young *Teredo furcifera* von Martens 1894.

The following, which are generally considered synonyms of *parksi*, are also young *furcifera*: *australasiatica* Roch; *krappei* Moll; *laciniata* Roch; *parksi madrasensis* Nair.

partita Stoliczka, **Teredo**: 1871, Palaeontologia Indica (6) **3**: 15, pl. 1, fig. 1 (fossil, Cretaceous Ootatoor Group. In fossil wood at Ootatoor and at Moraviatoor, southern India).

Name based on shell and tube only.

parvula Doncieux, **Teredo**: 1911, Ann. Univ. Lyon (N.S.) **1**, Sci. Med., Fasc. 30: 129, pl. 15, figs. 12-18 (fossil, Nummulitique de l'Aude et de l'Hérault. Lutétien inférieur: Fontcouverte; Montlaur; N. de Ribaute. Lutétien moyen: Douzens, France).

Name based on tubes only.

pedicellatus Quatrefages, **Teredo**: 1849, Ann. Sci. Nat. Zool. (3) **11**: 26, pl. 1, fig. 2 (la baie des Passages, Guipuscoa [Spain]); Moll 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin, 1941: 183.

Neotype, Paris Mus. no. 62.
Plate 1 A, D, E

Moll (1941) stated that the type specimen of *T. pedicellatus* was lost and that a neotype had been selected from Quatrefages' material from St. [San] Sebastian. The specimen figured here is the only Quatrefages specimen from this locality which was found in the Muséum National d'Histoire Naturelle, Paris, and though not so marked, is undoubtedly the neotype to which Moll referred.

Is *Lyrodus pedicellatus* (Quatrefages). See also the following: *arabica* Roch; *calmani* Roch; *chlorotica* Gould; *dagmarae* Roch; *dalli* Moll and Roch; *diegensis* Bartsch; *floridana* Bartsch; *franziusi* Roch; *hawaiensis* Dall, Bartsch and Rehder; *helleniusi* Moll; *hibicola* Kuronuma; *honoluluensis* Edmondson; *indica* Nair; *kauaiensis* Dall, Bartsch and Rehder; *kiiensis* Taki and Habe; *lamyi* Roch; *linaoana* Bartsch; *lomensis* Roch; *madrasensis* Nair; *malaccana* Roch; *midwayensis* Edmondson; *nodosa* Roch; *pertingens* Iredale; *pochhammeri* Moll; *robsoni* Roch; *samoanensis* Miller; *siamensis* Bartsch; *taiwanensis* Taki and Habe; *tateyamensis* Kuronuma; *togoensis* Roch; *townsendi* Bartsch; *tristi* Iredale; *truncata* Jeffreys; *yatsui* Moll.

pedicillata 'Quatrefages' Sowerby, **Teredo**: 1875, Conchologia Iconica **20**: TEREDO, pl. 3, fig. 11a-c (British coasts).

Error for *pedicellatus* Quatrefages.

pediculata Moll, **Teredo**: 1914, Naturwiss. Zeitschr. Forst. Landwirt. **12**: 516, fig. 4.

Error for *pedicillata* Sowerby [=*pedicellatus* Quatrefages] on the caption of figures of pallets which Moll had copied from Sowerby.

pedunculata Moll, **Teredo (Lyrodus)**: 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin, 1941: 183.

Nomen nudum, a name probably taken from a museum label and introduced into the synonymy of *Teredo* (*Lyrodus*) *pedicellatus* Quatrefages by Moll. I have been unable to find this name elsewhere.

pennaanseris Roch, **Bankia**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 274, pl. 2, fig. 4 (Vintano auf Sainte-Marie, bei Madagaskar).

Lectotype, Berlin Mus.
(here selected). Plate 43 A
Paratypes, BM(NH) 1933·5·8·3
and MCZ 170758.

Is young *Nausitora dunlopei* Wright 1864.

pennatifera Blainville, **Teredo**: 1828, Dict. Sci. Nat. **52**: 269 (mers de l'Inde).

In his original description Blainville refers to a specimen labeled *Teredo palmulata* Leach manuscript in the British Museum.

Is *Bankia bipennata* (Turton) 1819.

pennatifera Gray, **Xylotrya**: 1851, Ann. Mag. Nat. Hist. (2) **8**: 386.

This, in reality, is not a new species, but only a change of genus. It is included here, as it is often referred to as a new species. *Xylotrya pennatifera* Gray is the same as *Teredo pennatifera* Blainville, and is therefore *Bankia bipennata* (Turton) 1819.

pennatulifera 'Blainville' Laurent, **Teredo**: 1848, Dict. Univ. Hist. Nat. (Paris) **12**: 359.

Error for *pennatifera* Blainville.

pentagonalis Taki and Habe, **Psiloteredo (Psiloteredo)**: 1945, Venus **14**: 114 (Nagasaki, Nagasaki-ken, Japan); 1958 [*in*] Okada, Damage and Method of Protection against Wood-boring Animals, published by Japanese Assoc. Advan. Sci. p. 62, pl. 4, fig. 17 [in Japanese].

Is probably *Nototeredo edax* (Hedley) 1895.

personata Brocchi, **Teredo**: 1814, Conchologia Fossile Subapennina, p. 274.

Brocchi did not describe this species but referred to *Fistulana personata* Lamarck, placing it in the genus *Teredo*. It is included here because Brocchi is often credited with the name and it is listed as such in Sherborn, Index Animalium.

personata Lamarck, **Fistulana**: 1806, Ann. Mus. Natl. Hist. Nat. (Paris) **7**: 429; 1808, *ibid.* **12**, pl. 43, figs. 6-7, as *Teredina personata* Lamarck (fossil, Eocene, Paris Basin).

Is not in the Teredinidae, but is a *Teredina*

(Pholadidae). Is the type species of the genus *Teredina*.

pertingens Iredale, **Teredo**: 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 31, pl. 2, figs. 8-11 (Pyrmont, Port Jackson, New South Wales, Australia).
Holotype, Australian Mus. Plate 3 C
Paratype, MCZ 168009.
Is *Lyrodus pedicellatus* (Quatrefages) 1849.

petersi Moll, **Teredo**: 1928, Jour. Conch. (Paris) **71**: 282, text fig. 11 (des côtes de l'Afrique orientale); 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 6, pl. 1, fig. 3 (Qerimba-Inseln [Kerimba Island, Mozambique, Portuguese East Africa]).
Lectotype, Berlin Mus.
(here selected). Plate 21 A
Paratypes, Brussels Mus. 12790 and MCZ 170764.
Is *Teredora princesae* (Sivickis) 1928.

petitii Récluz, **Teredo**: 1849, Rev. Zool. (Paris) (2) **1**: 64 (la rivière de Grand Bassam, côte ouest d'Afrique [Ivory Coast]).
Type, not found. Plate 33 C
Is a variety of *senegalensis* Blainville 1828, according to Monod and Nicklès, 1952, p. 19.

philippi Gray, **Xylotrya**: 1851, Ann. Mag. Nat. Hist. (2) **8**: 386.
New name for *Teredo palmulata* Philippi; non Lamarck.
Is *Bankia carinata* (Gray) 1827.

philippinensis Bartsch, **Bankia (Bankia)**: 1927, Bull. U. S. Natl. Mus. **100** (2) pt. 5: 534, pl. 53, figs. 1-3; pl. 56, fig. 8; pl. 58, figs. 7-9 (*Albatross*, station 5243, Pujada Bay, eastern Mindanao, Philippine Islands, in 218 fathoms).
Holotype, USNM 310970. Plate 62 D
See also *Bankia tenuis* Sivickis.

philippinensis Bartsch, **Eoteredo**: 1923, Proc. Biol. Soc. Washington **36**: 98 (*Albatross*, station 5243, off Uanivan Island, Pujada Bay, S. E. Mindanao, Philippine Islands, in 218 fathoms); Bartsch, 1927, Bull. U. S. Natl. Mus. **100** (2) pt. 5: 551, pl. 54, figs. 4-6; pl. 57, fig. 7.
Holotype, USNM 311281. Plate 22 E
Nomen dubium. Name based on shells only.

Phylloteredo Roch 1937, Mitt. Zool. Mus. Berlin **22**: 169.
Type species, *Teredo norvagica* Spengler, original designation.
Is *Nototeredo* Bartsch 1923.

Pingoteredo Iredale 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 30.
Type species, *Teredo shawi* Iredale [=*T. bartschi* Clapp], original designation.
Is *Teredo* Linnaeus 1758.

pissarroi Cossman, **Teredo**: 1906, Bull. Soc. Sci. Nat. Ouest de la France (Nantes) (2) **6**: 247, pl. 20, figs. 8-11 (fossil, Eocene, Loire-inférieure, Bois-Gouet, France).
Name based on shell only.

plenus Gabb, **Turnus**: 1864, Geol. Surv. California, Paleont. **1** (4): 146, pl. 22, fig. 116 (fossil, Cretaceous, north fork of Cottonwood Creek [Division A], Shasta County, California).
Type species of the genus *Turnus* which was introduced as in the Teredininae but is now considered in the Pholadidae.

pliocena Hasse, **Teredo**: 1909, Ann. Soc. Roy. Zool. Malac. Belgique **44**: 122, pls. 3, 4 (fossil, Pliocene and Oligocene, Anvers [Antwerp], Belgium).
Name based on tubes only.

plumiformis 'Valisnieri and Sellius' Laurent, **Teredo**: 1848, Dict. Univ. Hist. Nat. (Paris) **12**: 359.
Nomen nudum, in synonymy of *nucivorus* Spengler [=*Uperotus clavus* (Gmelin)].

Plumulella Clench and Turner 1946, Johnsonia **2** (19): 22.
Type species, *Teredo fimbriata* Jeffreys [=*Bankia fimbriatula* Moll and Roch], original designation.

pochhammeri Moll, **Teredo**: 1931, Proc. Malac. Soc. London **19** (4): 216, fig. 44 (Colombo, Ceylon).
Lectotype, Berlin Mus. (here selected).
Paratypes, Berlin Mus.
and BM(NH). Plate 4 A
Is *Lyrodus pedicellatus* (Quatrefages) 1849.

pocilliformis Roch, **Teredo**: 1931, Proc. Malac. Soc. London **19** (4): 209, fig. 21 (Port Lincoln, South Australia).
Holotype, BM(NH) 1925·11·10·12-17.
Plate 15 C
Is *Teredo navalis* Linnaeus 1758.

poculifer Iredale, **Teredo (Pingoteredo)**: 1936, Queensland Forest Service Bull. No. 12, p. 33, pl. 1, figs. 1-9 (Kangaroo Point, Brisbane River, Queensland, Australia).
Holotype, Australian Mus. Plate 18 B
Paratype, MCZ 168007.

Polarthus 'Gabb' Stoliczka 1871, Palaeontologia Indica **3**: 14.
Error for *Polorthus* Gabb.

Polorthus Gabb 1861, Proc. Acad. Nat. Sci. Philadelphia, p. 366.
Type species, *P. americana* Gabb. This has often been included in the Teredinidae, but probably belongs in the Gastrochaenidae.

polythalamia Linnaeus, **Serpula**: 1767, Systema Naturae, ed. 12, p. 1266 (Indis). Refers to Rumphius 1705, D'Amboinsche Rariteitkamer, pl. 41, fig. E (*Solen arenarius*).
Is *Kuphus polythalamia* (Linnaeus). See

also the following: *arenaria* Lamarck; *arenaria* Linnaeus of authors, not of Linnaeus; *dubia* Sivickis; *gigantea* Gray; *gigantea* Home; *gigantea* Sowerby.

portoricensis Clapp, **Teredo (Teredo)**: 1924, Trans. Acad. Sci. St. Louis, Missouri **25** (1): 2, pl. 1, figs. 1-7 (San Juan, Porto [Puerto] Rico).

Holotype, MCZ 45303. Plate 7 A
Paratype, MCZ 120732.

primigenia Benoist, **Septaria**: 1877, Actes Soc. Linn. Bordeaux **31**: 316, pl. 19, fig. 17 (fossil, Miocènes inférieurs, Cérons, France).

Name based on fragments of tubes.

princesae Sivickis, **Teredo**: 1928, Philippine Jour. Sci. **37**: 291, pl. 2, fig. 11 (from a piece of wood exposed at low tide at Puerto Princesa, Palawan, Philippine Islands).

Syntypes, Philippine Bur. Sci., Manila, lost in World War II. Plate 34 B

Is *Teredora princesae* (Sivickis). See also the following: *alfredensis* van Hoepen; *diederichseni* Roch; *gazellae* Roch; *gregoryi* Dall, Bartsch and Rehder; *minori* Nair; *petersi* Moll; *sparcki* Roch.

problematica Fuchs, **Teredinopsis**: 1878, Denkschr. K. Akad. Wiss. Wien, Math.-Natur. Kl. **38** (2): 39, pl. 1, figs. 1-3 (fossil, Quarternär, Bitterseen, Suez).

Name based on shells and clusters of tubes. Renamed *fuchsii* by Vassel 1882.

protensa Gmelin, **Serpula**: 1791, Systema Naturae, ed. 13, p. 3744 (Mari indico et Americam).

Nomen dubium. Gmelin referred to Rumphius, 1705, D'Amboinsche Rariteitkamer, pl. 41, fig. 3 and to Martini, 1769, Conchylien-Cabinet (1) **1**, pl. 2, fig. 12A. Both of these figures are of the tubes only and could represent any species. Lamy, 1926, p. 247, says it is *T. norvagica* Spengler.

Proteredo May 1929, Zeitschr. Morph. Ökol. Tiere, Abt. A, **15**: 64, 665.

A hypothetical genus, excluded from zoological nomenclature. See Art. 1 of the International Code of Zoological Nomenclature, 1961.

Pseudodicyathifer Tchang, Tsi and Li 1958, Acta Zool. Sinica **10**: 248, 256.

Type species, *Teredo manni* Wright, original designation.

Is *Dicyathifer* Iredale 1932.

Psiloteredo Bartsch 1922, Bull. U. S. Natl. Mus. **122**: 36.

Type species, *Teredo dilatata* Stimpson [=*megotara* Hanley], original designation. See also *Dactyloteredo* Moll 1941.

pugetensis White, **Teredo**: 1889, Bull. U. S. Geol. Surv. **51**: 62, pl. 8 (fossil, Eocene, Carbonado, [Puget Sound Basin] Washington).

Name based on large tubes in petrified wood.

pujadana Bartsch, **Teredo (Ungoteredo)**: 1927, Bull. U. S. Natl. Mus. **100** (2), pt. 5: 547, pl. 54, figs. 8, 10; pl. 57, fig. 3; pl. 60, figs. 1-3 (*Albatross*, station 5243, Pujada Bay, eastern Mindanao, Philippine Islands, in 218 fathoms).

Holotype, USNM 246131. Plate 19 B

Is *Teredothyra matocotana* (Bartsch) 1927.

pulchella Terquem and Jourdy, **Teredo**: 1869 [1871], Mém. Soc. Géol. France (2) **9**: 70, pl. 4, figs. 18, 19 (fossil, Jurassic, l'Étage Bathonien, Les Clapes, dans un Isastrea, Dept. Moselle, France).

Types, École des Mines, Paris.

Is probably a *Jouannetia* (Pholadidae).

quadrangularis Sivickis, **Bankia**: 1928, Philippine Jour. Sci. **37**: 287, pl. 1, fig. 3 (from stumps that have been under water for about a year at Dalahican, Cavite, Luzon, Philippine Islands).

Types, Philippine Bur. Sci., Manila, destroyed during World War II.

Is *Nausitora dunlopei* Wright 1864.

queenslandica Iredale, **Nausitora**: 1936, Queensland Forest Service Bull. No. 12, p. 37, pl. 2, figs. 8-14 (Chelmer, upper Brisbane River, Queensland, Australia).

Holotype, Australian Mus. Plate 41 B, C, E
Paratype, MCZ 229366.

Is *Nausitora dunlopei* Wright 1864.

radcliffei Bartsch, **Teredo (Teredothyra)**: 1927, Bull. U. S. Natl. Mus. **100** (2), pt. 5: 542, pl. 53, figs. 11-14; pl. 56, fig. 5; pl. 59, figs. 7-9 (*Albatross*, station 5252, off Linao Point, Gulf of Davao, Mindanao, Philippine Islands, in 28 fathoms).

Holotype, USNM 312921. Plate 16 B

Is *Teredothyra smithi* (Bartsch) 1927.

radiciformis 'Lesser' Deshayes, **Tubulus**: 1839, Traité élémentaire de Conchyliologie **1** (2): 40. Refers to Lesser, 1744, Testaceo-Theologia, p. 112.

A *nomen nudum* in the synonymy of *Septaria* Lamarck.

radicis Moll, **Teredo (Teredo)**: 1937, Mitt. Zool. Mus. Berlin **22**: 182 (East London (Kapkolonie), Deutsch-Ostafrika? [Union of South Africa]).

Lectotype, Berlin Mus. (here selected). Plate 7 D

Is *Teredo somersi* Clapp 1924.

recta Sowerby, **Serpula**: 1840 [*in*] Grant, Trans. Geol. Soc. London (2) **5**: 327, pl. 25, fig. 1 (fossil, Tertiary, near Kotra, India).

Types, BM(NH)?

Name based on tube only. Generally referred to the Teredinidae and so is included here.

rectus Wade, **Teredo**: 1926, U. S. Geol. Surv. Prof. Pap. No. 137: 100, pl. 33, fig. 1 (fossil, Upper

Cretaceous, Ripley Formation, Dave Weeks' place on Coon Creek, McNairy County, Tennessee).
Type, USNM 32820.
Name based on tubes only.

rehderi Nair, **Teredo (Teredora)**: 1954 [1956], Rec. Indian Mus. **52**: 408, fig. 9a-d (Madras coast in drift, India).
Holotype, Zool. Surv. India, Calcutta. M17435/3.
Paratypes, Univ. Zool. Lab.
Madras, not found. Plate 23 H
Is in the genus *Uperotus* and is probably a young wood-boring form of *Uperotus clavus* (Gmelin) in which the shell is more typically developed, as discussed in Part I. See also *vattanansis* Nair and Gurumani; an examination of the type specimens shows these to be the young and mature specimens of the same species and both are probably *clavus* Gmelin.

remifer Iredale, **Nototeredo**: 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 32, pl. 3, figs. 1-4 (Darling Harbour, Port Jackson, New South Wales, Australia).
Holotype, Australian Mus. Plate 31 B
Paratype, MCZ 229514.
Is a young *Nototeredo edax* (Hedley) 1895.

renschi Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 267, text fig. 5 (Singapore).
Lectotype, Berlin Mus.
(here selected). Plate 11 B
Is *Teredo clappi* Bartsch 1923.

requienianus Matheron, **Teredo**: 1842, Catalogue Méthodique et Descriptif des Corps Organisés Fossiles du Département des Bouches-du-Rhône et Lieux Circonvoisins, Marseille, p. 132, pl. 10, figs. 5-7 (fossil, Crétacé, Craie Chloritée, Uchaux et Mornas, France).
Types, Univ. Lyon (Moll 1941b, p. 42).
Is probably a *Teredina* (Pholadidae).

retorta Mawe, **Serpula**: 1823, The Linnean System of Conchology, p. 193, pl. 34, fig. 5 (no locality given).
Is *Uperotus clavus* (Gmelin) 1791.

reynei Bartsch, **Teredo (Neoteredo)**: 1920, Proc. Biol. Soc. Washington **33**: 69 (Paramaribo, Dutch Guiana); Bartsch, 1922, Bull. U. S. Natl. Mus. **122**: 30, pl. 23; pl. 33, fig. 3.
Holotype, USNM 338240. Plate 32 C
This is a remarkable species, as the animal has two large, fleshy lappets on the dorsal surface of the body just anterior to the siphons. See also the Introduction, p. 23, and Figure 6 A.
Is *Neoteredo reynei* (Bartsch).

rhombica Gardner, **Teredo**: 1916, Maryland Geol. Surv., Upper Cretaceous, p. 732, pl. 45, fig. 3 (fossil, Monmouth Formation, Brightseat, Prince George's County, Maryland).
Holotype, USNM 131714.
Name based on fragments of shells only.

ringens Aldrich, **Teredo**: 1921, Bull. Amer. Paleont. **9** (37): 17, pl. 2, fig. 12 (fossil, Eocene, Sucarnochee clay bed, 3 miles south of Estelle, Alabama).
Holotype, No. 5, Geol. Surv. Alabama Type Collection, University, Ala., according to Palmer, 1965, Bull. Amer. Paleont. **48** (218): 315.
Name based on a tube only, and this is sculptured with evenly spaced rings. It is probably not a teredinid.

robsoni Roch, **Teredo**: 1931, Proc. Malac. Soc. London **19**: 209, pl. 23 (Simonstown, South Africa).
Holotype, Berlin Mus. Plate 4 C
Roch (1931) and Moll (1941) stated that the type of this species is in the BM(NH), but I was unable to locate it there. The specimen figured in the original description is the same one that is figured here as the holotype. It is in the Berlin Museum, labeled as the type, as from the British Museum, and with a reference to the Proceedings of the Malacology Society of London.
Is *Lyrodus pedicellatus* (Quatrefages) 1849.

rochi Moll, **Bankia**: 1931, Proc. Malac. Soc. London **19**: 215, pl. 25 (Christmas Island, south of Java).
Holotype, BM(NH)
1905·5·7·39. Plate 56 C; Figure 23
See also *roonwali* Rajagopalaiengar and *thielei* Roch.

roonwali Rajagopalaiengar, **Bankia (Neobankia)**: 1961, Science and Culture **27**: 550 (Sajnakhali, 22°7′N, 88°50′E, Sundarbans, West Bengal, India).
Holotype, Zool. Surv. India,
Calcutta M 16751/2. Plate 34 D
Paratype, MCZ 170838.
Is *Bankia rochi* Moll 1931.

rosenthali Iredale, **Bankia**: 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. Sydney Harbour Trust, p. 35, pl. 3, figs. 9-12 (Oyster Cove, Port Jackson, New South Wales, Australia).
Holotype, Australian Mus. Plate 63 E
Paratype, MCZ 168015.
Is *Bankia australis* (Calman) 1920.

rosifolia Moll, **Teredo**: 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 223, fig. 50a (Piedade, 15 km S. Recife [Pernambuco], Brasil).
Lectotype, Berlin Mus.
(here selected). Plate 30 D
Is *Nototeredo knoxi* (Bartsch) 1917.

rotundus J. deC. Sowerby, **Teredo**: 1850 [*in*] Dixon, The Geology and Fossils of the Tertiary and Cretaceous Formations of Sussex (London), p. 346, pl. 28, figs. 27, 28 (fossil, Cretaceous Chalk of Kent, England).

The specimen figured is too small and poor to determine definitely, but this species probably belongs in the family Pholadidae, genus *Diplothyra*.

rubra Sivickis, **Bankia**: 1928, Philippine Jour. Sci. **37**: 288, pl. 1, fig. 6 (from living mangrove stems, common near Puerto Galera, Mindoro, Philippine Islands).

Types, Philippine Bur. Sci., Manila, lost during World War II.

Is *Bankia bipalmulata* (Lamarck) 1801.

rugaardensis Grönwall, **Teredo**: 1907, Danmarks Geologiske Undersøgelse (2) **18**: 88, pl. 1, figs. 17, 18 (fossil, Paleocaen, Rugaard, Danmark).

Name based on shells only.

rugosa Schafhäutl, **Teredo**: 1863, Süd-Bayerns Lethaea Geognostica, Leipzig, p. 178, pl. 44, fig. 7 (fossil, Eocene, Kressenberg [Austria]).

Name based on tube only.

sajnakhaliensis Rajagopal [aiengar] **Nausitora**: 1964, Jour. Bombay Nat. Hist. Soc. **61** (1): 113, figs. 4-6 of the plate and text fig. 2 (about 13 km south of the Sajnakhali Forest Office, 22° 7′ N; 88° 50′ E, Sajnakhali, 24-Parganas Dist., West Bengal, India—from living 'Goran' tree).

Holotype, Zool. Surv. India, Calcutta M16846/2.

An examination of the holotype showed this to be *Bankia nordi* Moll, and Rajagopal's remark concerning the pallets that "the free margins of the membrane possess double rows of pectinate processes" certainly agrees with the condition in *nordi* and *orcutti* as described and figured on Plate 44 A and C.

samoaensis Miller, **Teredo**: 1924, Univ. California Publ. Zool. **26**: 149, pl. 10, figs. 21-25 (Tutuila, Samoa).

Holotype, CAS 1730. Plate 4 D
Paratypes, ANSP, USNM.

Is a heavily calcified form of *Lyrodus pedicellatus* (Quatrefages) 1849.

saucatsensis Benoist, **Teredo**: 1873, Actes Soc. Linn. Bordeaux **29**: 16 (fossil, La Sime, commune de Saucats [France], rare in zone à Cardita, Jouanneti), *nomen nudum;* 1876, *ibid.* **31**: 318, pl. 20, fig. 4 (fossil, Miocène moyen dans les couches faluniennes des Saucats à Lagus, plus rare à Cestas dans la couche mixte à *Melanopsis,* Sud-ouest de la France).

Types, Bordeaux Mus.

Name based on tubes and shells only.

sauctatsensis 'Benoist' May, **Teredo**: 1929, Zeitschr. Morph. Ökol. Tiere **15**: 648.

Error for *saucatsensis* Benoist.

saulii 'Wright' Hedley, **Calobates**: 1898, Proc. Linn. Soc. New South Wales **23**: 94, figs. 7-9 (Tamar River and Sanford, Tasmania; Beaumaris, Victoria; Bellinger River, New South Wales, Australia); non *Nausitora saulii* Wright 1866.

Because of Wright's error in citing the type locality of *saulii,* this name was used by Hedley and others for the common Australian *Bankia.* Calman recognized the error and named the species *australis* in 1920. See under *Xylotrya australis* Calman.

saulii Wright, **Nausitora**: 1866, Trans. Linn. Soc. London **25**: 567, pl. 65, figs. 9-15 (not Port Phillip, Australia, as given in the original description, but Callao, Peru).

Holotype, BM(NH) 53·6·27·13. Plate 42 A

The error in the type locality assignment of this species was first pointed out by Hanley (1885, Ann. Mag. Nat. Hist. (5) **16**: 28, footnote). Earlier, however, Sowerby (1875, Conchologia Iconica **20,** Teredo, pl. 3, fig. 10) gave the locality as Callao Bay without further comment. The label with the type specimen and the catalogue entry in the BM(NH) give the locality as Callao, Peru. See also Calman, 1920 (Proc. Zool. Soc. London, p. 398, figs. 4-5), for a discussion of this error of locality.

This may be a young, ecologic form of *Nausitora dryas* (Dall); however, because of lack of material this cannot be demonstrated here. Consequently the two species are being held separate for the present.

schneideri Moll, **Nausitora**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 271, pl. 2, fig. 1 (Karlei, Neupommern [Bismarck Archipelago]).

Lectotype, Berlin Mus.
(here selected). Plate 40 C

Is *Nausitora dunlopei* Wright 1864.

schrencki Moll, **Bankia**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 275, pl. 2, fig. 7 (São Francisco, Brasil).

Holotype, Berlin Mus. Plate 48 E

Is *Bankia gouldi* (Bartsch) 1908.

segaruensis Roch, **Bankia**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 20, pl. 2, fig. 20 (Togo).

Lectotype, Berlin Mus.
(here selected). Plate 52 B
Paratype, MCZ 170748.

Is *Bankia carinata* (Gray) 1827.

selliformis Meek and Hayden, **Teredo**: 1860, Proc. Acad. Nat. Sci. Philadelphia **12**: 178 (fossil, Fort Clark on the Missouri, Dakota Territory; in the

Fort Pierre group or formation No. 5 of the Upper Missouri Cretaceous); 1876, Report U. S. Geol. Surv. of the Territories **9**: 262, pl. 17, fig. 19a-d.

Types, USNM 421.

Name based on shell and tube only.

sellii van der Hoeven, **Teredo**: 1850, Handbuch der Zoologie **1**: 727 (Holland). Refers to the species described by Sellius, 1733, Hist. Nat. Teredinis, as well as to *T. navalis* Linnaeus and *T. batavus* Spengler.

Is *Teredo navalis* Linnaeus 1758.

semoni Moll, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 9, pl. 1, fig. 4 (Amboina; Ralun [Ralum, Bismarck Archipelago]).

Holotype, Berlin Mus. Plate 36 B

New name for *Teredo clava* von Martens 1894; non Gmelin 1791.

Is *Spathoteredo obtusa* (Sivickis) 1928.

senegalensis Blainville, **Teredo**: 1828, Dict. Sci. Nat. (Paris) **52**: 267 (dans les racines des mangliers qui bordent les fleuves de Niger et de Gambie, Sénégal). Refers to Adanson, 1757, Histoire Naturelle du Sénégal (Paris), p. 264, pl. 19; Adanson, 1759 [1765], Mém. Acad. Roy. Sci. (Paris), p. 277, pl. 9, figs. 1-4.

Holotype, Paris Mus.,
Adanson collection. Plate 32 A

There has been considerable confusion concerning the use of the name *senegalensis*, mainly because it is a variable species with striking differences occurring with age. Monod (1952, Inst. Franc. Afr. Noire, Cat. 8, pp. 12-29) discussed and illustrated the variations occurring in the pallets of *senegalensis* and showed that *petitii* Récluz is the young form. Rancurel has since shown that specimens growing in areas of low salinity and in uncrowded conditions retain the *petitii* form throughout life. Thus it appears that *petitii* is a young and ecologic form of *senegalensis* Blainville.

Is *Psiloteredo senegalensis* (Blainville). See also *adami* Moll.

senegalensis Laurent, **Teredo**: 1849, Dict. Univ. Hist. Nat. (Paris) **12**: 359; Laurent, 1850, Jour. Conch. (Paris) **1**: 349; non Blainville 1828.

Is *Nototeredo norvagica* (Spengler) 1792.

senex 'Jousseaume' Lamy, **Teredo**: 1923, Bull. Mus. Natl. Hist. Nat. (Paris) **29**: 178 (Djibouti, Aden et Massaouah, Mer Rouge).

Holotype, Paris Mus. Plate 29 D

Nomen dubium. Name based on shells only.

senix 'Jousseaume' Lamy, **Teredo**: 1923, Bull. Mus. Natl. Hist. Nat. (Paris) **29**: 178.

This is a manuscript spelling of *senex* which was included in the description by Lamy.

septa Mawatari and Kitamura, **Psiloteredo (Phylloteredo)**: 1960, Misc. Rept. Res. Inst. Nat. Resources, Tokyo, No. 52/53, pls. 72, 75, text fig. 8a-d, pl. 5, figs. 3-12 (Kagoshima Pref., Japan).

Is probably *Nototeredo edax* (Hedley) 1895.

Septaria Lamarck 1818, Histoire Naturelle des Animaux sans Vertèbres **5**: 436; non Férussac 1807.

Type species, *Septaria arenaria* Lamarck [=*Serpula polythalamia* Linnaeus], monotypic.

Is *Kuphus* Guettard 1770.

serpuliformis 'Feuchtelmann' Moll, **Teredo**: 1941, Fossilium Catalogus I: Animalia, pars 95, p. 43 (Chalk, New Jersey, USA); 1942, Palaeontographica **94A**: 150 (Senon, New Jersey).

Nomen nudum, a manuscript name taken from specimens in the collection of the museum of the Geologische-Palaeontologisches Institut der Universität, Berlin, Germany.

serpuloides Rochebrune, **Teredo**: 1882 [*in*] Sauvage, Mém. Soc. Géol. France (3) **2** (4): 4, pl. 32, fig. 8 (fossil, dans le Gault de l'est du Bassin de Paris, France).

Name based on tubes only.

serratus Deshayes, **Teredo**: 1860, Description des Animaux sans Vertèbres Découverts dans le Bassin de Paris **1**: 114, 115 (no locality given).

Nomen dubium. Deshayes, in his general remarks concerning the genera *Teredo* and *Xylotria* [*sic*] Gray, referred to *serratus* and compared the pallets of his fossil species *parisiensis* with it. However, he never actually described *serratus*. Jeffreys (1860, Ann. Mag. Nat. Hist. (3) **6**: 127) placed *serratus* Deshayes in the synonymy of *Bankia minima* (Blainville) [=*B. carinata* (Gray)].

setacea Tryon, **Xylotrya**: 1863, Proc. Acad. Nat. Sci. Philadelphia **15**: 144, pl. 1, figs. 2, 3 (San Francisco Bay, California).

Holotype, ANSP 50987. Plate 60 A

Is *Bankia setacea* (Tryon). See also *Bankia sibirica* Roch.

shawi Iredale, **Teredo**: 1932, Destruction of Timber by Marine Organisms in the Port of Sydney. (Roseville Bridge, Middle Harbour, Sydney, New Sydney Harbour Trust, p. 30, pl. 1, figs. 5-8 South Wales, Australia).

Holotype, Australian Mus. Plate 8 C
Paratypes, MCZ 229500, 168008.

Is *Teredo bartschi* Clapp 1923.

shionomisakiensis Habe, **Glumebra**: 1953, Venus **17**: 140, text figs. 13-15 (Shionomisaki, Wakayama Pref., Honshu, Japan).

Is probably *Uperotus clavus* (Gmelin) 1791.

siamensis Bartsch, **Teredo (Teredo)**: 1927, Jour.

Siam Soc. Nat. Hist. Suppl. **7** (1): 59, pl. 6, figs. 2-5, 9, 11 (Singora, Siam).

Holotype, USNM 363159. Plate 1 C

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

sibirica Roch, **Bankia**: 1934, Zool. Zhur. **13** (3): 446, pl. 2, fig. 2 [in Russian]; Roch, 1935, Sitzungsber. Akad. Wiss. Wien **144**: 275, pl. 2, fig. 6 (Soviet Harbor, USSR).

Holotype, Berlin Mus. Plate 60 B

Is probably *Bankia setacea* (Tryon) 1863. See Moll, 1941, Venus **11**, p. 18.

sigerfoosi Bartsch, **Teredo (Psiloteredo)**: 1922, Bull. U.S. Natl. Mus. **122**: 39, pl. 28, fig. 2; pl. 36, fig. 1 (Beaufort, North Carolina).

Holotype, USNM 345357. Plate 30 C

Is *Nototeredo knoxi* (Bartsch) 1917.

simplex Deshayes, **Teredo**: 1860, Description des Animaux sans Vertèbres Découverts dans le Bassin de Paris **1**: pl. 2, fig. 27.

Name given on the plate caption only. In the text the same figure is referred to as *T. modica* Deshayes, and subsequent authors have used the latter name.

simplex I. Lea, **Teredo**: 1833, Contributions to Geology (Philadelphia), p. 38, pl. 1, fig. 6 (fossil, Tertiary, Claiborne, Alabama).

Holotype, ANSP 5019, according to Palmer 1965, Bull. Amer. Paleont. **48** (218): 315.

Name based on fragments of tubes. Is a species of *Protula* (a genus of polychaetes) according to Walter J. Schmidt.

simplexopsis Gregorio, **Teredo**: 1890, Ann. Geol. Paleont., Palermo, Liv. 8, p. 236, pl. 38, fig. 26a-b (fossil, Eocene, Alabama [no further data given]).

Types, Gregorio collection, 26449, Paleont. Res. Inst., Ithaca, N.Y., according to Palmer, 1965, Bull. Amer. Paleont. **48** (218): 316.

Name based on tubes only.

sinensis Roch, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 13, pl. 2, fig. 11 (Tsingtau [Tsingtao, Shantung, China]).

Lectotype, Berlin Mus.
(here selected). Plate 15 B

Is *Teredo navalis* Linnaeus 1758.

singaporeana Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 266, text fig. 4 (Singapore).

Holotype, Berlin Mus. Plate 18 E

Is *Lyrodus massa* (Lamy) 1923.

sivicksi Miller, **Teredo**: 1956, Proc. 8th Pacific Science Congress **3A**: 1575.

New name for *Teredo bartschi* Sivickis 1928; non Clapp 1923.

Is *Dicyathifer manni* (Wright) 1866.

skutschburyi 'Leach' Clessin, **Teredo**: 1893, Conchylien-Cabinet (2) **11** (4), Pholadea, p. 68.

Error for *stutchburyi* 'Leach' Blainville.

smithi Bartsch, **Bankia (Nausitora)**: 1927, Jour. Siam Soc. Nat. Hist. Suppl. **7** (1): 61, pl. 6, figs. 1, 6-8, 10, 12 (Chao Phya River at Bang Sorn, Siam).

Holotype, USNM 363158. Plate 39 B

Is *Nausitora dunlopei* Wright 1864.

smithi Bartsch, **Teredo (Teredothyra)**: 1927, Bull. U.S. Natl. Mus. **100** (2), pt. 5: 540, pl. 53, figs. 6, 7; pl. 56, fig. 4; pl. 59, figs. 10-12 (*Albatross*, station 5266, off Matocot Point, western Luzon, Philippine Islands).

Holotype, USNM 312919. Plate 16 D

Is *Teredothyra smithi* (Bartsch).

See also the following: *bengalensis* Nair; *kiiensis* Taki and Habe; *lanceolata* Moll; *nambudalaiensis* Nair and Gurumani; *radcliffei* Bartsch; and *tanonensis* Bartsch.

socialis Eichwald, **Teredo**: 1853, Bull. Soc. Imp. Nat. Moscou **26** (1): 227 [as *Gastrochaena socialis*]; 1868, Lethaea Rossica (Stuttgart), **2**: 796, pl. 27, fig. 17 (fossil, Cretaceous, grès ferrugineux de Koursk [Russia]).

Name based on tubes only. Plate 27, figure 17 shows a piece of fossilized wood with numerous 'teredo' tubes.

somersi Clapp, **Teredo (Zopoteredo)**: 1924, Proc. Amer. Acad. Arts and Sci. (Cambridge) **59** (12): 284, pl. 2 figs. 7-12; pl. 3, figs. 15, 16 (Ireland Island, Bermuda).

Holotype, MCZ 45304. Plate 7 E

See also *radicis* Moll.

sparcki Roch, **Teredo**: 1931, Arkiv Zool. (Stockholm) **22A** (13): 15, pl. 2, fig. 4 (Panay, Philippine Islands).

Holotype, Copenhagen Mus., not found.

Is *Teredora princesae* (Sivickis) 1928.

spatha Jeffreys, **Teredo**: 1860, Ann. Mag. Nat. Hist. (3) **6**: 124 (in *Cedrela odorata* at Guernsey, England, with *T. bipartita* Jeffreys).

Lectotype, Jeffreys Collection,
USNM 194272 (here selected). Plate 36 A

Is *Spathoteredo spatha* (Jeffreys). See also *molli* Roch.

Spathoteredo Moll 1928, Jour. Conch. (Paris) **71**: 282.

Type species, *T. batilliformis* 'Clapp' Moll; non Clapp, a misidentification. Type species, here selected, *T. bataviana* Moll and Roch.

Moll instituted the name *Spathoteredo* in his commentary on the revision of the Teredinidae by Lamy (1926, Jour. Conch. [Paris] **70**: 230). Moll's entire statement is as follows:

"p. 230—*T. batilliformis* Clapp. J'ai établi pour cette espèce un nouveau genre *Spathoteredo,* caractérisé par des palettes à contour en forme de pelle [shovel]. Ici appartiennent le *T. batava* de Sowerby [1875, =*bataviana* Moll and Roch 1931; non Spengler 1792] et vraisemblablement aussi le *T. spatha sensu stricto* de Jeffreys, ainsi que le *T. spathula* Tiberi (si ce ne sont pas des *Lyrodus* dont le périostracum est détruit)."

It is obvious that Moll had not seen specimens of *batilliformis* Clapp, for this species does not have shovel-shaped pallets and is not related to *bataviana* or *spatha.* Consequently, if we are to hold to the concept of the genus as given in the brief description, by the two additional species mentioned and by general use, *batilliformis* Clapp cannot be considered the type species. Therefore Moll's use of *batilliformis* is considered a misidentification and *bataviana* Moll and Roch is selected as the type species of *Spathoteredo* Moll. This is the same species that Roch selected as the type of *Spathoteredo* Roch when he introduced it as new nine years later, overlooking the work of his colleague. Thus *Spathoteredo* Moll 1928 and *Spathoteredo* Roch 1937 are both homonymous and synonymous. See next entry.

Spathoteredo Roch 1937, Mitt. Zool. Mus. Berlin **22**: 173.

Type species, *T.* (*Spathoteredo*) *bataviana* Moll and Roch, original designation.

spathula 'Tiberi' Lamy, **Teredo**: 1927, Jour. Conch. (Paris) **70**: 252.

This was a manuscript name on a specimen in the Paris Museum. Lamy stated that the specimen was received by Petit de la Saussaye from Tiberi with the label "*Teredo spathula,* n. sp." but that an additional note on the label indicated the species was *divaricata* Fischer. Lamy did not describe the specimen but stated that he thought it was closer to *jamaicensis* Bartsch. Moll (1941, Sitzungsber. Ges. Naturforsch. Fr. Berlin 1941: 168, 184) credits the species to Tiberi and considers it a synonym of *pedicellatus* Quatrefages. It is, of course, a *nomen nudum.*

spatula Roch, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 10.

Error for *spathula* 'Tiberi' MS, which Roch considers the same as his *T. lamyi* [=*Lyrodus pedicellatus* (Quatrefages) 1849].

stimpsoni Bartsch, **Teredo (Psiloteredo)**: 1922, Bull. U.S. Natl. Mus. **122**: 38, pl. 28, fig. 3; pl. 35, fig. 3 (Charleston, South Carolina).

Holotype, USNM 27461. Plate 28 B

Is *Nototeredo knoxi* (Bartsch) 1917.

striata Carozzi, **Vaginella**: 1954, Arch. Sci., Genève **7**: 107, figs. 1, 2 (fossil, Jurassique dans le Portlandien-Purbeckien inférieur et moyen de Pierre-châtel [southern Jura Mts.]); Farinacci, 1963, Geologica Romana **2**: 151-178, figs. 1-6, pls. 1-5.

This fossil was originally described by Favre in 1927 as organism "C", but was formally described by Carozzi as a pteropod in the genus *Vaginella* in 1954. According to Farinacci, Radoicic considered it a tintinnid protozoan. After restudying the material, Farinacci interpreted it as fragments of pallets, and placed *striata* Carozzi in the genus *Bankia.* Having carefully studied Farinacci's paper, I would suggest that these are probably not *Bankia* pallets because the specimens figured are circular in cross-section while a *Bankia* pallet is semicircular. In addition, they occur in a limestone matrix and it is highly unlikely that isolated pallets would survive to be fossilized unless they remained in the tube, in which case evidence of fossilized wood would also be found.

striatior Jeffreys, **Teredo megotara**: 1865, British Conchology **3**: 177 (British Isles).

Lectotype, Jeffreys Collection,
USNM 194260 (here selected). Plate 26 C

Is *Psiloteredo megotara* (Hanley) 1848.

striolatus Boettger, **Teredo**: 1875, Palaeontographica (Cassel), Suppl. **3** (1): 23, pl. 4, fig. 27a-b (fossil, Eocene, Borneo. Eisenschüssiger Thonstein (Etage α), nur das abgebildete Handstück).

Name based on fragments of shells and tube only.

stuchburgi 'Blainville' Laurent, **Teredo**: 1848, Dict. Univ. Hist. Nat. (Paris) **12**: 349.

Error for *stutchburyi* Blainville.

stuchburyi 'Blainville' Paetel, **Teredo**: 1890, Catalog Conchylien-Sammlung **3**: 7; also Moll, 1914, Naturwiss. Zeitschr. Forst- und Landwirtschaft **12**: 516, fig. 13.

Error for *stutchburyi* Blainville.

stutchburii 'Blainville' Hanley, **Teredo**: 1885, Ann. Mag. Nat. Hist. (5) **16**: 27.

Error for *stutchburyi* Blainville.

stutchburyi 'Leach' Blainville, **Teredo**: 1828, Dict. Sci. Nat. (Paris) **52**: 268 (Sumatra); Sowerby, 1876, Conchologia Iconica **20**, Teredo, pl. 2, fig. 5a-c.

Lectotype, BM(NH)
(here selected). Plate 46 A

Is *Bankia carinata* (Gray) 1827.

subaequalis Dall, **Xylotrya fimbriata**: 1883, Proc. U.S. Natl. Mus. **6**: 337 (Cedar Keys, Florida).

Nomen nudum. The single statement, "This differs from the type in having the anterior and posterior areas subequal in size," certainly does not constitute a description.

subaustralis Iredale, **Bactronophorus**: 1936, Queensland Forest Service Bull. No. 12, p. 41, pl. 2, figs. 15-21 (Traveston [Traverston], Burrum River, about 20 miles north of Maryborough, Queensland, Australia).

Holotype, Australian Mus. Plate 25 C
Paratypes, MCZ 229351.

Is *Bactronophorus thoracites* (Gould) 1856.

subericola MacGillivray, **Teredo**: 1845, Edinburgh New Phil. Jour. **38**: 141 (in cork-floats, on the coast of Aberdeen [Scotland]).

Nomen dubium. The brief description of the pallets could apply to a number of species.

subericola Jeffreys, **Teredo**: 1860, Ann. Mag. Nat. Hist. (3) **6**: 122 (Guernsey, England, in drift fir).

Lectotype, Jeffreys Collection,
USNM 194264 (here selected). Plate 26 F

Jeffreys stated in his original description that *subericola* was a manuscript name of MacGillivray, overlooking the introduction of the name by MacGillivray in 1845. In addition, he placed the specimens taken from cork floats at Aberdeen, to which MacGillivray referred, in *subericola* var. *minor* Jeffreys.

Is *Psiloteredo megotara* (Hanley) 1848.

subicensis Edmondson, **Teredo (Teredothyra)**: 1959, Occ. Pap. B. P. Bishop Mus. **22** (11): 205, fig. 1e-f (from test panel at Subic Bay, Luzon, Philippine Islands).

Holotype, BPBM 112. Plate 17 D

Is a worn specimen of *Teredo palauensis* Edmondson 1959, and probably the same as *excavata* Jeffreys 1860.

subparisiensis Gregorio, **Teredo**: 1894, Ann. Géol. Paléont. **14**: 33, pl. 6, figs. 187-188 (fossil, Eocene, Étage Parisien, Mont Postale [Italy]).

Name based on tubes only.

substriata Conrad, **Teredo**: 1849 [*in*] Dana, Geol. U.S. Exploring Expedition, Appendix 1, pt. 3, p. 728, pl. 20, fig. 7a-b.

Not in the Teredinidae, but is a *Dentalium* [Scaphopoda]. See Emerson, 1958, Proc. Biol. Soc. Washington **71**: 91-94.

suciensis Whiteaves, **Teredo**: 1879, Geol. Surv. Canada, Mesozoic Fossils **1** (2): 135, pl. 17, figs. 1, 1a; 1884, *ibid.*, (3): 218, pl. 29, fig. 1 (fossil, Cretaceous, south-west side of Denman Island, Straits of Georgia, Vancouver, British Columbia).

Name based on shells and tubes only.

sulcata Eichwald, **Teredo**: 1868, Lethaea Rossica (Stuttgart), **2**: 794, pl. 27, fig. 15 (fossil, la marne crétacée de Badrak et de Simferopol en Crimée [Russia]).

Name based on segmented tube only. Probably is not in the Teredinidae.

syltensis Mörch, **Teredo (Uperotus)**: 1874, Meddelese paa det Ilte Skandinaviske Naturforskermøde i Kjøbenhavn for 1873, p. 292. (fossil, [Tertiary], Morsum Klif [Denmark]).

Name based on fragment of shell only.

syriaca Roch, **Bankia**: 1936 [*in*] Moll, Mitt. Ges. Vorratsschutz E.V., Berlin-Steglitz **12** (1): 4 (Jaffa [Israel]).

Lectotype, MCZ 170749
(here selected).
Paratype, MCZ 170678. Plate 34 E

Is *Bankia carinata* (Gray) 1827. I was unable to locate any specimens of *syriaca* Roch in the Berlin Museum; however, paratype specimens were sent by Moll to Dr. Clapp at the William F. Clapp Laboratories, Duxbury, Mass. A lectotype has been selected from these.

taiwanensis Taki and Habe, **Teredo (Lyrodus)**: 1945, Venus **14**: 113 (Taiwan, Formosa); 1958 [*in*] Okada, Damage and the Method of Protection against Wood-boring Animals, published by Japanese Assoc. Adv. Sci., p. 60 [in Japanese].

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

takanoshimensis Roch, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 10, pl. 1, fig. 7 (Kingyoki [Kingyoku], Takanoshima, Japan).

Holotype, Berlin Mus. Plate 7 C

Is *Lyrodus takanoshimensis* (Roch). See also *Teredo dicroa* Roch.

tanonensis Bartsch, **Teredo (Teredothyra)**: 1927, Bull. U.S. Natl. Mus. **100** (2), pt. 5: 543, pl. 54, fig. 7; pl. 56, fig. 1; pl. 59, figs. 1-3 (*Albatross*, station 5189, off Pecador Island, Tenon Strait, Philippine Islands, in 300 fathoms).

Holotype, USNM 310964. Plate 16 A

Is *Teredothyra smithi* (Bartsch) 1927.

tarbelliana Archiac, **Septaria**: 1846, Mém. Soc. Géol. France (2) **2**: 207, pl. 8, fig. 11 (fossil, Eocene, les couches Nummulines de la Côte de Biarritz, France).

Name based on the end of a tube only.

tateyamensis Kuronuma, **Teredo (Teredops)**: 1931, Venus **2** (6): 295, pl. 8, fig. 5; pl. 9, figs. 23-25 (in floating pine board at Tateyama Bay, Chiba Pref. Japan).

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

tenuis Sivickis, **Bankia**: 1928, Philippine Jour. Sci. **37**: 287, pl. 1, fig. 4 (from Cebu region, Philippine Islands).

Holotype, Philippine Bur. Sci., destroyed during World War II.

Is *Bankia philippinensis* Bartsch 1927.

Terebrimya Stephenson 1952, U.S. Geol. Surv. Prof. Pap. no. 242: 141.

Type species, *Terebrimya lamarana* Stephenson, original designation.

Teredarius Duméril 1806, Zoologie Analytique, p. 343.
Nomen nudum. This name is listed in the index only and refers to page 168 where the 'Tarets' are discussed, but there is no mention of the genus.

Teredigenus Renier 1807, Tavole per servire alle Classificazione e Connoscenza degli Animali, Padua, Tav. VII.
This publication was placed on the Official Index of Rejected and Invalid Works in Zoological Nomenclature by the International Commission in 1956, Opinion 427.

Teredina Lamarck 1818, Histoire Naturelle des Animaux sans Vertèbres **5**: 438.
Type species, *Fistulana personata* Lamarck, subsequent designation, Children 1823.
This genus of fossil Pholadidae is included here because it has often been included with the Teredinidae. It is quite similar in appearance but has dorsal plates and a callum. (See Plate 64 I.)

Teredinopsis Fuchs 1878, Denkschr. K. Akad. Wiss. Wien, Math.–Natur. Kl. **38**: 39.
Type species, *Teredinopsis problematica* Fuchs, monotypic. Is probably a synonym of *Uperotus* Guettard 1770.

teredo Müller, **Pholas**: 1776, Zoologiae Danicae Prodromus, p. 251 (Danmark).
Is *Teredo navalis* Linnaeus 1758.

teredo da Costa, **Serpula**: 1778, British Conchology, p. 21 (British Isles). Refers to Sellius, 1733, Historia Naturalis Teredinis.
Is *Teredo navalis* Linnaeus 1758.

Teredo Linnaeus 1758, Systema Naturae, ed. 10, p. 651; non Huebner 1809 [1813] [Lepidoptera].
Type species, *Teredo navalis* Linnaeus, subsequent designation, Children, 1822, as set by Opinion 94 (1926) of the International Commission on Zoological Nomenclature, Smithsonian Miscellaneous Collection **73** (4): 12, 13 (see Directions 72, 73).

teredoides Taki and Habe, **Kuphus (Coeloteredo)**: 1945, Venus **14**: 116 (Suzaki-tyo, Takaoka-gun, Kochi-ken, Japan); Taki and Habe [*in*] Okada, 1958, Damage and Method of Protection against Wood-boring Animals, published by Japanese Assoc. Adv. Sci., p. 62, pl. 4, fig. 21 [22] [as *Zopoteredo*].
All but the scientific names are in Japanese.
The type specimens of this species were not available for study, but on the basis of the brief description and rather poor figures it is probably *Teredo triangularis* Edmondson 1942. In their second reference (1958), Taki and Habe placed *teredoides* in *Zopoteredo,* the subgenus to which Edmondson referred *triangularis.*

Teredolites Leymerie 1841, Mém. Soc. Géol. France **4** (2): 341 [*nomen nudum*]; 1842, *ibid.* **5**: 2.
Type species, *Teredolites clavatus* Leymerie, monotypic.
This name was proposed, using the ending "lites" to indicate the fossil forms of *Teredo.*
Is close to *Uperotus* Guettard 1770.

Teredolithes 'Leymerie' Herrmannsen 1852, Indicis Generum Malacozoorum Suppl., p. 131.
Error for *Teredolites* Leymerie.

Teredolithus Bartsch 1930, Science (N.S.) **71**: 460.
A new collective group name in the Teredinidae for species which cannot be placed in a genus.

Teredops Bartsch 1921, Proc. Biol. Soc. Washington **34**: 26.
Type species, *Teredo diegensis* Bartsch, original designation.
Is *Lyrodus* Gould 1870.

Teredora Bartsch 1921, Proc. Biol. Soc. Washington **34**: 26.
Type species, *Teredo malleolus* Turton, original designation.

Teredothyra Bartsch 1921, Proc. Biol. Soc. Washington **34**: 26.
Type species, *Teredo* (*Teredothyra*) *dominicensis* Bartsch, original designation.

teredula Pallas, **Pholas**: 1788, Nova Acta Acad. Sci. Imperialis Petropolitanae **2**: 240, pl. 6, fig. 25 a-d (In littore maris germanici ad Belgium).
Has been included with the Teredinidae but is a *Xylophaga* (Pholadidae).

thielei Roch, **Bankia**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 275, pl. 2, fig. 8 (Vintano auf Sainte-Marie bei Madagaskar).
Lectotype, Berlin Mus.
(here selected). Plate 51 F
Moll (1941) considered this a synonym of *B. stutchburyi* (Blainville) [=*carinata* Gray], but an examination of the types shows this to be in error, as the periostracal border of the cones is wide and serrated. The type specimen is in such poor condition that it will probably never be possible to match good material with it.
Is possibly *Bankia rochi* Moll 1931.

thilei 'Roch' Moll, **Bankia**: 1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 204.
Error for *thielei* Roch.

thomsonii Tryon, **Teredo**: 1863, Proc. Acad. Nat. Sci. Philadelphia **15**: 280, pl. 2, figs. 3-5 (New Bedford, Massachusetts).
Lectotype, ANSP 50974 (here selected).
Paratypes, Copenhagen Mus.;
MCZ 212084. Plate 20 A
Is *Teredora malleolus* (Turton) 1822.

thoracites Gould, **Teredo**: 1856, Proc. Boston Soc. Nat. Hist. **6**: 15 (Tavoy, British Burmah).

Types, lost, according to Johnson, 1964, Bull. U.S. Natl. Mus. **239**: 159.

This is the type species of *Calobates* Gould 1862 [=*Bactronophorus* Tapparone-Canefri 1877]; non Kaup 1829.

Is *Bactronophorus thoracites* (Gould).

See also the following: *australis* Wright; *edulis* Sivickis; *filotcoi* Sivickis; *furcelloides* Gray; *subaustralis* Iredale.

tibialis Lamarck, **Fistulana**: 1806, Ann. Mus. Natl. Hist. Nat. (Paris) **12**: 428; 1808, *ibid.* **12**, pl. 43, fig. 8.

Is a *Clavagella* (Clavagellidae).

tibialis Morton, **Teredo**: 1833, Amer. Jour. Sci. **13**: 292, pl. 9, fig. 2 [fig. not published]; Morton, 1834, Synopsis of the Organic Remains of the Cretaceous Group of the U.S., Philadelphia, p. 68, pl. 9, fig. 2 (fossil, Cretaceous strata of New Jersey).

Types, ANSP.

Name based on a cluster of tubes only.

togoensis Roch, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 11, pl. 1, fig. 8 (Togo).

Lectotype, Berlin Mus.
(here selected). Plate 2 C

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

tondiensis Nair and Gurumani, **Teredo (Psiloteredo)**: 1956, Current Sci., Bangalore, India **25** (11): 361, text figs. 1-3 (from wooden piles, Port of Tondi, east coast of India, 9°44′N; 79° 2′E); 1957, Jour. Bombay Nat. Hist. Soc. **54**: 672, fig. 8.

Holotype, Zool. Surv. India, Calcutta M17448/3.

An examination of the type specimens showed this to be *Nototeredo edax* (Hedley) 1895.

Toredo May 1929, Zeitschr. Morph. Ökol. Tiere, Abt. A, **15**: 652.

Error for *Teredo* Linnaeus.

tortola 'Blainville' Laurent, **Teredo**: 1848, Dict. Univ. Hist. Nat. Paris **12**: 359.

Nomen nudum.

torulosa Stoliczka, **Teredo**: 1871, Palaeontologia Indica (6) **3**: 16, pl. 1, fig. 3 (fossil, Cretaceous, Ootatoor Group. In fossil wood at Moraviatoor, southern India).

Name based on shells and tubes only.

tournali Leymerie, **Teredo**: 1846, Mém. Soc. Géol. France (2) **1**: 360, pl. 14, figs. 1-4 (fossil, Marnes épicrétacées de Fontcouverte [Corbières]; Nummulites de l'Ariege; Conques [Montagne Noire] [France]).

Types, École des Mines, Paris. Plate 60 D

Is a *Bankia*.

townsendi Bartsch, **Teredo (Lyrodus)**: 1922, Bull. U.S. Natl. Mus. **122**: 26, pl. 22, fig. 2; pl. 33, fig. 2 (Shaw-Batcher Shipyard, south San Francisco, California).

Holotype, USNM 344665. Plate 3 B

Is young *T. diegensis* Bartsch 1916, according to Kofoid and Miller, 1927, p. 198 [=*Lyrodus pedicellatus* (Quatrefages) 1849].

triangularis Sivickis, **Bankia**: 1928, Philippine Jour. Sci. **37**: 286, pl. 1, fig. 1 (Cebu, Philippine Islands); non *Teredo triangularis* Edmondson 1942.

Holotype, Philippine Bur. Sci., destroyed during World War II.

Is *Nausitora dunlopei* Wright 1864.

triangularis Edmondson, **Teredo (Zopoteredo)**: 1942, Occ. Pap. B. P. Bishop Mus. **17** (10): 126, fig. 8a-b (Kahului, Maui, Hawaiian Islands).

Holotype, BPBM 104. Plate 9 A
Paratype, MCZ 228101.

See also *teredoides* Taki and Habe.

tristi Iredale, **Teredo (Pingoteredo)**: 1936, Queensland Forest Service Bull. No. 12, p. 35, pl. 1, figs. 10-15 (Sandgate, Moreton Bay, Brisbane, Australia).

Holotype, Australian Mus.

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

tritubulata Moll, **Teredo**: 1941, Sitzungsber. Ges. Naturforsch. Fr. Berlin 1941: 221, fig. 4b (Victoria in the Cameroons, Africa).

Holotype, Berlin Mus., not found. Plate 19 E

See also Rancurel, 1955, Bull. Inst. Franc. Afr. Noire **17** (4): 1145-1148, figs. 1-2.

Is young *Teredothyra excavata* (Jeffreys) 1860.

troscheli Troschel, **Teredo**: 1916, Handbuch der Holzkonservierung, Berlin, p. 211; Moll, 1941, Sitzungsber. Ges. Naturforsch. Fr. Berlin 1941: 170, 179 (Tsingtau [China]).

Nomen nudum. Troschel never described this species but Moll (1941) included the name in the synonymy of *T. navalis* Linnaeus. Though Moll states that the type specimen is in the Berlin Museum, and though he gives a type locality for the specimen, this does not validate the name.

trulliformis Miller, **Teredo**: 1924, Univ. California Publ. Zool. **26**: 150, pl. 11, figs. 31-34 (Honolulu Harbor [Oahu], Hawaiian Islands).

Holotype, CAS 1731. Plate 11 D, E
Paratypes, USNM; ANSP 134322.

Is *Teredo clappi* Bartsch 1923.

truncata Quatrefages, **Teredo**: 1849, Ann. Sci. Nat. Zool. (Paris) (3) **11**: 27 (mers d'Amboine).

Holotype, Paris Mus.

There is a single lot in the Paris Museum labeled *truncata* from Quoy and Gaimard, the original collectors of the species. The soft parts and the shell were in poor condition and the pallets had apparently disintegrated. Consequently *truncata* must be considered a *nomen dubium* as the original description is inadequate and subsequent authors did not add to it.

truncata Jeffreys, **Teredo pedicellata**: 1865, British Conchology **3**: 174 (British Isles).

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

tryoni Bartsch, **Teredo (Psiloteredo)**: 1922, Bull. U.S. Natl. Mus. **122**: 40, pl. 29, fig. 3; pl. 35, fig. 4 (Cedar Keys, Florida).

Holotype, USNM 36046a. Plate 28 C

Is *Nototeredo knoxi* (Bartsch) 1917.

tuberculata 'Serres' Moll, **Septaria**: 1942, Palaeontographica **94A**: 139.

Error for *tuberculosa* Serres.

tuberculosa Serres, **Septaria**: 1845, Actes Soc. Agricole Sci. Litt. des Pyrénées-Orientales **6** (2): 89 (fossil, Tertiaire, Luguano, Parme [Italy]).

Name based on tube only.

tubulus Bronn, **Teredinis**: 1848, Handbuch einer Geschichte der Natur **3**, Index palaeontologicus, p. 1135. Refers to Goldfuss, 1831, Petrefacta Germaniae **1**: 239, pl. 70, fig. 16; and Leymerie, 1842, Mém. Soc. Géol. France **5** (1): 2, pl. 2, fig. 2.

Name based on tubes only.

tubus vermicularis Bergius, **Teredo**: 1765, K. Svenska Vetenskapsakad. Handl. (Stockholm) **26**: 229 (Oceano Europaeo ad Angliam). Refers to Ellis, 1755, Essai d'Histoire Naturelle des Corallines, pl. 38, fig. 2.

Equals *Serpula vermicularis* Linnaeus, which was based on the same figure in Ellis, and is a polychaete worm. See D. Heppell, 1963, Bull. Zool. Nomencl. **20**: 443-446.

tumida Stinton, **Bankia (Neobankia)**: 1957, Proc. Malac. Soc. London **32**: 168, pl. 25, figs. 1-7 (fossil, Upper Eocene, Lower Barton Beds, Horizon A3, Highcliffe, Hampshire, England).

Holotype, BM(NH) L87321.

Is probably the same as *parisiensis* Deshayes 1860.

turneri Powell and Bartrum, **Bankia**: 1929, Trans. Proc. New Zealand Inst. **60**: 410, pl. 44, figs. 74-75 (fossil, Tertiary, Waitematan Oneroa, Waiheke Island, New Zealand).

Types, A. W. B. Powell collection, Auckland, New Zealand.

Name based on shells and pallets, but the latter were neither figured nor adequately described.

Turnus Gabb 1864, Geol. Surv. California, Paleont. **1** (4): 145.

Type species, *Turnus plenus* Gabb, monotypic. Genus described as in the Teredininae, forming a link with the Pholadinae.

Ungoteredo Bartsch 1927, Bull. U.S. Natl. Mus. **100** (2) pt. 5: 544.

Type species, *Teredo (Ungoteredo) matacotana* [*matocotana*] Bartsch, original designation.

Is *Teredothyra* Bartsch 1921.

unguiculata Roch, **Teredo**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 264, pl. 1, fig. 1 (San Diego-Suarez, Madagaskar).

Holotype, Berlin Mus., not found.

The figure published by Moll was poor and could not be copied. Is *Teredothyra matocotana* (Bartsch) 1927, according to Moll, 1941 (Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 172).

ungulata Stinton, **Teredo (Psiloteredo)**: 1957, Proc. Malac. Soc. London **32**: 170, pl. 25, figs. 8-14 (fossil, Upper Eocene, Middle Barton Beds, Horizon F, Barton, Hampshire, England).

Holotype, BM(NH) L87328.

Is probably a *Teredora*, possibly a young *duplicata* Stinton.

Uperotis 'Guettard' H. and A. Adams 1856, The Genera of Recent Mollusca **2**: 333, 659.

Error for *Uperotus* Guettard.

Uperotus Guettard 1770, Mémoires sur Différentes Parties des Sciences et Arts, Paris **3**: 126, pl. 70, figs. 6-9.

Type species, *Teredo clava* Gmelin, subsequent designation, Lamy 1927.

There has been confusion concerning this genus. Iredale (1936, Destruction of Timber by Marine Organisms in the Port of Brisbane, p. 42), believing that the name *Uperotus* might not be available, instituted a new name, *Glumebra*. This was unnecessary. Though Guettard did not mention a species name at the time he instituted the genus *Uperotus*, his description and figures leave no doubt that the species was *T. clava* Gmelin.

According to the 1961 edition of the International Code of Zoological Nomenclature, Article 16, sections 7 and 8, a new genus name published before 1931 is valid if it was introduced in connection with an illustration or description. Therefore, there appears to be no difficulty in the use of the name *Uperotus* Guettard.

Further confusion was caused in the early days by the misidentification of *Teredo clava* Gmelin and species of *Fistulana*, particularly *Fistulana clava* Lamarck. For a discussion of the problems in *Fistulana* see Iredale (1915, Proc. Malac. Soc. London **11**: 296).

Fischer (1887, Manuel de Conchyliologie, p. 1139) used the name *Hyperotus*, an emendation for *Uperotus* Guettard, which was introduced by Herrmannsen in 1847.

utriculus Gmelin, **Teredo**: 1791, Systema Naturae, ed. 13, **1**: 3748 (no locality given other than "intra lignum"). Refers to Kämmerer, 1786, Die Conchylien im Cabinette des Herrn Erbprinzen von Schwarzburg-Rudolstadt, p. 7, pl. 1. The plate to which Gmelin referred shows a cluster of teredo tubes such as is left when a badly infested piece of wood erodes away.

Type, not seen.

The holotype specimen of *utriculus* cannot be found. Gmelin probably based the name solely on the figure of Kämmerer. Though the figure is "well executed" as Hanley (1885, Ann. Mag. Nat. Hist. (5) **16**: 25) points out, it does not show the characters which could positively identify the genus of shipworm responsible for the tubes, much less the species. Therefore regardless of subsequent descriptions and remarks, *utriculus* Gmelin must remain a *nomen dubium*.

utriculus 'Gmelin' Hanley, **Teredo**: 1882, Jour. Linn. Soc. London **16**: 541, pl. 12, figs. 9-12 (plate caption and figures only. No locality is given); Hanley, 1885, Ann. Mag. Nat. Hist. (5) **16**: 25 (Cannes, France, from the wreck of a submerged Italian ship).

Holotype, BM(NH). Plate 24 E

In 1885 Hanley stated that "Until lately this ancient species, founded upon a well-executed drawing in Kämmerer (Conch. Cab. Rudolst. t. 1), was omitted, or neglected, in our lists of sea-shells." He also stated that the name had been cited as a synonym of *T. norvagicus* Spengler, but that, from the material he had found at Cannes, there appeared to be differences and these he briefly described. These remarks, together with the figures published in 1882, certainly establish the species, but the credit should go to Hanley rather than Gmelin. (See comments under *T. utriculus* Gmelin.)

Following Hanley, Roch 1931, Arch. Zool. (Stockholm) **22A**: 9, pl. 1, fig. 1, and Moll and Roch 1931 (Proc. Malac. Soc. London **19**: 203, fig. 2 and pl. 22, fig. 2) restricted *T. utriculus* to southern Europe and the Mediterranean and gave an extended 'synonymy' as well as a description of the species. In 1940 Roch (Thalassia **4** (3): 43-61, pls. 3-4) discussed the species in great detail. Moll (1941, Sitzungsber. Ges. Naturforsch. Fr., Berlin 1941: 190) stated that the type of *T. utriculus* Gmelin could not be found and that a neotype was in the Berlin Museum. However he did not figure it, nor was the locality cited. I was unable to locate a specimen so marked in the series of *utriculus* in the Berlin Museum.

The earliest well-defined name used for this species in the Mediterranean is *Teredo bruguierii* Delle Chiaje 1830. Should the southern European-Mediterranean form prove to be distinct from *norvagica* Spengler 1792, this is the name which should be used. Moll (1952, Inst. Franc. Afr. Noire, Cat. 8: 102) stated: "In the southern regions we see the species *T. utriculus*, which Roch thinks to be a good species, but which I believe identical with *T. norvegica* [*sic*]." My recent studies indicate that Moll's interpretation is probably correct. See Plate 24, which illustrates specimens from localities throughout the range of the species.

Is *Nototeredo norvagica* (Spengler) 1792.

valparaisensis Moll, **Bankia**: 1935, Sitzungsber. Akad. Wiss. Wien **144**: 273, pl. 2, fig. 3 (Valparaiso, Chile).

Holotype, Berlin Mus. Plate 48 D

Is *Bankia martensi* (Stempell) 1899.

varennensis Buvignier, **Teredo**: 1852, Statistique Géologique, Minéralogique, Minérallurgique, et Paléontologique du Département de la Meuse (Paris), p. 521, Atlas, p. 6, pl. 6, figs. 40-48 (fossil [Middle Cretaceous], dans les bois fossiles du Gault, sables verts, Varennes, Grandpre. France).

Name based on shells and tubes. Is probably a *Teredina* (Pholadidae).

variegata Sivickis, **Teredo**: 1928, Philippine Jour. Sci. **37**: 291, pl. 2, fig. 10 (Cebu, Philippine Islands).

Holotype, Philippine Bur. Sci., Manila, destroyed in World War II. Plate 34 C

Is a small specimen of *Spathoteredo obtusa* (Sivickis) 1928.

vastitas Etheridge, **Teredo**: 1902, Rec. Australian Mus. **4**: 201, pls. 34, 35 (fossil, Cretaceous, Rolling Downs Formation, Queensland, Australia).

Types, Australian Mus.

This name is based on tubes only.

vastitus 'Etheridge' Dun, **Teredo**: 1903, Geol. Zentralblatt **3**: 185.

Error for *T. vastitas* Etheridge.

vattanansis Nair and Gurumani, **Teredo (Teredora)**: 1957, Ann. Mag. Nat. Hist. (12) **10**: 174, figs. 1, 2 (from log washed ashore near Tondi [Vattãnam, Ramnad Dist.], East Coast, South India).

Holotype, Zool. Surv. India, Calcutta M17436/3. Plate 23 G

An examination of the holotype has shown that *T. rehderi* Nair (1956) and *vattanansis* refer to the young and adult forms of the same species. The name *rehderi* was the first to be introduced and, though referring to the young stage, is the name which must be used. It is probably an ecologic, wood-boring form of *Uperotus clavus* (Gmelin).

vermicularis Bergius, **Teredo**: 1765, K. Svenska Vetenskapsakad. Handl. (Stockholm) **26**: 229 (Oceano Europaeo ad Angliam).

Bergius refers to Ellis, 1736 (Essai Hist. Nat. de Corallines pl. 38, fig. 2). The figure is definitely not of a teredinid but probably some tube worm.

vermicularis Deshayes, **Teredo**: 1860, Description des Animaux sans Vertèbres Découverts dans le Bassin de Paris **1**: 117, pl. 3, figs. 5, 6 (fossil, Eocene, Auvers, Sables-moyens, Bassin de Paris, France).

Name based on a mass of tubes only.

verneuilli Moll, **Teredo**: 1941, Fossilium Catalogus I: Animalia pars 95, p. 49 [*nomen nudum*]; 1942, Palaeontographica **94A**: 143, pl. 24, fig. 47 (fossil, aus dem Pariser Becken).

Types, École des Mines, Paris.

Name based on shells only.

vincentensis Bartsch, **Teredo (Teredora)**: 1922, Bull. U.S. Natl. Mus. **122**: 35, pl. 27, figs. 1, 2 (St. Vincent, [Lesser Antilles] West Indies).

Holotype, USNM 17622. Plate 20 C

Nomen dubium. Name based on shell only.

virginiana Clark, **Teredo**: 1895, Johns Hopkins Univ. Circular **15**: 5 (fossil, Eocene, many places in Maryland and Virginia); 1896, Bull. U.S. Geol. Surv. No. 141, p. 72, pl. 15, fig. 5a-c (Woodstock, Potomac Creek, Evergreen, Virginia; Clifton Beach, Maryland).

Syntypes, USNM, according to Palmer, 1965, Bull. Amer. Paleont. **48** (218): 316.

Name based on tube fragments only.

voracissima Müller, **Gastrochaena**: 1851, Monographie der Petrefacten der Aachener Kreideformation, Abt. **2**: 62 (fossil, Kreideformation, im versteinerten Holze und in Conglomeraten des Aachener Waldes [Germany]). Refers to Geinitz, 1839-42, Charakteristik der Schichten und Petrefacten des sächsisch-böhmischen Kreidegebirges, pl. 6, figs. 2, 3 (tubes in fossilized wood) and d'Orbigny, 1843, Paléontologie Française, Terrains Crétacés **3**: 302, pl. 348, figs. 1, 2 (tubes only under the name of *Teredo argonnensis* Buvignier).

Name based on tubes only. Holzapfel, 1889 (Palaeontographica **35**: 142, pl. 8, figs. 4-7, pl. 12, fig. 16) under the name of *Teredo voracissima* Müller described and figured shells and tubes from Aachen which are similar to *T. argonnensis* and appear to belong in the genus *Turnus* (Pholadidae).

vulgaris Lamarck, **Teredo**: 1801, Système des Animaux sans Vertèbres, p. 128.

A substitute name for *Teredo navalis* Linnaeus 1758.

Xylotria 'Gray' Deshayes 1860, Description des Animaux sans Vertèbres Découverts dans le Bassin de Paris **1**: 144.

Emendation for *Xylotrya* Gray.

Xylotrya 'Leach' Gray 1847, Proc. Zool. Soc. London, p. 188; non Gray 1842; non Menke 1830 (Pholadidae).

Type species, *Teredo* [=*Bankia*] *bipalmulata* Lamarck, monotypic.

yakushimae Habe, **Psiloterdo (Phylloteredo)**: 1952, Genera of Japanese Shells, Pelecypoda No. 3: 252, fig. 677 (no locality given [?Yaku Shima, Japan—based on specific name]).

Is probably *Nototeredo edax* (Hedley) 1895.

yatsui Moll, **Teredo**: 1929, Mitt. Zool. Staatsinst. Zool. Mus. Hamburg **44**: 10, pl. 2, fig. 5 (Japan).

Lectotype, Berlin Mus.
(here selected). Plate 4 B

Is *Lyrodus pedicellatus* (Quatrefages) 1849.

Zachsia Bulatoff and Rjabtschikoff 1933, Zool. Anz. **104**: 166.

Type species, *Zachsia zenkewitschi* Bulatoff and Rjabtschikoff, subsequent designation, Habe, 1952, Genera of Japanese Shells, Pelecypoda No. 3, p. 255.

zenkewitschi Bulatoff and Rjabtschikoff, **Zachsia**: 1933, Zool. Anz. **104**: 170, figs. 1, 3-5, 7-10 (Vladivostok, USSR, in den Wurzeln von [roots of living] *Phylospadix ruprechti* [Najadaceae]); Roch, 1934, Zool. Zhur. **13** (3): 446, pl. 2, fig. 3 [in Russian].

Holotype, Zool. Mus., Moscow State Univ.

The pallets measured only 1.2 mm to 1.5 mm and appear to be stenomorphic forms growing in small roots. *Zachsia lignaui* Bulatoff and Rjabtschikoff, which is a *nomen dubium* because only shells were known, came from the same locality and is probably the same species.

zeteki Bartsch, **Bankia (Neobankia)**: 1921, Proc. Biol. Soc. Washington **34**: 26 (in greenheart timber, Canal Locks at Balboa, Canal Zone, Panama).

Holotype, USNM 34128. Plates 49, 50 A

Zopoteredo Bartsch 1923, Proc. Biol. Soc. Washington **36**: 96.

Type species, *Teredo* (*Zopoteredo*) *clappi* Bartsch, original designation.

The Plates

All of the original figures on the 64 plates were drawn by the author from the specimens with the aid of a camera lucida. Three professional artists aided in inking some of the illustrations and this help is acknowledged in the Introduction. In a few cases, when it was impossible to study the types, copies were made of the original figures and this is indicated in the plate captions. Additional specimens are sometimes illustrated to show the variation within the species and to give evidence as to why some names are considered synonyms.

The majority of figures have been grouped so that synonymous and closely related species are on the same or adjacent plates. Though some forms which are considered synonyms may look quite different, it must be remembered that in most cases only type specimens are illustrated. For some species, such as *Lyrodus pedicellatus,* literally hundreds of specimens were examined before the various names were placed in synonymy. Many of the factors considered when deciding on the validity of a named form are explained in Part I. Additional notes concerning the species are often given in the Catalogue and this should be consulted when using the plates for determining species.

The names given for the type specimens in the plate captions are those under which the species were described. If the species was also placed in a subgenus this is indicated in the Catalogue, but not on the plate caption.

The type localities are given as published in the Catalogue but have been translated into English and occasionally abbreviated in the captions.

The scale of magnifications is given for each figure. Usually all figures for one lot are drawn to the same scale, but if not, the scale is so placed that it is clearly evident to which figure it refers. Though not indicated by connecting lines or in the plate caption, the figures of the outer and inner faces of the same pallet can be readily recognized by the shape. They are always drawn to the same scale.

PLATE 1

A. *Teredo pedicellatus* Quatrefages — San Sebastian, Spain

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 6. Outer faces of pallet.
Figs. 4 and 7. Inner faces of pallet.
Fig. 5. Side view of pallet.

All figures are of a specimen in the Quatrefages collection in the Muséum National d'Histoire Naturelle, Paris, no. 62. The specimen has a medium to dark golden brown periostracum. This is probably the specimen which Moll selected as a neotype.
See notes under *pedicellatus*.

B. *Teredo floridana* Bartsch — Tampa, Florida

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Side view of pallet.
Fig. 5. Inner face of pallet.

The pallets of the holotype have apparently been lost, so Figures 3-5 have been copied from Bartsch 1922, pl. 34, fig. 1.

C. *Teredo siamensis* Bartsch — Singora, Siam

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.

All figures are of the holotype, USNM 363159. The periostracum covering the distal portion of the pallet is a dark mahogany brown. The broken pallet (Figs. 3 and 4) shows the extension of the calcareous portion beneath the periostracal cap.

D. *Lyrodus pedicellatus* (Quatrefages) — British Isles

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Side view of pallet.

This is the specimen figured by Jeffreys in British Conchology **5**, pl. 54, fig. 3, and is now in the United States National Museum, no. 194280. The distal half of the pallet is covered with a dark brown periostracum and the bubble-like cavity is filled with a granular calcareous material.

E. *Lyrodus pedicellatus* (Quatrefages) — from test board, Shoreham, England

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.

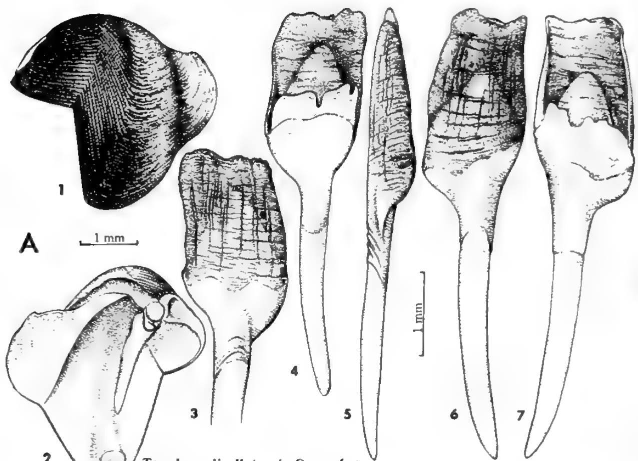
A young specimen as seen with transmitted light, showing the extent to which the periostracal cap covers the calcareous base and the beginning of the bubble-like cavity in the periostracal cap (MCZ 299769).

F. *Teredo hawaiensis* [*sic*] Dall, Bartsch and Rehder — *Albatross* sta. 3810, off Oahu, Hawaii

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Side view of pallet.

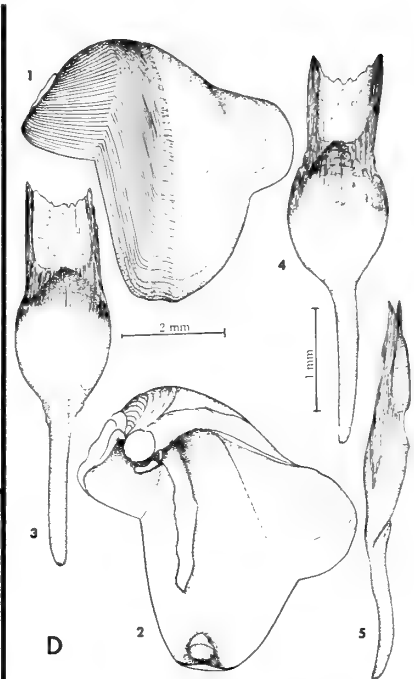
All figures are of the holotype, USNM 335077. According to the original description, only a single pallet was found and it has apparently been lost, for it was not in the vial with the shells at the time I saw it. Figures 3-5, therefore, have been copied from Dall, Bartsch and Rehder, 1938, p. 213, pl. 55, fig. 7. The type material was taken from a dredged palm log (29 shells and only a single pallet) and it is quite possible that the shells and pallet of the "holotype" did not come from the same specimen.

All of the species figured on this plate are now considered *Lyrodus pedicellatus* (Quatrefages).



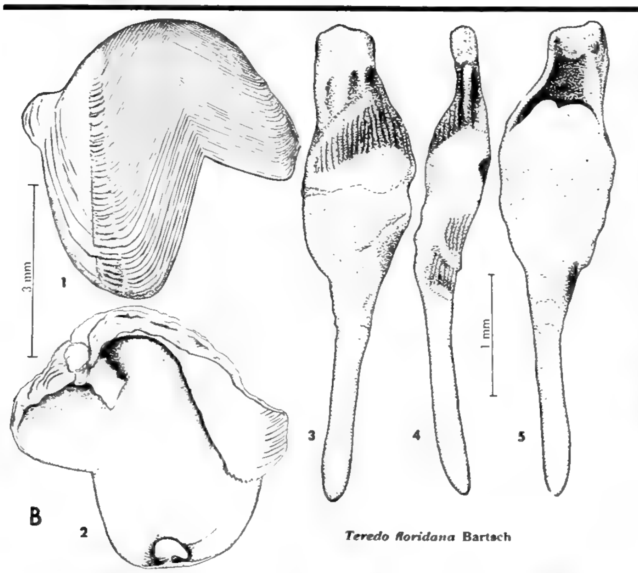
A

Teredo pedicellatus de Quatrefages



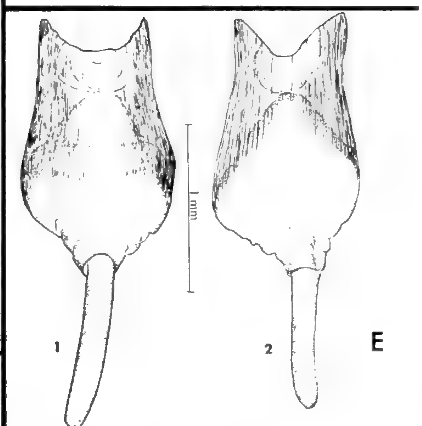
D

Lyrodus pedicellatus de Quatrefages

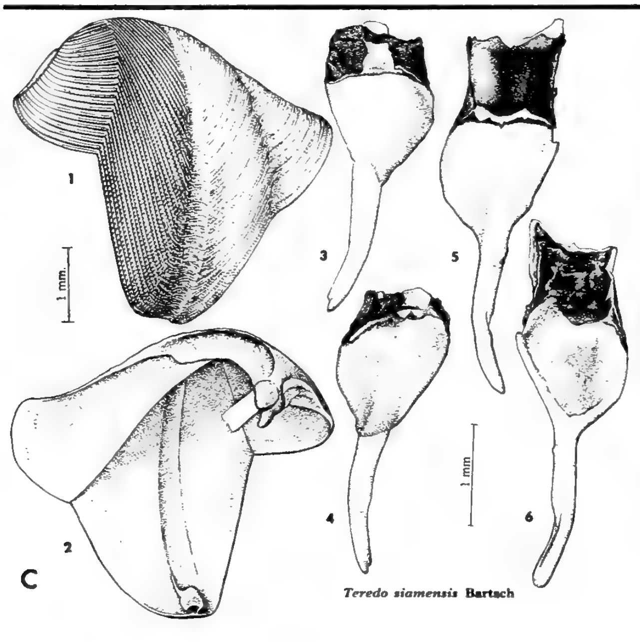


B

Teredo floridana Bartsch

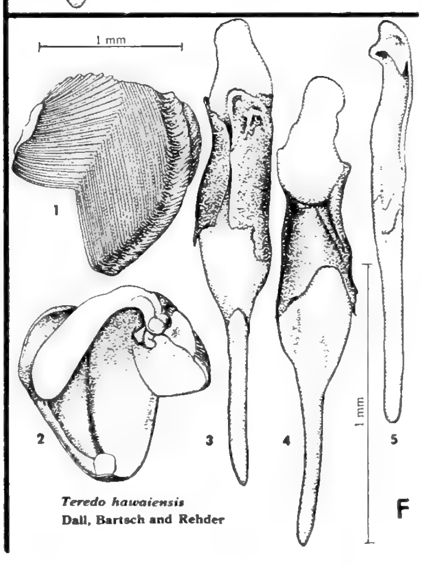


E



C

Teredo siamensis Bartsch



F

Teredo hawaiensis Dall, Bartsch and Rehder

PLATE 2

A. *Teredo dagmarae* Roch — Brazil
Figs. 1, 3, 5 and 7. Outer faces of pallets.
Figs. 2, 4, 6 and 8. Inner faces of pallets.

All figures are of paratypes, Berlin Museum. There were no shells in the paratype lot. The periostracum is a dark red-brown to nearly black.

B. *Teredo lomensis* Roch — Togo
Fig. 1. Inner face of pallet.
Fig. 2. Outer face of pallet.

Both figures are of the holotype, Berlin Museum. Shells unknown. The heavy periostracum covering the pallets is dark brown and exfoliating.

C. *Teredo togoensis* Roch — Togo
Figs. 1 and 6. Side views of pallets.
Figs. 2 and 4. Outer faces of pallets.
Figs. 3 and 5. Inner faces of pallets.

All figures are of the lectotype, Berlin Museum. Shells unknown. Periostracal cap a dark brown; the distal end of the pallet has a whitish, calcareous deposit.

D. *Teredo lamyi* Roch — Naples, Italy
Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.

Both figures are of the broken pallet of the holotype, figured in the original description, now in the Berlin Museum. The other pallet and the shells were apparently in the Hamburg Museum and were destroyed in World War II. Periostracum dark brown to nearly black, heavy, and peeling off at the junction of the periostracal cap with the calcareous base.

E. *Teredo helleniusi* Moll — Ismailia, Egypt
Figs. 1 and 3. Outer faces of pallets.
Figs. 2 and 4. Inner faces of pallets.

Figures 1-2 are of the lectotype and 3-4 a paratype, all Berlin Museum. The large number of miscellaneous valves in the type lot did not appear to belong with the pallets. Consequently one was not figured. The periostracum covering the distal half of the pallets was heavy and nearly black in color.

F. *Teredo franziusi* Roch — Mediterranean Sea
Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.

Both figures are of the lectotype, Berlin Museum. The periostracum is a dark golden brown. The shells could not be found in the Berlin collection, though there was a picture of one of the valves. Part of the type lot was probably left in the Hamburg Museum and was destroyed in World War II.

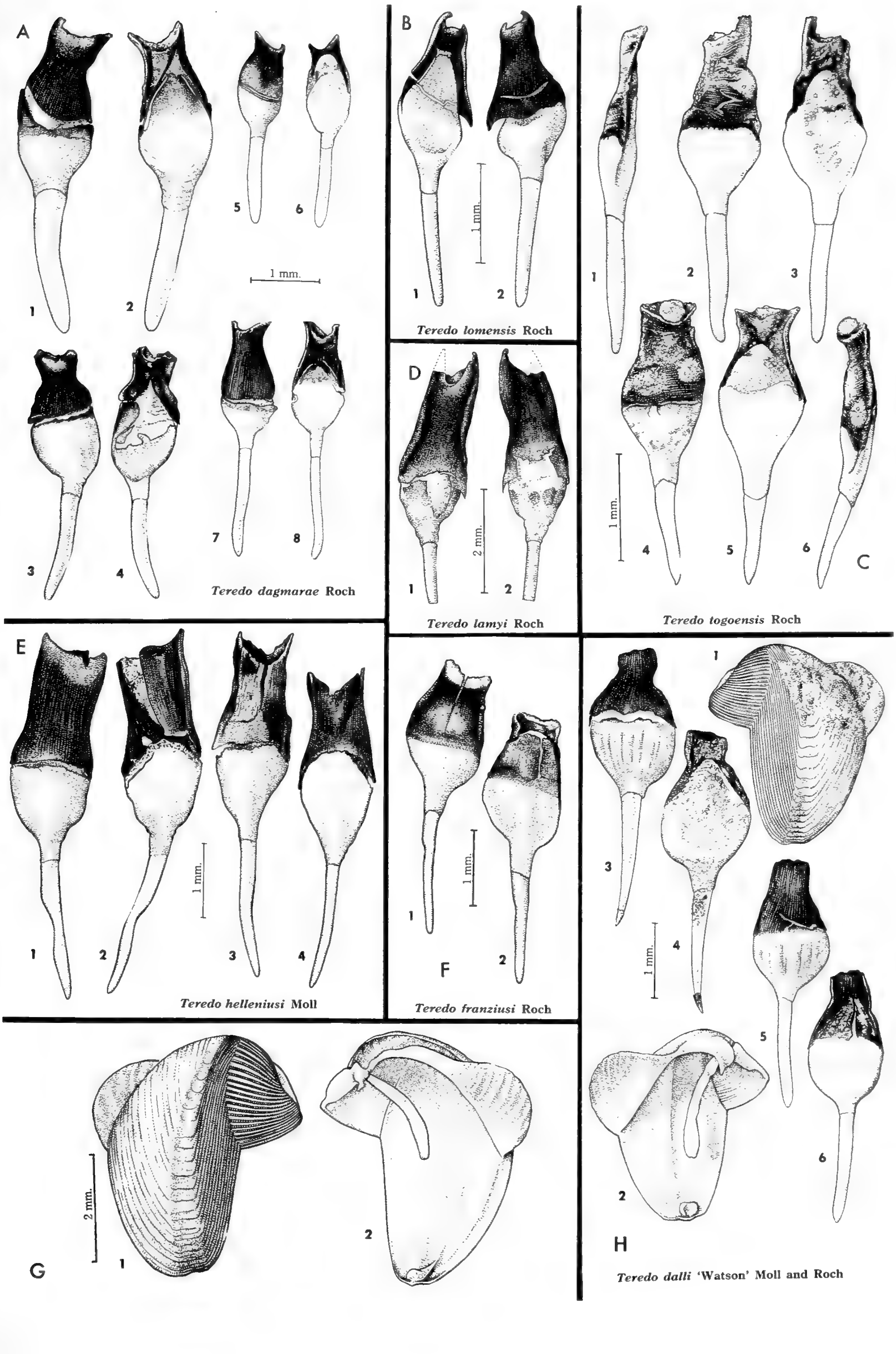
G. *Teredo dallii* Watson — southeastern coast of Madeira
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.

Both figures are of the holotype, BM(NH) from J. R. le B. Tomlin. The pallets are unknown; therefore this is a *nomen dubium.*

H. *Teredo dalli* 'Watson' Moll and Roch — Madeira
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.

All figures are of the holotype, Berlin Museum. Watson's *dallii* is a *nomen dubium* as the pallets were unknown. The neotype which Moll and Roch selected for *dallii* Watson is in reality the holotype of *dalli* Moll and Roch, *non* Watson.

All of the species figured on this plate are now synonymized with *Lyrodus pedicellatus* (Quatrefages).



A. *Teredo dagmarae* Roch

B. *Teredo lomensis* Roch

C. *Teredo togoensis* Roch

D. *Teredo lamyi* Roch

E. *Teredo helleniusi* Moll

F. *Teredo franziusi* Roch

H. *Teredo dalli* 'Watson' Moll and Roch

PLATE 3

A. *Teredo diegensis* Bartsch — San Diego, California

Figs. 1 and 4. Outer faces of pallets.
Figs. 2 and 5. Inner faces of pallets.
Fig. 3. Side view of pallet.
Fig. 6. Inner view of shell.
Fig. 7. Outer view of shell.

All figures are of the holotype, USNM 74219. The holotype is dry and the dark mahogany periostracum is peeling and flaking from the pallets. The distal end of the pallets is filled with a granulated calcareous deposit.

B. *Teredo townsendi* Bartsch — Shaw-Batcher Shipyard, San Francisco, California

Fig. 1. Inner view of shell.
Fig. 2. Outer view of shell.
Fig. 3. Side view of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Outer face of pallet.

All figures are of the holotype, USNM 344665. This is a young specimen. The periostracal cap covering the distal half of the pallets is a golden brown darkening toward the tip. There is no definite line between the periostracal cap and the calcareous base.

C. *Teredo pertingens* Iredale — Pyrmont, Port Jackson, New South Wales, Australia

Fig. 1. Outer view of shell.
Fig. 2. Outer face of pallet.
Fig. 3. Inner face of pallet.

All figures are of a paratype, MCZ 168009. The shell was too fragile to remove from the animal so that the inner surface could not be figured. The distal half of the pallet is covered with a dark mahogany colored periostracal cap, the end of which is filled with a granular deposit. Drawn as seen with transmitted light.

D. *Teredo calmani* Roch — Port Lincoln, South Australia

Figs. 1 and 3. Outer faces of pallets.
Figs. 2 and 4. Inner faces of pallets.

All figures are of the holotype, Berlin Museum. The pallets are from a young specimen and have a thin, straw colored periostracum.

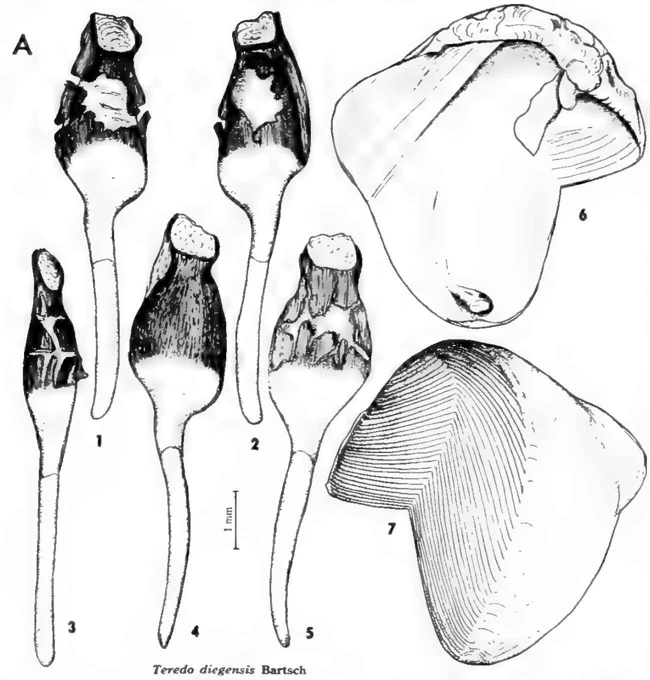
E. *Teredo nodosa* Roch — Naples, Italy

Figs. 1 and 3. Outer faces of pallets.
Figs. 2 and 4. Inner faces of pallets.
Fig. 5. Inner view of shell.
Fig. 6. Outer view of shell.

All figures are of the holotype, Berlin Museum. The periostracal caps covering the distal half of the pallets are very thick and black. This is an old, deformed specimen.

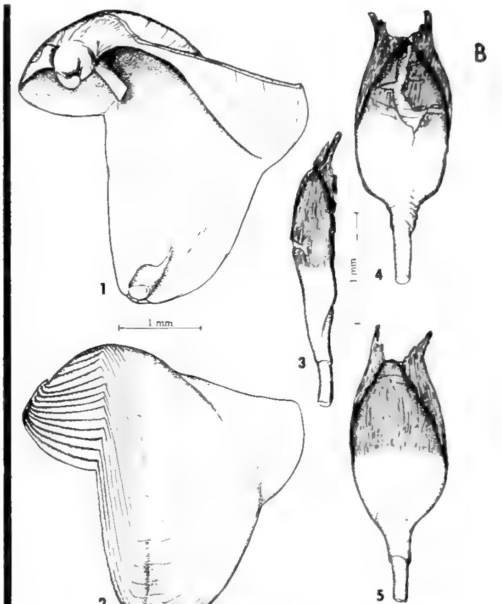
All of the species figured on this plate are now synonymized with *Lyrodus pedicellatus* (Quatrefages).

A



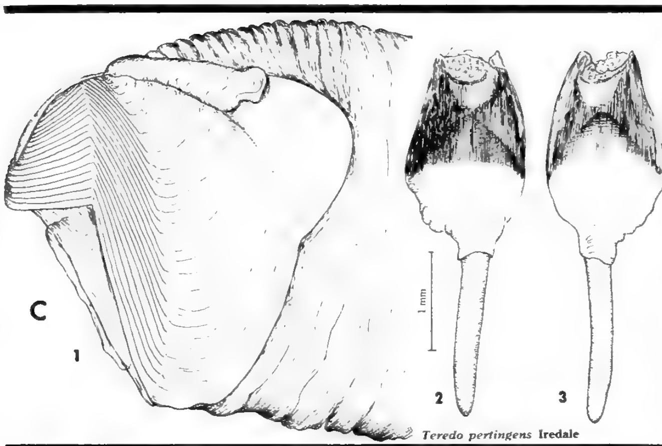
Teredo diegensis Bartsch

B



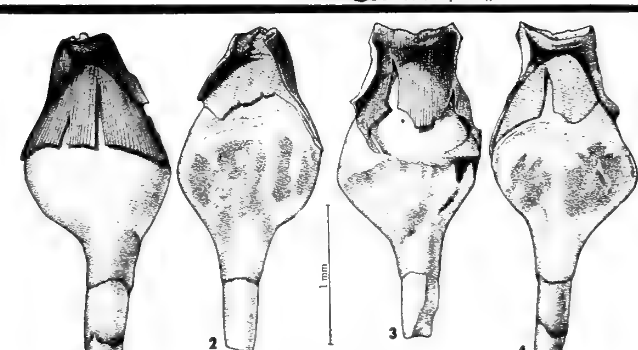
Teredo townsendi Bartsch

C



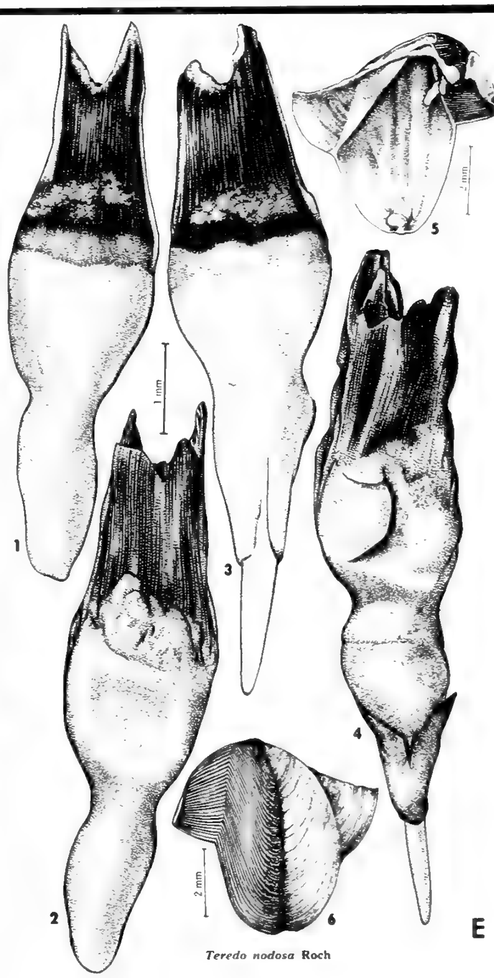
Teredo pertingens Iredale

D



Teredo calmani Roch

E



Teredo nodosa Roch

PLATE 4

A. *Teredo pochhammeri* Moll — Colombo, Ceylon

Figs. 1 and 5. Outer faces of pallets.
Figs. 2 and 6. Inner faces of pallets.
Fig. 3. Inner view of shell.
Fig. 4. Outer view of shell.

Figures 1-2 are of a paratype and 3-6 the lectotype, all Berlin Museum. The pallets have a heavy dark brown periostracal cap which in the paratypes has become detached from the calcareous base. The specimens were dry and deteriorated.

B. *Teredo yatsui* Moll — Japan

Figs. 1 and 2. Inner faces of pallets.
Figs. 3 and 4. Outer faces of pallets.

Figures 1 and 3 are of the lectotype and 2 and 4 a paratype, all Berlin Museum. Shells unknown. This is a very large specimen with dark red-brown to nearly black periostracum. The pallets, though dry, are in fairly good condition, the periostracum only slightly peeling.

C. *Teredo robsoni* Roch — Simonstown, South Africa

Fig. 1. Inner face of pallet.
Fig. 2. Outer face of pallet.

Both figures are of the holotype, Berlin Museum. The periostracum is dark brown and peeling in patches, exposing the irregular calcareous deposit at the distal end.

D. *Teredo samoaensis* Miller — Tutuila, Samoa

Figs. 1 and 5. Outer faces of pallets.
Figs. 2 and 6. Inner faces of pallets.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

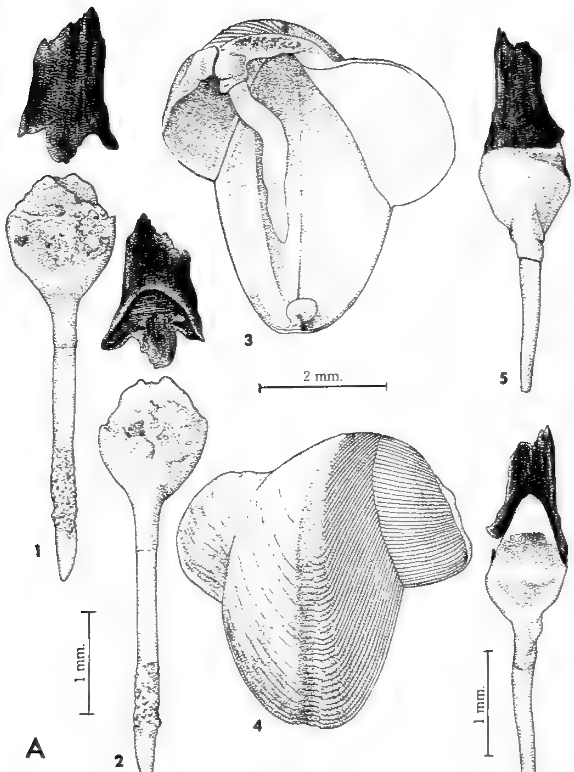
All figures are of the holotype, CAS 1730. The distal half of the blade of the pallet is covered by a golden to dark brown periostracum which is dried and peeling, showing the heavy calcareous base beneath.

E. *Teredo linaoana* Bartsch — *Albatross* sta. 5252, off Linao Point, Mindanao, Philippine Ids.

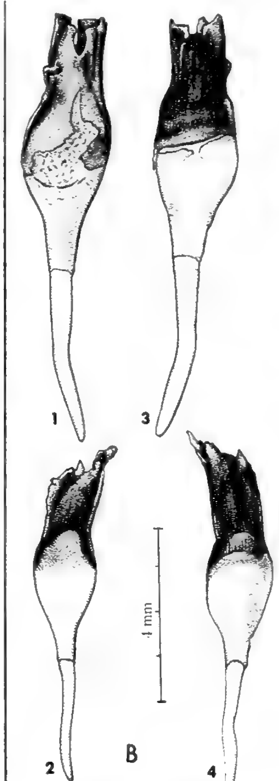
Figs. 1 and 5. Outer faces of pallets.
Figs. 2 and 6. Inner faces of pallets.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.
Fig. 7. Side view of opposed pallets.

All figures are of the holotype, USNM 312917. Both shell and pallets are badly deteriorated. The pallets have a dark golden brown periostracum and a white granular deposit on the distal end.

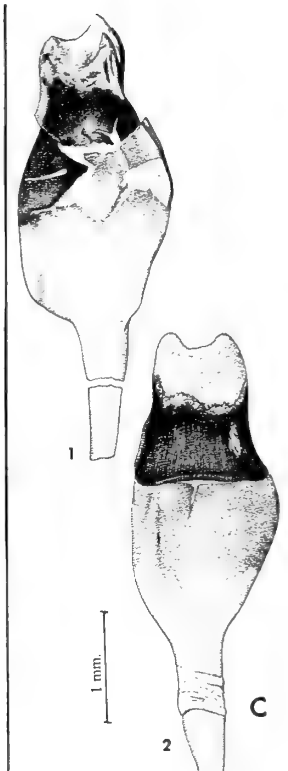
All of the species figured on this plate are now synonymized with *Lyrodus pedicellatus* (Quatrefages).



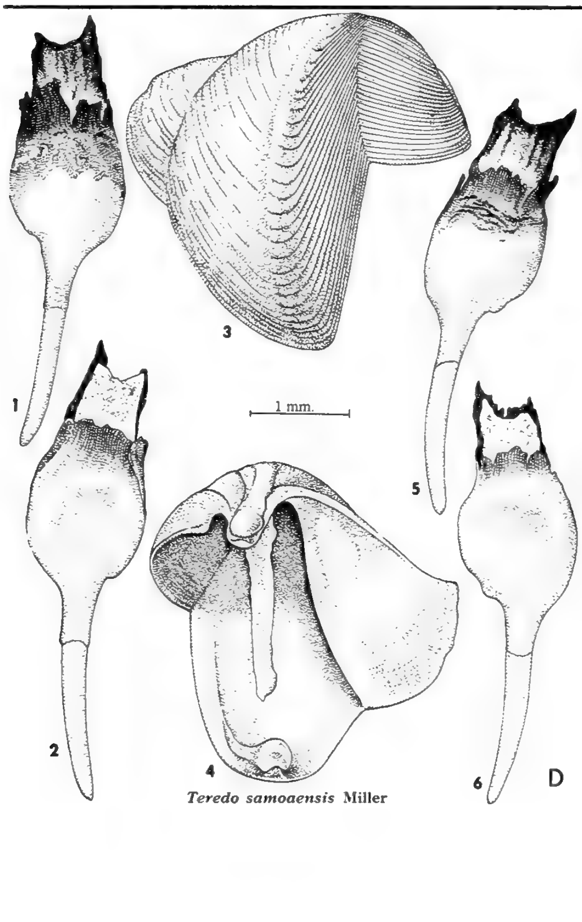
Teredo pochhammeri Moll



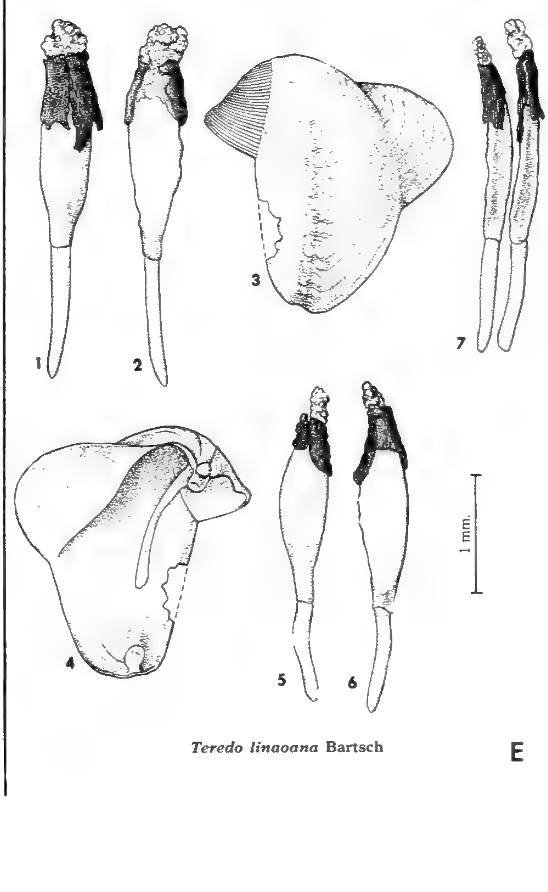
Teredo yatsui Moll



Teredo robsoni Roch



Teredo samoaensis Miller



Teredo linaoana Bartsch

PLATE 5

A. *Teredo arabica* Roch — Port Aden

Fig. 1. Pallet, with periostracal cap removed to show calcareous base.
Fig. 2. Inner face of pallet.
Figs. 3, 4 and 5. Outer faces of pallets.

Figures 1, 4, 5 are of paratypes and 2-3 of the lectotype. Specimens selected from the type lot in the Berlin Museum to show range of shape. It was impossible to match any specimen with the published figures of Roch, so a lectotype was selected from this series. The periostracum is rather thick, a deep golden brown to dark mahogany in color and longitudinally striated. The specimens are dry and deteriorating.

B. *Teredo malaccana* Roch — Singapore

Figs. 1 and 3. Outer faces of pallets.
Figs. 2 and 4. Inner faces of pallets.

Figures 1-2 are of the holotype and 3-4 a paratype, all Berlin Museum. Periostracum heavy, dark brown to nearly black and striated, much thinner and lighter in color on the inner face than on the outer face. The specimens were dry and deteriorating.

C. *Teredo diegensis midwayensis* Edmondson — Midway Id.

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Inner view of shell.
Fig. 4. Outer view of shell.

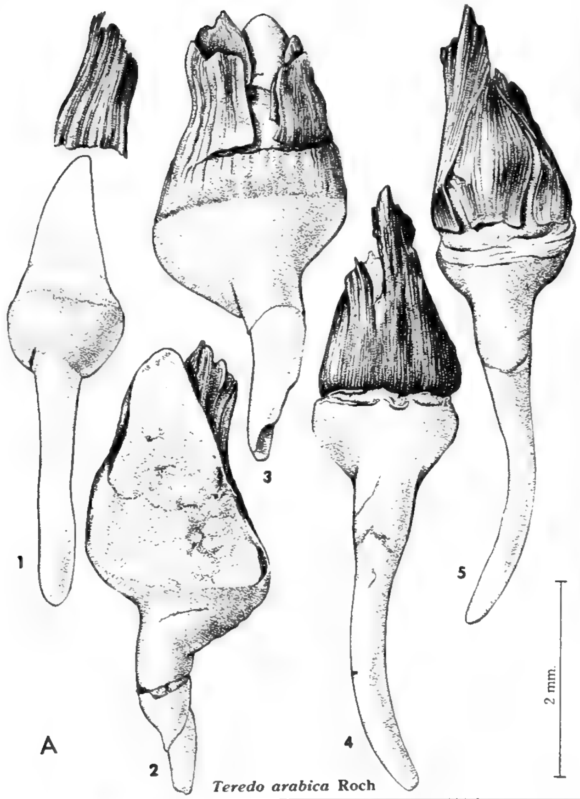
All figures are of the holotype, BPBM 103. Periostracum heavy, dark brown to nearly black in color, thinner and lighter on the inner surface. The distal end of the pallet is filled with a gray-white deposit.

D. *Teredo honoluluensis* Edmondson — from test block, Honolulu Harbor, Oahu, Hawaii

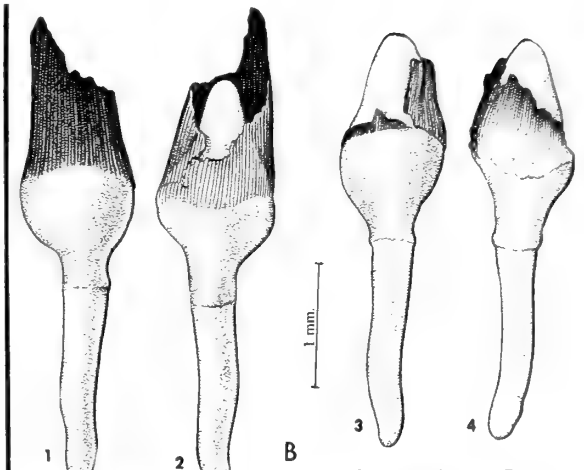
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.

All figures are of the holotype, BPBM 101. Periostracum ragged, a dark golden brown in color and greatly worn.

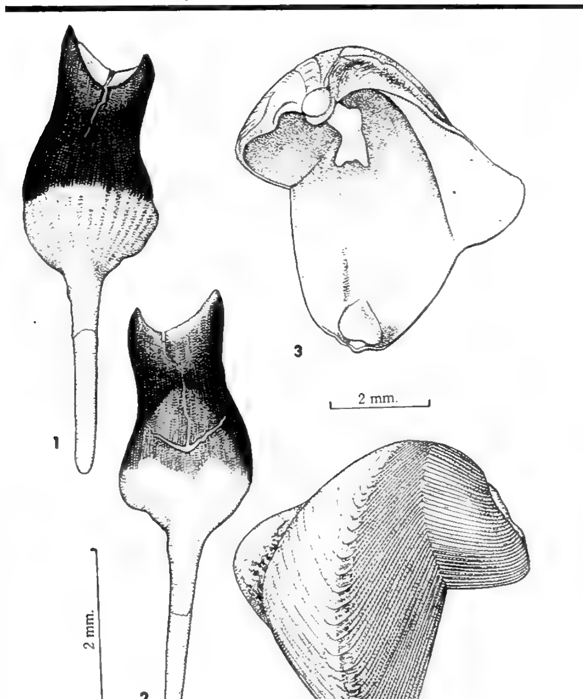
All of the species figured on this plate are now synonymized with *Lyrodus pedicellatus* (Quatrefages).



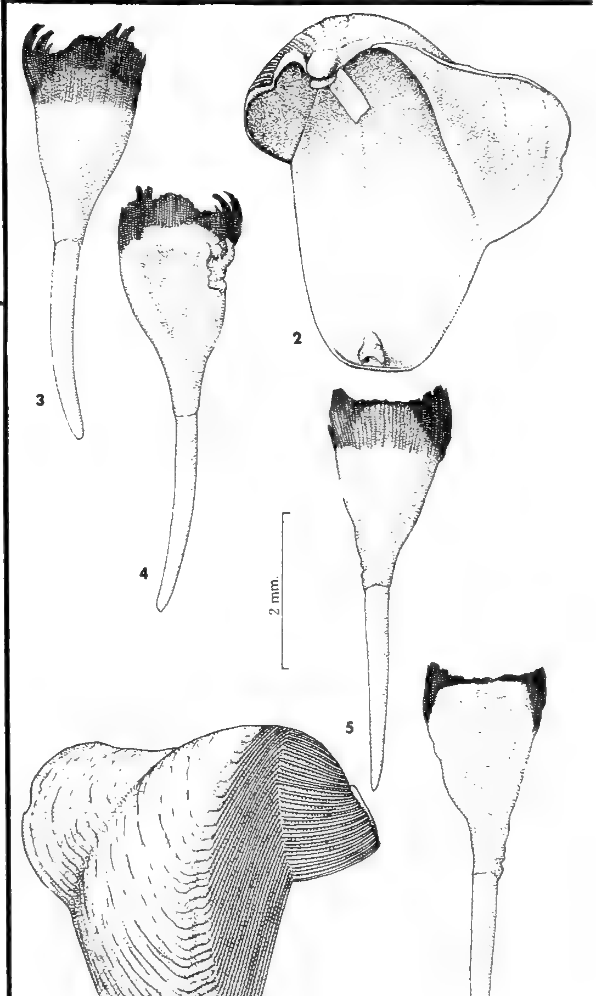
Teredo arabica Roch



Teredo malaccana Roch



Teredo diegensis midwayensis Edmondson



Teredo honoluluensis Edmondson

PLATE 6

A. *Teredo bipartita* Jeffreys — from driftwood, Guernsey, England

Fig. 1. Inner view of shell.
Fig. 2. Outer view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the lectotype, USNM 194268. Jeffreys did not figure this species, but his descriptive remarks, ''pallets resembling those of *T. pedicellata,* but longitudinally divided into two equal parts by a deep furrow,'' left no doubt that this specimen in the Jeffreys collection in the USNM is the one he described. The distal half of the pallet is covered by a dark brown periostracum with a deep longitudinal furrow on the outer face.

Is *Lyrodus bipartita* (Jeffreys).

B. *Teredo medilobata* Edmondson — Kawela Bay, Oahu, Hawaii

Fig. 1. Inner view of shell.
Fig. 2. Outer view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Siphonal end of animal showing pallets and siphons.

Figure 1 is of a paratype, MCZ 228105, from Waikiki, Oahu, and Figures 2-5 are of the holotype, BPBM 105, from Kawela Bay, Oahu. The holotype is a complete specimen about 25 mm long and carries well-developed larvae. The siphons lack color spots and there is no collar or thickening at the base of the siphons.

Is *Lyrodus medilobata* (Edmondson).

C. *Teredo affinis* Deshayes — Réunion Id.

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.

The type specimens are lost. Figures 1-3 were copied from Deshayes (1863, pl. 28, figs. 8, 9, 11).

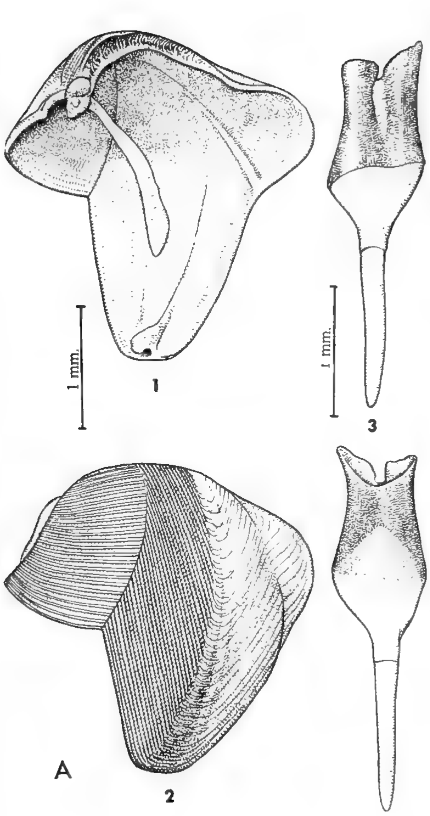
Is *Lyrodus affinis* (Deshayes).

D. *Teredo milleri* Dall, Bartsch and Rehder — Nawiliwili, Kauai, Hawaii

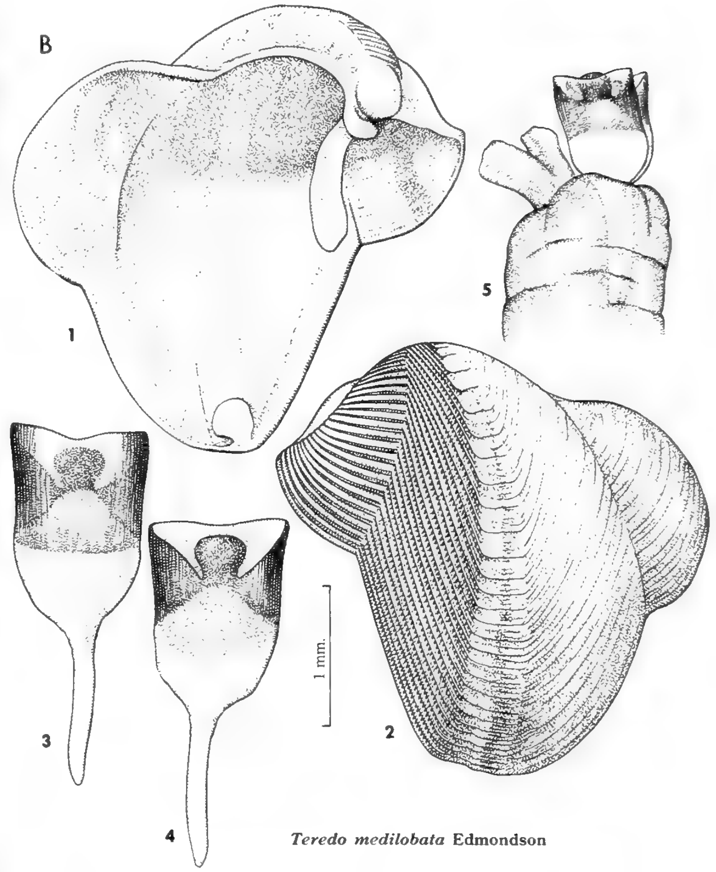
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Fig. 5. Inner face of pallet.

All figures are of the holotype, CAS 12384. This specimen is also the neotype of *Teredo affinis* Deshayes, as designated by Moll (1941). See also entries under *affinis* Deshayes and *milleri* Dall, Bartsch and Rehder. The periostracal cap which has become detached from the base is dark brown with the characteristic forked appearance.

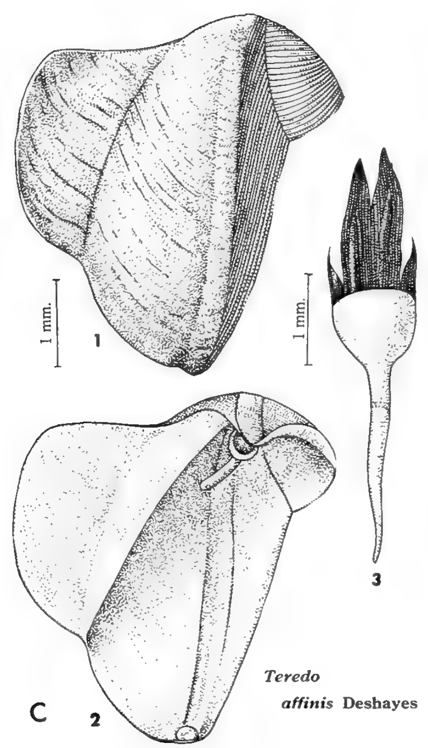
Is *Lyrodus affinis* (Deshayes).



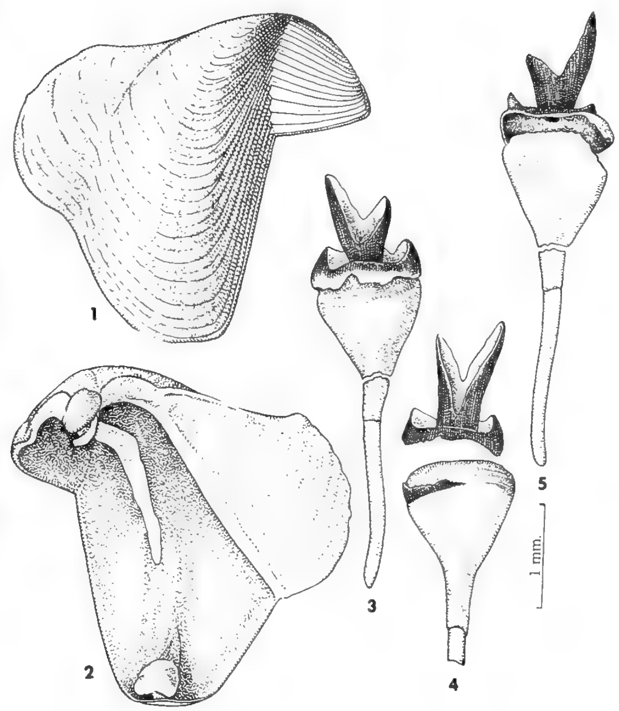
Teredo bipartita Jeffreys



Teredo medilobata Edmondson



Teredo affinis Deshayes



Teredo milleri Dall, Bartsch and Rehder

PLATE 7

A. *Teredo portoricensis* Clapp — San Juan, Puerto Rico

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.

Figures 1-4 are of the holotype, MCZ 45303, and 5-6 a paratype, MCZ 120732. Periostracum golden brown, thin, transparent and covering the distal half of the pallet.

B. *Teredo dicroa* Roch — Togo

Figs. 1, 3, 5 and 7. Outer faces of pallets.
Figs. 2, 4, 6 and 8. Inner faces of pallets.

Figures 1-2 are of the lectotype and 3-8 paratypes, all Berlin Museum. Shells unknown. The periostracal cap is dark brown in color. Pallets dry and deteriorating with the periostracum exfoliating.

Is probably *Lyrodus takanoshimensis* (Roch).

C. *Teredo takanoshimensis* Roch — Kingyoku, Takanoshima, Japan

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, Berlin Museum. Periostracum a medium brown in color.

Is *Lyrodus takanoshimensis* (Roch).

D. *Teredo radicis* Moll — East London, South Africa

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the lectotype, Berlin Museum. Pallet solid with a medium to dark brown periostracum.

Is *Teredo somersi* Clapp.

E. *Teredo somersi* Clapp — Ireland Id., Bermuda

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, MCZ 45304. Pallet solid and heavy. The periostracum a light horn to red-brown color.

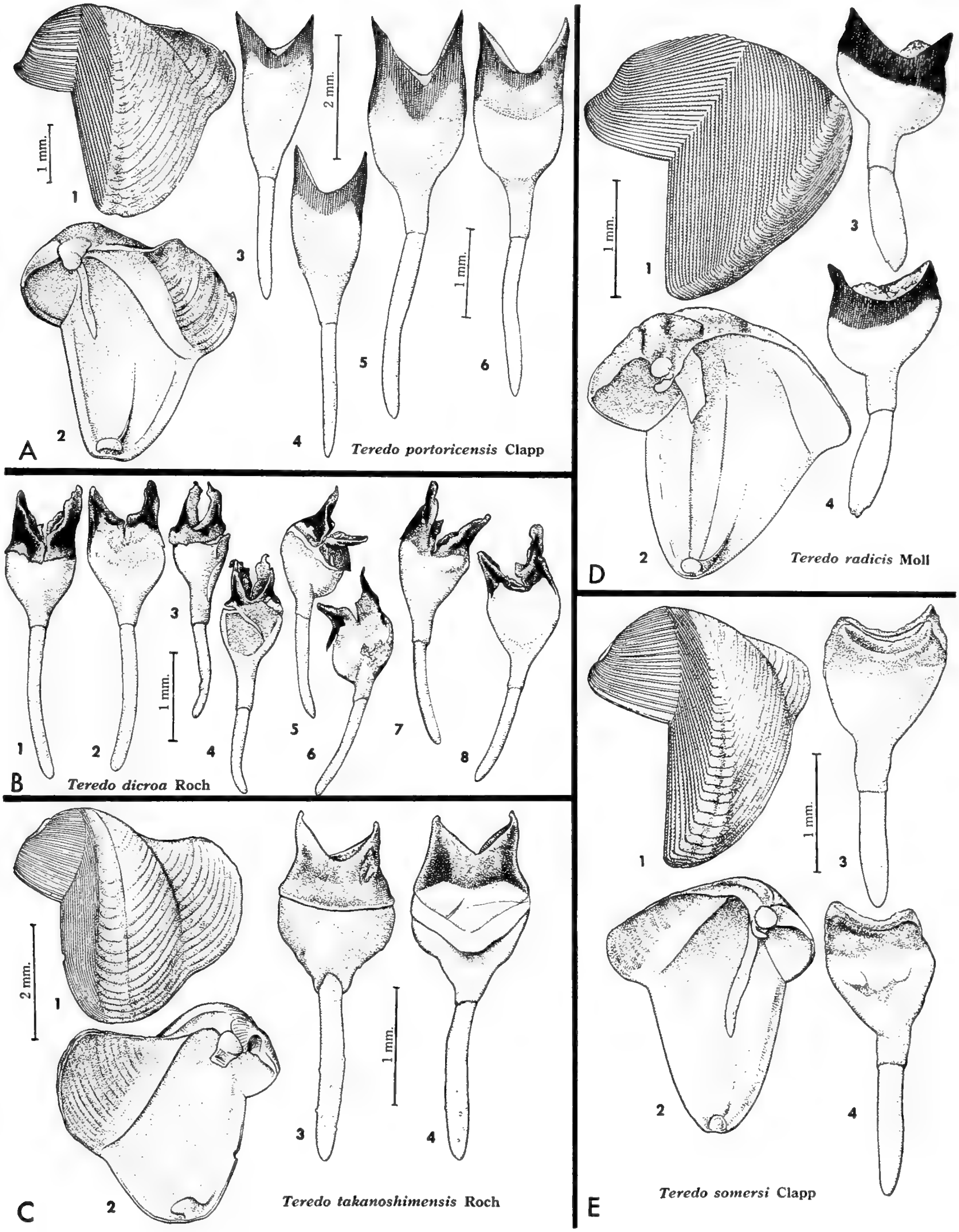

A
Teredo portoricensis Clapp
1 mm.
2 mm.
1 mm.
B
Teredo dicroa Roch
1 mm.
C
Teredo takanoshimensis Roch
2 mm.
1 mm.
D
Teredo radicis Moll
1 mm.
E
Teredo somersi Clapp
1 mm.

PLATE 8

A. *Teredo bartschi* Clapp — Port Tampa, Florida
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, MCZ 45301. The periostracum is thin and a golden brown in color.

B. *Teredo batilliformis* Clapp — St. George's, Bermuda
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, MCZ 45305. A typical young specimen of *bartschi*.

C. *Teredo shawi* Iredale — Roseville Bridge, Middle Harbour, Sydney, New South Wales, Australia
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 6. Outer faces of pallets.
Figs. 4 and 7. Inner faces of pallets.
Fig. 5. Side view of pallet.

Figures 1-2, 6-7 are of a paratype, MCZ 229500, and Figures 3-5 of a paratype, MCZ 168008. The white calcareous portion of the blade can be seen through the yellow periostracum which extends well down over the blade.

D. *Teredo balatro* Iredale — Pyrmont, Port Jackson, Sydney Harbour, New South Wales, Australia
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Side view of pallet.

Type specimens not seen. All figures copied from Iredale, 1932, pl. 2, figs. 4-7.

E. *Teredo hiloensis* Edmondson — Hilo, Hawaii
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, BPBM 106.
The periostracal margin is thin and a red-brown in color.

F. *Teredo grobbai* Moll — Basra, Iraq
Figs. 1 and 3. Outer faces of pallets.
Figs. 2 and 4. Inner faces of pallets.

All figures are of the holotype, Berlin Museum. No shells were in the type lot. The pallets are in poor condition, eroded, and the golden periostracum peeling.

Species B-F are now synonymized with *Teredo bartschi* Clapp.

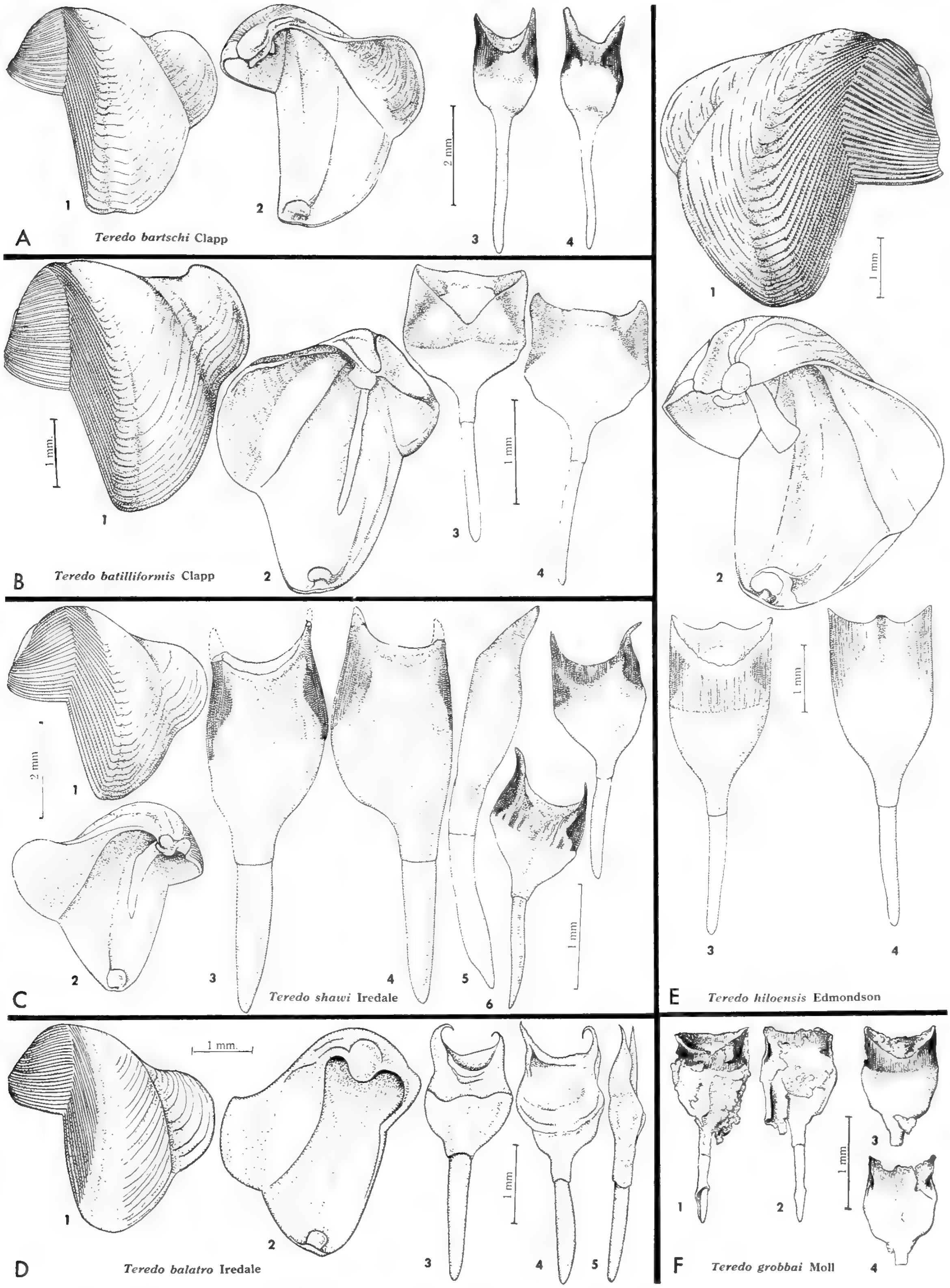

A Teredo bartschi Clapp
2 mm
B Teredo batilliformis Clapp
1 mm.
1 mm
C Teredo shawi Iredale
2 mm
1 mm
D Teredo balatro Iredale
1 mm.
1 mm
E Teredo hiloensis Edmondson
1 mm
1 mm
F Teredo grobbai Moll
1 mm

PLATE 9

A. *Teredo triangularis* Edmondson — Kahului, Maui, Hawaii

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Side of view of pallet.
Fig. 4. Outer face of pallet.
Fig. 5. Inner face of pallet.

Figures 1, 3-5 are of the holotype, BPBM 104 and Figure 2 is of a paratype, MCZ 228101. The periostracal band at the distal end of the pallet is a red-brown.

B. *Teredo elongata* Quatrefages — Indian Ocean

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.

Both figures are of the holotype, copied from Rancurel (1954, Bull. Inst. français d'Afrique noire **16** (2): 460, fig. 4). See also remarks under *elongata* Quatrefages for a discussion of the status of this species.

C. *Teredo aegypos* Moll — Beira, Mozambique

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 6. Outer faces of pallets.
Figs. 4 and 7. Inner faces of pallets.
Fig. 5. Side view of pallet.

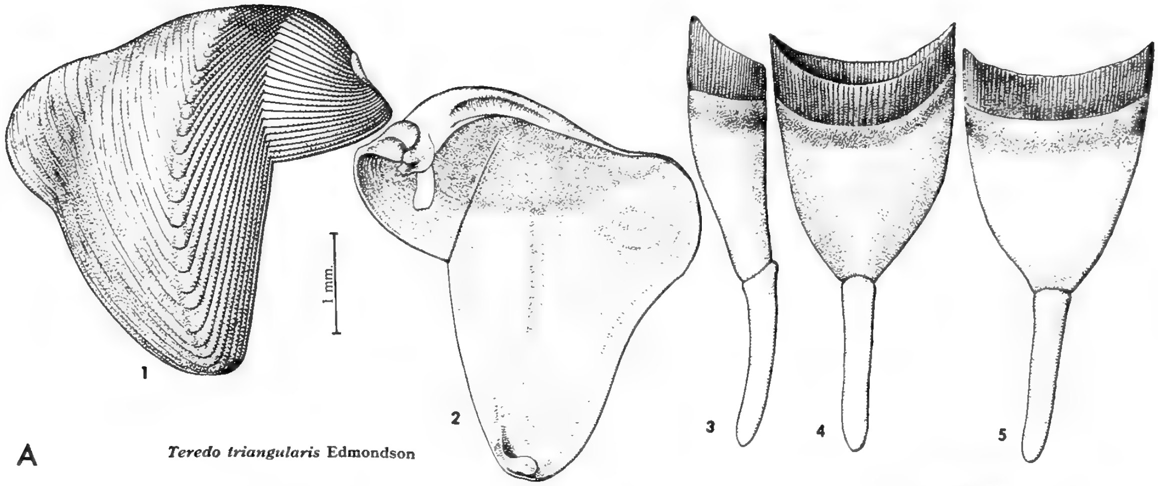
All figures are of the holotype, Berlin Museum. The shells and pallets are badly eroded and exfoliating. The distal end of the pallet is covered with a dark brown periostracum. The remainder of the pallet is a grayish ivory, the base of the blade and the stalk almost translucent.

D. *Teredo aegyptia* Roch — Port Said, Egypt

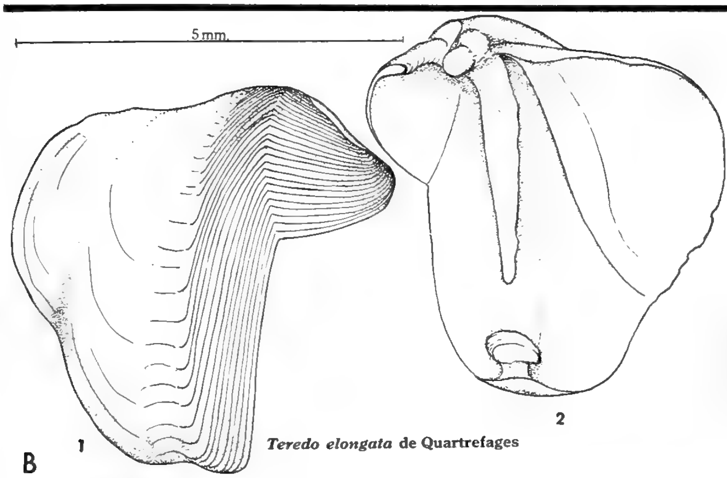
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 4. Outer faces of pallets.
Fig. 5. Inner face of pallet.

Figures 3 and 5 are of the lectotype and Figures 1, 2, 4 of paratypes, all Berlin Museum. A golden brown periostracum covers the distal half of the blade of the pallets.

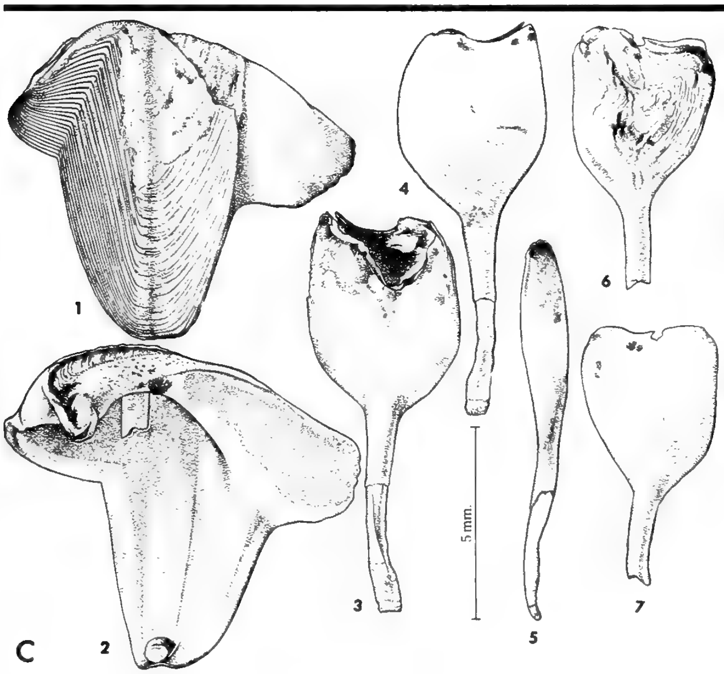
Is *Teredo bartschi* Clapp.



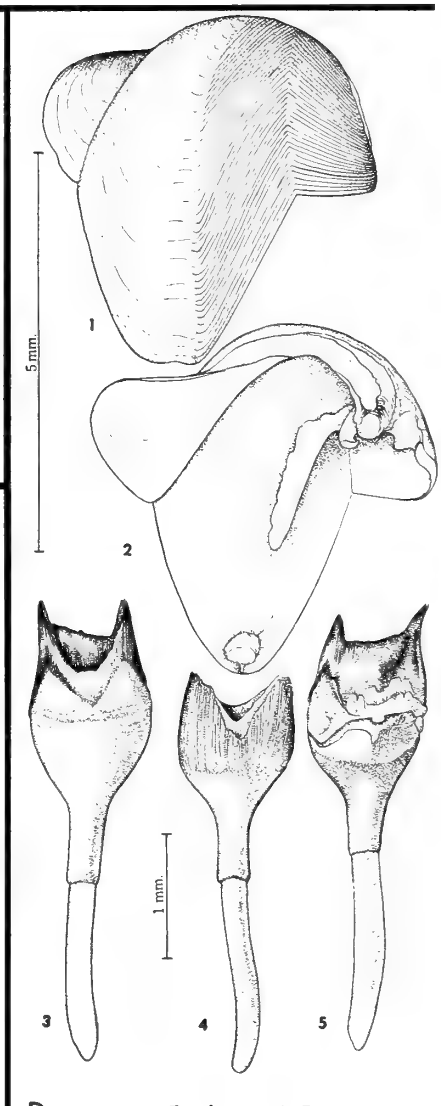
A *Teredo triangularis* Edmondson



B *Teredo elongata* de Quartrefages



C



D *Teredo aegyptia* Roch

PLATE 10

A. *Teredo parksi* Bartsch — Pearl Harbor, Oahu, Hawaii

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 4. Outer faces of pallets.
Fig. 5. Inner face of pallet.
Fig. 6. Side view of pallet.

All figures are of the holotype, USNM 341132. A dark brown periostracum covers the blade and, in the type, extends nearly to the stalk. The pallets are dry and the periostracum flaking, exposing the calcareous base.

B. *Teredo krappei* Moll — São Francisco, Brasil

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the lectotype, Berlin Museum. Pallets are dry and in poor condition; the heavy, dark brown periostracum covering the distal end of the blade is peeling and exposing the calcareous base beneath. Periostracum on the inner face thin.

C. *Teredo parksi madrasensis* Nair — Madras Harbour, India

Fig. 1. Outer view of shell.
Fig. 2. Outer face of pallet.
Fig. 3. Inner face of pallet.

All figures are of the holotype, copied from Nair (1958, text fig. 2a-c).

D. *Teredo laciniata* Roch — Diego-Suarez, Madagascar

Figs. 1 and 3. Outer faces of pallets.
Figs. 2 and 4. Inner faces of pallets.

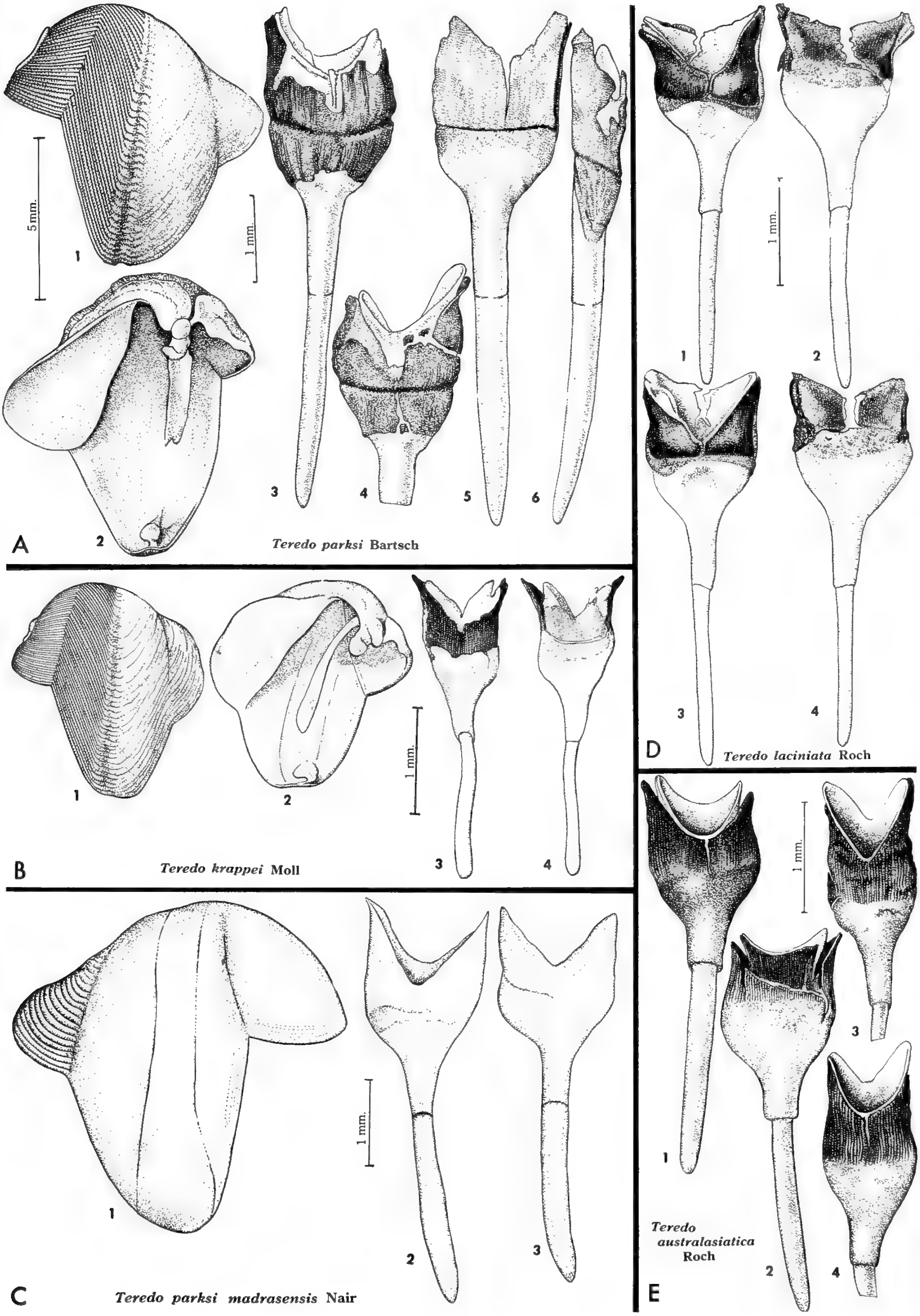
All figures are of the holotype, Berlin Museum. Shells unknown. Specimen dry. The dark brown periostracum covering the distal portion is flaking, particularly on the inner face.

E. *Teredo australasiatica* Roch — Singapore

Figs. 1, 3 and 4. Outer faces of pallets.
Fig. 2. Inner face of pallet.

Figures 1-2 are of the lectotype and 3-4 of paratypes, all Berlin Museum. The periostracum is heavy, dark brown and extends only slightly below the mid-point.

All of the species figured on this plate are young *Teredo furcifera* von Martens. The degree to which the periostracum extends below the mid-point of the blade, as well as the thickness and color of the periostracum, varies greatly even within a single lot taken from the same collecting board. The blade extends down the stalk as a sleeve.



A *Teredo parksi* Bartsch

B *Teredo krappei* Moll

C *Teredo parksi madrasensis* Nair

D *Teredo laciniata* Roch

E *Teredo australasiatica* Roch

PLATE 11

A. *Teredo clappi* Bartsch — from keel of ship, Key West, Florida
- Fig. 1. Outer view of shell.
- Fig. 2. Side view of pallet.
- Fig. 3. Outer face of pallet.
- Fig. 4. Inner face of pallet.

All figures are of the holotype, USNM 348189. The valves are dried, but with the animal inside, so the interior of the shell could not be illustrated. The entire anterior area and much of the posterior area of the shell is covered with a shiny golden brown periostracum. The periostracum covering the distal half of the outer face of the pallet is red-brown in color.

B. *Teredo renschi* Roch — Singapore
- Figs. 1, 2, 4 and 5. Outer faces of pallets.
- Fig. 3. Inner face of pallet.

Figures 1 and 3 are of the lectotype and 2, 4 and 5 of paratypes, all Berlin Museum. The periostracum is a medium to dark brown and covers the distal half of the solid calcareous blade. In most of the type specimens the periostracum is patchy so that the calcareous portion shows through.

C. *Teredo clappi* Bartsch — Key West, Florida
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.
- Figs. 3, 4, 6 and 7. Outer faces of pallets.
- Fig. 5. Inner face of pallet.

All figures are of paratypes, MCZ 120711. Figures 3 and 6 show the small cleft in the distal margin of the pallet which may or may not be present.

D. *Teredo trulliformis* Miller — Honolulu Harbor, Hawaii
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.
- Fig. 3. Outer face of pallet.
- Fig. 4. Inner face of pallet.

All figures are of the holotype, CAS 1731.

E. *Teredo trulliformis* Miller — Honolulu, Hawaii
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.
- Fig. 3. Outer face of pallet.
- Fig. 4. Inner face of pallet.
- Fig. 5. Side view of pallet.

All figures are of a paratype, ANSP 134322.

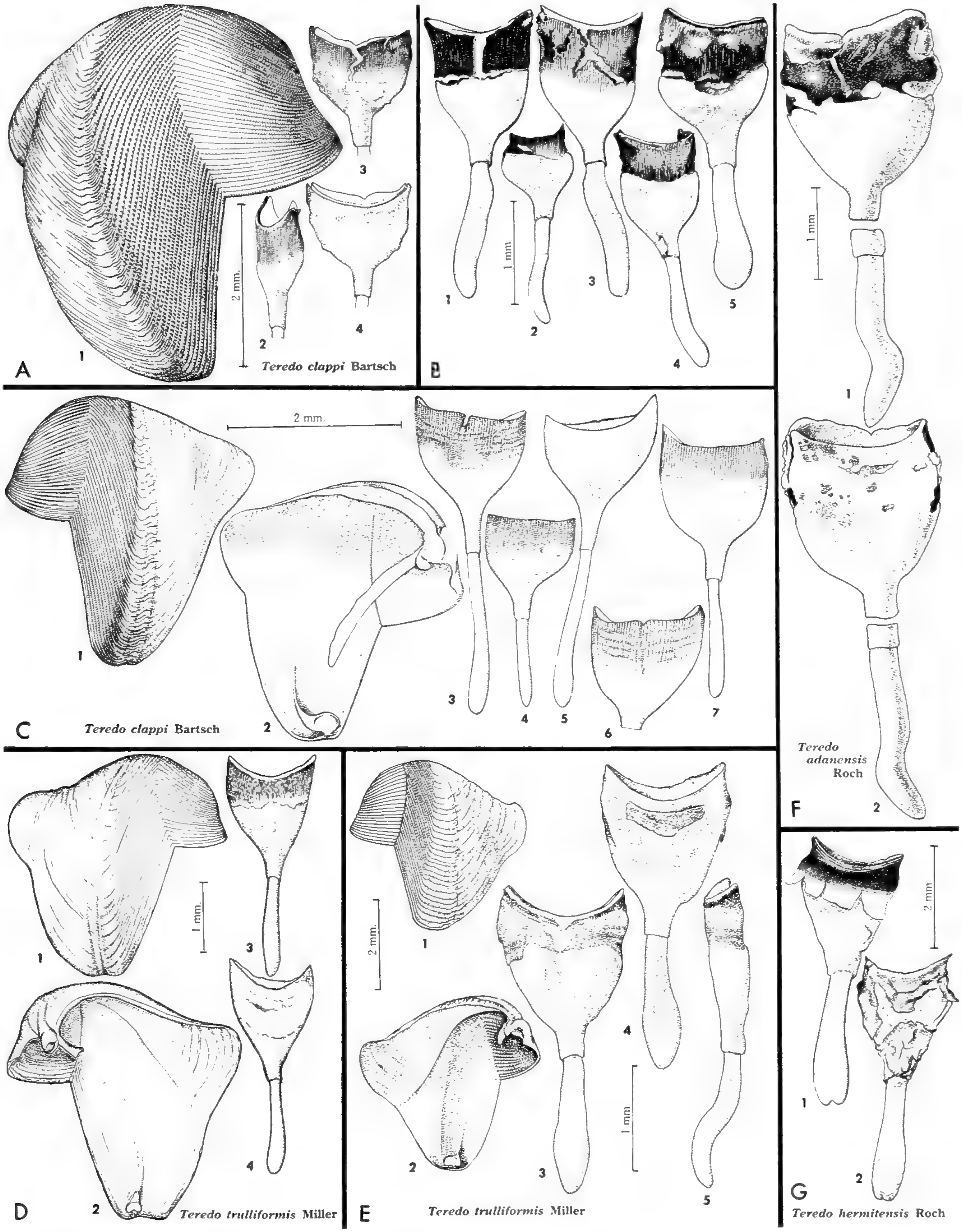
F. *Teredo adanensis* Roch — Port Aden
- Fig. 1. Outer face of pallet.
- Fig. 2. Inner face of pallet.

Both figures are of the holotype, Berlin Museum. Shells unknown. The pallets are dry and in poor condition with the brown periostracum worn away from the distal end of the blade.

G. *Teredo hermitensis* Roch — Hermit Id., Bismarck Archipelago
- Fig. 1. Outer face of pallet.
- Fig. 2. Inner face of pallet.

Both figures are of the holotype, Berlin Museum. Shells unknown. The pallet is dry and the periostracum peeling from the outer and inner face of the blade. A dark brown band of periostracum was present around the cup, the remaining periostracum is a golden brown color.

Species B and D-G are now synonymized with *Teredo clappi* Bartsch.



A
1
2
3
4
2 mm.
Teredo clappi Bartsch
B
1
2
3
4
5
1 mm
C
1
2
3
4
5
6
7
2 mm.
Teredo clappi Bartsch
D
1
2
3
4
1 mm.
Teredo trulliformis Miller
E
1
2
3
4
5
2 mm.
1 mm
Teredo trulliformis Miller
F
1
2
1 mm
Teredo adanensis Roch
G
1
2
2 mm
Teredo hermitensis Roch

PLATE 12

A. *Teredo fulleri* Clapp — Lameshur Bay, St. John, Virgin Ids.
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the neotype, MCZ 169626. The blade of the pallet is milk-white with a narrow margin of pale yellow periostracum at the distal margin; the stalk is a translucent white.

B. *Teredo indomalaiica* Roch — Singapore
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the lectotype, Berlin Museum. The distal end of the pallet has a brown periostracum, the calcareous portion is chalky white and eroded.

Is *Teredo fulleri* Clapp.

C. *Teredo bicorniculata* Roch — Diego-Suarez, Madagascar
Fig. 1. Outer face of pallet.
Fig. 2. Side view of pallet.
Fig. 3. Inner face of pallet.

All figures are of the lectotype, Berlin Museum. Shells unknown. The pallets are dry and in very poor condition. The blade is white, chalky and eroded. Periostracum, where present, brown.

Is *Teredo fulleri* Clapp.

D. *Teredo mindanensis* Bartsch — *Albatross* sta. 5252, off Linao Point, Mindanao, Philippine Ids.
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Side view of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Outer face of pallet.

All figures are of the holotype, USNM 310975. The pallet is white and hollow, the cavity of the cone extending to the stalk. Periostracum, where present, thin and yellow.

E. *Teredo bayeri* Roch — Tandjoeng Pinang [Bintan Id.], Rhiouw-Arch., Indonesia
Figs. 1 and 3. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 4 and 6. Outer faces of pallets.
Figs. 5 and 7. Inner faces of pallets.

Figures 1-2, 4-5 are of the lectotype and Figures 3, 6-7 are of paratypes, all Leiden Museum.

Is probably a deformed *Teredo mindanensis* Bartsch.

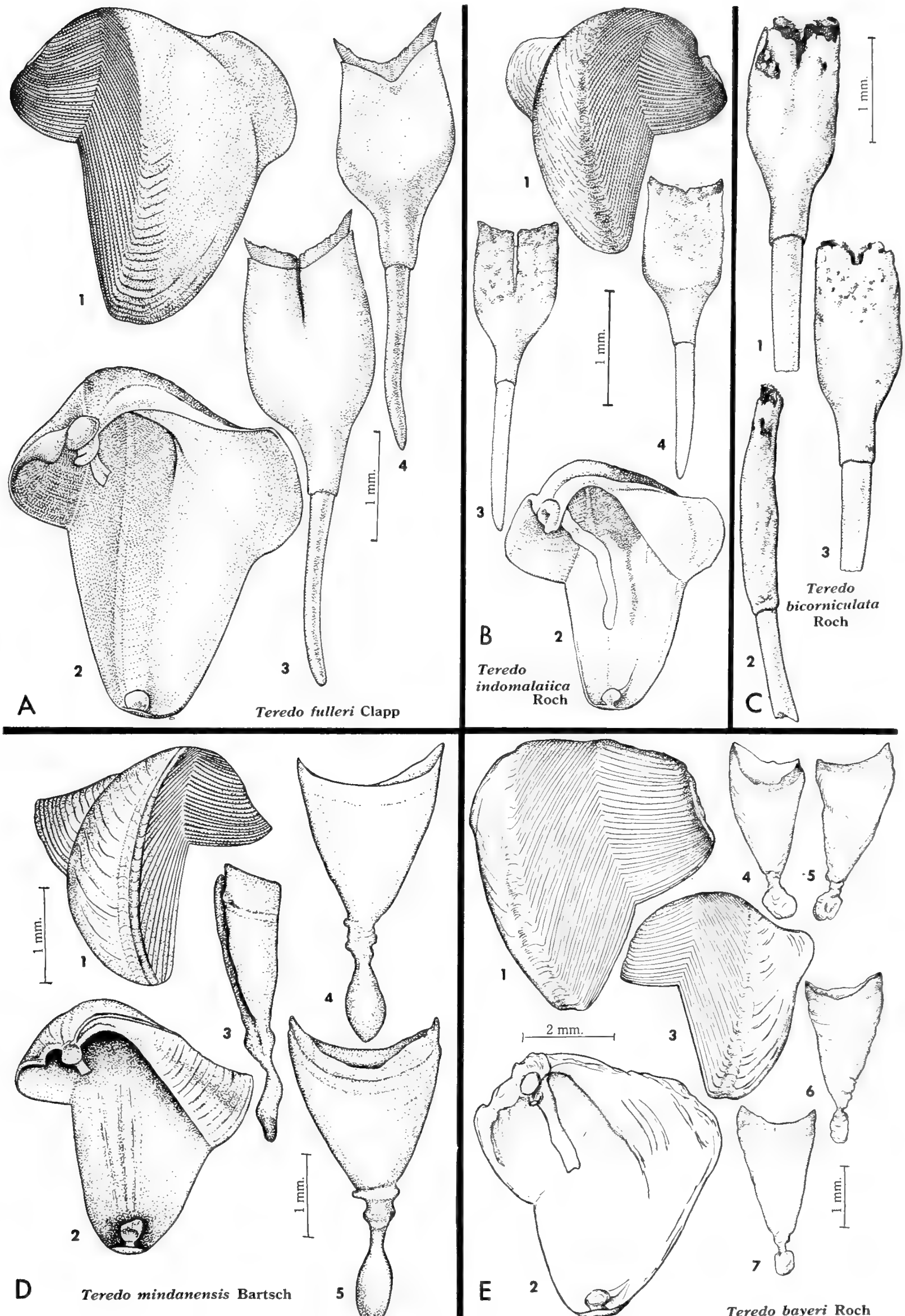

A
1
2
3
4
1 mm.
Teredo fulleri Clapp
B
1
2
3
4
1 mm.
Teredo indomalaiica Roch
C
1
2
3
1 mm.
Teredo bicorniculata Roch
D
1
2
3
4
5
1 mm.
1 mm.
Teredo mindanensis Bartsch
E
1
2
3
4
5
6
7
2 mm.
1 mm.
Teredo bayeri Roch

PLATE 13

A. *Teredo furcillatus* Miller — Tutuila, Samoa

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3, 5 and 7. Outer faces of pallets.
Figs. 4, 6 and 8. Inner faces of pallets.

Figures 1-2, 5-8 are of the holotype, CAS 1729, and Figures 3-4 are of a paratype, ANSP 134323. The periostracum is entirely gone from the holotype. The pallets are white and chalky. The paratype specimen has patches of thin pale yellow periostracum adhering to it, but the outer face is chalky and white.

B. *Teredo furcifera* von Martens — Amboina, Mollucca Ids.

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, Berlin Museum. The pallets are badly worn and there is no periostracum left.

C. *Teredo furcata* Moll — Colombo, Ceylon

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.

Both figures are of the holotype, Berlin Museum. Shells unknown. The pallet is in very poor condition. Considerable debris is dried on the surface, but beneath this the periostracum appears to be brown. The cavity of the cup is deep.

D. *Teredo bensoni* Edmondson — Canton Id.

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.

Figures 1-2, 5-6 are of the holotype, BPBM 100, and Figures 3-4 of a paratype, MCZ 232058. The pallets of the holotype are devoid of periostracum, white and solid. The paratype specimen has remnants of a thin, golden periostracum on the upper portions of the blade.

E. *Teredo furcifera* von Martens — Guam, Marianas Ids.

Figs. 1-7. A series of pallets taken from a single test board to show the amount of variation that can result from differences in age, rate of growth and deterioration.

Figure 7 is from an old but still living specimen, the periostracum entirely gone. The periostracum on the remaining specimens is a light brown. All figures are of MCZ 232102.

Species A, C and D are now synonymized with *Teredo furcifera* von Martens. See also Plate 10.

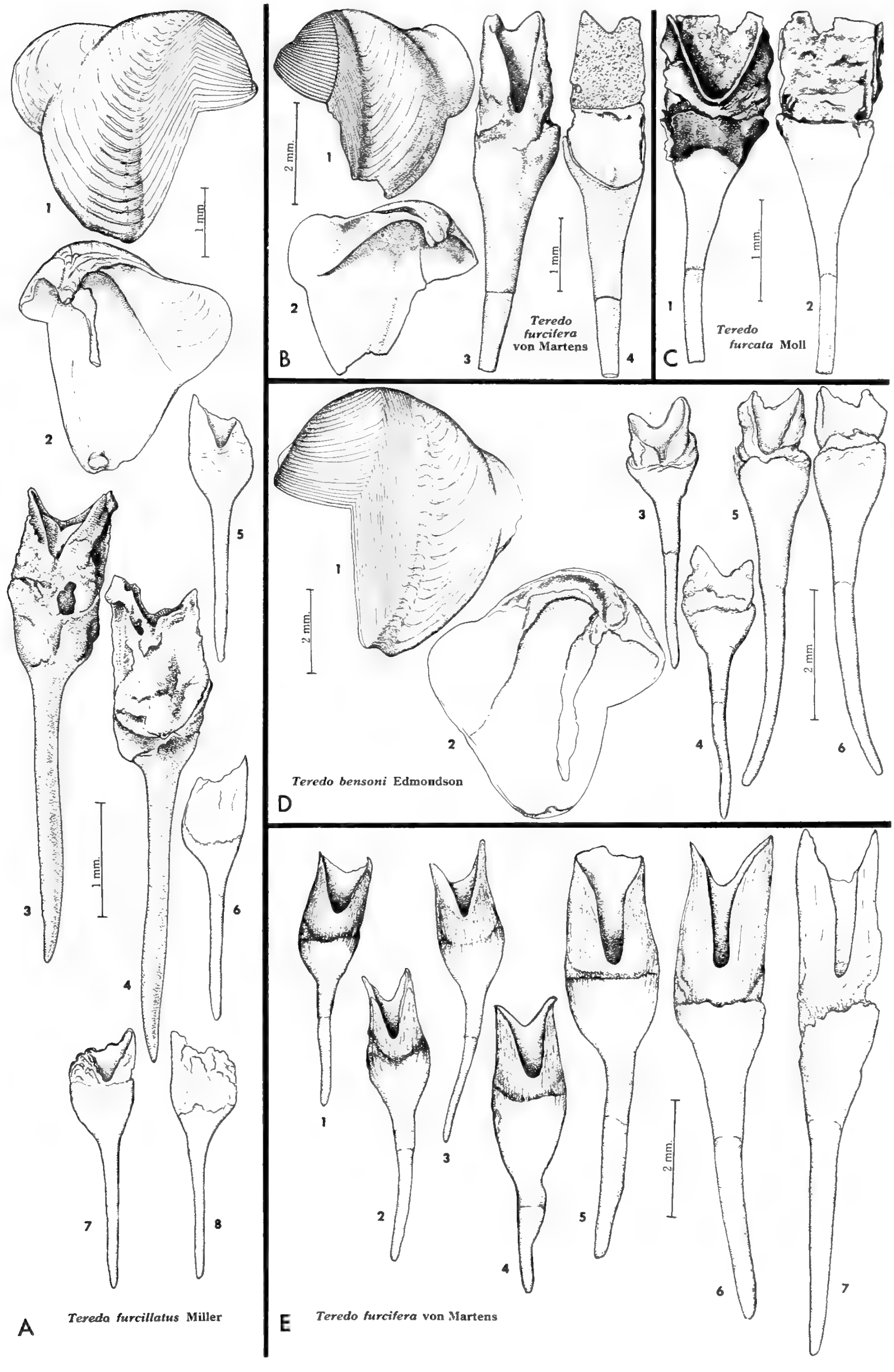

A
Teredo furcillatus Miller
B
Teredo furcifera von Martens
C
Teredo furcata Moll
D
Teredo bensoni Edmondson
E
Teredo furcifera von Martens
1 mm.
2 mm.

PLATE 14

A. *Teredo navalis* Linnaeus — Netherlands

Type figure, copied from Sellius (1733, pl. 2, fig. 6). Linnaeus actually mentioned only plate 1 where the entire animal is illustrated; but the posterior end was enlarged in plate 2, and it is this figure which is copied here.

B. *Teredo beaufortana* Bartsch — Rivers Id., Beaufort, North Carolina

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.

Both figures are of the holotype, USNM 345346. Shells unknown.

Is an elongate form of *Teredo navalis* Linnaeus.

C. *Teredo novangliae* Bartsch — Woods Hole, Massachusetts

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Side view of pallet.

All figures are of the holotype, USNM 74499. This is a specimen which grew rapidly, with a large auricle, widely spaced ridges on the anterior slope of the shell, and with broad pallets.

D. *Teredo beachi* Bartsch — San Pablo Bay, California

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, USNM 341155.

E. *Teredo morsei* Bartsch — Manhattan Beach, Long Id. New York

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, USNM 346333.

Species B-E are now synonymized with *Teredo navalis* Linnaeus.

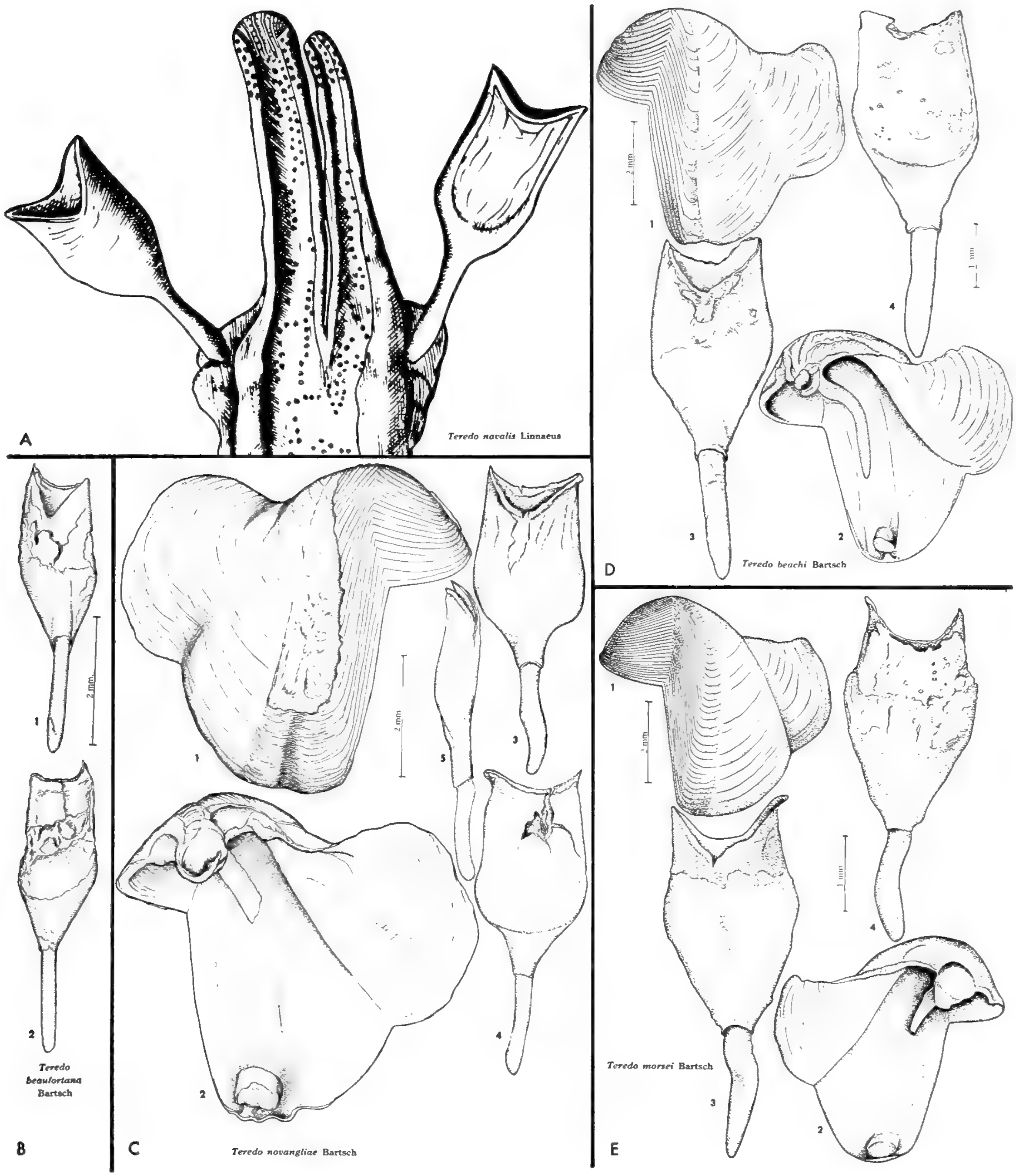

A
Teredo navalis Linnaeus
B
Teredo beaufortana Bartsch
C
Teredo novangliae Bartsch
D
Teredo beachi Bartsch
E
Teredo morsei Bartsch
2 mm
1 mm

PLATE 15

A. *Teredo japonica* Clessin — Japan

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, Berlin Museum. Specimen dry, the pale yellow periostracum, covering the distal portion of the blade, nearly gone.

B. *Teredo sinensis* Roch — Tsingtao, Shantung, China

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3, 5 and 7. Outer faces of pallets.
Figs. 4, 6 and 8. Inner faces of pallets.

Figures 1-4 are of the lectotype and 5-8 of paratypes, all Berlin Museum. Though the specimens were living at the time collected and bits of muscle are still attached to the stalk of the pallets, they have dried and the outer surface has flaked badly. The paratypes are illustrated to show the range of size and shape.

C. *Teredo pocilliformis* Roch. — Port Lincoln, South Australia

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, BM(NH) 1925·11·10·12-17. Though not labeled by Roch as the holotype, this was the only specimen found in the British Museum (Natural History) from the type locality. The name on the label was in Roch's handwriting and the specimen agrees with his brief description and poor figure. There were no specimens in the Berlin Museum under this name.

Species A-C are now synonymized with *Teredo navalis* Linnaeus

D. *Teredo indica* Nair — Madras Harbour, South India

Fig. 1. Outer view of shell.
Fig. 2. Outer face of pallet.
Fig. 3. Inner face of pallet.
Fig. 4. Posterior end of animal showing pallet and siphons.

All figures are of the holotype, copied from Nair, 1958, p. 268, fig. 4a-d.

An examination of the holotype has shown this to be *Lyrodus pedicellatus* (Quatrefages).

E. *Teredo austini* Iredale — Camp Cove, Sydney, Port Jackson, New South Wales, Australia

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of a paratype, MCZ 229499.

Is *Teredo navalis* Linnaeus

F. *Teredo madrasensis* Nair — Mylapore, Madras, India

Fig. 1. Outer view of shell.
Fig. 2. Inner face of pallet.
Fig. 3. Outer face of pallet.

All figures are of the holotype, copied from Nair 1956, p. 410, fig. 6a-c.

An examination of the holotype has shown this to be *Lyrodus pedicellatus* (Quatrefages).

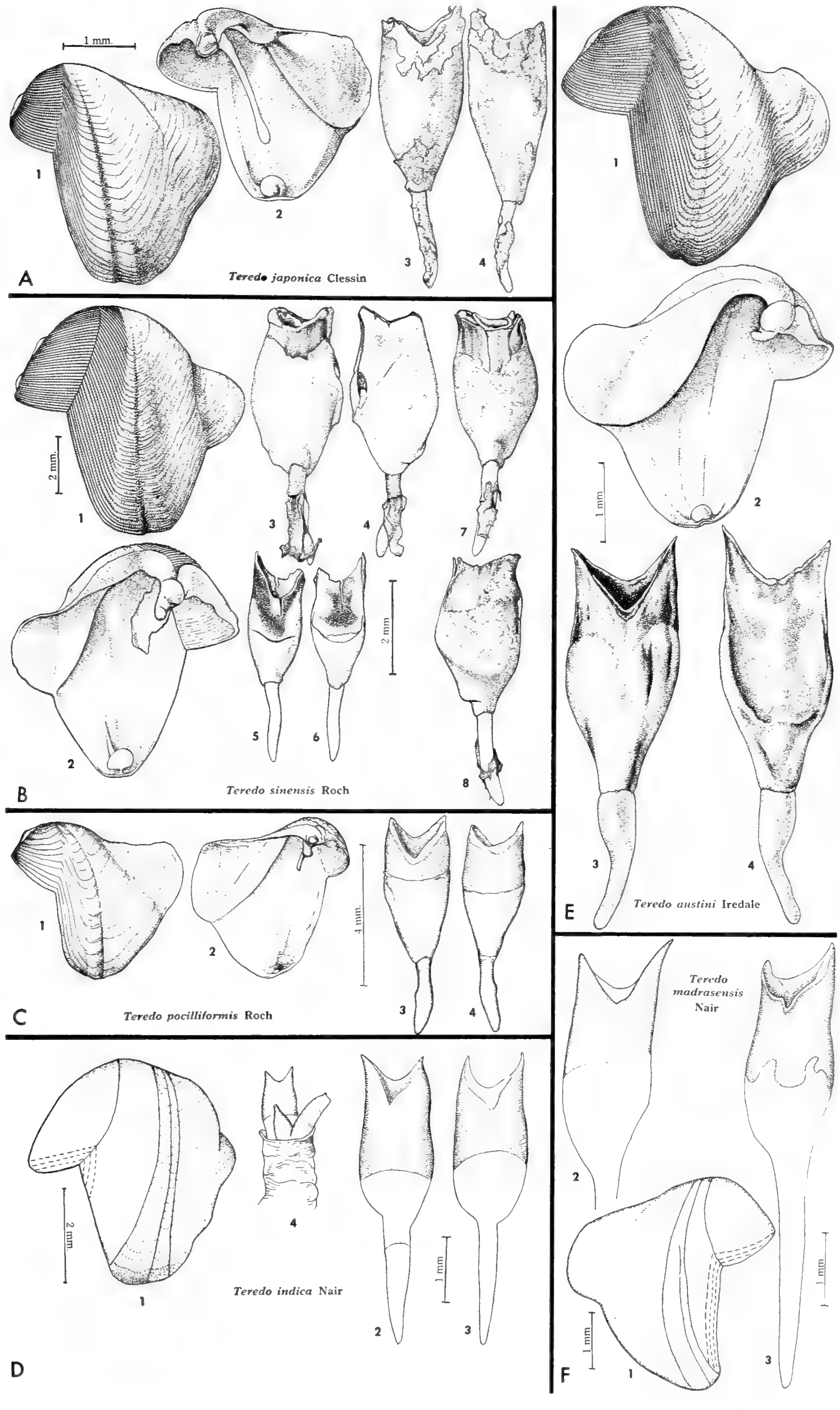

A
1 mm.
Teredo japonica Clessin
B
2 mm.
2 mm
Teredo sinensis Roch
C
4 mm.
Teredo pocilliformis Roch
D
2 mm.
1 mm
Teredo indica Nair
E
1 mm
Teredo austini Iredale
F
Teredo madrasensis Nair
1 mm
1 mm

PLATE 16

A. *Teredo tanonensis* Bartsch — *Albatross* sta. 5189, off Pecador Id., Philippine Ids.

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Side view of pallet.

All figures are of the holotype, USNM 310964. Shell very thin and fragile. A light yellow periostracum covers the distal end of the pallets.

B. *Teredo radcliffei* Bartsch — *Albatross* sta. 5252, off Linao Point, Mindanao, Philippine Ids.

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Side view of pallet.

All figures are of the holotype, USNM 312921. A light straw colored periostracum covers the distal end of the pallets.

C. *Teredo bengalensis* Nair — From drift wood, Madras beach, Madras, India

Fig. 1. Outer view of shell.
Fig. 2. Outer face of pallet.
Fig. 3. Inner face of pallet.

All figures are of the holotype, Zool. Survey India, Calcutta, and are copied from Nair (1956, p. 411, fig. 10a-c). In the original description Nair states that "at the distal end of the calcareous part of the blade is a horn coloured periostracum which is translucent and is slightly cupped with a long narrow sinus traversing its middle median line on the outside." The holotype has been virtually destroyed by formalin.

D. *Teredo smithi* Bartsch — *Albatross* sta. 5266, off Matocot Point, Luzon, Philippine Ids.

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Side view of pallet.
Fig. 5. Inner face of pallet.

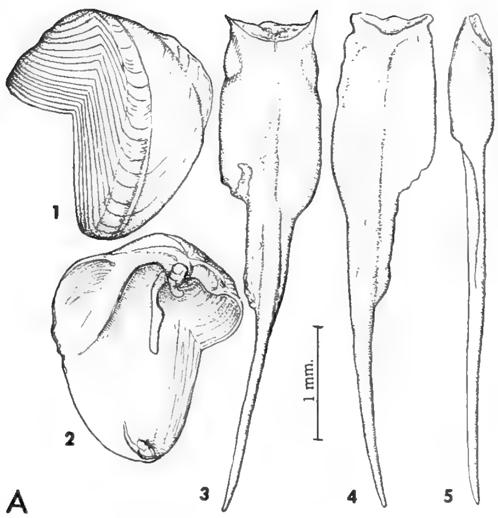
All figures are of the holotype, USNM 312919. This is an old specimen in which the distal end has become eroded and completely divided. The periostracum remaining is thin and golden.

E. *Teredo nambudalaiensis* Nair and Gurumani — Nambudalai, Ramnad Dist., Madras, India

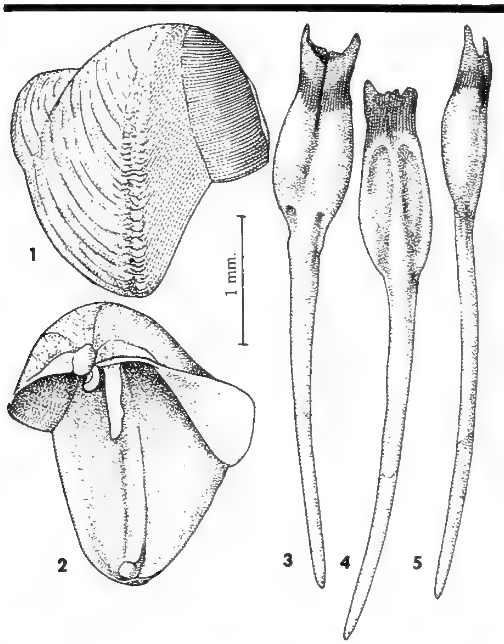
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, copied from Nair and Gurumani (1957, p. 157, figs. 1-2). An examination of the holotype showed this to be a large old specimen from which the distal ends of the pallets have been worn away.

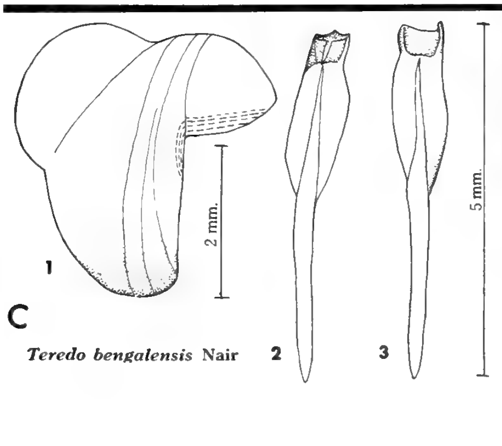
All of the species figured on this plate are now synonymized with *Teredothyra smithi* (Bartsch).



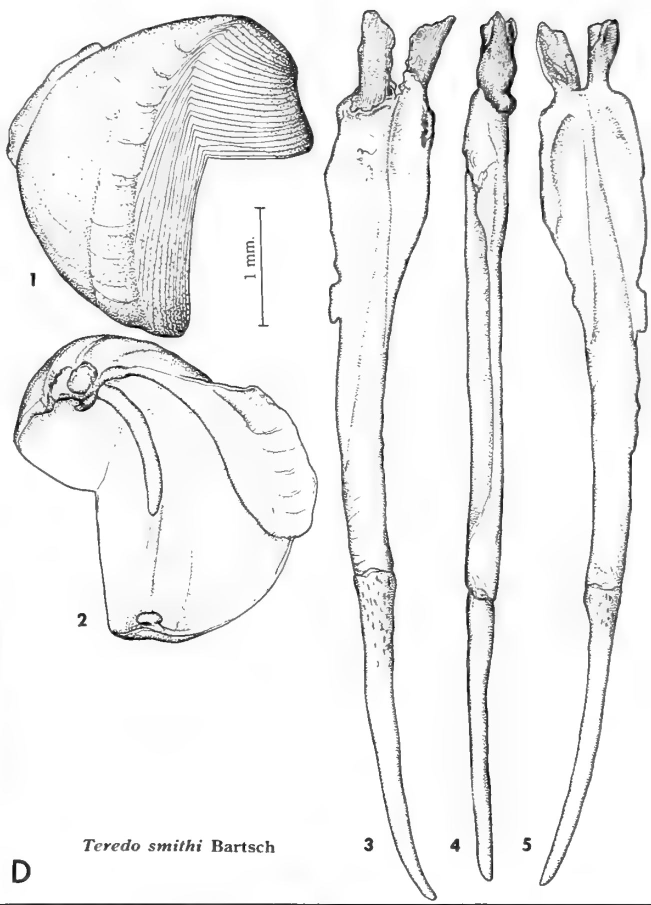
Teredo tanonensis Bartsch



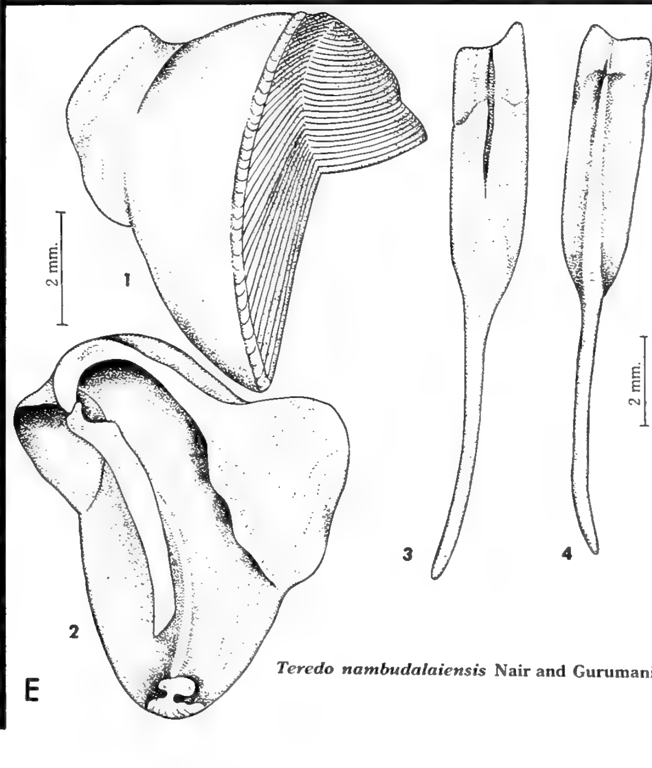
Teredo radcliffei Bartsch



Teredo bengalensis Nair



Teredo smithi Bartsch



Teredo nambudalaiensis Nair and Gurumani

PLATE 17

A. *Teredo atwoodi* Bartsch — Guantanamo Bay, Cuba

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Distal end of tube showing the division.
Figs. 4 and 6. Outer faces of pallets.
Figs. 5 and 7. Inner faces of pallets.
Fig. 8. Side view of pallet.

All figures are of the holotype, USNM 348186. The pallets are a sandy brown color, solid in structure and with no evident periostracum. The stalk is hollow at the proximal end. The specimen was apparently dead when collected.

Is an old specimen of *Teredothyra dominicensis* (Bartsch).

B. *Teredo dominicensis* Bartsch — *Blake* sta. 192, off Dominica Id., Lesser Antilles

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Distal end of tube showing the division.
Figs. 4 and 6. Outer faces of pallets.
Figs. 5 and 7. Inner faces of pallets.
Fig. 8. Side view of pallet.

Figures 1-5 are of the holotype, USNM 341129, and 6-8 of a paratype, USNM 635841.

Is *Teredothyra dominicensis* (Bartsch).

C. *Teredo palauensis* Edmondson — Koror, Palau Ids., Caroline Ids.

Fig. 1. Outer view of shell.
Figs. 2 and 3. Inner views of shells.
Figs. 4 and 6. Outer faces of pallets.
Figs. 5 and 7. Inner faces of pallets.

All figures are of the holotype, BPBM 111.

Is probably *Teredothyra excavata* (Jeffreys)

D. *Teredo subicensis* Edmondson — Subic Bay, Luzon, Philippine Ids.

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Basal portion of pallet.

Figures 1-2 are of the holotype, BPBM 112, and Figure 3 is of a paratype. This species was based on the two pallets shown here. The holotype is in poor condition and the missing half of the pallet has been indicated by dotted lines.

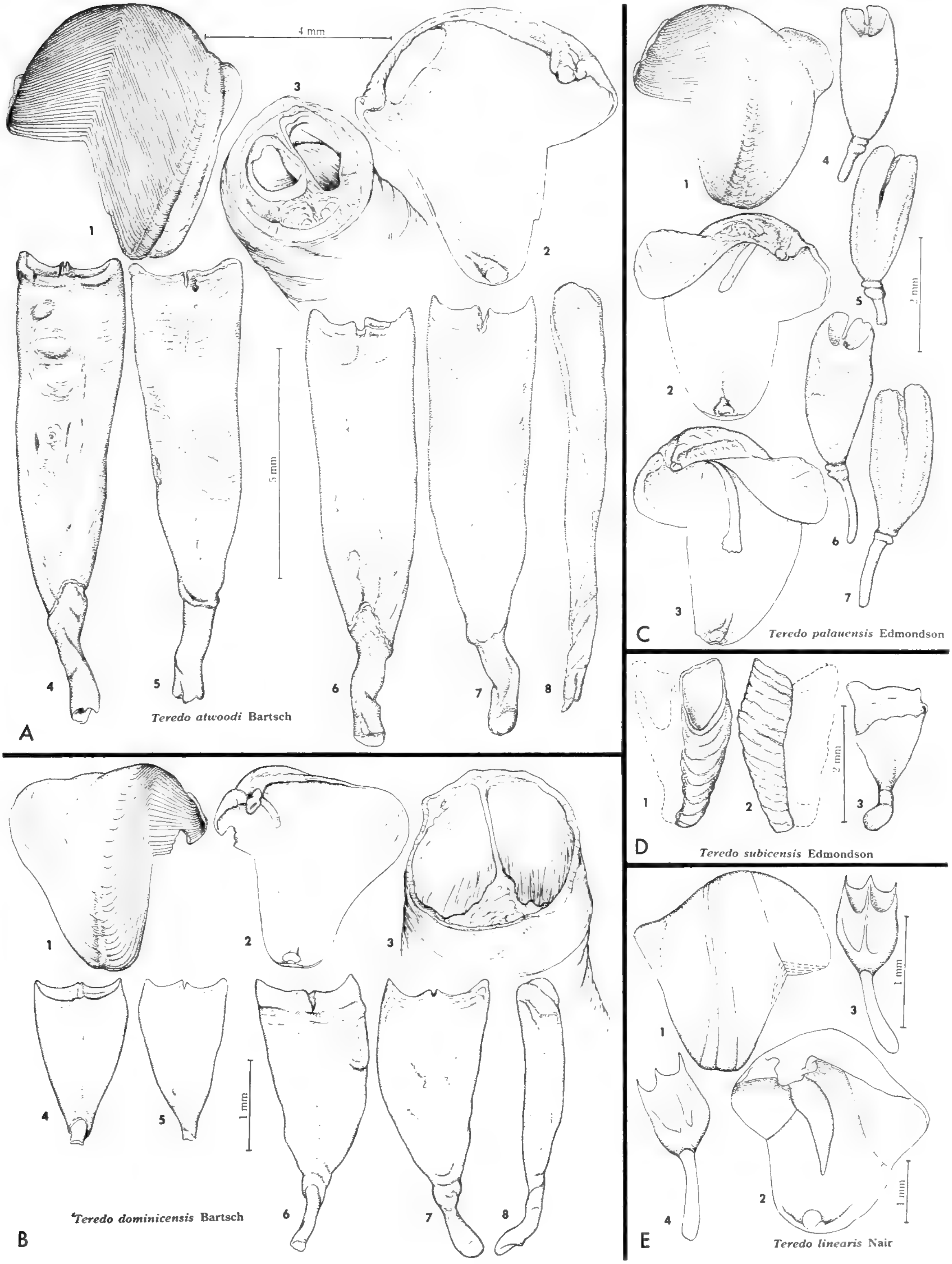
Is a worn specimen of *T. palauensis* Edmondson, and probably young *Teredothyra excavata* Jeffreys.

E. *Teredo linearis* Nair — from driftwood, Royapuram, South India

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, copied from Nair 1958, p. 273, fig. 6a-d.

Is young *Teredothyra excavata* (Jeffreys).



A *Teredo atwoodi* Bartsch

B *Teredo dominicensis* Bartsch

C *Teredo palauensis* Edmondson

D *Teredo subicensis* Edmondson

E *Teredo linearis* Nair

PLATE 18

A. *Teredo massa* Lamy — Massaouah (Ethiopia)

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.

All figures are of the holotype, Paris Museum. The type was dry, fragile and glued to a card so that the inner face could not be illustrated. The inner cup was covered with a black periostracum which was almost gone from the outer cup.

Is *Lyrodus massa* (Lamy).

B. *Teredo poculifer* Iredale — Kangaroo Point, Brisbane River, Queensland, Australia

Fig. 1. Anterior end of animal showing shell.
Fig. 2. Posterior end of animal showing outer face of pallet.
Fig. 3. Side view of pallet.
Fig. 4. Inner face of pallet.

All figures are of a paratype, MCZ 168007. The pallets are an ivory white with only a thin edge of pale yellow periostracum. The specimen is complete and therefore only the outer view of the shell is illustrated.

C. *Teredo infundibulata* Roch — Singapore

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, copied from Roch (1935, p. 266, fig. 3) as the specimen could not be found.

Is *Lyrodus massa* (Lamy).

D. *Lyrodus massa* (Lamy)

Fig. 1. Dried pallet from a young specimen from Puerto Rico.
Figs. 2-4. A series of preserved pallets from Mombasa, Kenya.

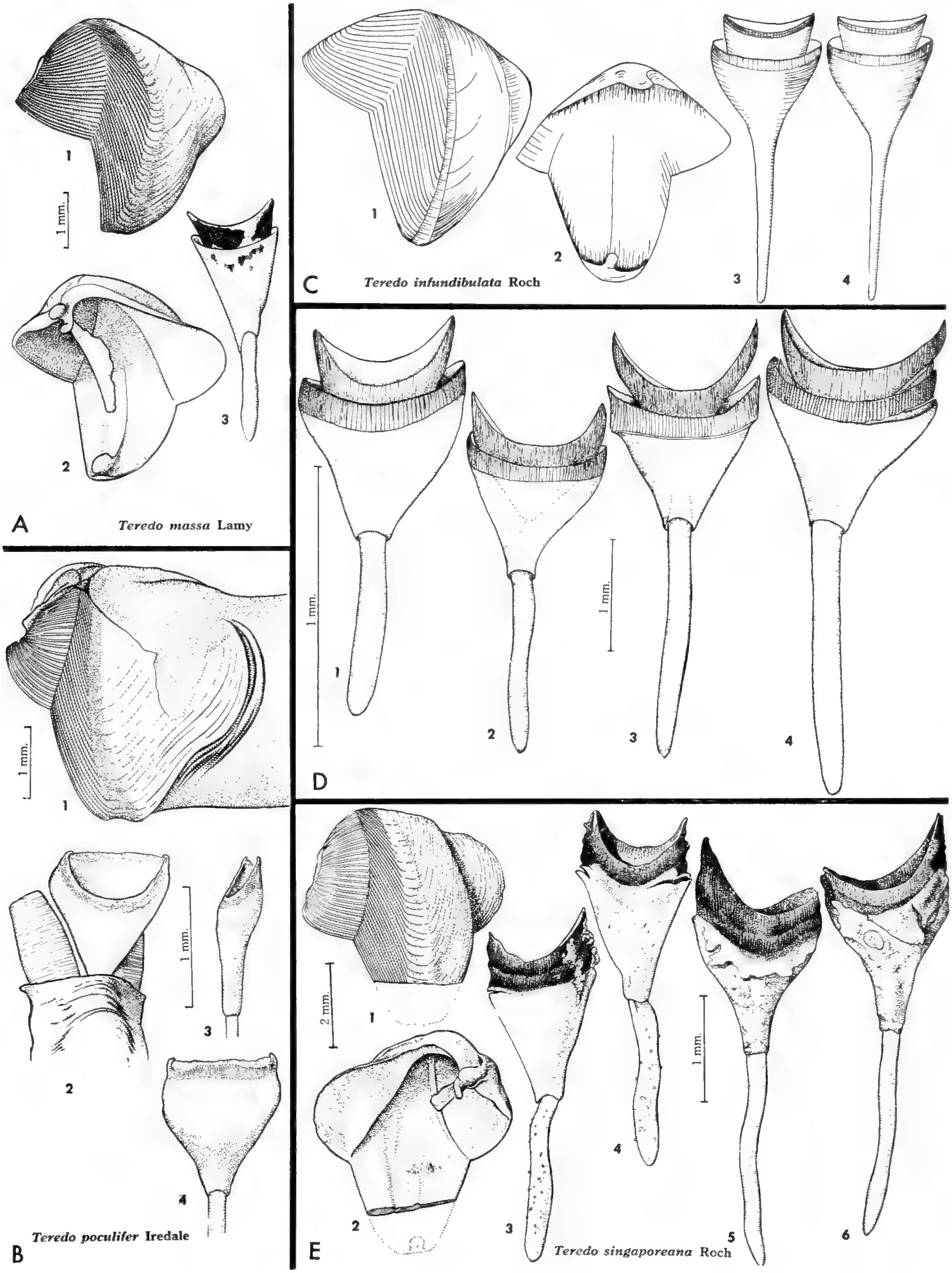
Specimens 2-3 drawn as seen with transmitted light to show inner construction.

E. *Teredo singaporeana* Roch — Singapore

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.

Figures 1-4 are of the holotype and 5-6 of a paratype, all Berlin Museum. A heavy dark brown periostracum covers the distal portion of the pallets and a pale yellow periostracum the basal portion.

Is *Lyrodus massa* (Lamy).



A *Teredo massa* Lamy

B *Teredo poculifer* Iredale

C *Teredo infundibulata* Roch

D

E *Teredo singaporeana* Roch

PLATE 19

A. *Teredo chamberlaini* Bartsch — *Albatross* sta. 5252, off Linao Point, Mindanao, Philippine Ids.

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Side view of pallet.

All figures are of the holotype, USNM 312922.

Is a young *Teredothyra matocotana* (Bartsch).

B. *Teredo pujadana* Bartsch — *Albatross* sta. 5243, Pujada Bay, Mindanao, Philippine Ids.

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.
Fig. 7. Distal view of pallet showing the divided cup.

All figures are of the holotype, USNM 246131.

Is *Teredothyra matocotana* (Bartsch).

C. *Teredo matocotana* Bartsch — *Albatross* sta. 5266, off Matocot Point, Luzon, Philippine Ids.

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 6. Outer faces of pallets.
Figs. 4 and 7. Side views of pallets.
Figs. 5 and 8. Inner faces of pallets.
Fig. 9. Distal view of pallet to show the divided cup.

The pallets are white with a very thin light yellow periostracum covering the upper portion. Stalks are a translucent white. All figures are of the holotype, USNM 312930.

Is *Teredothyra matocotana* (Bartsch).

D. *Teredo johnsoni* Clapp — Guantanamo, Cuba

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. End of tube showing the longitudinal division.
Fig. 4. Outer face of pallet.
Fig. 5. Inner face of pallet.

All figures are of the neotype, MCZ 121632. The distal portion of the pallets are a medium to dark brown. The insides of the cups are white.

E. *Teredo tritubulata* Moll — Victoria, Cameroons

Fig. 1. Outer face of pallet.
Fig. 2. Outer view of shell.
Fig. 3. Inner view of shell.
Fig. 4. Pallet of young specimen as seen with transmitted light.
Fig. 5. Outer face of entire pallet of an older specimen.

Figure 1 is of the holotype, copied from Moll (1941, p. 221, fig. 4b). Figures 2-5 are copied from Rancurel (1955, pp. 1146-7, figs. 1-2), based on specimens from Grand-Bassam, Ivory Coast.

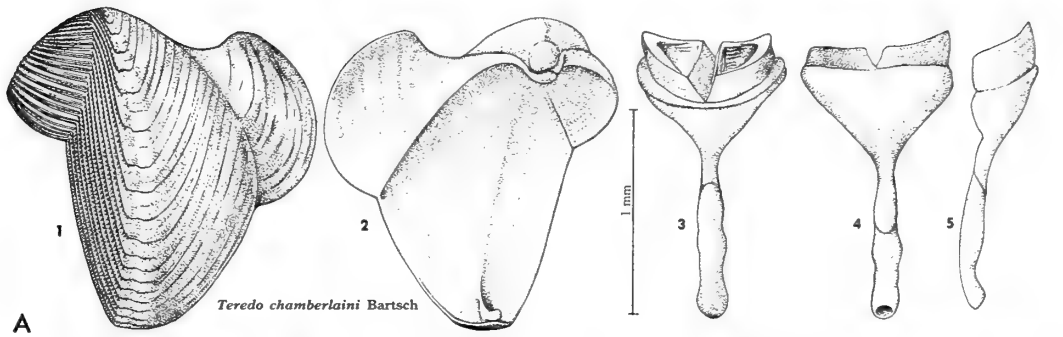
Is young *Teredothyra excavata* (Jeffreys).

F. *Teredo excavata* Jeffreys — from driftwood, Guernsey, England

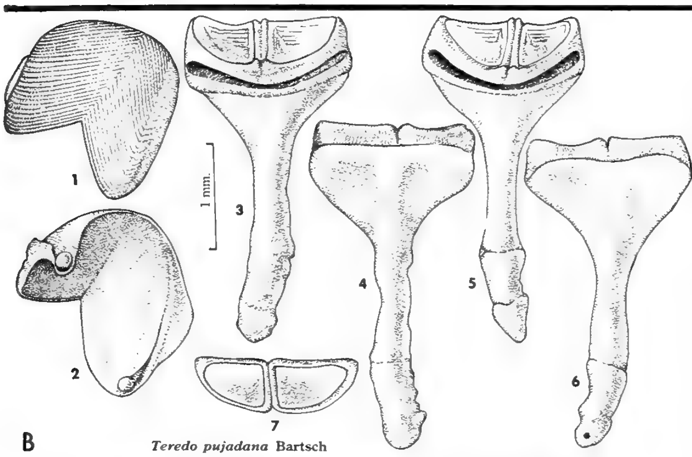
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Side view of pallet.

All figures are of the lectotype USNM 194257. The specimen was old and dry and the inner construction could not be observed.

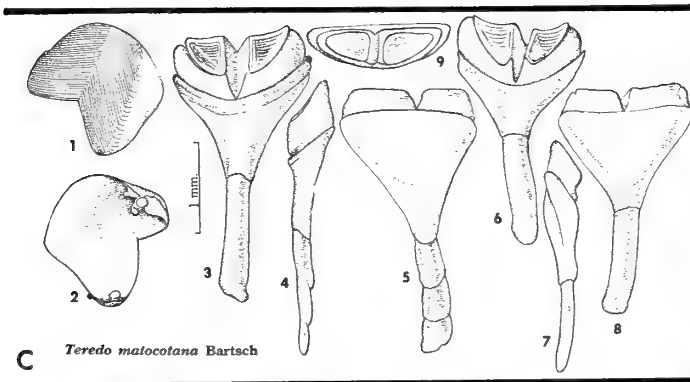
Is *Teredothyra excavata* (Jeffreys).



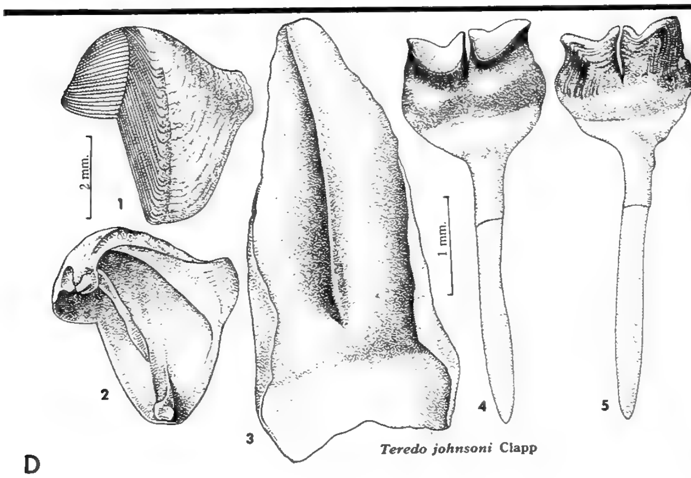
A *Teredo chamberlaini* Bartsch



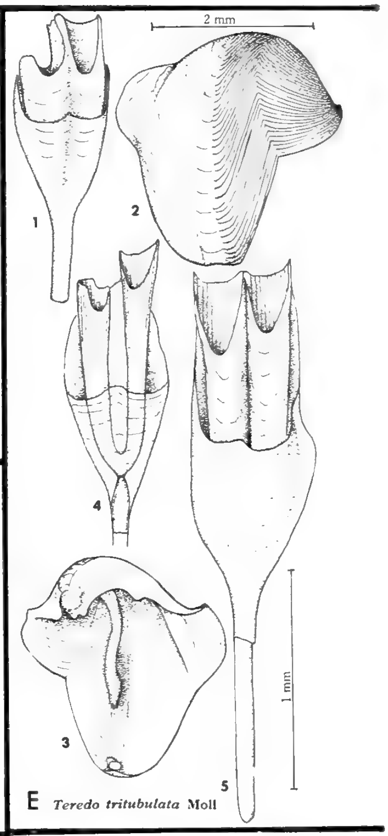
B *Teredo pujadana* Bartsch



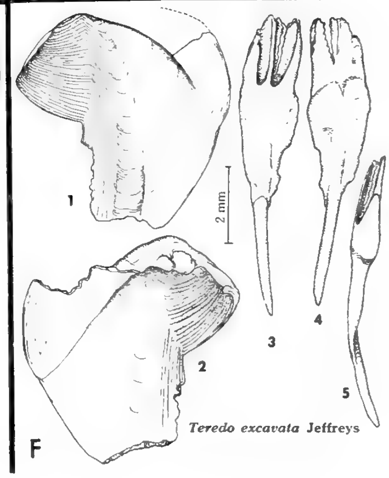
C *Teredo matocotana* Bartsch



D *Teredo johnsoni* Clapp



E *Teredo tritubulata* Moll



F *Teredo excavata* Jeffreys

PLATE 20

A. *Teredo thomsonii* Tryon — New Bedford, Massachusetts
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the lectotype, ANSP 50974.

Is *Teredora malleolus* (Turton).

B. *Teredo malleolus* Turton — Torbay, England
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 6. Outer faces of pallets.
Fig. 4. Side view of pallet.
Figs. 5 and 7. Inner faces of pallets.

Figures 1-2, 6-7 are of the lectotype, USNM 194213, and 3-5 are of normal pallets from the same locality. All specimens figured were from Turton and in the Jeffreys collection, USNM. The shell figured is the one in the Turton lot which agreed with the measurements in the original description. The malformed pallets (Figs. 6-7) agree with Turton's figures. The pale straw-yellow periostracum is nearly gone from the pallets.

Is *Teredora malleolus* (Turton).

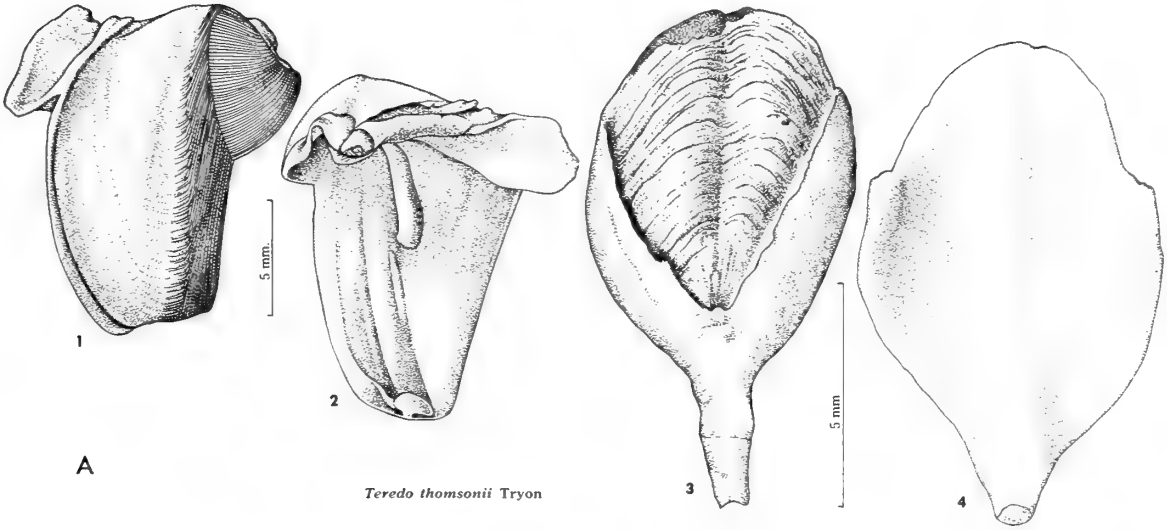
C. *Teredo vincentensis* Bartsch — St. Vincent, Lesser Antilles
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.

Both figures are of the holotype, USNM 17622. Pallets unknown.

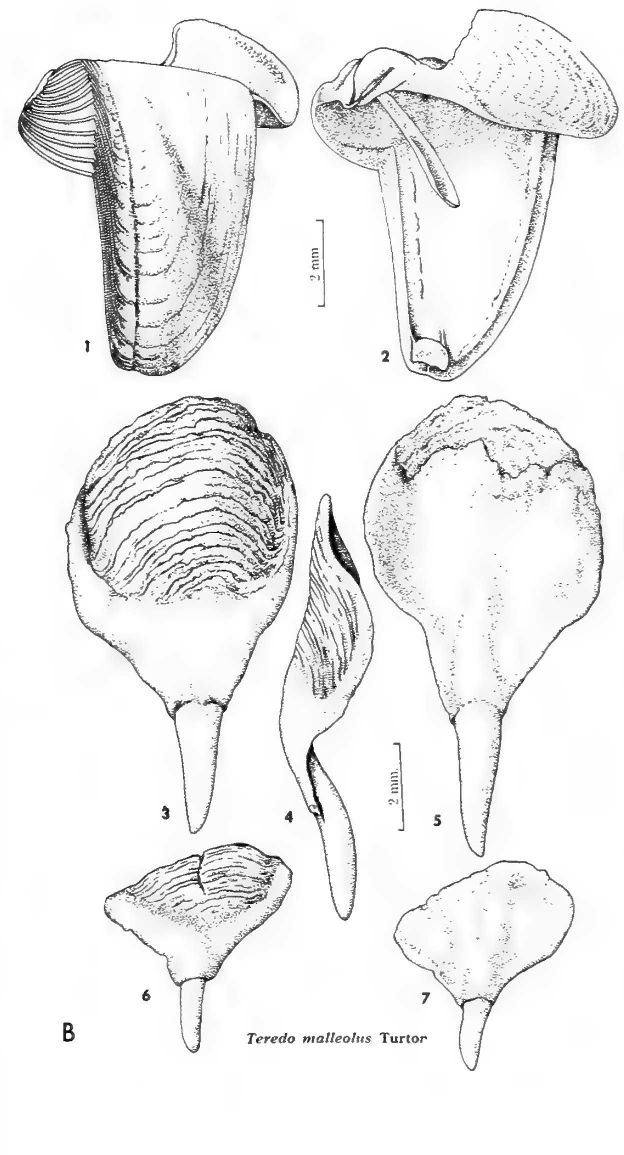
D. *Teredo nana* Turton — Torbay, England
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.

Both figures are of the holotype, USNM 19258.

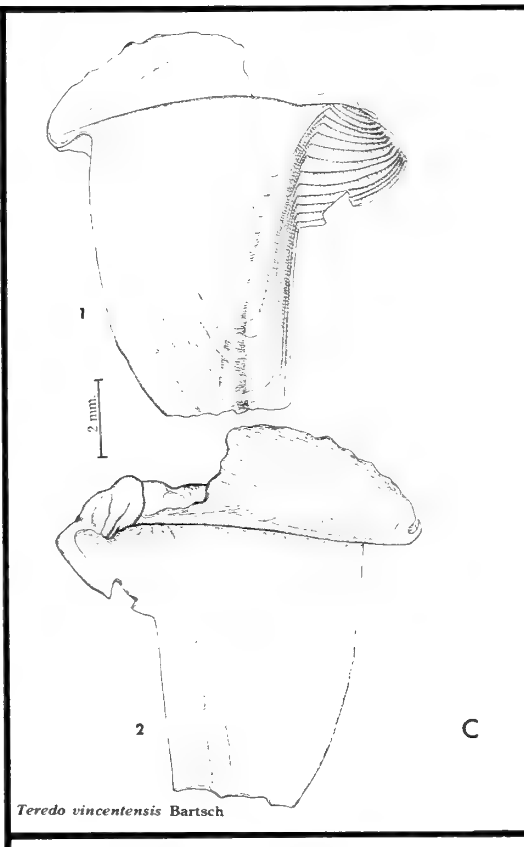
See Catalogue entry for *Teredo megotara* Hanley.



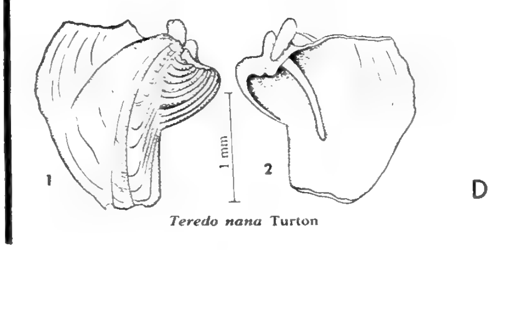
Teredo thomsonii Tryon



Teredo malleolus Turton



Teredo vincentensis Bartsch



Teredo nana Turton

PLATE 21

A. *Teredo petersi* Moll — Kerimba Ids., Mozambique

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3, 5, and 6. Outer faces of pallets.
Figs. 4 and 8. Inner faces of pallets.
Fig. 7. Side view of pallet.

Figures 1-5 are of the lectotype, Berlin Museum, and 6-8 of a paratype, Brussels Museum 12790.

Is *Teredora princesae* (Sivickis).

B. *Teredo alfredensis* van Hoepen — Port Alfred, South Africa

Fig. 1. Inner view of shell.
Fig. 2. Outer view of shell.
Fig. 3. Outer face of pallet.

All figures are of the holotype, copied from van Hoepen 1941, p. 176, pl. 10, figs. 3, 4, 6.

Is probably *Teredora princesae* (Sivickis).

C. *Teredo gazellae* Roch — Malay Archipelago

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Side view of pallet.
Fig. 5. Inner face of pallet.

All figures are of the holotype, Berlin Museum. The pallet is white with a trace of pale yellow periostracum remaining.

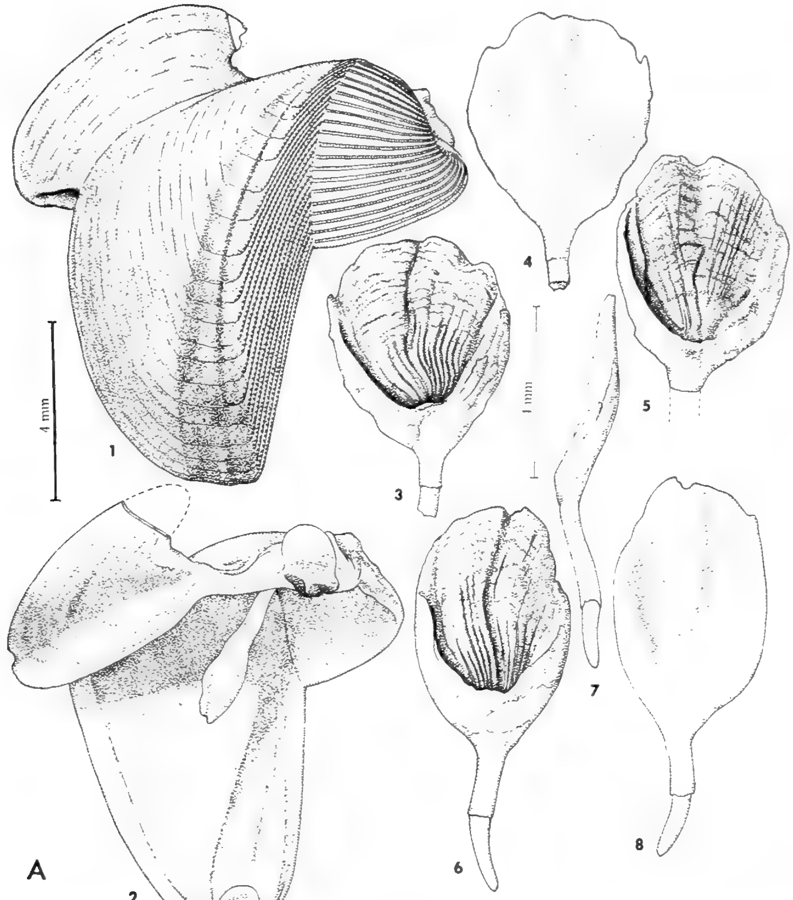
Is *Teredora princesae* (Sivickis).

D. *Teredo diederichseni* Roch — between Manila, Philippine Ids. and Sunda Straits, Java

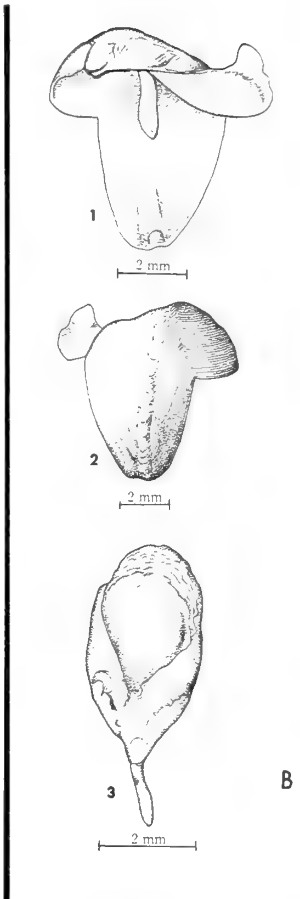
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Side view of pallet.

All figures are of the holotype, Berlin Museum. The remaining patches of periostracum are a pale yellow.

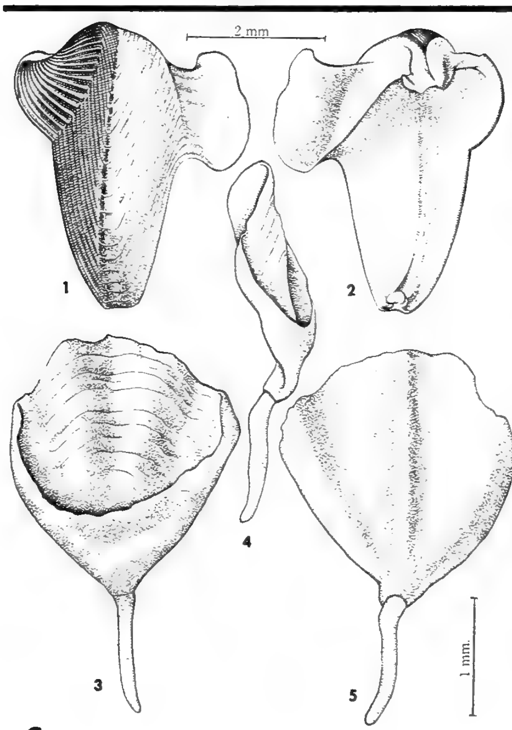
Is *Teredora princesae* (Sivickis).



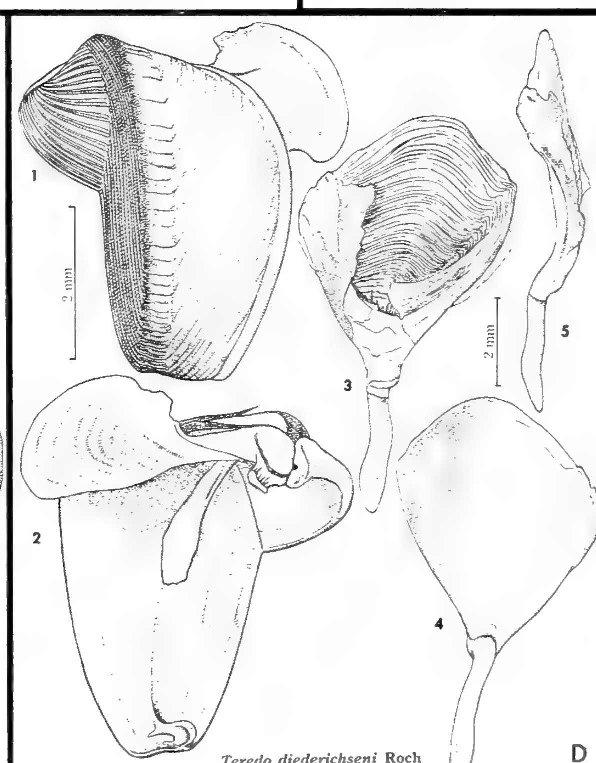
Teredo petersi Moll



Teredo alfredensis van Hoepen



Teredo gazellae Roch



Teredo diederichseni Roch

PLATE 22

A. *Teredo gregoryi* Dall, Bartsch and Rehder — from driftwood, Keaukaha, Hilo, Hawaii
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.
- Fig. 3. Outer face of pallet.
- Fig. 4. Inner face of pallet.
- Fig. 5. Side view of pallet.

All figures are of the holotype, USNM 337316.

Is *Teredora princesae* (Sivickis).

B. *Teredo minori* Nair — from floating log, Madras coast, South India
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.
- Fig. 3. Outer face of pallet.
- Fig. 4. Inner face of pallet.

All figures are of the holotype, copied from Nair (1958, p. 275, figs. 7a-d).

Is young *Teredora princesae* (Sivickis).

C. *Teredo ? escarceoana* Bartsch — *Albatross* sta. 5294, off Escarceo Point, Mindoro, Philippine Ids.
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.

Both figures are of the holotype, USNM 312931. The shell is badly worn and broken. The pallets are unknown.

D. *Teredo ? luzonensis* Bartsch — *Albatross* sta. 5269, off Matocot Point, Luzon, Philippine Is.
- Fig. 1. Inner view of shell.
- Fig. 2. Outer view of shell.

Both figures are of the holotype, USNM 311063. The shell is worn and broken. The pallets are unknown.

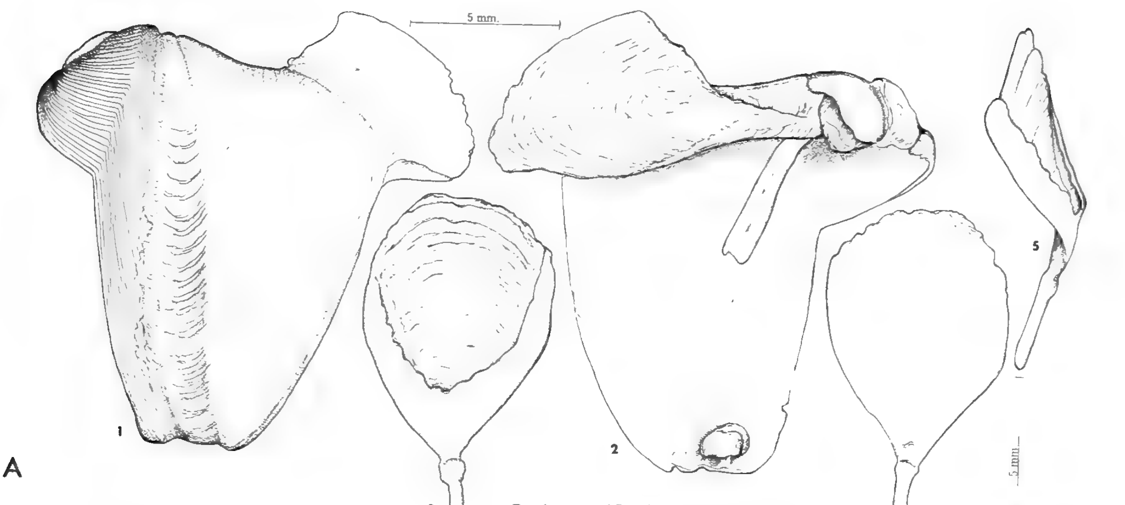
E. *Eoteredo philippinensis* Bartsch — *Albatross* sta. 5243, off Uanivan Id., Pujada Bay, Mindanao, Philippine Ids.
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.

Both figures are of the holotype, USNM 311281. The shells are worn. The pallets are unknown.

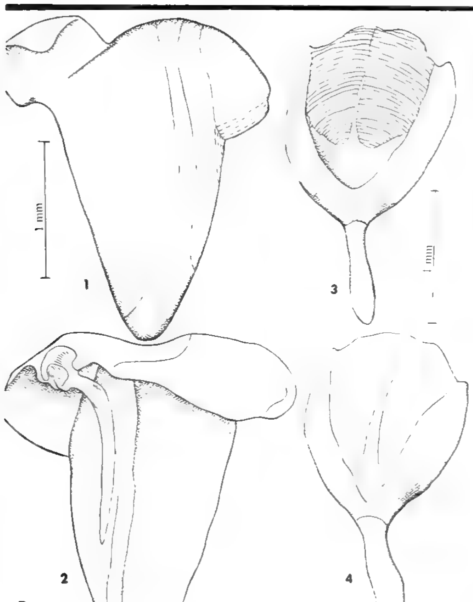
Bartsch established the genus *Eoteredo* on the basis of this specimen because the apophysis arose from beneath the middle of the shelf rather than from the umbo. However, a study of a large series shows this to be an age factor exhibited by species belonging to several genera.

F. *Teredo ? mindoroana* Bartsch — *Albatross* sta. 5294, off Escarceo Point, Mindoro, Philippine Ids.
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.

Both figures are of the holotype, USNM 312933. The shells are worn and broken. The pallets are unknown.

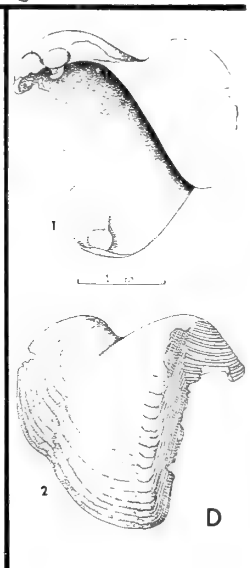


Teredo gregoryi Dall, Bartsch and Rehder

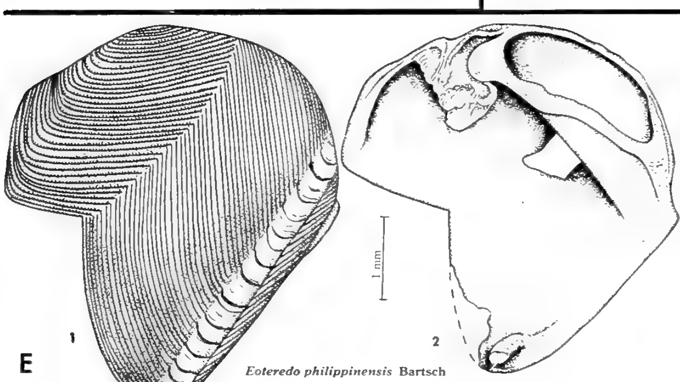


Teredo minori Nair

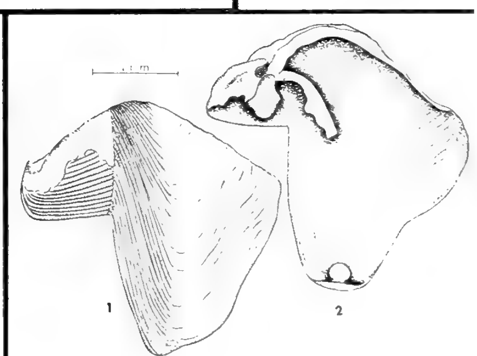
Teredo ? escarceoana Bartsch



Teredo ? luzonensis Bartsch



Eoteredo philippinensis Bartsch



Teredo ? mindoroana Bartsch

PLATE 23

A. *Teredo nucivorus* Spengler — Tranquebar, Madras, India

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Side view of pallet.
Fig. 4. Cluster of tubes (about ½ natural size).

All figures are of the holotype, Copenhagen Museum.

Is *Uperotus clavus* (Gmelin).

B. *Glumebra elegans* Iredale — Green Id., off Cairns, Queensland, Australia

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Cluster of tubes.
Fig. 4. Outer face of pallet.
Fig. 5. Inner face of pallet.
Fig. 6. Side view of pallet.

All figures are of the holotype, copied from Iredale (1936, pl. 2, figs. 22-27). Figures 1-2 (5 ×); Figure 3, slightly reduced; Figures 4-6 (3 ×).

Is *Uperotus clavus* (Gmelin).

C. *Uperotus clavus* Gmelin — Tranquebar, Madras, India

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

A typical specimen in the BM(NH) from the restricted type locality. Pallets are white, nearly devoid of periostracum. This species is usually found living in fruits of *Xylocarpus*.

D. *Fistulana gregata* Lamarck — locality unknown

Figs. 1-4. Characteristic clusters of calcareous tubes (about ½ natural size).

All figures are of specimens in the type series, Paris Museum.

Is *Uperotus clavus* (Gmelin).

E. *Teredo panamensis* Bartsch — *Albatross* sta. 2805, Panama Bay

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Side view of pallet.
Fig. 5. Inner face of pallet.

All figures are of the holotype, USNM 212591.

Is *Uperotus panamensis* (Bartsch).

F. *Teredo lieberkindi* Roch — about 356 miles west of Durnford Point, Rio de Oro, Africa

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 4. Outer faces of pallets.
Fig. 5. Side view of pallet.
Figs. 6 and 7. Inner faces of pallets.

All figures are of the holotype, Copenhagen Museum.

Is possibly *Uperotus panamensis* (Bartsch).

G. *Teredo vattanansis* Nair and Gurumani — from drift log, near Tondi, Vattãnam, Ramnad Dist., South India

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, copied from Nair and Gurumani (1957, p. 175, figs. 1-2).

See under *Teredo rehderi* Nair (Fig. H).

H. *Teredo rehderi* Nair — Madras Coast, India

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, copied from Nair (1956, p. 409, fig. 9a-d).

These two forms, *rehderi* and *vattanansis*, are the young and adult of the same species and are probably only woodboring forms of *Uperotus clavus* (Gmelin).


A
Teredo nucivorus Spengler
1 mm
B
Glumebra elegans Iredale
C
1 mm
D
Fistulana gregata Lamarck
E
1 mm
Teredo panamensis Bartsch
F
1 mm
Teredo lieberkindi Roch
G
1 mm
Teredo vattanansis Nair and Gurumani
H
1 mm
Teredo rehderi Nair

PLATE 24

Nototeredo norvagica (Spengler)

A series of specimens from widely spaced localities to show variation. The southern form has been called *utriculus* Gmelin by some authors, but a study of large series from several localities indicates that there is only one species exhibiting a great deal of ecologic variation which is not geographic in its distribution.

A. From Eupatoria [Koslof], Crimea—Berlin Museum
  Fig. 1. Outer view of shell.
  Fig. 2. Inner view of shell.
  Fig. 3. Inner face of pallet.
  Fig. 4. Outer face of pallet.

B. From Trieste, Italy—Brussels Museum no. 3354
  Fig. 1. Outer view of shell.
  Fig. 2. Inner view of shell.
  Figs. 3 and 5. Outer faces of pallets.
  Figs. 4 and 6. Inner faces of pallets.

C. From Marseilles, France—MCZ no. 225792
  Fig. 1. Outer view of shell.
  Fig. 2. Inner view of shell.
  Fig. 3. Posterior end of animal showing siphons and outer face of pallet.
  Fig. 4. Inner face of pallet.

D. From off the Orkney Islands, Scotland, *Triton* station 10 (59° 40′ N; 7° 21′ W) in 516 fathoms
  Fig. 1. Inner view of shell.
  Fig. 2. Outer view of shell.
  Figs. 3 and 5. Outer faces of pallets.
  Fig. 4. Inner face of pallet.

  A stenomorphic but living specimen from a piece of dredged wood.

E. From Cannes, France
  Fig. 1. Outer view of shell.
  Fig. 2. Inner view of shell.
  Fig. 3. Outer face of pallet.
  Fig. 4. Inner face of pallet.

  This is the specimen referred to by Hanley as *Teredo utriculus* Gmelin. See under *utriculus*.

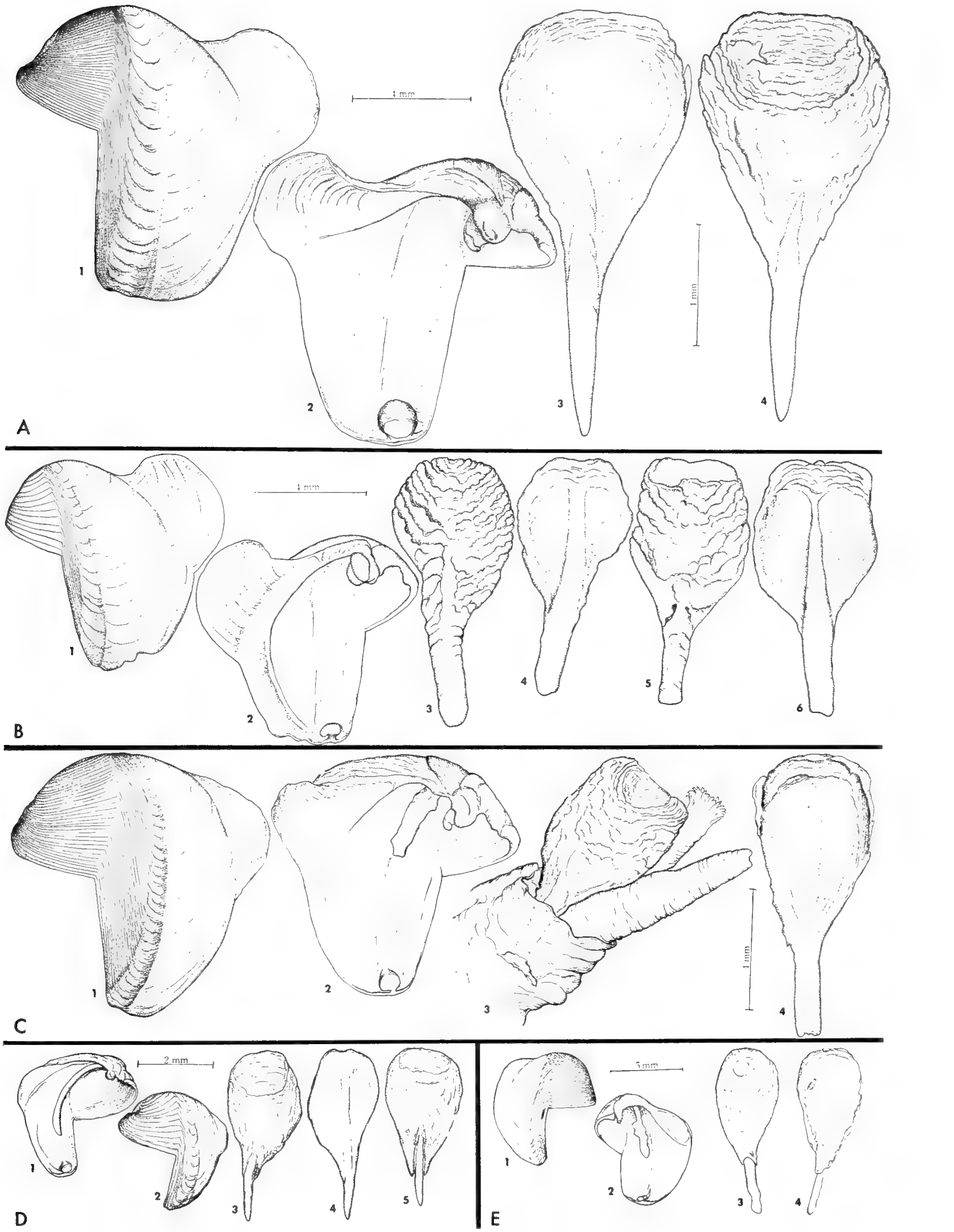

A
B
C
D
E
1 mm
1 mm
2 mm
5 mm

PLATE 25

A. *Teredo megotara* Hanley — Herne Bay, Kent, England

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Anterior view of opposed valves.

All figures are of a lectotype, Hanley collection, BM(NH). No pallets could be found. The shells of this species are characteristic. Figure 3 shows the large auricle extending above the prominent dorsal condyles.

Is *Psiloteredo megotara* (Hanley).

B. *Teredo megotara* Hanley — Lerwick, Scotland

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

This is the specimen figured by Jeffreys in British Conchology **5**, pl. 54, fig. 4. Though no locality was given on the label, it was indicated in the text. The specimen is in the United States National Museum, no. 194275.

Is *Psiloteredo megotara* (Hanley).

C. *Bactronophorus subaustralis* Iredale — Traverston, Burrum River, Queensland, Australia

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Inner face of pallet.
Fig. 4. Outer face of pallet.

All figures are of a paratype, MCZ 229351.

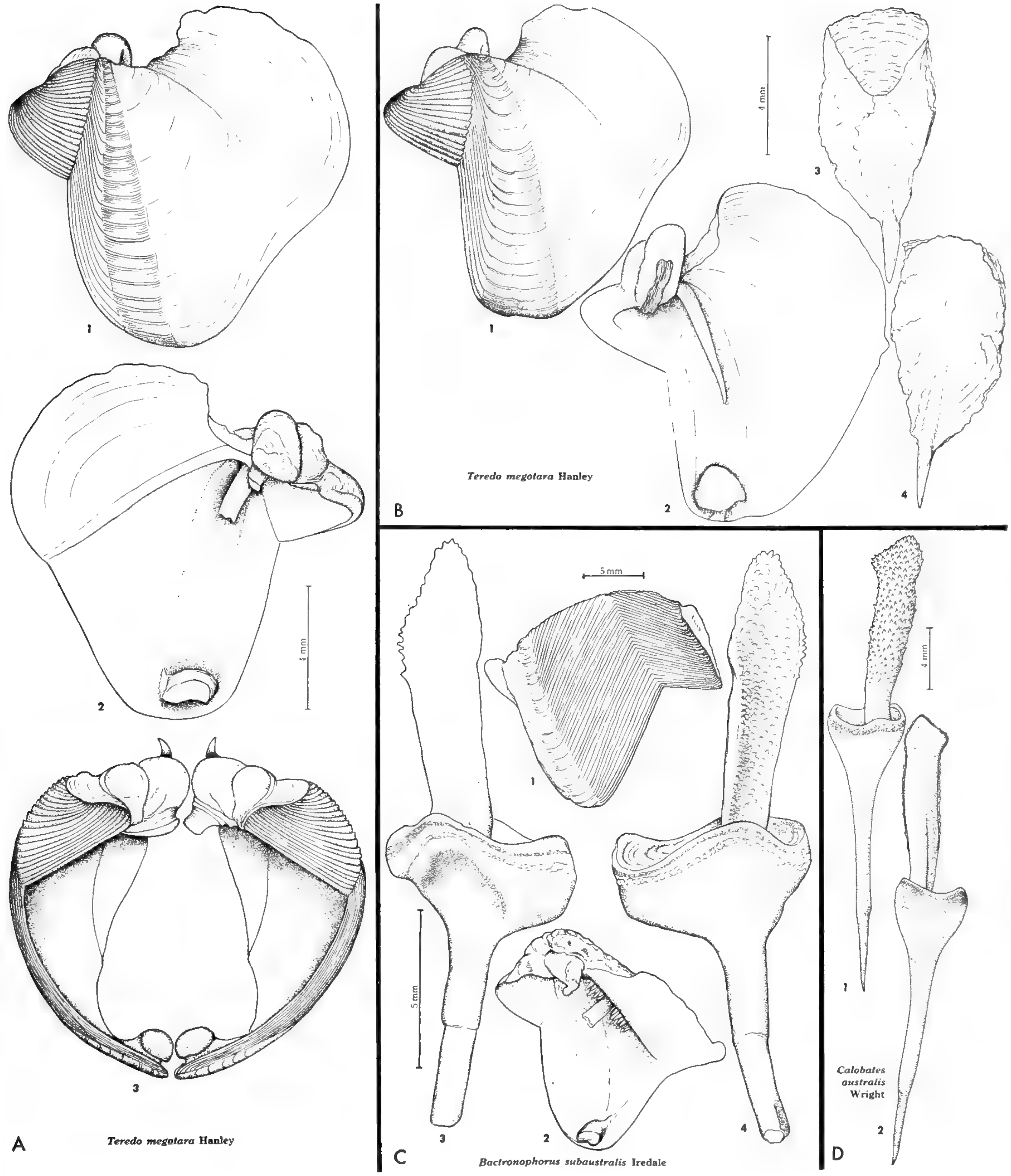
Is *Bactronophorus thoracites* (Gould).

D. *Calobates australis* Wright — Fremantle, Western Australia

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.

Both figures are of the lectotype, BM(NH) 66·4·13·3.

Is *Bactronophorus thoracites* (Gould).



A *Teredo megotara* Hanley

B *Teredo megotara* Hanley

C *Bactronophorus subaustralis* Iredale

D *Calobates australis* Wright

PLATE 26

A. *Teredo megotara excisa* Jeffreys — British Isles
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.
- Fig. 3. Inner face of pallet.
- Fig. 4. Outer face of pallet.

All figures are of the lectotype, USNM 194252 in the Jeffreys collection. Is a deformed specimen.

B. *Teredo navalis* Turton — Torbay, England
- Fig. 1. Inner view of shell.
- Fig. 2. Outer view of shell.
- Fig. 3. Outer face of pallet.
- Fig. 4. Inner face of pallet.
- Fig. 5. Side view of pallet.

All figures are of the lectotype, USNM 194261 from Turton in the Jeffreys collection. Shell and pallets are dry and the periostracum almost gone. Where present it is a pale straw color.

C. *Teredo megotara striatior* Jeffreys — British Isles
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.
- Fig. 3. Outer face of pallet.
- Fig. 4. Inner face of pallet.

All figures are of the lectotype, USNM 194260 in the Jeffreys collection.

D. *Teredo subericola minor* Jeffreys — in cork floats, Aberdeen, Scotland
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.
- Figs. 3 and 5. Outer faces of pallets.
- Figs. 4 and 6. Inner faces of pallets.

All figures are of the lectotype, USNM 194211 in the Jeffreys collection. Is a stenomorphic form.

E. *Teredo megotara mionota* Jeffreys — British Isles
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.
- Fig. 3. Outer face of pallet.
- Fig. 4. Inner face of pallet.

All figures are of the lectotype, USNM 194218, in the Jeffreys collection.

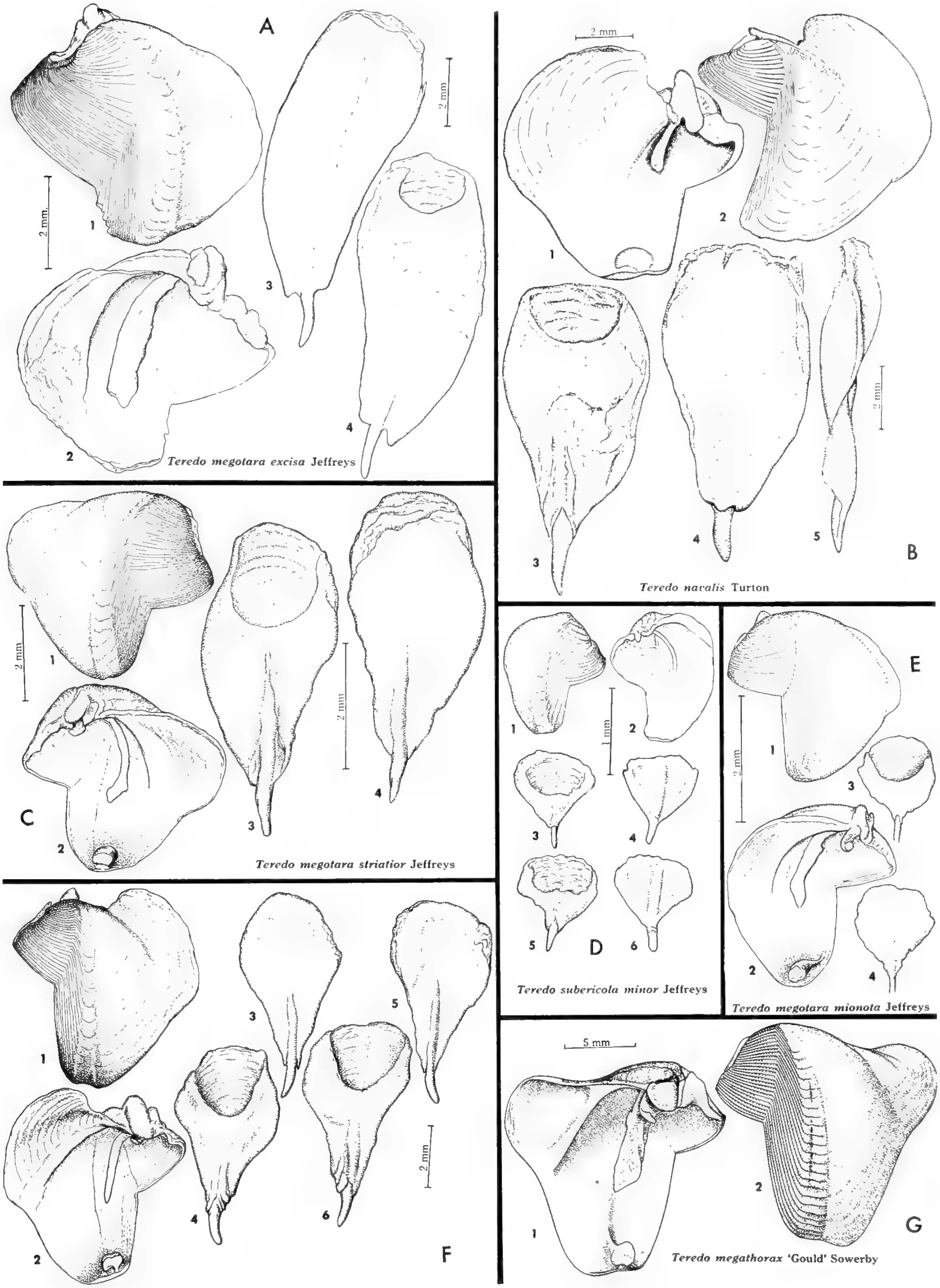
F. *Teredo subericola* Jeffreys — from driftwood, Guernsey, England
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.
- Figs. 3 and 5. Inner faces of pallets.
- Figs. 4 and 6. Outer faces of pallets.

All figures are of the lectotype, USNM 194264 in the Jeffreys collection.

Species A-F are now synonymized with *Psiloteredo megotara* (Hanley), and exhibit tremendous variation due to age and ecologic conditions.

G. *Teredo megathorax* 'Gould' Sowerby — North America
- Fig. 1. Inner view of shell.
- Fig. 2. Outer view of shell.

Both figures are of the holotype, BM(NH), Cuming collection. Pallets unknown.



A. *Teredo megotara excisa* Jeffreys

B. *Teredo navalis* Turton

C. *Teredo megotara striatior* Jeffreys

D. *Teredo subericola minor* Jeffreys

E. *Teredo megotara mionota* Jeffreys

F.

G. *Teredo megathorax* 'Gould' Sowerby

PLATE 27

A. *Teredo denticulata* 'Gray' Sowerby — Britain ?

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Posterior end of the tube in wood.
Figs. 4 and 6. Outer faces of pallets.
Figs. 5 and 7. Inner faces of pallets.

All figures are of the holotype, BM(NH), Cuming collection. The pallets are dry, very chalky and exfoliating, with only bits of golden brown periostracum remaining. The stalks show faint longitudinal striae.

B. *Teredo dilatata* Stimpson — Lynn, Massachusetts

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.

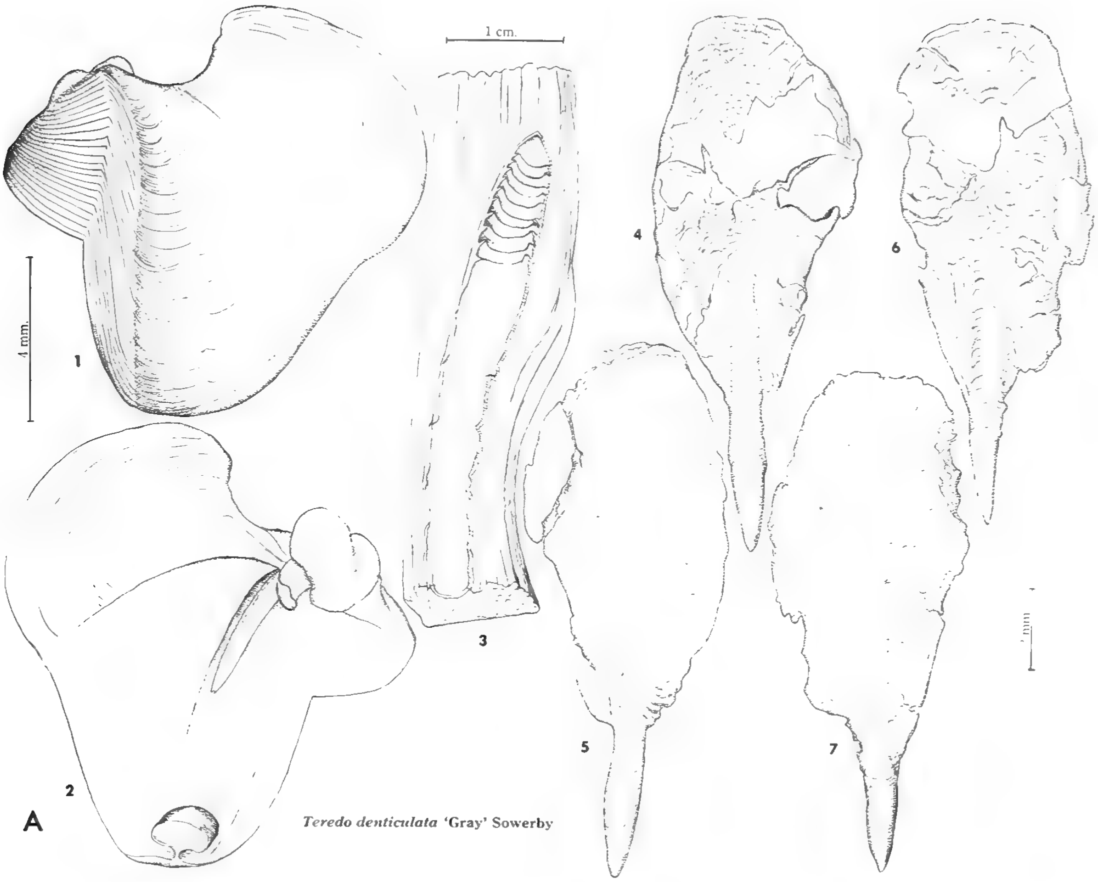
All figures are of the holotype, ANSP 50985. The pallet is chalky white and scaling, with no sign of periostracum. Only the outer face could be illustrated, as the specimen was glued to a card and was too fragile to remove.

C. *Teredo denticulata* 'Gray' Fischer — Greenland

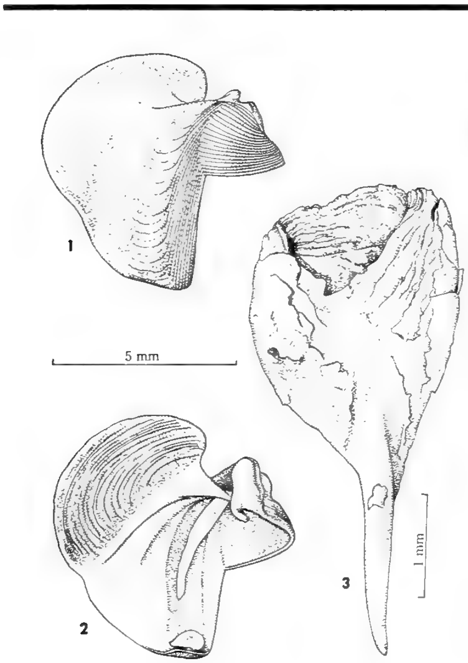
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, BM(NH) 43·6·30·395. Pallet old, dry and exfoliated.

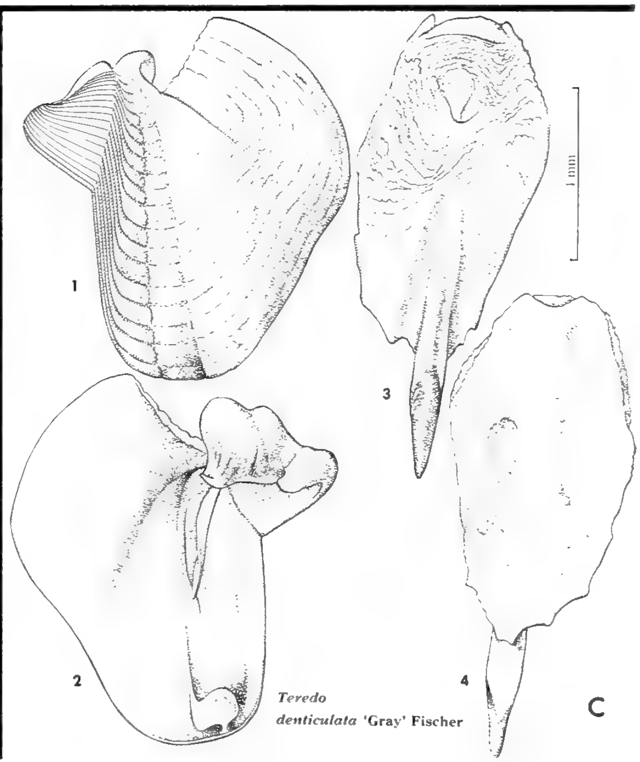
All of the species figured on this plate are now synonymized with *Psiloteredo megotara* (Hanley).



A *Teredo denticulata* 'Gray' Sowerby



B *Teredo dilatata* Stimpson



C *Teredo denticulata* 'Gray' Fischer

PLATE 28

A. *Teredo bisiphites* 'Lesueur' Roch — St. Thomas, Virgin Ids.

Figs. 1 and 2. Outer faces of pallets.
Figs. 3 and 4. Inner faces of pallets.
Fig. 5. Outer view of shell.
Fig. 6. Inner view of shell.

All figures are of the holotype, Copenhagen Museum. Pallets dried and exfoliating. Periostracum covering the pallets is yellow to golden brown in color.

B. *Teredo stimpsoni* Bartsch — Charleston, South Carolina

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Side view of pallet.
Fig. 4. Inner view of shell.
Fig. 5. Outer view of shell.

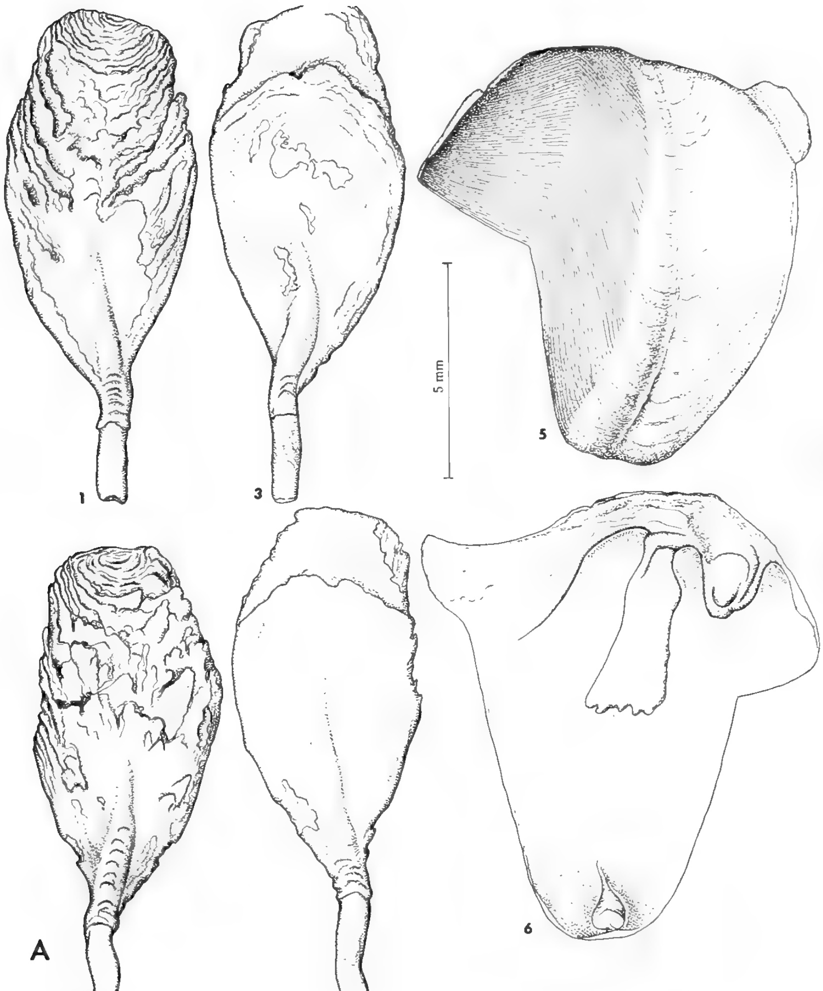
All figures are of the holotype, USNM 27461. Specimen dry and exfoliating. Pallets covered with a golden periostracum which is rather heavy on the inner face. The shells are also covered by a yellow periostracum over most of the posterior region.

C. *Teredo tryoni* Bartsch — Cedar Keys, Florida

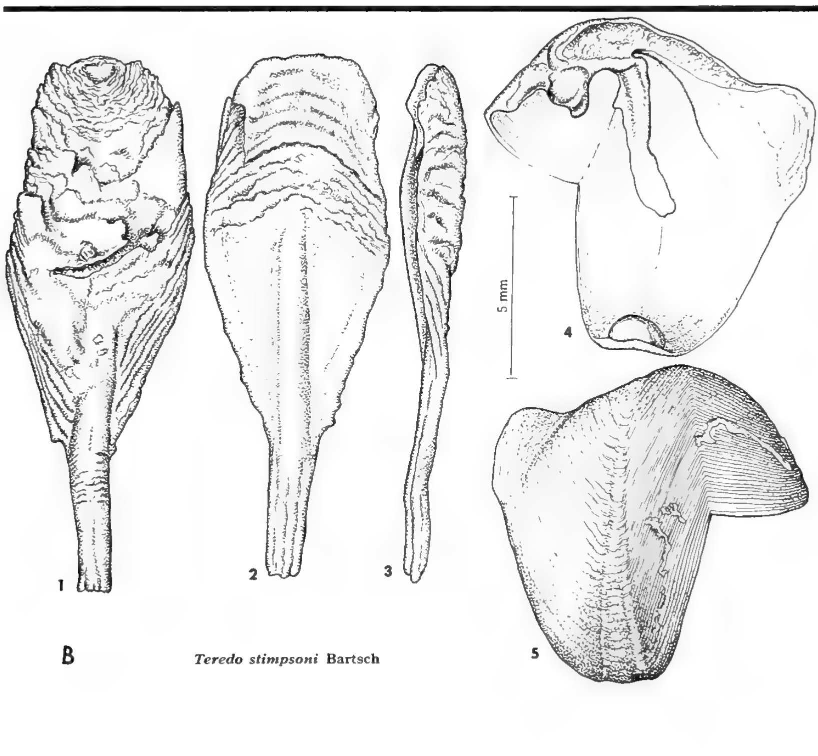
Fig. 1. Outer face of pallet.
Fig. 2. Side view of pallet.
Fig. 3. Inner face of pallet.
Fig. 4. Outer view of shell.
Fig. 5. Inner view of shell.

All figures are of the holotype, USNM 36046a. A pale yellow periostracum covers the distal end of the pallets, the outer face of which is exfoliating.

All of the species figured on this plate are now synonymized with *Nototeredo knoxi* (Bartsch).



Teredo bisiphites 'Lesueur' Roch



Teredo stimpsoni Bartsch

Teredo tryoni Bartsch

PLATE 29

A. *Teredo congoensis* Roch — Belgian Congo

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Side view of pallet.
Figs. 4 and 6. Outer faces of pallets.
Figs. 5 and 7. Inner faces of pallets.

Figures 1-5 are of the lectotype and 6-7 of a paratype, all Berlin Museum. A pale yellow periostracum covers the outer face of the blade.

Is *Nototeredo knoxi* (Bartsch).

B. *Psiloteredo kirai* Taki and Habe — Shikoku, Japan

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of a paratype, USNM 596195. The outer surface of the blade is quite smooth and devoid of periostracum.

Is *Nototeredo edax* (Hedley)

C. *Teredo batavus* Spengler — Holland

Fig. 1. Inner view of shell.
Fig. 2. Outer view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

The shells of the holotype are in the Copenhagen Museum, but the pallets are missing, so that Figures 3-4 were copied from Spengler (1792, pl. 2, fig. c).

Is *Teredo navalis* Linnaeus.

D. *Teredo senex* Lamy — Red Sea

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.

Both figures are of the holotype, Paris Museum. This was the only lot in the collection of the Paris Museum labeled as *senex* in Jousseaume's hand, as mentioned by Lamy.

E. *Teredo norvagicus* Spengler — Friedriksvaernshavn, Norway

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, copied from Spengler (1792, pl. 2, figs. 5, 6 and B).

Is *Nototeredo norvagica* (Spengler).

F. *Teredo miliacea* Lamy — Aden

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.

Both figures are of the holotype, Paris Museum. Pallets unknown.

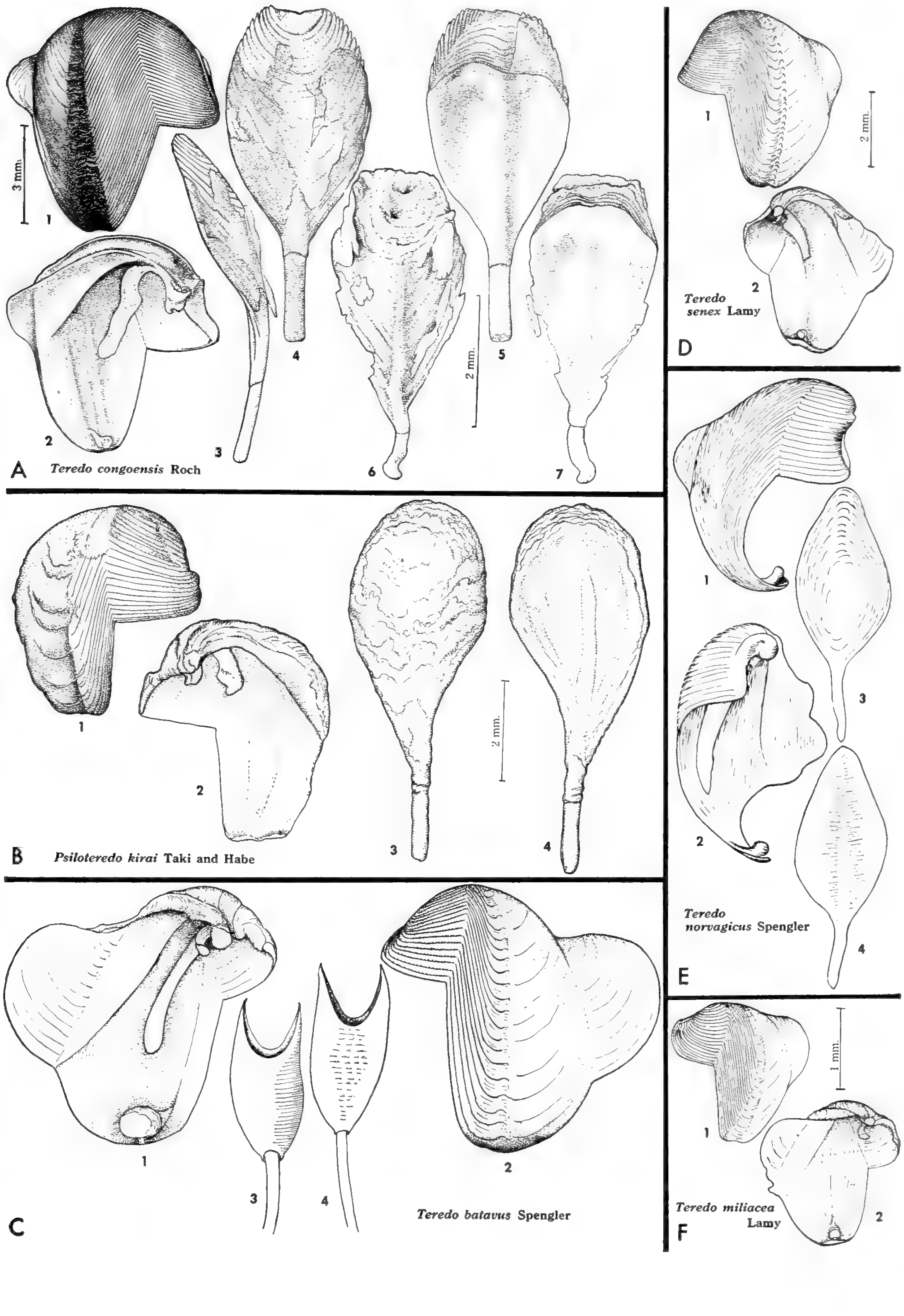

3 mm.
2 mm.
A Teredo congoensis Roch
B Psiloteredo kirai Taki and Habe
C Teredo batavus Spengler
D Teredo senex Lamy
E Teredo norvagicus Spengler
1 mm.
F Teredo miliacea Lamy

PLATE 30

A. *Teredo knoxi* Bartsch — Guantanamo Bay, Cuba

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Side view of pallet.
Fig. 4. Outer face of pallet.
Fig. 5. Inner face of pallet.

All figures are of the holotype, USNM 216919. The specimen is dry and the pale straw colored periostracum covering the outer face and distal portion of the inner face of the pallets is peeling off.

B. *Teredo jamaicensis* Bartsch — Jamaica

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Side view of pallet.

All figures are of the holotype, USNM 194283. The pallets are dry, chalky and badly flaking.

C. *Teredo sigerfoosi* Bartsch — Beaufort, North Carolina

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.

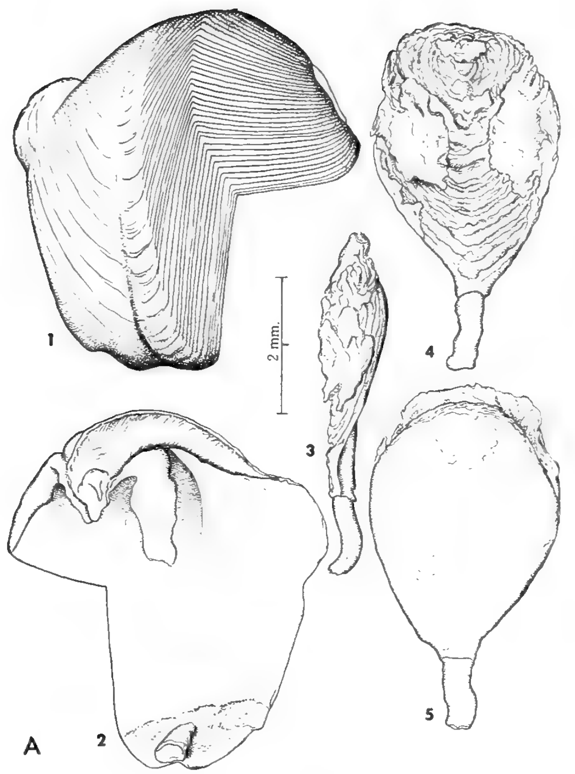
All figures are of the holotype, USNM 345357. Pallets are covered with a very thin straw colored periostracum which is peeling off.

D. *Teredo rosifolia* Moll — Piedade, 15 km S of Recife, Brasil

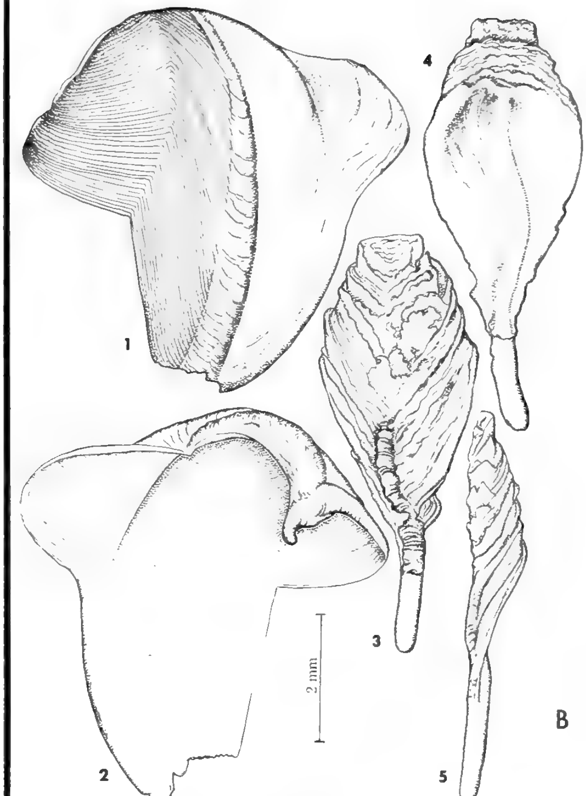
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3. and 4. Outer faces of pallets.
Figs. 5. and 6. Inner faces of pallets.

Figures 1-3, 6 are of the lectotype and 4-5 of a paratype, all Berlin Museum. Specimen dry and deteriorated. Pallets covered with patches of pale straw colored to reddish brown periostracum.

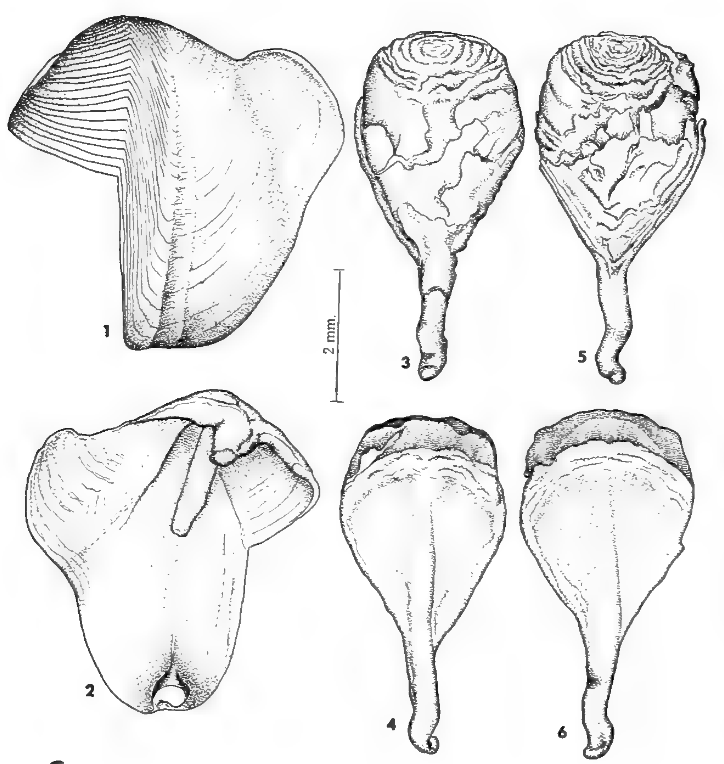
All of the species figured on this plate are now considered *Nototeredo knoxi* (Bartsch).



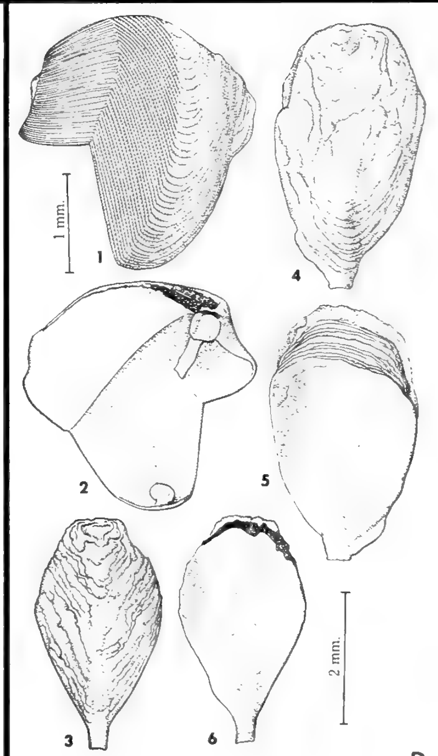
Teredo knoxi Bartsch



Teredo jamaicensis Bartsch



Teredo sigerfoosi Bartsch



Teredo rosifolia Moll

PLATE 31

A. *Teredo edax* Hedley — Lago Bay, N of Port Adelaide, South Australia

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of a paratype, BM(NH) 1904·5·10·80, which is dry and exfoliating. Greenish yellow periostracum covers the anterior portion of the shell. Periostracum on the pallets a pale straw color where present.

B. *Nototeredo remifer* Iredale — Darling Harbour, Port Jackson, New South Wales, Australia

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Posterior end of young specimen with the pallets in place showing the fringe of the periostracal covering which extends beyond the calcareous portion of the pallet.

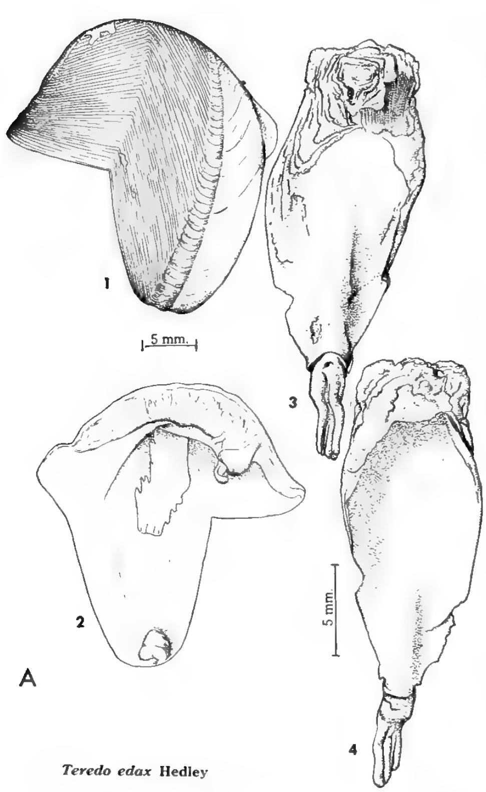
All figures are of paratypes, MCZ 229514. In adult specimens only patches of periostracum remain.

C. *Teredo juttingae* Roch — Rhiouw-Archipel, Sumatra

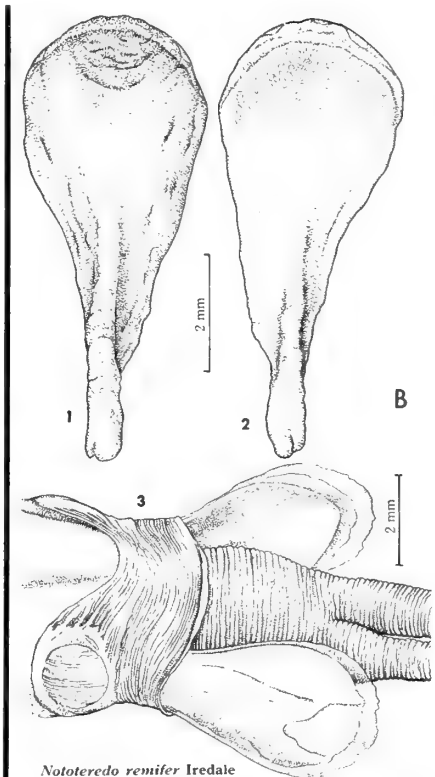
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 4. Outer faces of pallets.
Figs. 5 and 6. Inner faces of pallets.

All figures are of the holotype, Leiden Museum. Specimen dry, the pallets chalky white, pitted, exfoliating and with little or no periostracum. The type lot is from a population having broad, rounded pallets. Other lots from Sumatra are typical elongate *edax*.

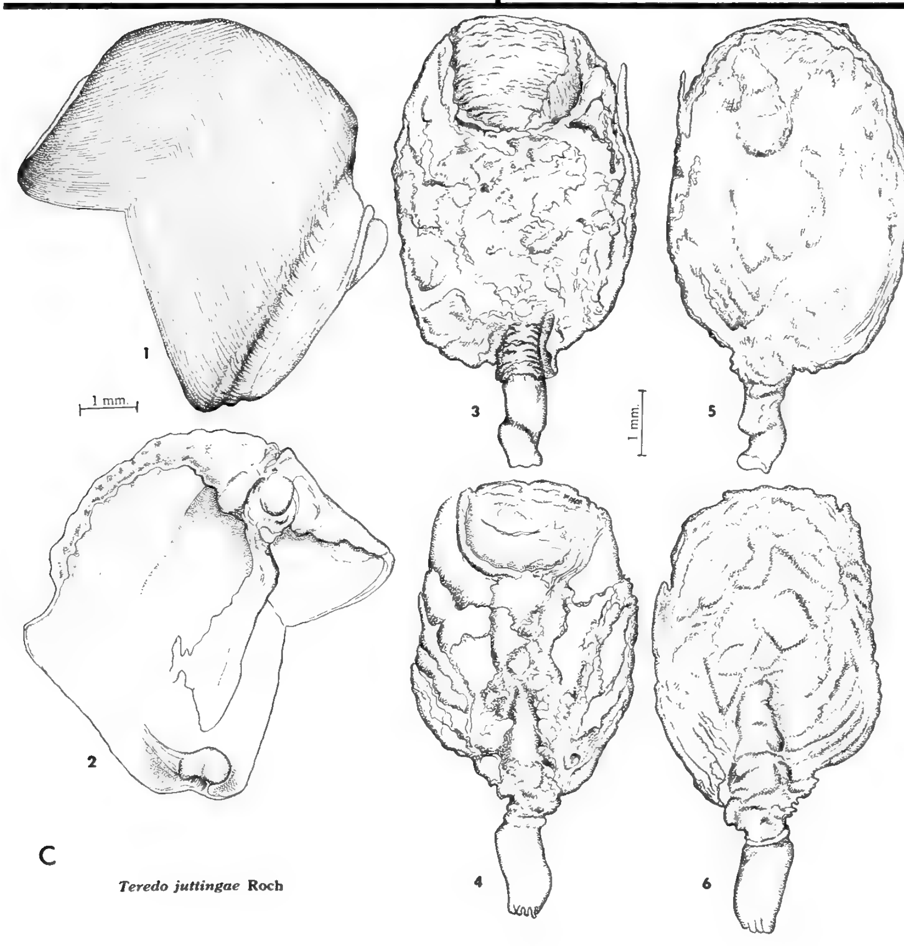
All of the species figured on this plate are now considered *Nototeredo edax* (Hedley).



Teredo edax Hedley



Nototeredo remifer Iredale



Teredo juttingae Roch

PLATE 32

A. *Teredo senegalensis* Blainville — Sénégal

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Side view of pallet.

All figures are of the holotype, Adanson collection, Paris Museum. There are no shells and the pallets are dry. Though the specimens are old they are in good condition and a dark, straw-brown periostracum is present in patches on the outer face.

Is *Psiloteredo senegalensis* (Blainville). See also Plate 33 C.

B. *Teredo adami* Moll — Marigot de Diabakar, Sénégal

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.

Figures 1-4 are of the holotype and 5-6 of a paratype, all Brussels Museum. The specimen is dry, the pallets worn nearly smooth. See discussion under *adami* Moll.

Is a malformed *Psiloteredo senegalensis* (Blainville).

C. *Teredo reynei* Bartsch — Paramaribo, Dutch Guiana [Surinam]

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Side view of pallet.

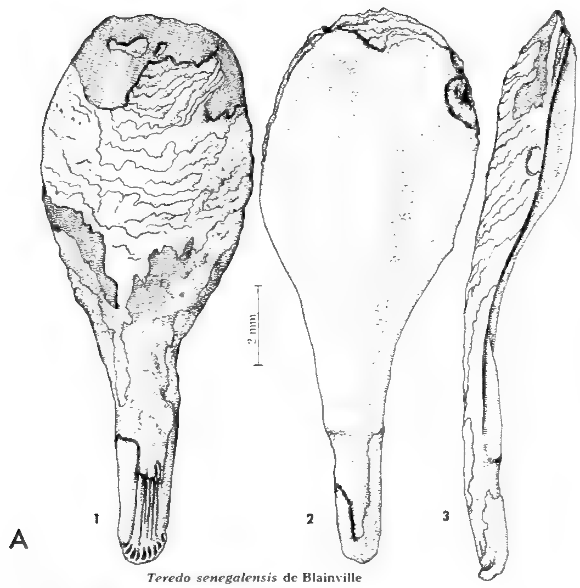
All figures are of the holotype, USNM 338240. An old dry specimen in poor condition. The pallet is heavy and massive with a slight indentation at the distal end and with fragments of a red-brown periostracum remaining. See also pages 23, 44 and Figures 6 A and 8 A.

Is *Neoteredo reynei* (Bartsch).

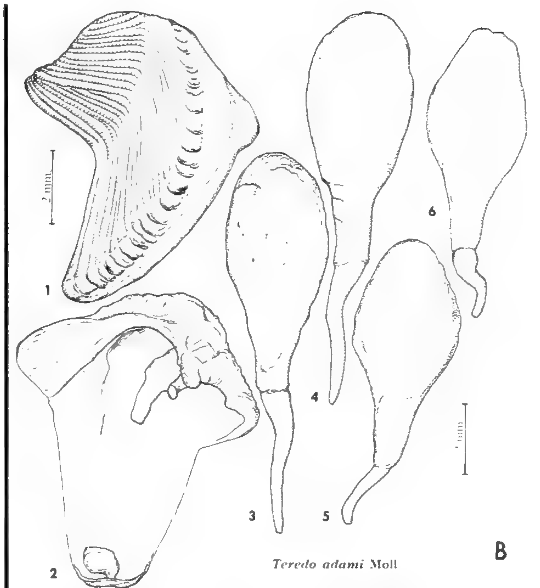
D. *Teredo miraflora* Bartsch — Mira Flores Lake, Pedro Miguel, Canal Zone, Panama

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.

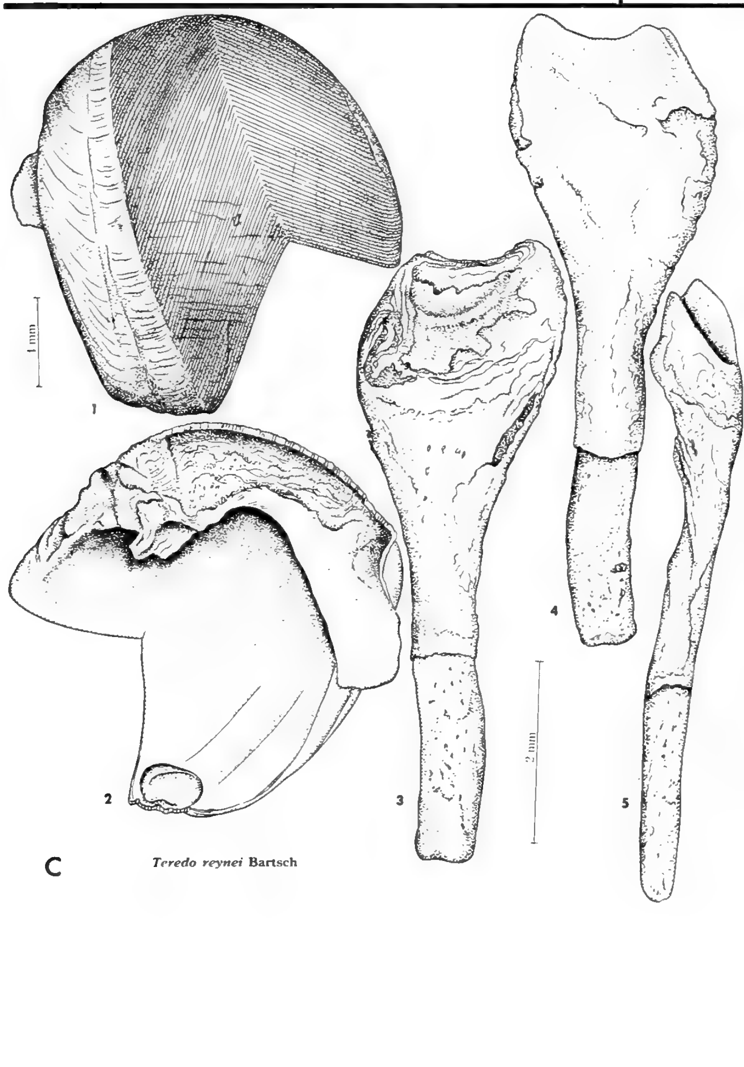
Both figures are of the holotype, USNM 344661. This species was described on the basis of shells only. See notes in the Catalogue.



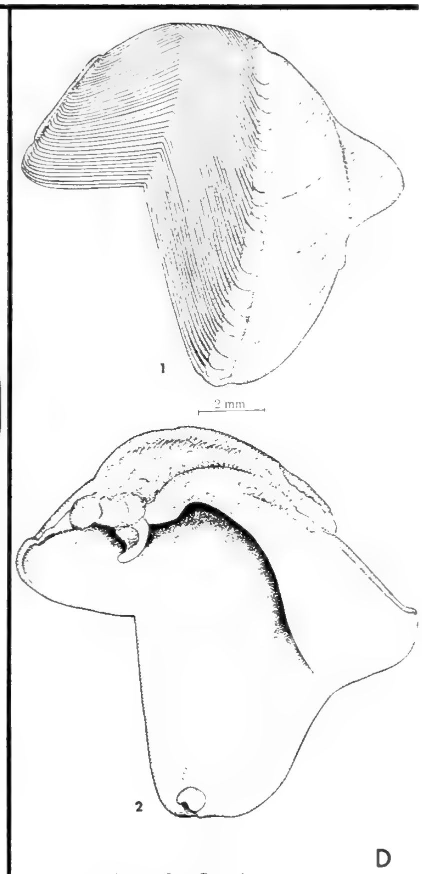
Teredo senegalensis de Blainville



Teredo adami Moll



Teredo reynei Bartsch



Teredo miraflora Bartsch

PLATE 33

A. *Teredo healdi* Bartsch — Cabimas, 20 mi SE of Maracaibo, Venezuela

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 6. Outer faces of pallets.
Figs. 4 and 7. Inner faces of pallets.
Figs. 5 and 8. Side views of pallets.

All figures are of the holotype, USNM 381921. The pallets are dry and badly deteriorating. A pale yellow periostracum covers the stalk of the pallet and the posterior portion of the shell. The pallets appear close to those of *Neoteredo reynei* (Bartsch), but the animal is a pale ivory rather than dark gray in color and lacks the dorsal lappets at the posterior end of the body.

Is *Psiloteredo healdi* (Bartsch).

B. *Teredo divaricata* 'Deshayes' Fischer — Sicily

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.
Fig. 5. Side view of pallet.

All figures are of the holotype, Paris Museum. The distal ends of the pallets are worn, smooth and white.

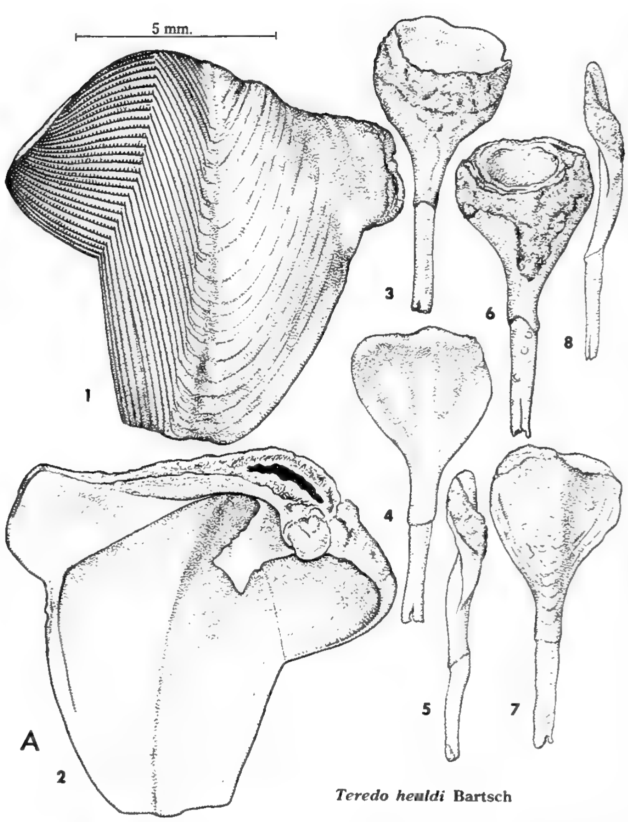
Is an abnormal specimen of *Nototeredo norvagica* (Spengler).

C. *Teredo senegalensis,* form *petitii* Récluz — St. Louis, Sénégal

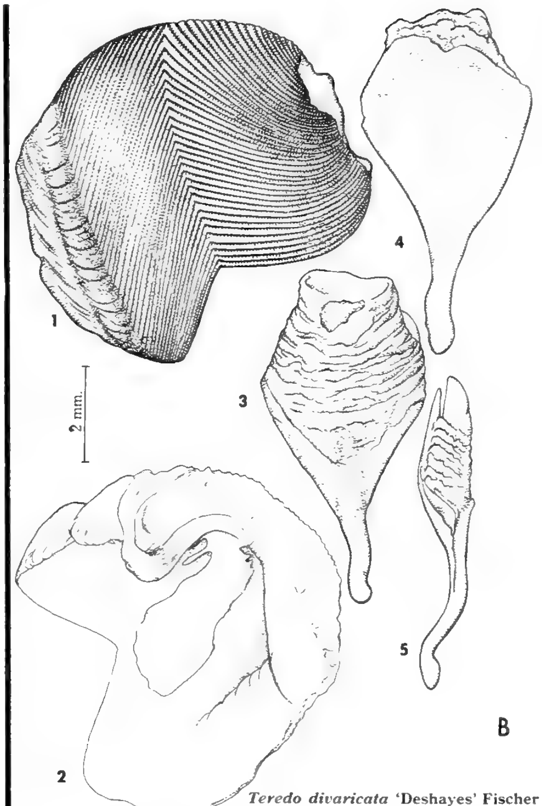
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3, 5, 7, 9 and 11. Outer faces of pallets.
Figs. 4, 6, 8, 10 and 12. Inner faces of pallets.

This collection in the Paris Museum is the material used by Monod (1952) to demonstrate the change and variation in the pallets of *Teredo senegalensis* Blainville, of which *petitii* is a young and ecologic form. The type specimen of *petitii* Récluz is apparently lost.

Is *Psiloteredo senegalensis* (Blainville).



Teredo heuldi Bartsch



Teredo divaricata 'Deshayes' Fischer

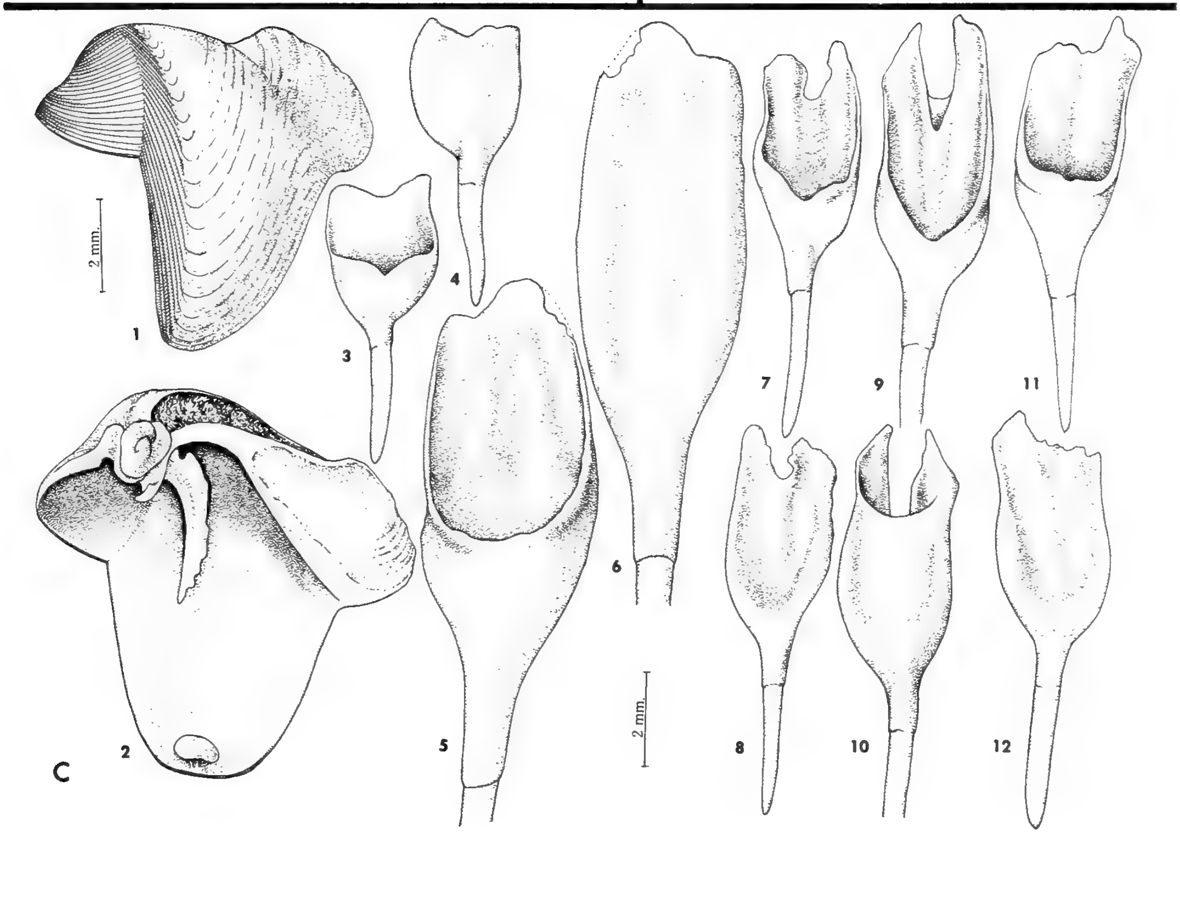


PLATE 34

A. *Teredo obtusa* Sivickis — Sir J. Brooke Point, Palawan, Philippine Ids.
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3, 5 and 7. Inner faces of pallets.
Figs. 4, 6 and 8. Outer faces of pallets.

All figures are of syntypes and are drawn from the photographs by Sivickis (1928, pl. 2, fig. 9).

Is *Spathoteredo obtusa* (Sivickis).

B. *Teredo princesae* Sivickis — Puerto Princesa, Palawan, Philippine Ids.
Fig. 1. Outer view of shell.
Figs. 2-5. Outer faces of pallets.

All figures are of syntypes and are drawn from the photographs by Sivickis (1928, pl. 2, fig. 11).

Is *Teredora princesae* (Sivickis).

C. *Teredo variegata* Sivickis — Cebu, Philippine Ids.
Fig. 1. Outer view of shell.
Fig. 2. Outer face of pallet.
Fig. 3. Inner face of pallet.

All figures are of the holotype and are drawn from the photographs by Sivickis (1928, pl. 2, fig. 10).

Is a small specimen of *Spathoteredo obtusa* (Sivickis).

D. *Bankia roonwali* Rajagopalaiengar — Sajnakhali, Sundarbans, West Bengal, India
Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.

Both figures are of a paratype, MCZ 170838, received from Rajagopalaiengar, Zoological Survey of India, Calcutta.

Is *Bankia rochi* Moll.

E. *Bankia syriaca* Roch — Jaffa, Israel
Figs. 1 and 3. Outer faces of pallets.
Figs. 2 and 4. Inner faces of pallets.
Fig. 5. Enlargement of cones to show periostracal border.

Figures 1-2 are of the lectotype, MCZ 170749, and 3-5 of a paratype, MCZ 170678.

Is *Bankia carinata* (Gray).

F. *Teredo lanceolata* Moll — probably Tanganyika
Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Side view of pallet.

All figures are of the holotype, MCZ 170752.

Is *Teredothyra smithi* (Bartsch).

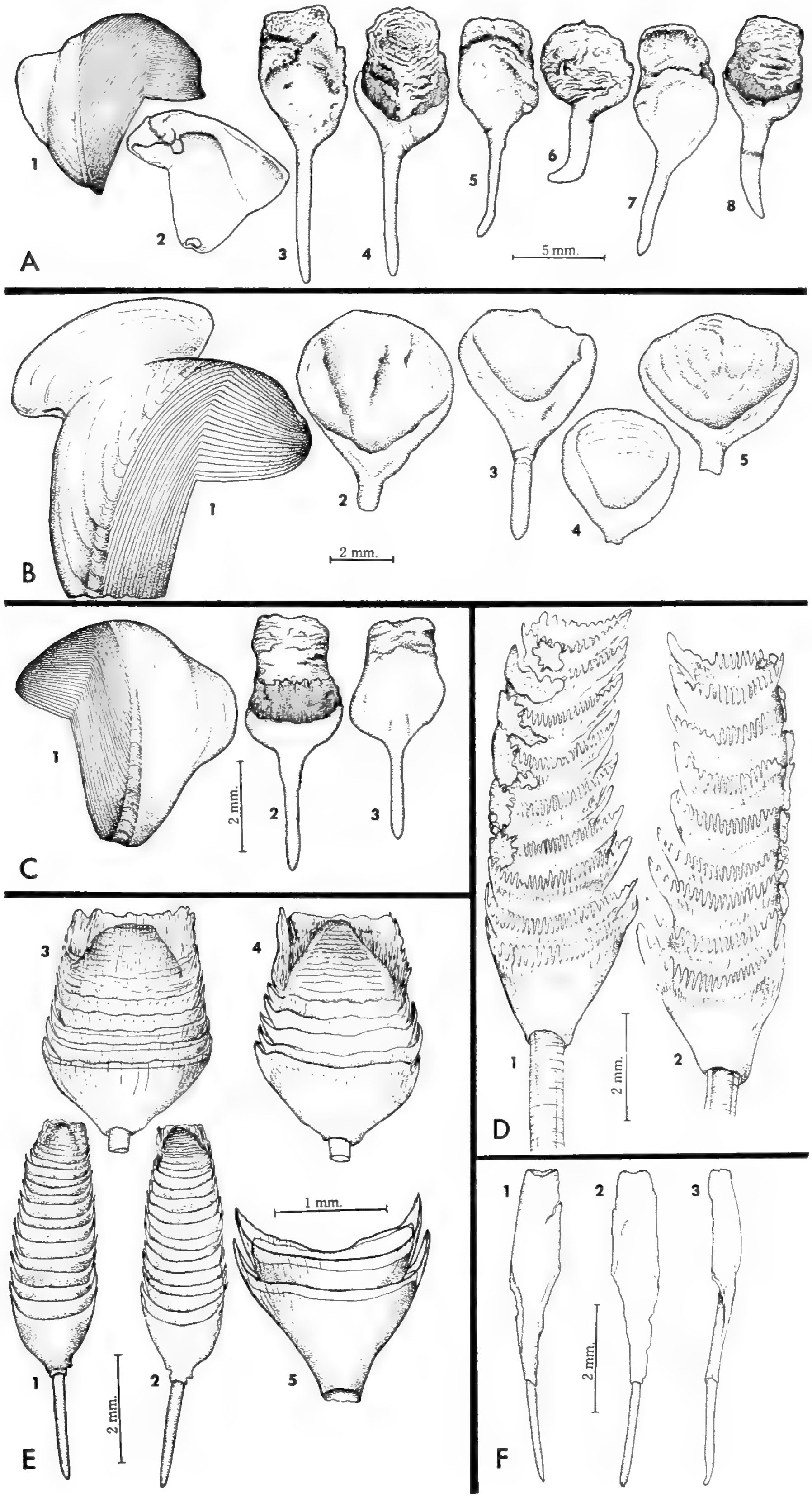

A
1
2
3
4
5
6
7
8
5 mm.
B
1
2
3
4
5
2 mm.
C
1
2
3
2 mm.
D
1
2
2 mm.
E
1
2
3
4
5
1 mm.
2 mm.
F
1
2
3
2 mm.

PLATE 35

A. *Dicyathifer caroli* Iredale — Mouth of Brisbane River, Queensland, Australia

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

All figures are of a paratype, MCZ 168012. The specimen was taken from gray mangrove. A mahogany colored band encircles the blade of the pallet near the distal end.

Is *Dicyathifer manni* (Wright).

B. *Teredo murrayi* Moll — Christmas Id., off Java

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Side view of pallet.

All figures are of the holotype, BM(NH) 1909·5·7·38. Shells unknown. The blade of the pallets is covered by a golden-brown colored periostracum marked by growth lines, and the distal portion is covered by a pustulose, calcareous incrustation. Though the specimen was not labeled as a type by Moll, there is no question that it is the specimen which he figured.

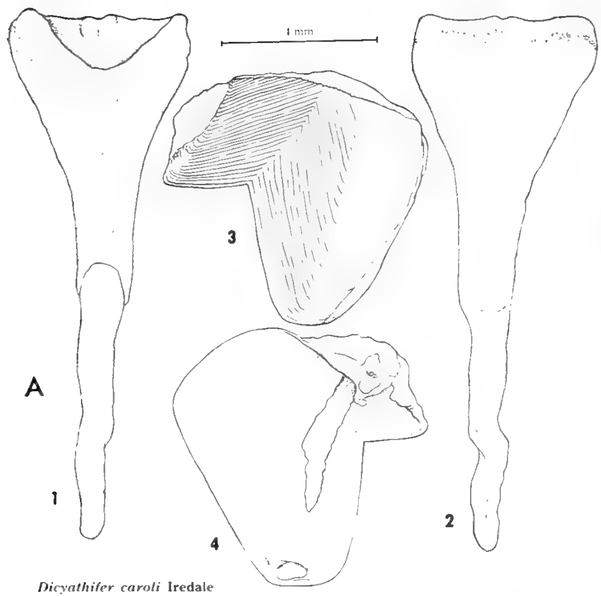
Is *Spathoteredo obtusa* (Sivickis).

C. *Teredo bataviana* Moll and Roch — Batavia [Djakarta, Java]

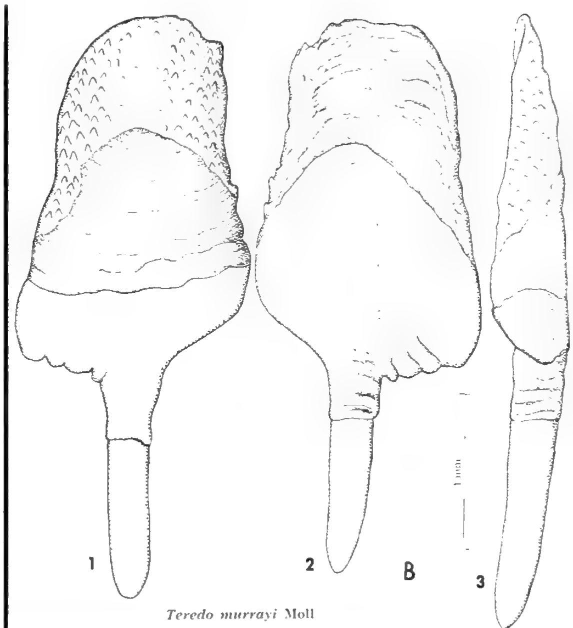
Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Side view of pallet.
Fig. 4. Outer view of shell.
Fig. 5. Inner view of shell.
Fig. 6. Anterior view of shell.
Fig. 7. Posterior view of shell.

All figures are of the holotype of *Teredo batavus* Sowerby 1878 [*non* Spengler 1792], which Moll and Roch renamed *bataviana* (BM(NH) 50·2·26·40). Periostracum on the central portion of the pallet is a golden brown in color. The distal portion of the pallet is eroded.

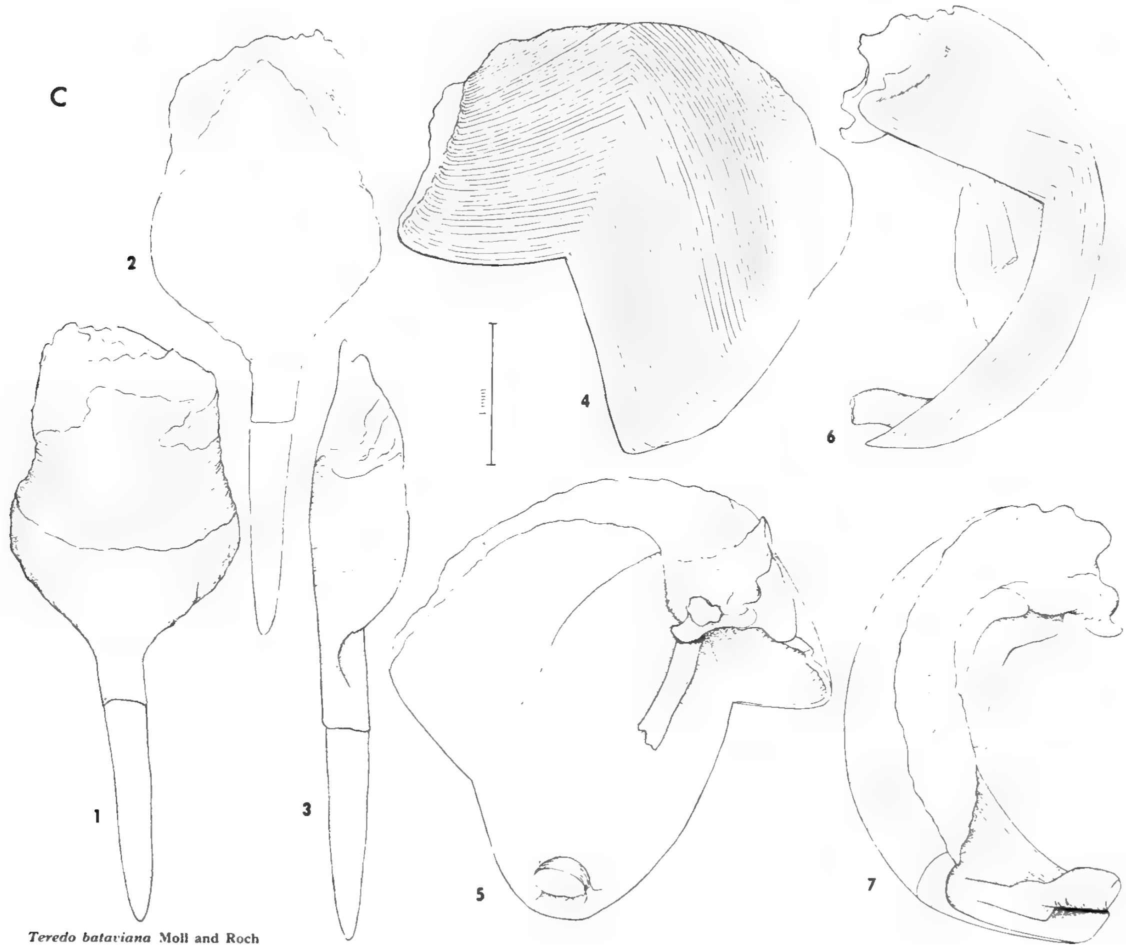
Is *Spathoteredo obtusa* (Sivickis).



Dicyathifer caroli Iredale



Teredo murrayi Moll



Teredo bataviana Moll and Roch

PLATE 36

A. *Teredo spatha* Jeffreys — from driftwood, Guernsey, England

Fig. 1. Anterior view of shell.
Fig. 2. Outer view of shell.
Fig. 3. Inner view of shell.
Figs. 4 and 6. Outer faces of pallets.
Fig. 5. Side view of pallet.
Fig. 7. Inner face of pallet.

All figures are of the lectotype, USNM 194272 in the Jeffreys collection. Shell with a heavy red-brown periostracum. Pallets with a band of periostracum on the median area of the outer face, the upper portions of the blade covered with a whitish papillose calcareous deposit. The dark color of the periostracum may be due to the wood (a cedar) into which the shipworm was boring.

Is *Spathoteredo spatha* (Jeffreys).

B. *Teredo semoni* Moll — Amboina, Molucca Ids., Indonesia

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Side view of pallet.
Fig. 5. Inner face of pallet.

All figures are of the holotype of *Teredo clava* van Martens [*non* Gmelin] which was renamed *semoni* by Moll (Berlin Museum). Periostracum on the pallets very dark and heavy, but peeling on the dried type specimen. The outer face of the pallet is marked with more or less concentric growth lines.

Is *Spathoteredo obtusa* (Sivickis).

C. *Teredo molli* Roch — from driftwood, Atlantic Ocean

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 4. Outer faces of pallets.
Fig. 5. Side view of pallet.
Figs. 6 and 7. Inner faces of pallets.

All figures are of the holotype, Copenhagen Museum. The pallets are deteriorated. Remaining periostracum on the pallets is a dark brown color. The outer surface of the shell, particularly the posterior slope, is covered by a heavy brown periostracum.

Is *Spathoteredo spatha* (Jeffreys).

D. *Kuphus ? mannii* Wright — New Harbour, Singapore

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Posterior view of shell.
Fig. 4. Anterior view of shell.
Fig. 5. Outer face of pallet.
Fig. 6. Inner face of pallet.

All figures are of the lectotype, BM(NH) 66·4·13·4. The pallets are white, lacking a periostracal margin and solid. Only a single pallet remains in the collection. The shells have a pale yellow-brown periostracum. The auricle is reduced externally and the median area is very narrow.

Is *Dicyathifer manni* (Wright).

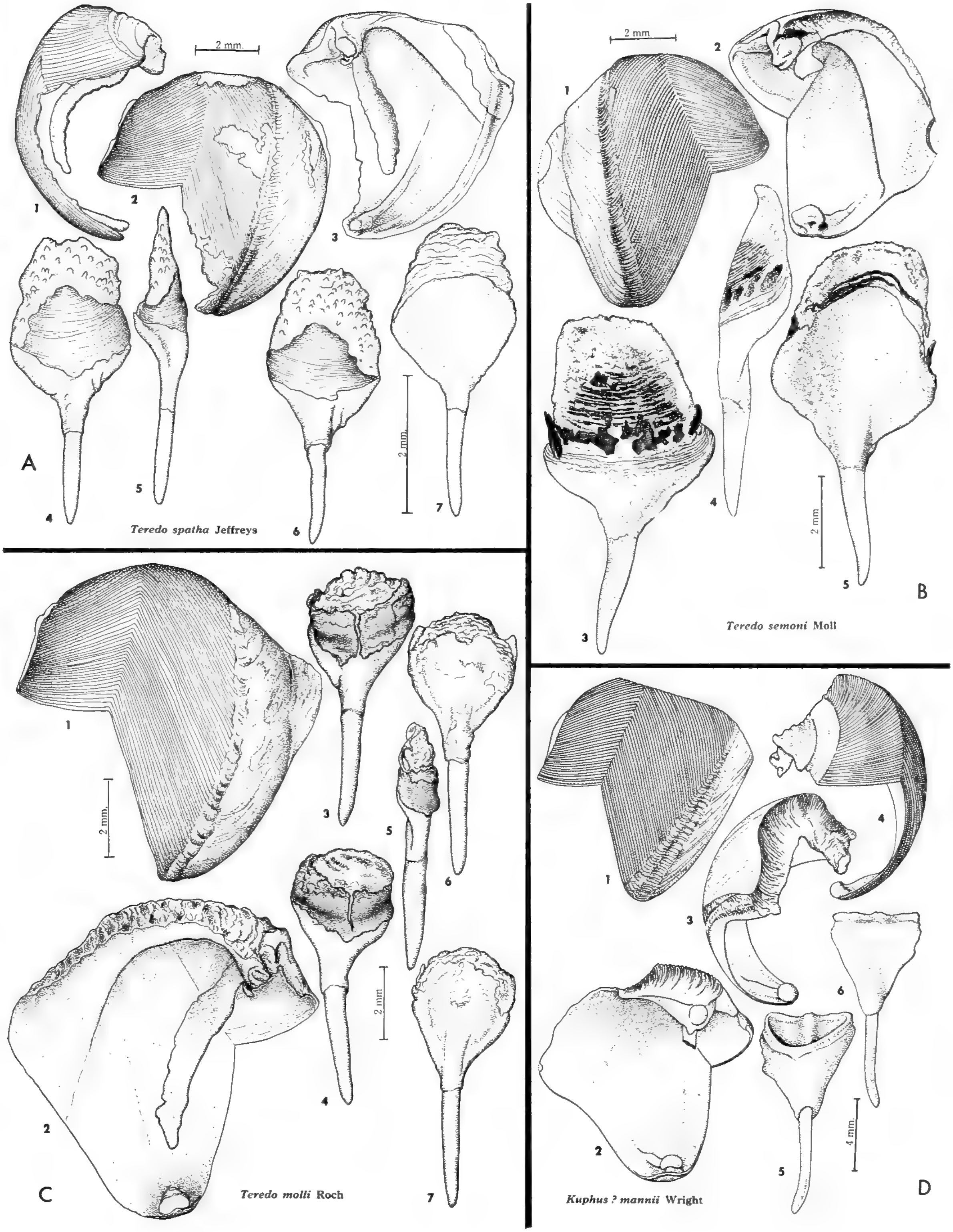

A
Teredo spatha Jeffreys
2 mm.
2 mm.
B
Teredo semoni Moll
2 mm
2 mm
C
Teredo molli Roch
2 mm.
2 mm
D
Kuphus ? mannii Wright
4 mm.

PLATE 37

A. *Bankia excolpa* Bartsch — Gulf of California

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3, 6, 9 and 11. Inner faces of pallets.
Figs. 4, 5, 7 and 10. Outer faces of pallets.
Fig. 8. Side view of pallet.

Figures 1, 3-6 are of the holotype, USNM 98763, and Figures 2, 7-11 of paratypes, also in the USNM. Irregular patches of a calcareous and slightly pustulose incrustation cover the distal ends of the pallets, and fragments of a red-brown periostracum cover the lower portions of the blade and stalk obscuring the cone-like elements below.

Is probably *Nausitora fusticula* (Jeffreys).

B. *Teredo fusticulus* Jeffreys — from driftwood, Leith, Scotland

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.

All figures are of the lectotype, USNM 194267 in the Jeffreys collection. A pustulose, whitish, calcareous deposit covers the distal end of the pallet and a red-brown periostracum covers the basal portion extending under the calcareous deposit.

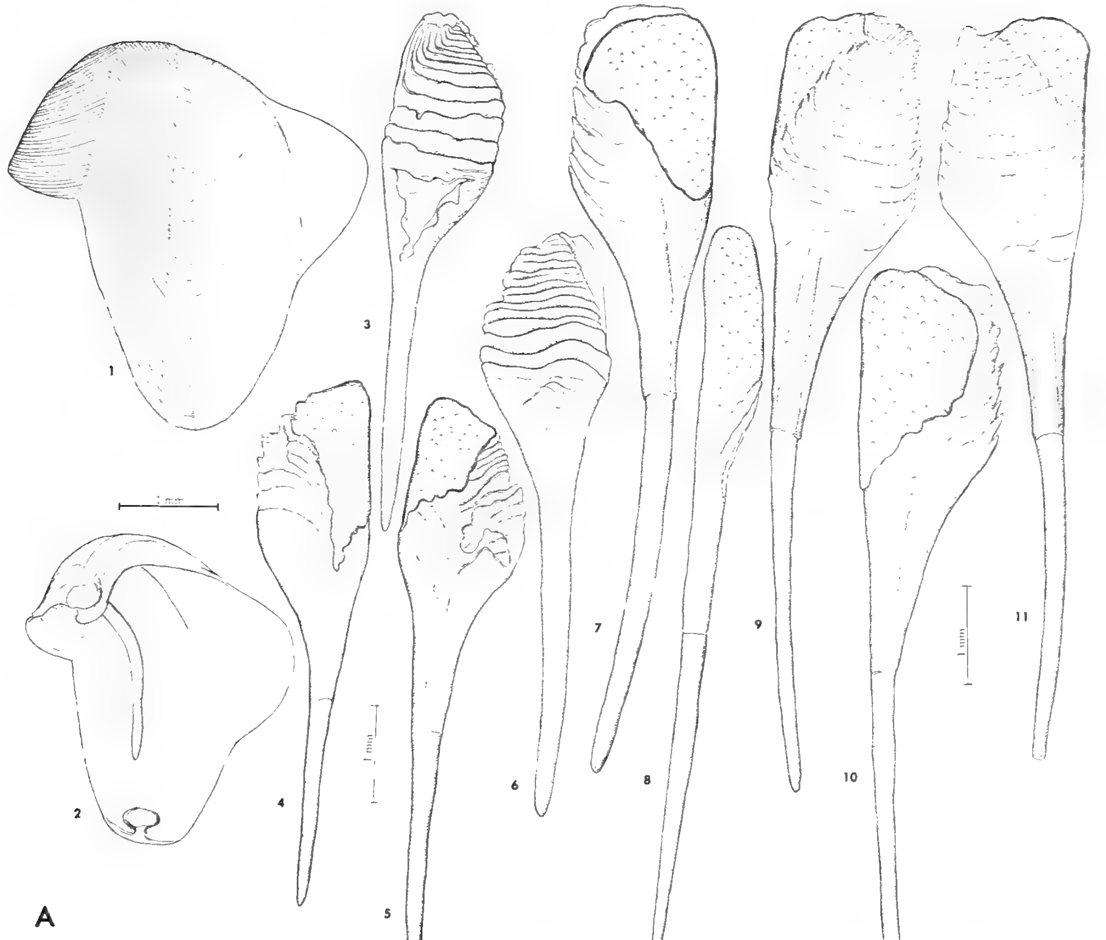
Is *Nausitora fusticula* (Jeffreys).

C. *Bankia braziliensis* Bartsch — Santos, Brasil

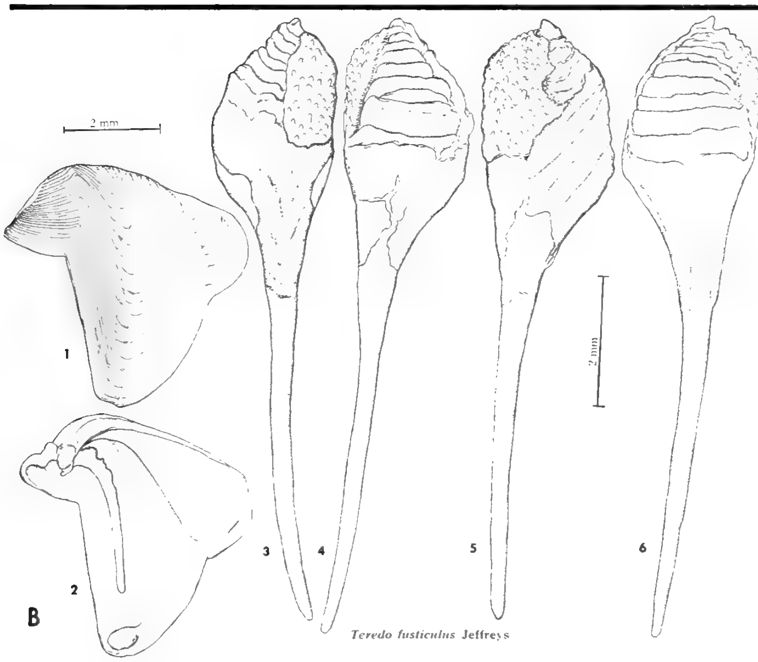
Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Inner view of shell.
Fig. 4. Outer view of shell.

All figures are of the holotype, USNM 110435. Specimen broken and deteriorating. There is a small patch of the calcareous deposit remaining on the distal end of the outer face of the pallet, and the brown periostracum extends well down the stalk.

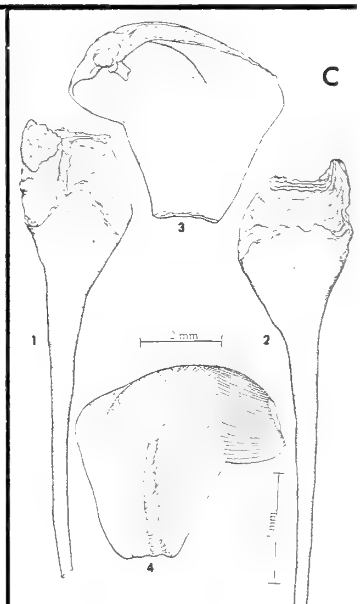
Is *Nausitora fusticula* (Jeffreys).



Bankia excolpa Bartsch



Teredo fusticulus Jeffreys



Bankia braziliensis Bartsch

PLATE 38

A. *Xylotrya dryas* Dall — from living mangrove, Estero dell Palo, Santo Tumbes, Peru

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Side view of pallet.
Fig. 4. Outer view of shell.
Fig. 5. Inner view of shell.

All figures are of the holotype, USNM 207695.

B. *Bankia jamesi* Bartsch — Balboa, Panama

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

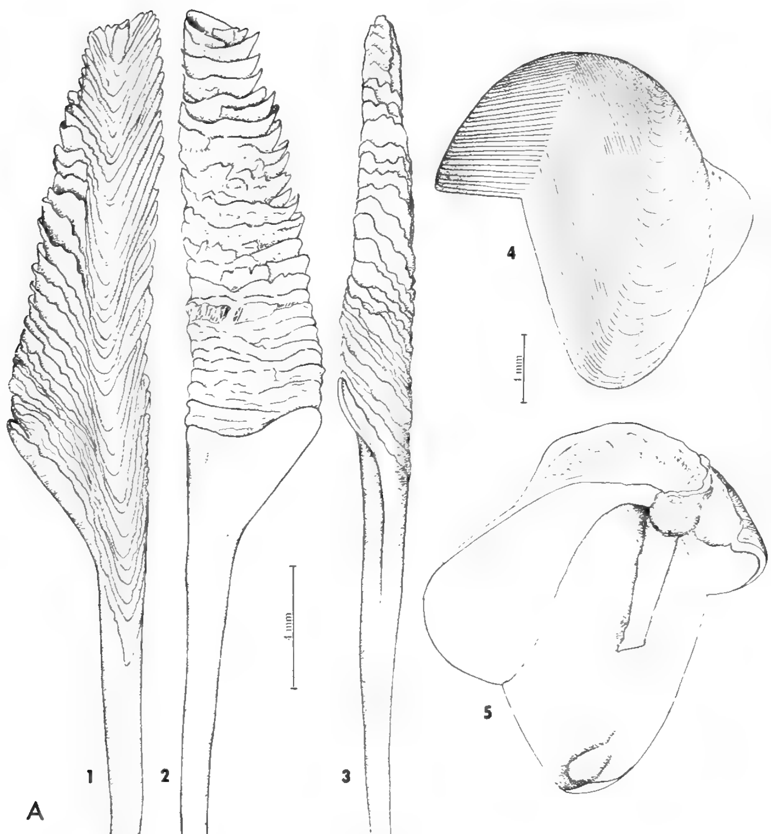
All figures are of the holotype, USNM 513762. The periostracum covering the shell is brown and quite heavy for a teredinid. The pallets are greyish white, except for patches of golden brown periostracum. The stalk is approximately the same length as the blade. A heavy, papillose incrustation covers the distal end of the pallet.

C. *Bankia jamesi* Bartsch — Balboa, Panama

Figs. 1-3. Outer faces of pallets.

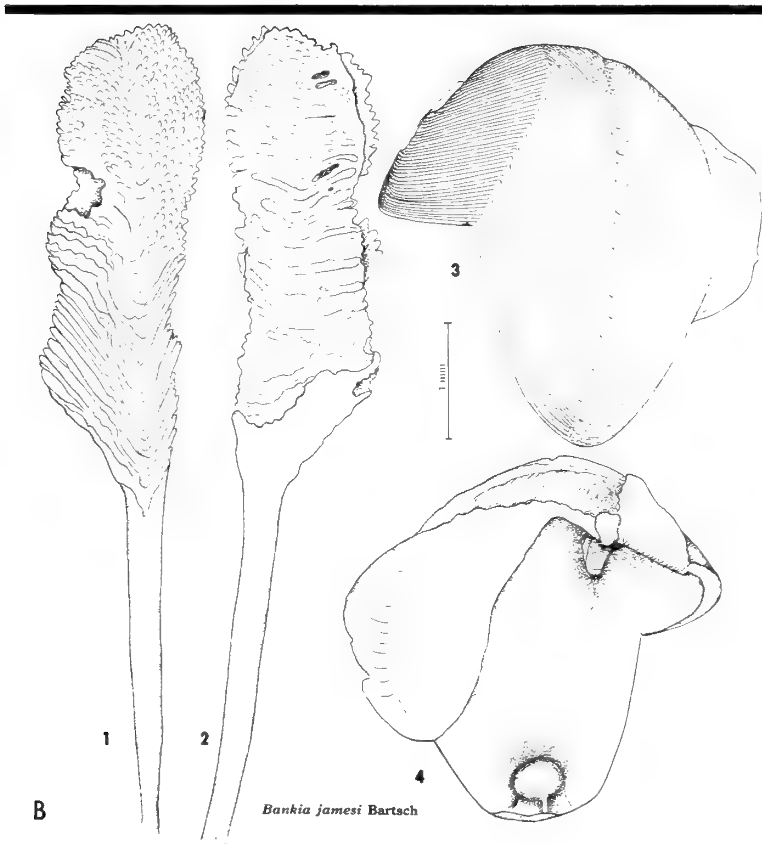
All figures are of paratypes, USNM 537895. This series, along with the holotype of *jamesi,* shows the transition from heavily incrusted specimens (B 1) to the worn specimen (C 3) which is like the holotype of *N. dryas* Dall (A).

All of the species figured on this plate are now considered *Nausitora dryas* (Dall).



A

Xylotrya dryas Dall



B

Bankia jamesi Bartsch

C

Bankia jamesi Bartsch

PLATE 39

A. *Nausitora dunlopei* Wright — Freshwater below Fureedpore, Comer River, Bengal, India

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Posterior view of shell.
Fig. 5. Anterior view of shell.
Fig. 6. Inner view of shell.

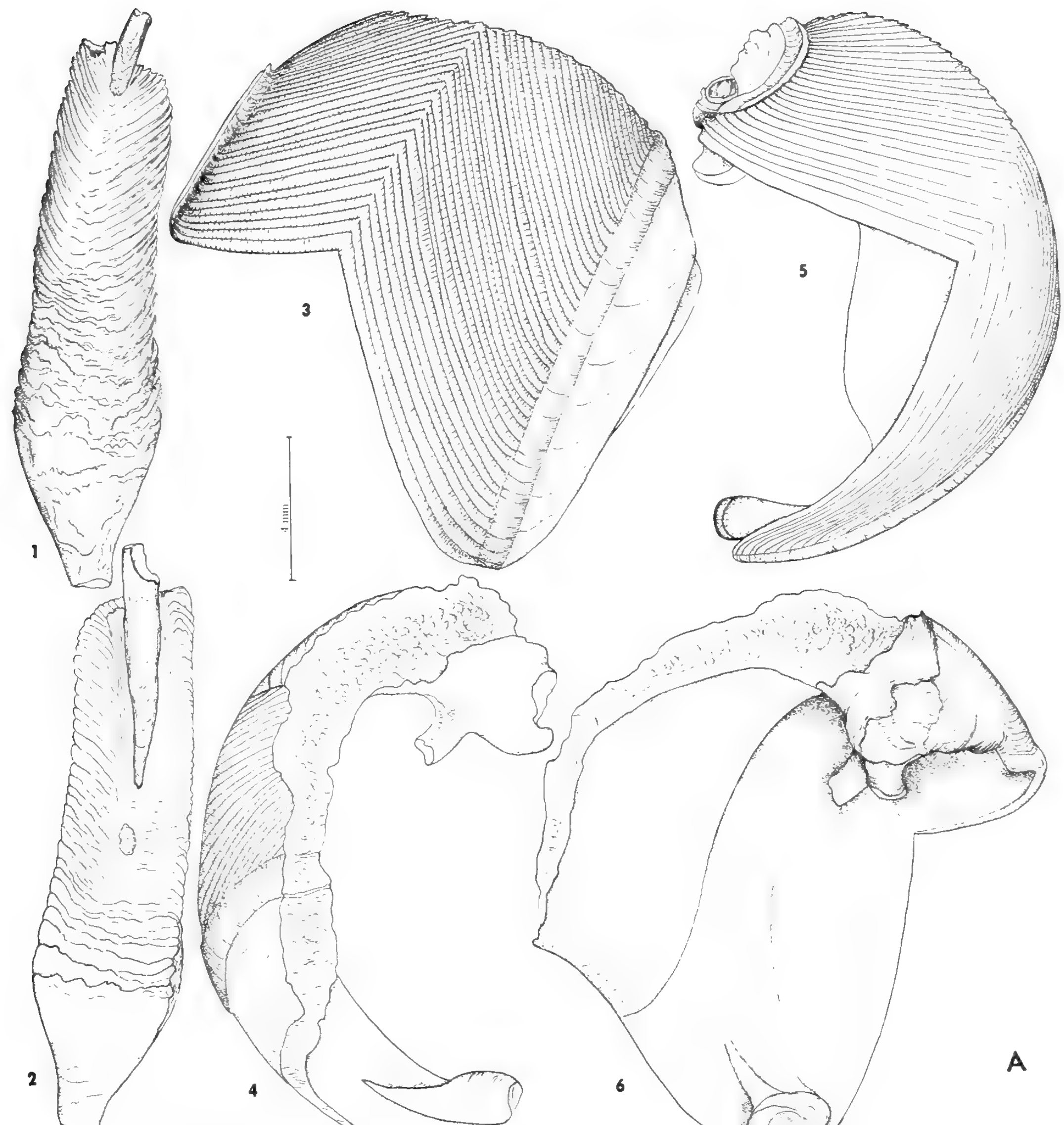
All figures are of the holotype, BM(NH) 64·3·4·2, which was dried and had deteriorated, the stalk broken off and all traces of periostracum gone. Wright gave an excellent series of figures of this species.

B. *Bankia smithi* Bartsch — Chao Phya River, Bang Sorn, Siam [Thailand]

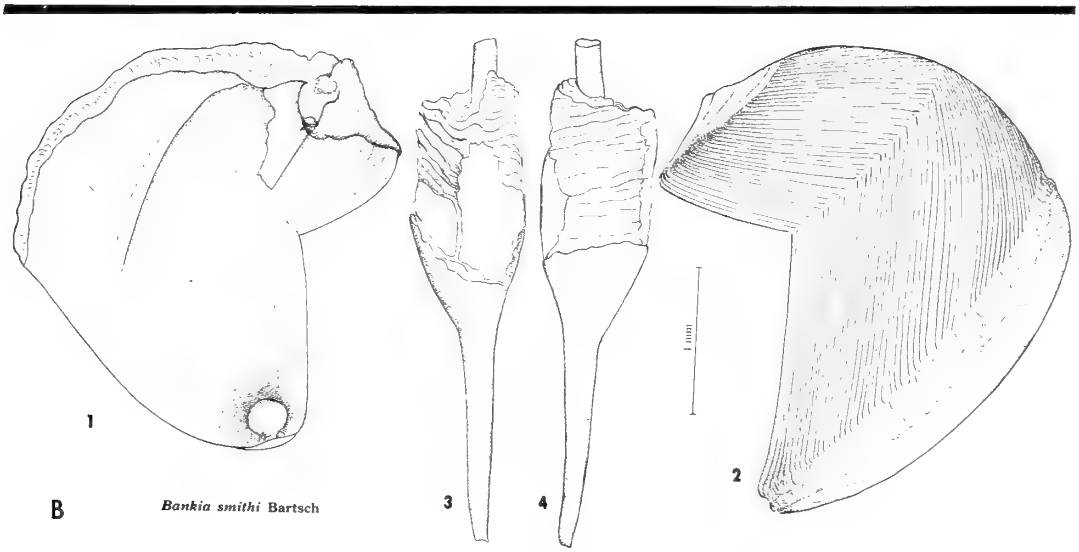
Fig. 1. Inner view of shell.
Fig. 2. Outer view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, USNM 363158. The specimen was badly deteriorated. A red-brown periostracum covers the lower portions of the outer face of the blade and extends a short distance around on the inner face.

Is *Nausitora dunlopei* Wright.



Nausitora dunlopei Wright



B *Bankia smithi* Bartsch

PLATE 40

A. *Nausitora madagassica* Roch — Port Choisel, Maroantsetra, Madagascar

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.

All figures are of the holotype, Berlin Museum. The pallets are worn with only fragments of dark brown periostracum and small patches of the calcareous incrustation at the distal end remaining. The stalk is visible in the middle and distal portion of the inner face of the blade. The fused, cone-like elements of the blade are very closely set.

B. *Nausitora messeli* Iredale — Cattai Creek, Hawkesbury River, New South Wales, Australia

Fig. 1. Anterior end of animal showing outer view of shell.
Fig. 2. Posterior end of same animal showing pallets and siphons.
Fig. 3. Posterior end of another specimen to show range of variation in the pallets.

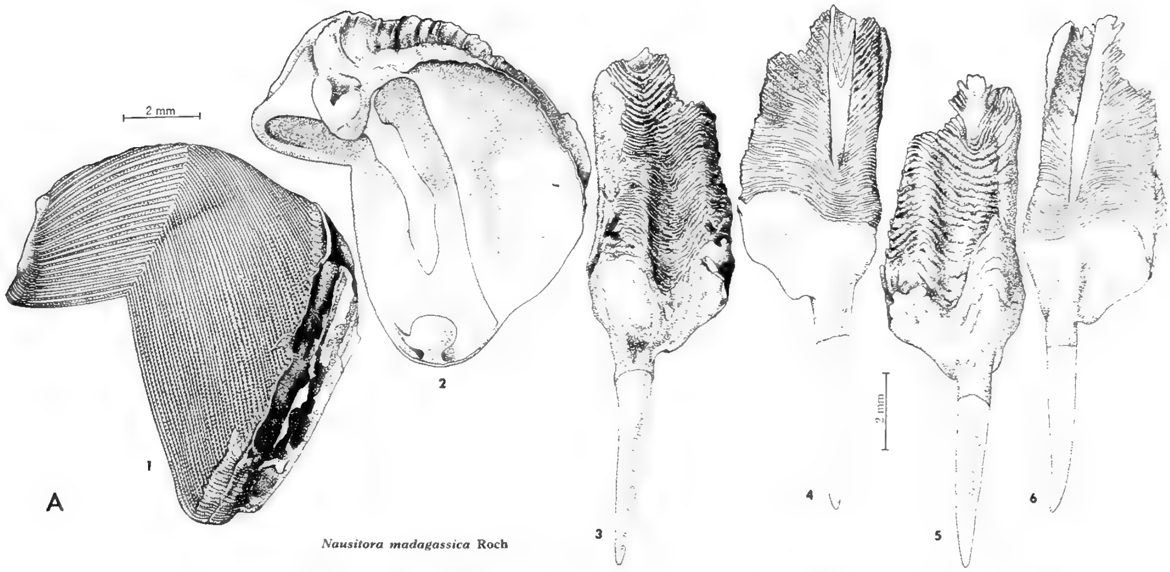
Figures 1-2 are of paratype MCZ 168010 (245 mm in length), and Figure 3 is of a paratype, MCZ 229513. The proximal ends of the pallets are covered with a pale straw colored periostracum which extends into awns laterally and a thin tuberculate incrustation covers a small part of the distal end. The stalk shows through the cones in the middle and distal portions of the blade. Pale brown spots cover the siphons.

C. *Nausitora schneideri* Moll — Karlei, Neupommern [New Britain], Bismarck Archipelago

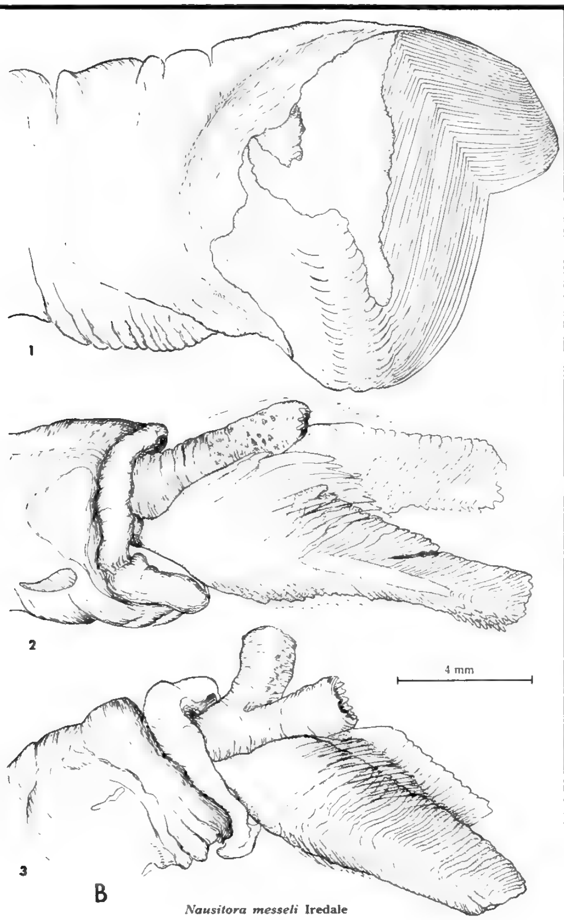
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3, 4 and 5. Outer faces of pallets.
Fig. 6. Inner face of pallet.

Figures 1-3, 6 are of the lectotype and 4-5 are of paratypes, all Berlin Museum. The specimens are dry and exfoliating with only a small patch of the calcareous incrustation remaining on the distal end of the pallet of the lectotype (Fig. 3).

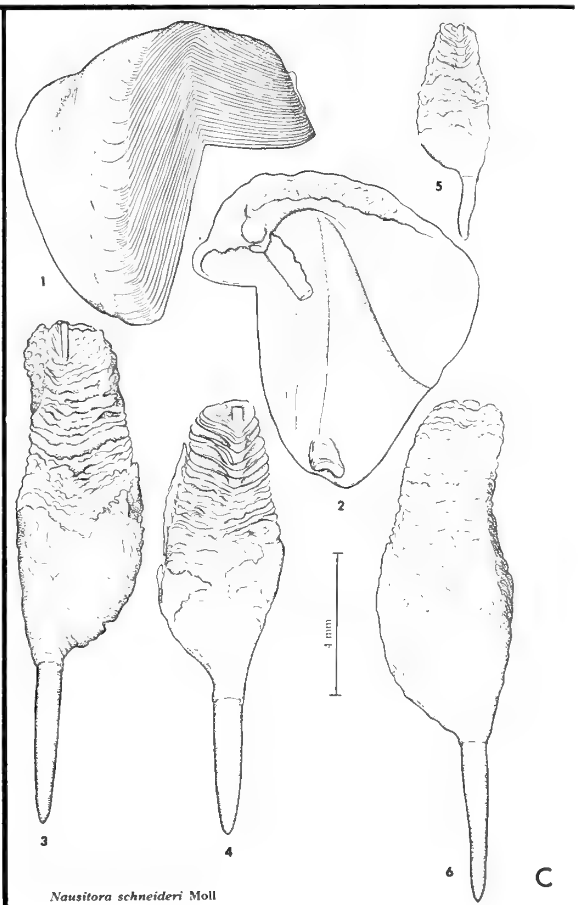
All of the species figured on this plate are now synonymized with *Nausitora dunlopei* Wright.



Nausitora madagassica Roch



Nausitora messeli Iredale



Nausitora schneideri Moll

PLATE 41

A. *Calobates fluviatilis* Hedley — Navua River, Viti Levu, Fiji Ids.
Figs. 1 and 3. Outer faces of pallets.
Figs. 2 and 4. Inner faces of pallets.
Fig. 5. Inner view of shell.
Fig. 6. Outer view of shell.

All figures are of a paratype, BM(NH) 98·9·26·7. The specimen is dry and the periostracal fringe lost, so changing the shape of the pallet.

B. *Nausitora queenslandica* Iredale — Chelmer, Brisbane River, Queensland, Australia
Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

All figures are of a paratype, MCZ 229366.

C. *Nausitora queenslandica* Iredale — Chelmer, Brisbane River, Queensland, Australia
Fig. 1. Posterior end of animal showing the siphons and pallets.
Fig. 2. Anterior end of same specimen.

A young specimen in the paratype lot, MCZ 229366, illustrated to show the variation in spacing of the segments of the blade.

D. *Calobates fluviatilis* Hedley — Navua River, Viti Levu, Fiji Ids.
Fig. 1. Posterior end, paratype, Australian Mus. C5094.
Fig. 2. Posterior end, paratype, MCZ 32425.

The specimen shown in Figure 1 is young and measures approximately 50 mm in total length (preserved). A thin pale yellow periostracum covers the base of the pallets and extends as fine awns at the sides. At the distal end of the pallets the stalk is visible and the edges of the fused cones marked by rows of calcareous tubercles. The siphons are spotted with dark brown. The specimen shown in Figure 2 measures 195 mm (preserved) in total length. The periostracal fringe and distal portion are worn, the stalk protruding beyond the blade.

E. *Nausitora queenslandica* Iredale — near Johnson's Rock, Brisbane River, Queensland, Australia
Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

All figures are of a paratype, MCZ 168011. A pale yellow periostracum covers the basal half of the blade of the pallets and extends to the side as small awns. The series of paratypes illustrated indicate the range of variation exhibited in both the shells and the pallets as a result of age, rate of growth and deterioration.

All of the species figured on this plate are now synonymized with *Nausitora dunlopei* Wright.

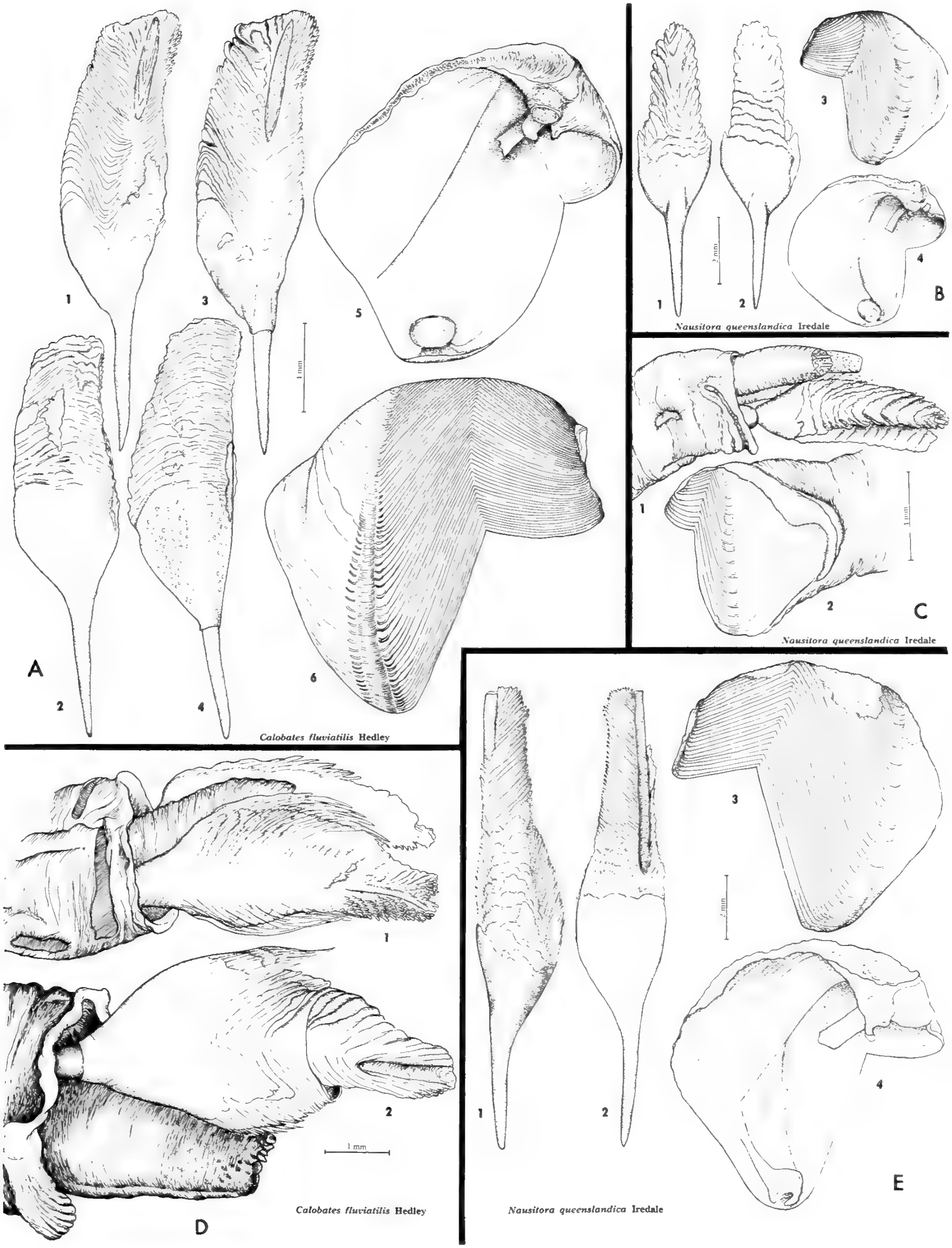

A
1
2
3
4
5
6
1 mm
Calobates fluviatilis Hedley
B
1
2
3
4
2 mm
Nausitora queenslandica Iredale
C
1
2
1 mm
Nausitora queenslandica Iredale
D
1
2
1 mm
Calobates fluviatilis Hedley
E
1
2
3
4
Nausitora queenslandica Iredale

PLATE 42

A. *Nausitora saulii* Wright — Callao, Peru

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3, 5 and 7. Outer faces of pallets.
Figs. 4, 6 and 8. Inner faces of pallets.

Figures 1-4 are of the holotype, BM(NH) 53·6·27·13, and 5-8 of paratypes, BM(NH).

B. *Bankia gabrieli* Nair — from teak wood canoe, Ernakulam, west coast, South India

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Posterior end of animal showing the siphons.
Fig. 4. Inner face of pallet.
Fig. 5. Outer face of pallet.

All figures are of the holotype, Zool. Surv. India, copied from Nair (1958, p. 262, text fig. 1 a-e).

Is *Nausitora hedleyi* Schepman.

C. *Nausitora hedleyi* Schepman — Merauke, New Guinea

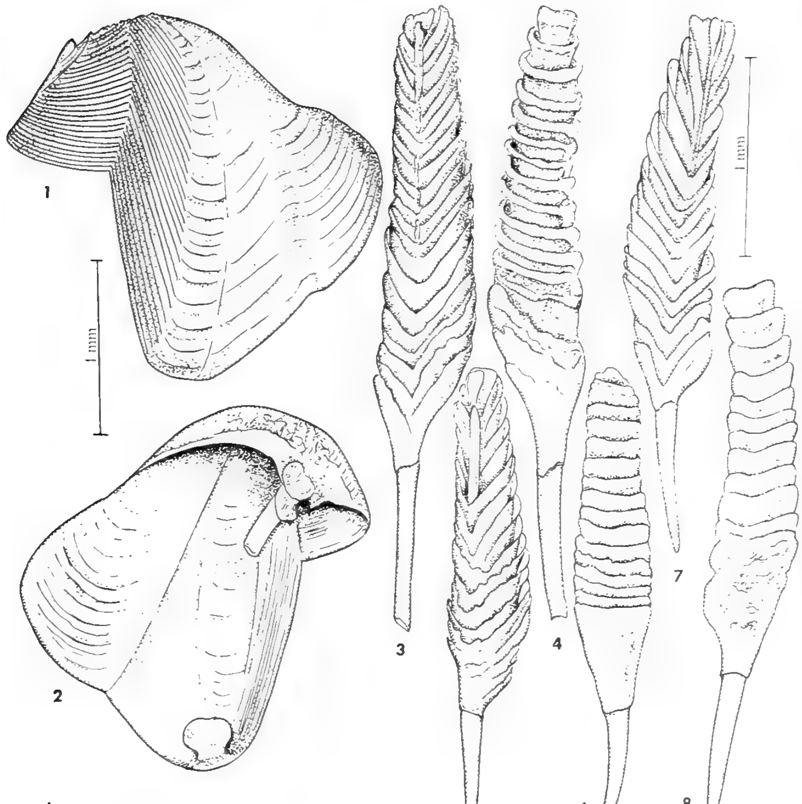
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.
Fig. 7. Side view of pallet.

All figures are of the holotype, Amsterdam Museum. A golden brown periostracum covers the lower half of the blade of the pallet.

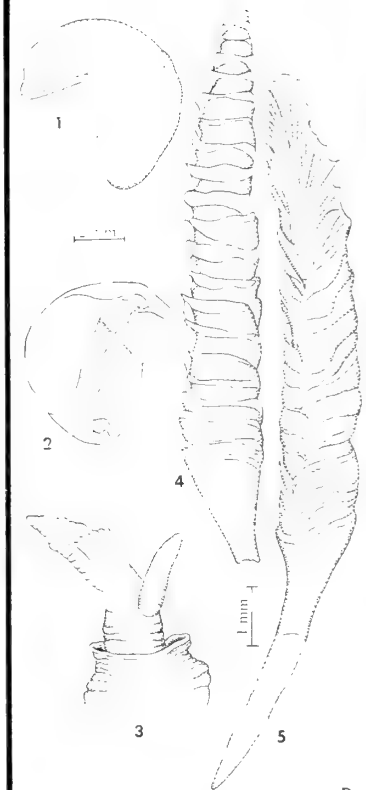
D. *Bankia consularis* Moll — Singapore

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Inner face of pallet.
Fig. 4. Outer face of pallet.

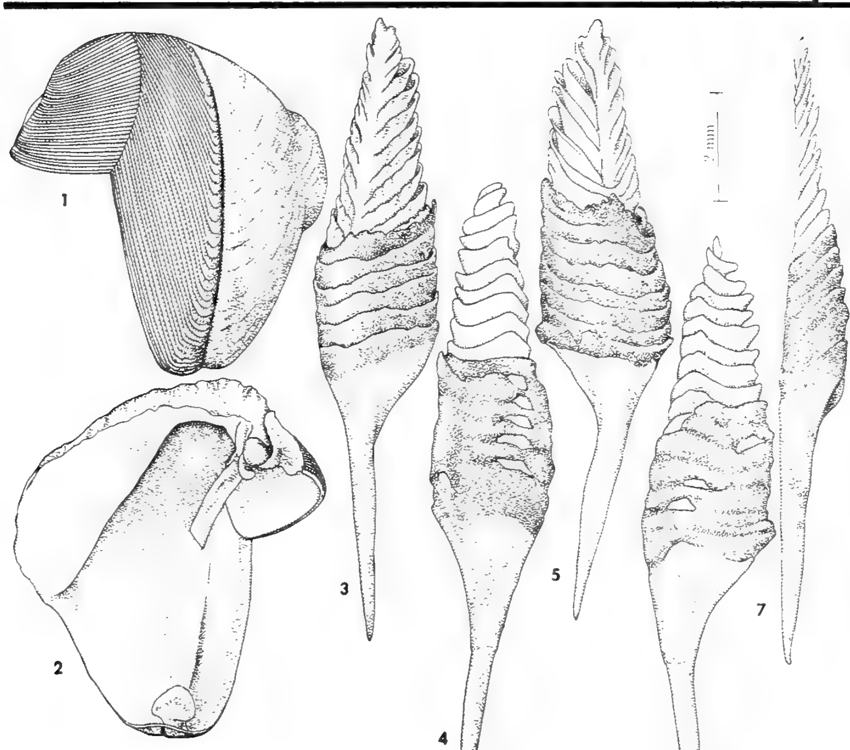
All figures are of the holotype, Berlin Museum. Both shells and pallets are dry and in very poor condition. The shells are covered with a rather heavy red-brown periostracum. On the outer face of the pallet a bit of brown periostracum remains. The stalk is brown and granular. The cones are close set and the remaining bit of periostracum extends over the surface of four cones, which would suggest that this may be a young *Bankia carinata* (Gray).



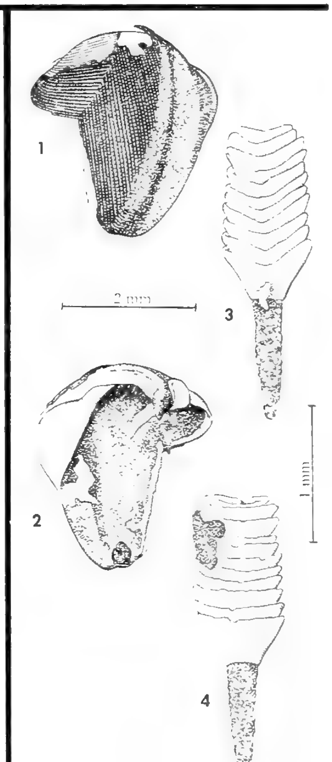
A *Nausitora saulii* Wright



Bankia gabrieli Nair B



C *Nausitora hedleyi* Schepman



Bankia consularis Moll D

PLATE 43

A. *Bankia pennaanseris* Roch — Vintano, Sainte-Marie, Madagascar

Figs. 1, 3 and 6. Outer faces of pallets.
Figs. 2, 4 and 5. Inner faces of pallets.
Fig. 7. Side view of pallet.

Figures 3-4 are of the lectotype, Figures 1-2 of a paratype, all Berlin Museum; and Figures 5-7 are of paratypes, BM(NH) 1935·5·8·3. A light straw colored periostracum covers the distinct but closely set cones on the lectotype.

Is young *Nausitora dunlopei* Wright.

B. *Bankia madrasensis* Nair — Royapuram, Madras, India

Fig. 1. Outer view of shell.
Fig. 2. Outer face of pallet.
Fig. 3. Inner face of pallet.
Fig. 4. Posterior end of animal showing siphons and base of pallets.

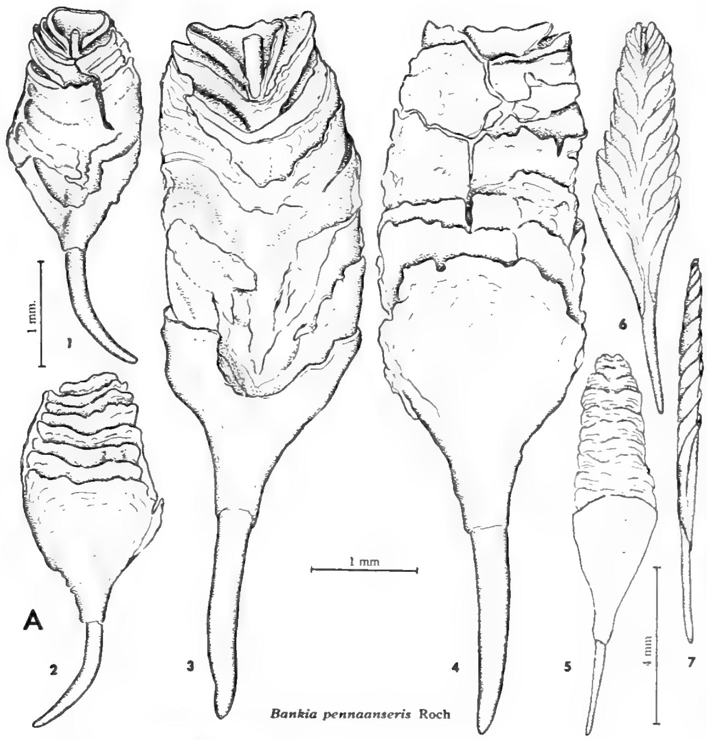
All figures are of the holotype, copied from Nair 1956, p. 399, text fig. 5a-d. The holotype is a young specimen. See notes in the catalogue.

Is young *Nausitora dunlopei* Wright.

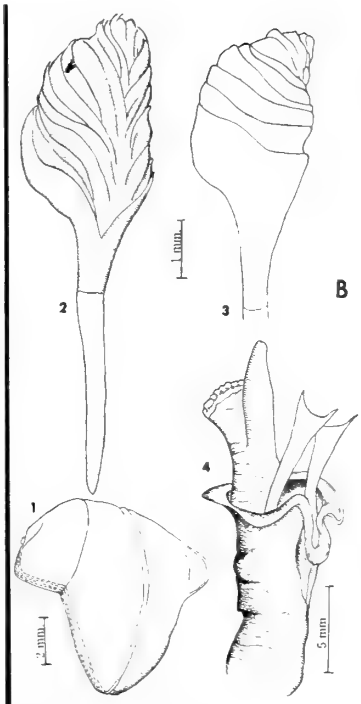
C. *Bankia oahuensis* Edmondson — from submerged branches of algaroba tree, Kalihi entrance, Oahu, Hawaii

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 5. Outer faces of pallets.
Figs. 4 and 6. Inner faces of pallets.

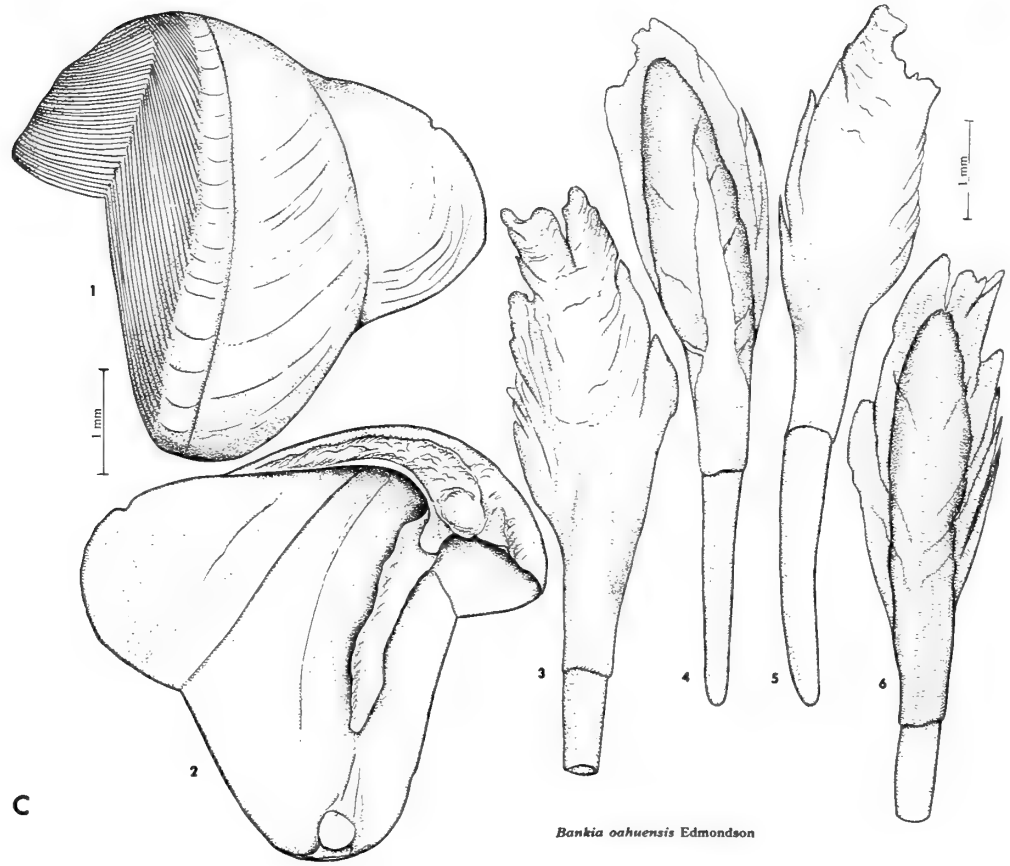
All figures are of the holotype, BPBM 110. The periostracum varies from a light to dark-red-brown, completely covers the blade, and is somewhat fringed at the edges. This species was based upon ''numerous shells and a few pallets.'' Unfortunately no living specimens were found. The pallets are probably from a young *Nausitora*, but further material is needed before the species can be definitely assigned.



Bankia pennaanseris Roch



Bankia madrasensis Nair



Bankia oahuensis Edmondson

PLATE 44

A. *Bankia orcutti* Bartsch — Bacochibampo Bay, Sonora, Mexico

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Side view of pallet.
Fig. 4. Outer view of shell.
Fig. 5. Inner view of shell.

All figures are of the holotype, USNM 348191. The golden brown periostracum remains only on the outer surface of the dried pallets. This species is characterized by having two rows of fine fringes on each cone.

B. *Nausitora kamiyai* Roch — Kingyoku, Takanoshima, Japan

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, Berlin Museum. The specimen is dry and deteriorated. Patches of golden brown periostracum cover the outer face and sides of the pallets. A very thin yellow periostracum remains on the inner face. The pallets are from a young specimen, though the shell would appear to be from a stenomorphic old specimen to judge by the number of rows of denticulated ridges on the anterior slope. However, it may have been boring in very hard wood, resulting in the rapid addition of denticulated ridges.

Is young ***Bankia carinata*** **(Gray). See Figure 22 in the Introduction which illustrates the growth stages of** ***carinata*** **(Gray).**

C. *Bankia nordi* Moll — Singapore

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 4. Outer face of two fragments of the pallet.

All figures are of the holotype, Berlin Museum. Specimen dry and badly deteriorated. The periostracum is brown, very closely appressed and with fine fringes which appear only as dark lines. The pallets are too deteriorated and too covered with debris to figure the inner faces. There appear to be two rows of fringes to each cone.

Is possibly ***Bankia orcutti*** Bartsch.

D. *Nausitora orientalis* Roch — Kingyoku, Takanoshima, Japan

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, Berlin Museum. A golden brown periostracum covers the outer face of the pallets. Specimen is dry and the periostracum exfoliating.

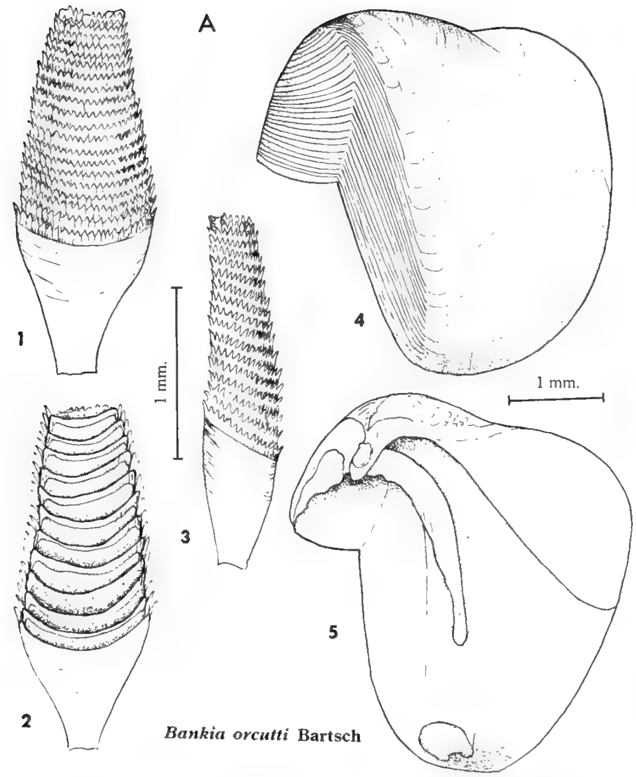
Is probably a young ***Bankia carinata*** (Gray). See Figure 22, page 72, which shows the growth stages of ***carinata*** (Gray).

E. *Bankia davaoensis* Bartsch — *Albatross* sta. 5252, off Linao Point, Mindanao, Philippine Ids.

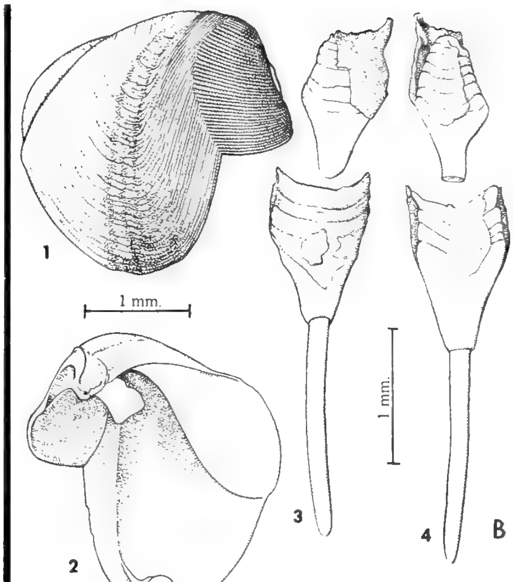
Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Figs. 3 and 4. Individual cones, probably from the same specimen.

All figures are of the holotype, USNM 310973. The specimen was dry and had fragmented badly. This is all that remains of the holotype. The figures given by Bartsch in the original description appear to be a reconstruction rather than of the actual specimen.

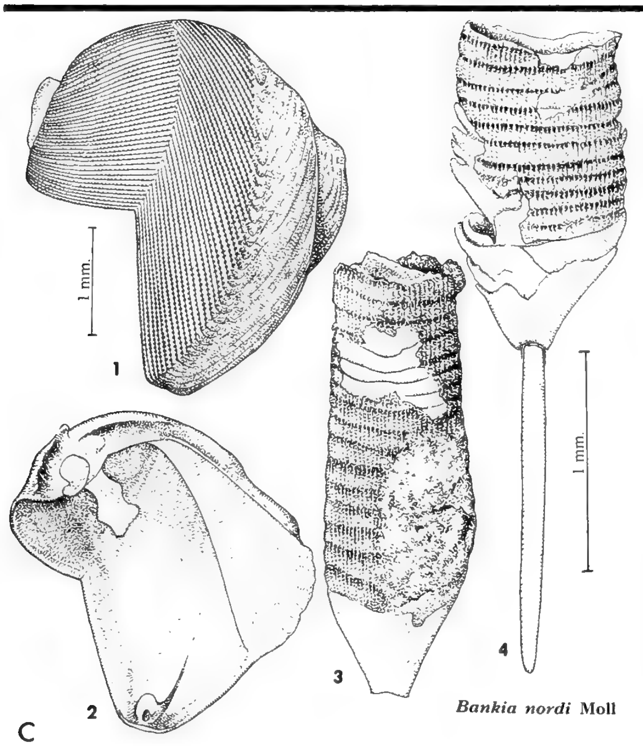
Is ***B. barthelowi*** Bartsch, see Plate 62 E.



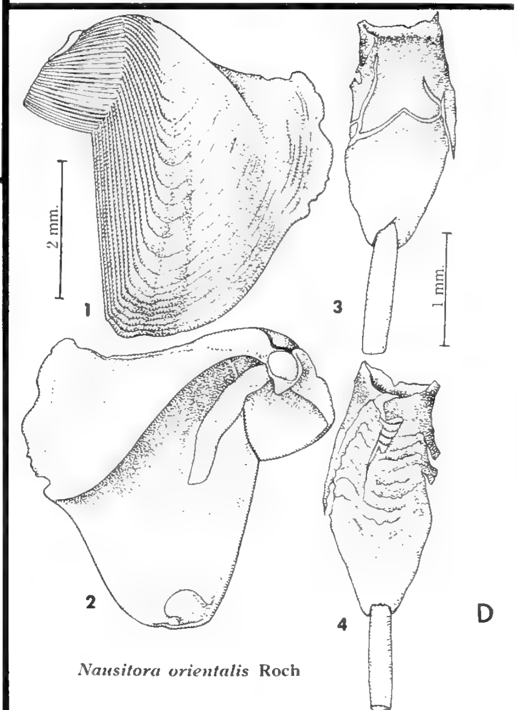
Bankia orcutti Bartsch



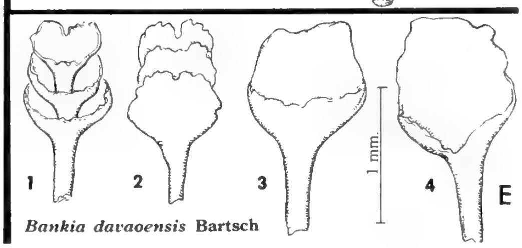
Nausitora kamiyai Roch



Bankia nordi Moll



Nausitora orientalis Roch



Bankia davaoensis Bartsch

PLATE 45

Bankia caribbea Clench and Turner — from test block, Fort Pickens, Pensacola, Florida

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

All figures are of the holotype, MCZ 121065, taken from Clench and Turner (1946, pl. 10).

Is *Bankia carinata* (Gray).

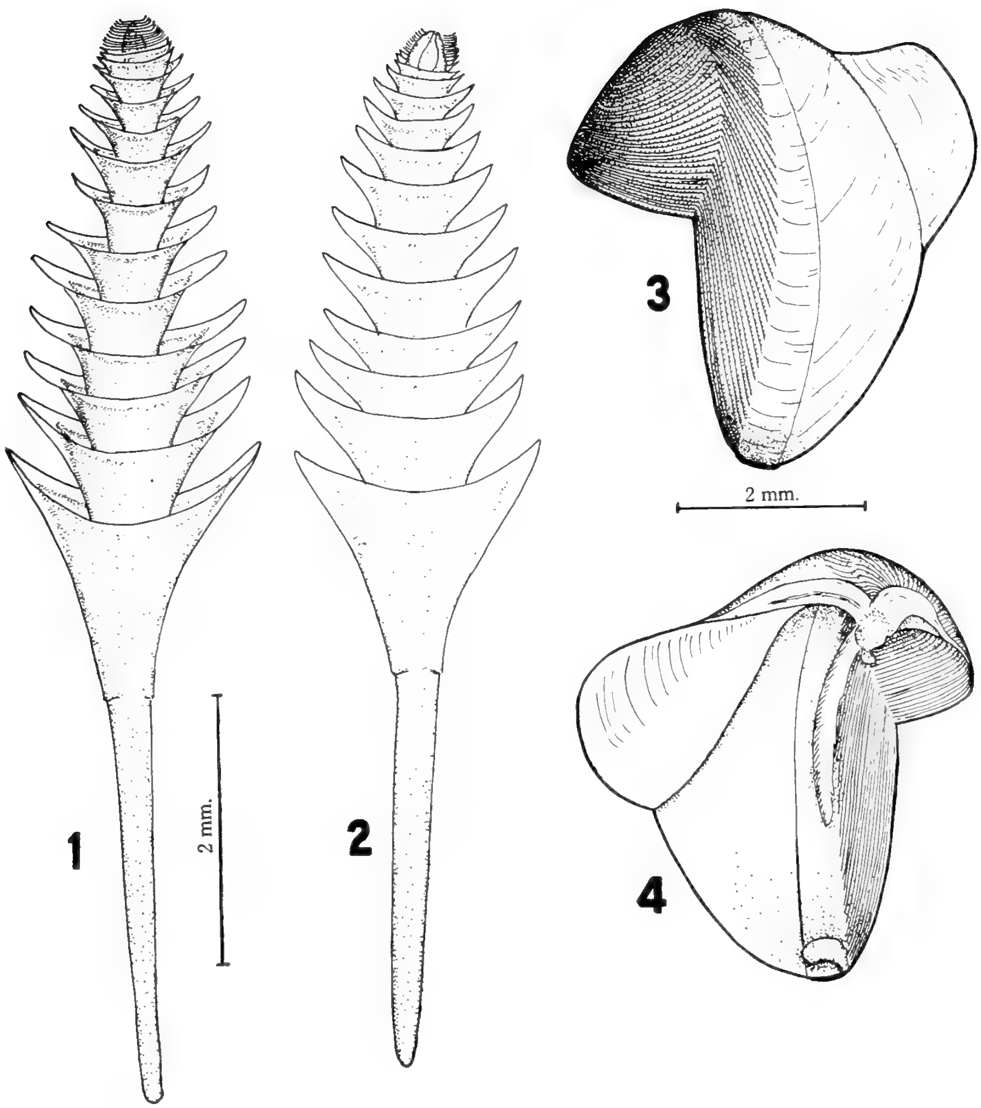

1
2
3
4
2 mm.
2 mm.

PLATE 46

A. *Teredo stutchburyi* 'Leach' Blainville — Sumatra

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Side view of pallet.
Fig. 5. Inner face of pallet.

All figures are of the lectotype, BM(NH) from Stutchbury. This is the specimen figured by Sowerby in the Conchologia Iconica **20**, TEREDO, pl. 2, species 5, and probably the one which Gray called *carinata*.

B. *Teredo navalis* Spengler — locality unknown

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, Copenhagen Museum. There has obviously been an error, as the shells of this type do not belong with the pallets, though they were the ones figured by Spengler.

C. *Bankia minima* Blainville — Cap Lopez, Gabon, French Equatorial Africa

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

From the collection in the Paris Museum, used by Monod (1952) in his work on this species. This is a small form of *carinata* Gray, often with closely packed cones.

D. *Bankia edmondsoni* Nair — from logs, Madras Beach, India

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Figs. 4 and 5. Enlargement of cones to show detail.

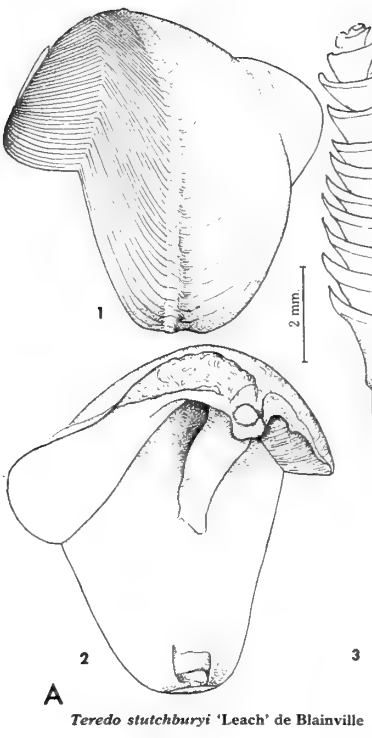
All figures are of the holotype; copied from Nair (1956, p. 397, text fig. 4a-e).

E. *Bankia indica* Nair — from test blocks, off Mylapore, Madras Coast, India

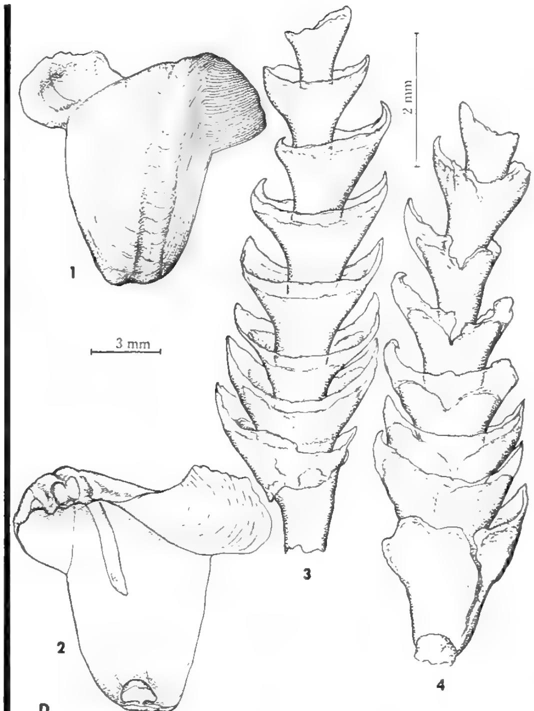
Fig. 1. Outer view of shell.
Fig. 2. Outer face of pallet.
Fig. 3. Outer face of enlarged cones.
Fig. 4. Inner face of enlarged cones.

All figures are of the holotype; copied from Nair (1956, p. 394, text fig. 3a-d).

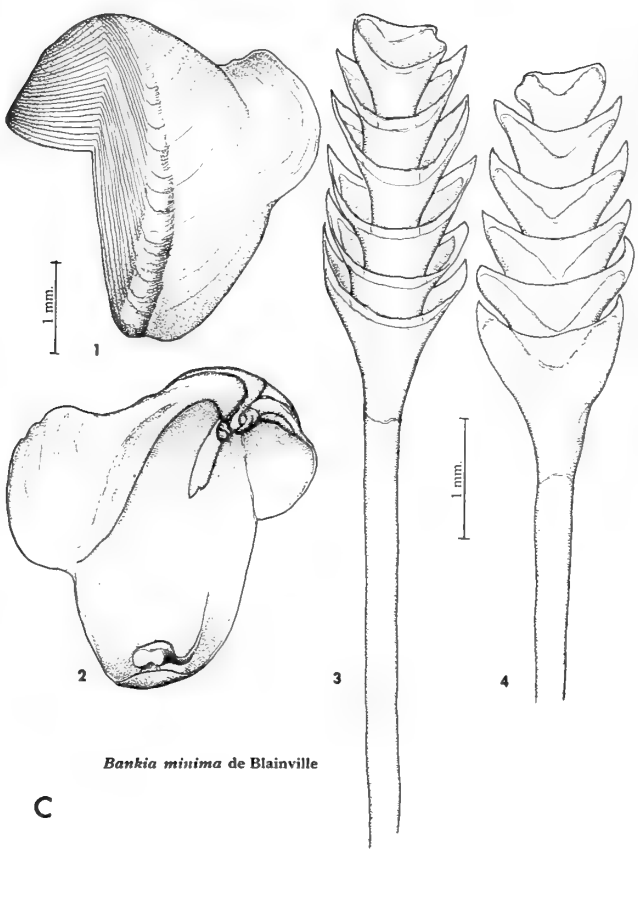
All of the species figured on this plate are now synonymized with *Bankia carinata* (Gray).



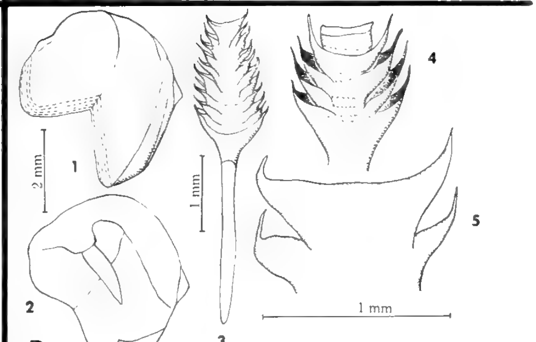
Teredo stutchburyi 'Leach' de Blainville



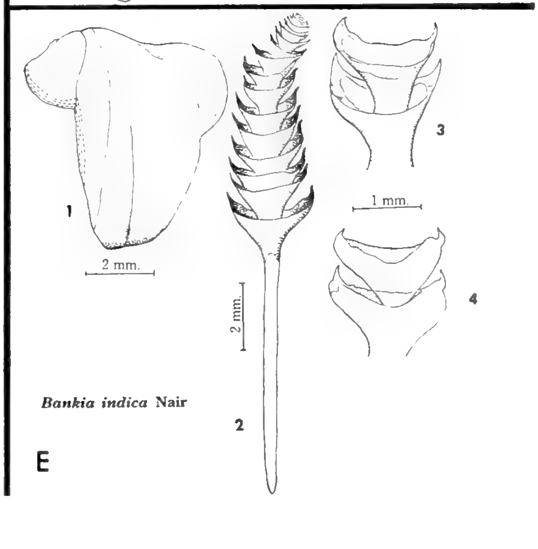
Teredo navalis Spengler



Bankia minima de Blainville



Bankia edmondsoni Nair



Bankia indica Nair

PLATE 47

Bankia katherinae Clench and Turner from test block, Bahia, Brasil

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Figs. 3 and 5. Outer views of shells.
Figs. 4 and 6. Inner views of shells.

Figures 1-4 are of the holotype, MCZ 168023, and 5-6 of a paratype, MCZ 168029. The holotype was taken from a block which had been submerged for 4 months; the paratypes were from the control board which had been in only one month. These are illustrated to show change in shell shape with age. Figures taken from Clench and Turner (1946, pl. 11).

Is *Bankia campanellata* Moll and Roch.

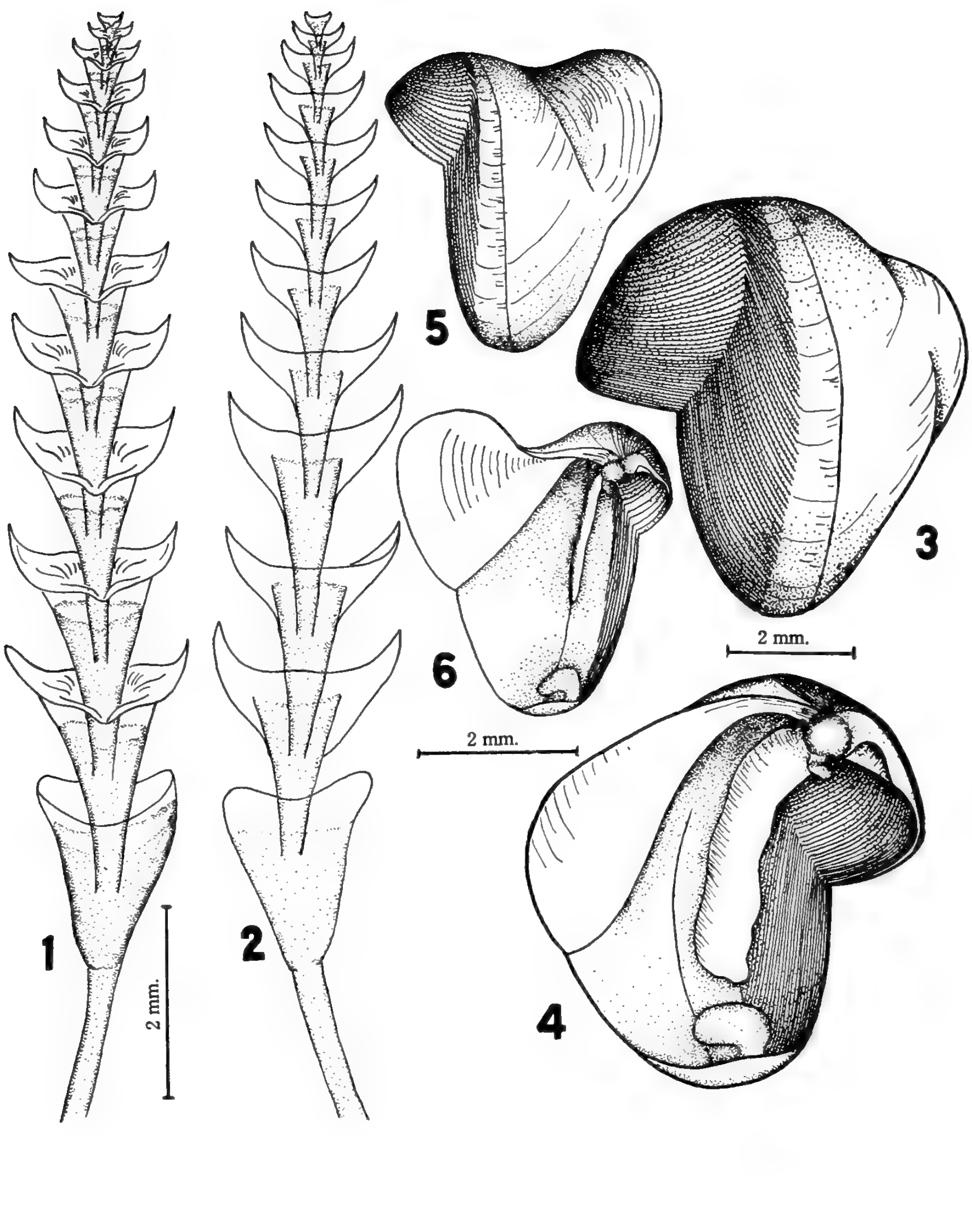

1
2
3
4
5
6
2 mm.
2 mm.
2 mm.

PLATE 48

A. *Teredo campanulata* 'Deshayes' Sowerby — locality unknown

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

All figures are of the holotype, BM(NH) 50·2·26·42-43. The pallets are covered with a whitish deposit and the periostracum which is a medium brown is curled and broken. The shells probably did not belong with the pallets.

Is *Bankia campanellata* Moll and Roch.

B. *Bankia bengalensis* Nair — in fishing float, Mylapore, Madras, India

Fig. 1. Outer view of shell.
Fig. 2. Enlargement of cones to show detail.
Fig. 3. Outer face of pallet.

All figures are of the holotype, Zool. Surv. India, Calcutta, copied from Nair (1956, p. 389, text fig. 1a-c).

An examination of the holotype showed this to be *Bankia campanellata* Moll and Roch.

C. *Bankia kuronunii* Roch — Kingyoku, Takanoshima, Japan

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Detail of a single cone.

All figures are of the holotype, Berlin Museum. The shell is apparently lost. It was not in the vial with the pallets, though Roch did describe it.

Is *Bankia carinata* (Gray).

D. *Bankia valparaisensis* Moll — Valparaiso, Chile

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Figs. 4-6. Fragments of pallets.
Fig. 7. Inner face of pallet.

Figures 1, 2, 3, and 7 are of the holotype and Figures 4-6 of paratypes, all Berlin Museum. The type is in poor condition, the pallets chalky and all the periostracum gone.

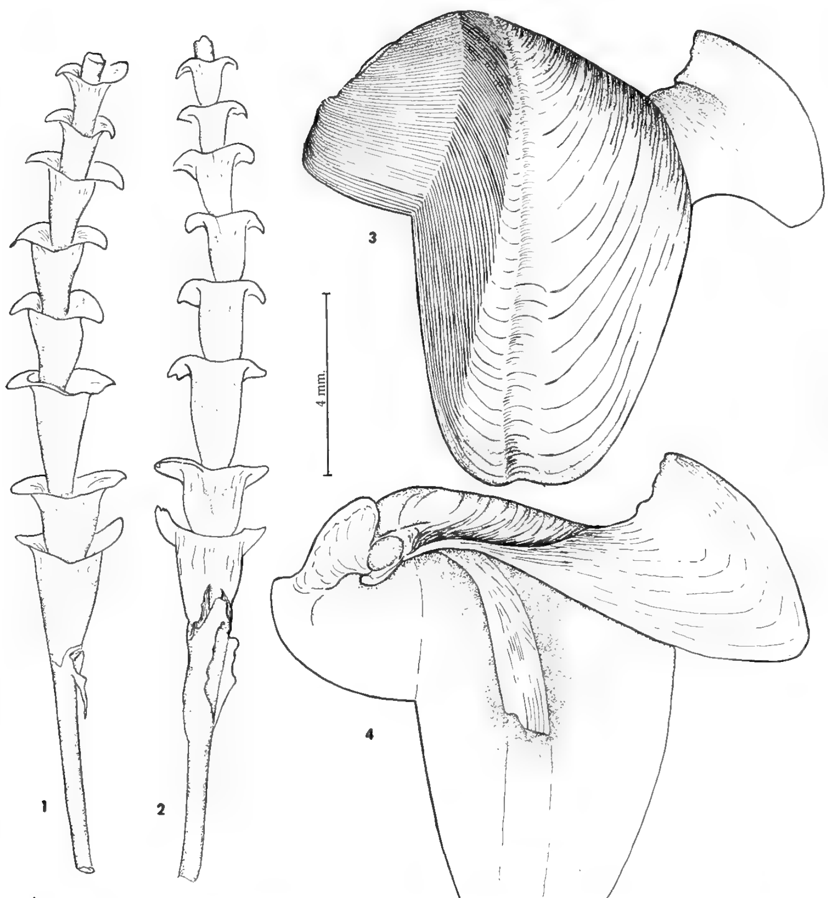
Is *Bankia martensi* (Stempell).

E. *Bankia schrencki* Moll — São Francisco, Brasil

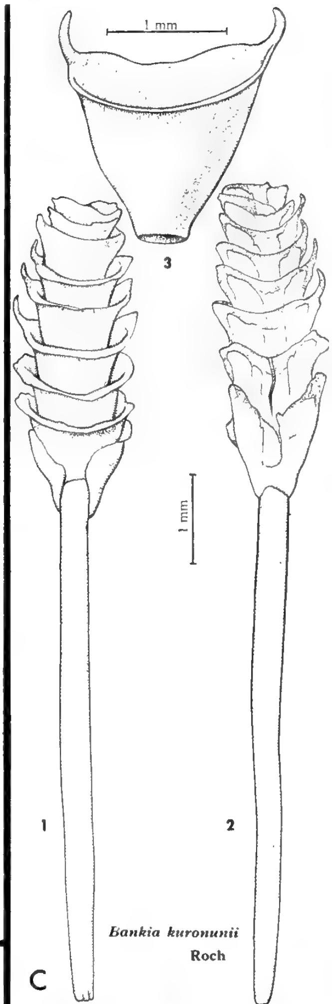
Fig. 1. Inner face of pallet.
Fig. 2. Outer face of pallet.

Both figures are of the holotype, Berlin Museum. Pallets dry and in poor condition. Periostracum a straw color, projecting at the sides.

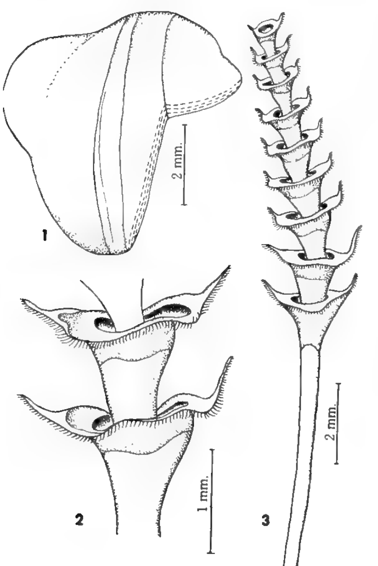
Is *Bankia gouldi* (Bartsch).



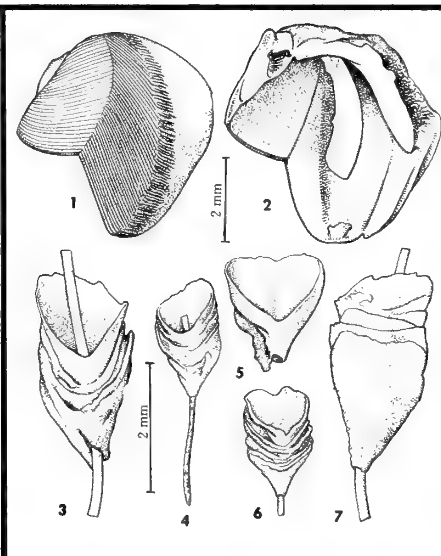
A *Teredo campanulata* 'Deshayes' Sowerby



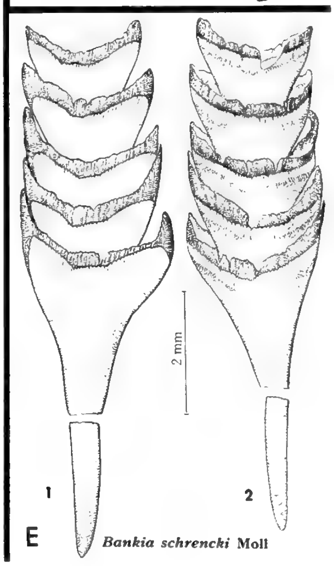
C *Bankia kuronunii* Roch



B *Bankia bengalensis* Nair



D *Bankia valparaisensis* Moll



E *Bankia schrencki* Moll

PLATE 49

Bankia zeteki Bartsch Balboa, Panama

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

A young specimen, MCZ 168108, illustrated to show the details of the cones, as only fragments of the pallets of the holotype remain. Figures taken from Clench and Turner (1946, pl. 12).

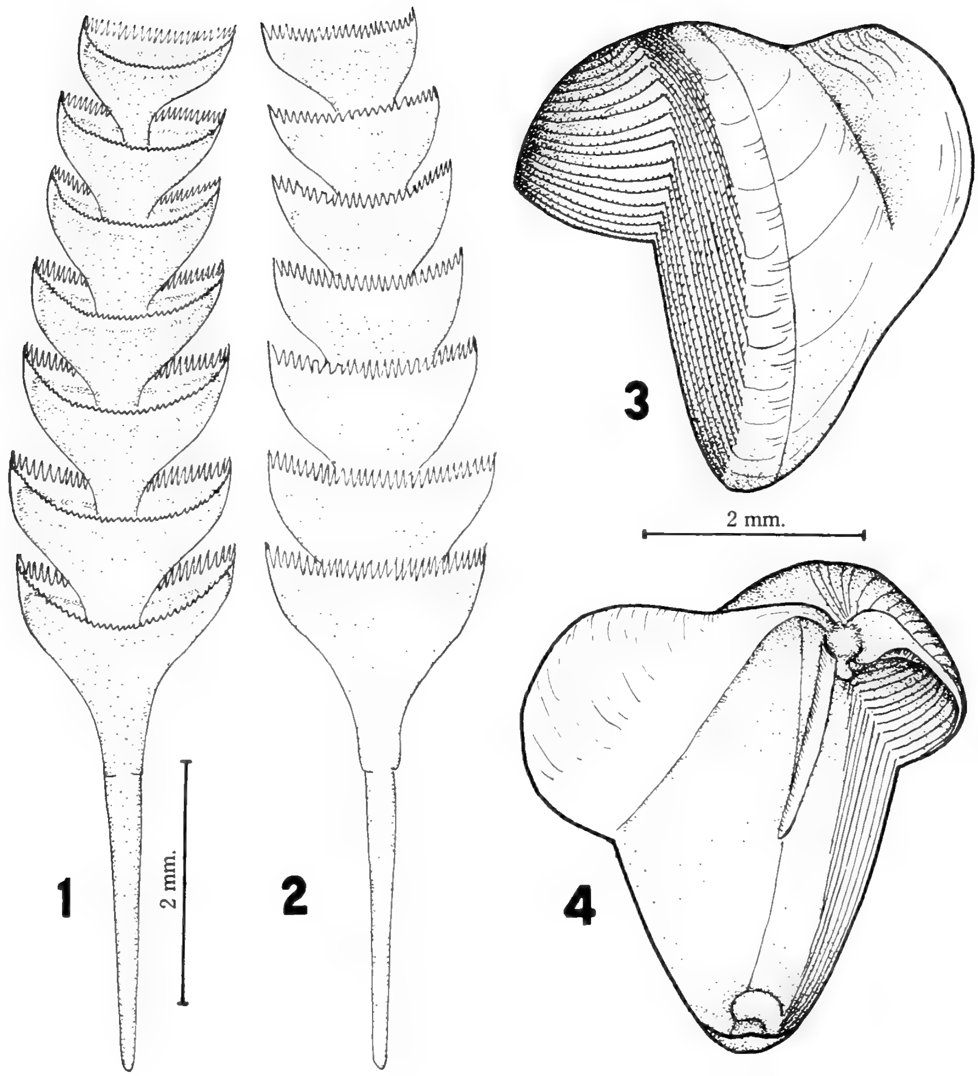

1
2 mm.
2
3
2 mm.
4

PLATE 50

A. *Bankia zeteki* Bartsch — Canal Locks, Balboa, Canal Zone, Panama

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Side view of pallet.
Fig. 4. Outer face of pallet.
Fig. 5. Inner face of pallet.

All figures are of the holotype, USNM 34128. The pallets are dry and have fragmented. See Plate 49 which illustrates a preserved specimen.

B. *Bankia mexicana* Bartsch — Sinaloa, Mexico

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, USNM 194176a. This is all that remains of the pallets of the holotype.

Is *Bankia gouldi* (Bartsch).

C. *Teredo bipalmulata* Lamarck — Pondichery, India

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.

Both figures are of the holotype, Paris Museum alcohol collection no. 81. There are no shells in the holotype lot. The specimen is still in good condition, showing the characteristic unequal awns and the serrated margin of the inner face of the cones.

Is *Bankia bipalmulata* (Lamarck).

D. *Bankia hawaiiensis* Edmondson — Honolulu Harbor, Oahu, Hawaii

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.

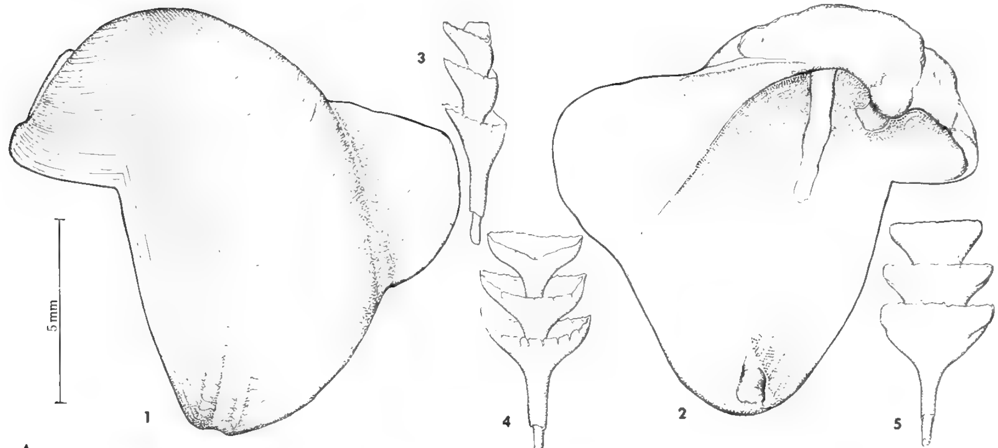
Both figures are of the holotype, BPBM 109. The shells of the holotype are in too poor a condition to illustrate.

Is *Bankia bipalmulata* (Lamarck).

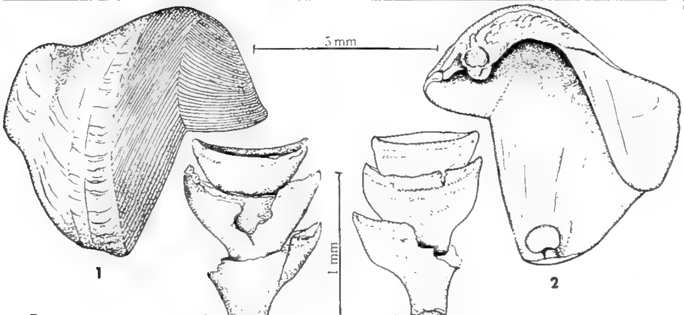
E. *Bankia konaensis* Edmondson — Kealakekua Bay, Kona, Hawaii, Hawaii

Fig. 1. Outer face of pallet.
Fig. 2. Stalk of pallet to show length.
Fig. 3. Inner face of pallet.

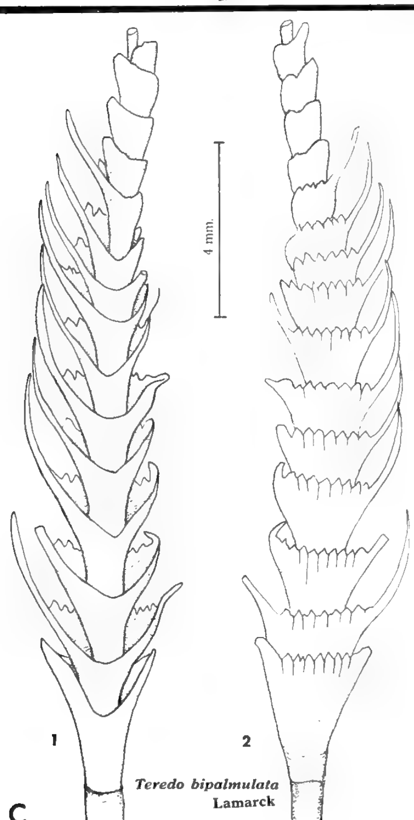
All figures are of the holotype, BPBM 108. Shells unknown. This is an example of a rapidly growing specimen of *Bankia bipalmulata* (Lamarck).



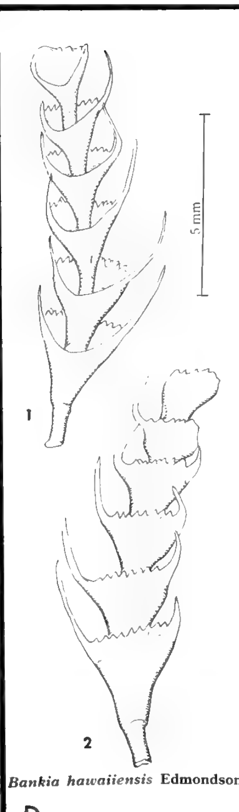
A *Bankia zeteki* Bartsch



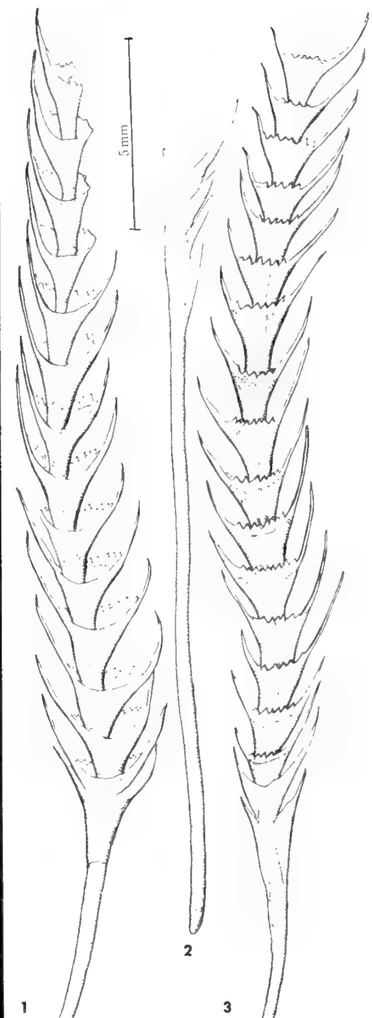
B *Bankia mexicana* Bartsch



C *Teredo bipalmulata* Lamarck



D *Bankia hawaiiensis* Edmondson



E *Bankia konaensis* Edmondson

PLATE 51

A. *Bankia denticuloserrata* Daniel — Madras coast, India

Fig. 1. Outer face of pallet.
Fig. 2. Continuation of the stalk.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.
Fig. 5. Enlargement of a single cone.

All figures are of the holotype, copied from Daniel (1956, p. 594, figs. 1-5).

Is *Bankia bipennata* (Turton).

B. *Bankia kingyokuensis* Roch — Kingyoku, Takanoshima, Japan

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Enlargement of a single cone.
Fig. 4. Outer face of pallet.
Fig. 5. Inner face of pallet.

All figures are of the holotype, Berlin Museum.

Is *Bankia bipennata* (Turton).

C. *Bankia lineata* Nair — from drift logs, Madras beach, India

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer view of enlarged cones.
Fig. 4. Inner view of enlarged cones.
Fig. 5. Inner face of pallet.

All figures are of the holotype, copied from Nair (1955, p. 11, text figs.).

Is *Bankia bipennata* (Turton).

D. *Bankia bagidaensis* Roch — [Bagida], Togo

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer face of pallet soaked in water and mounted in diaphane.

Shells unknown. Figures 1-2 are of the lectotype and Figure 3 of a paratype, all Berlin Museum.

Is probably young *Bankia bipennata* (Turton).

E. *Bankia johnsoni* Bartsch — *Albatross* sta. 5266, Batangas Bay, Luzon, Philippine Ids.

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 4. Detail of isolated cones.
Fig. 5. Outer face of remaining fragment of pallet.

All figures are of the holotype, USNM 310966. In the original description Bartsch states, "the pallet is too broken to yield measurements." The figures given by him are reconstructions, and to date no additional specimens have been found to compare with them. They are described as being evenly fringed on the inner and outer faces.

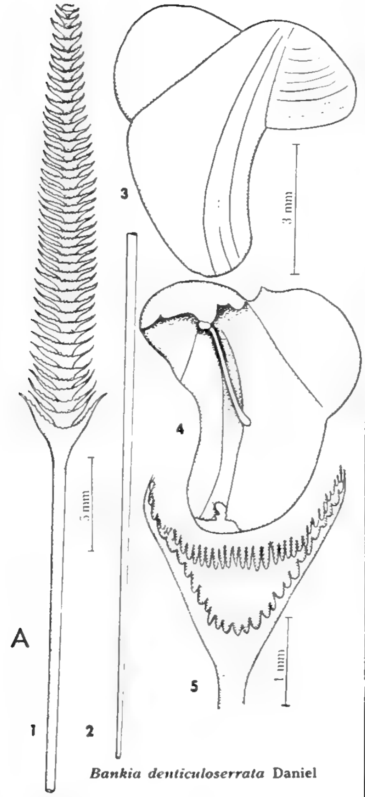
Is probably *Bankia bipennata* (Turton).

F. *Bankia thielei* Roch — Vintano, Sainte-Marie, Madagascar

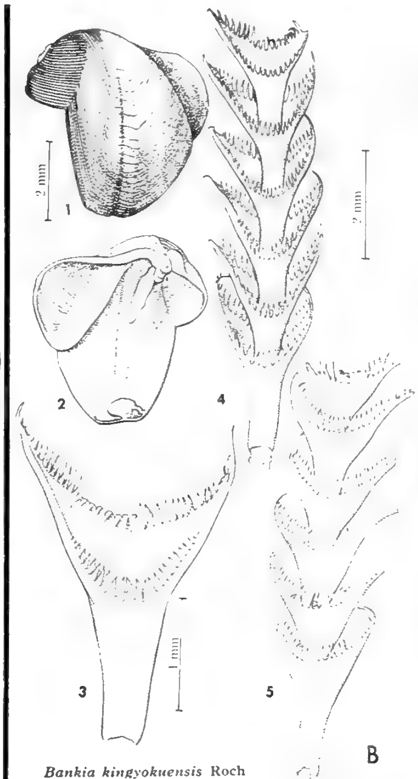
Figs. 1 and 3. Outer faces of pallets.
Fig. 2. Inner face of pallet.

Figures 1-2 are of the lectotype, and Figure 3 of a paratype, both Berlin Museum. Shells unknown. The pallets are dry and badly deteriorated. The periostracal margin of the cones appears to be wide, serrated, and with short awns which on drying have adhered tightly to the cones.

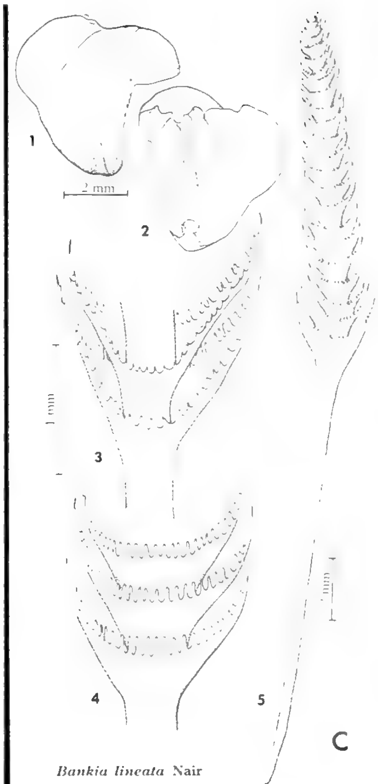
Is possibly *Bankia rochi* Moll.



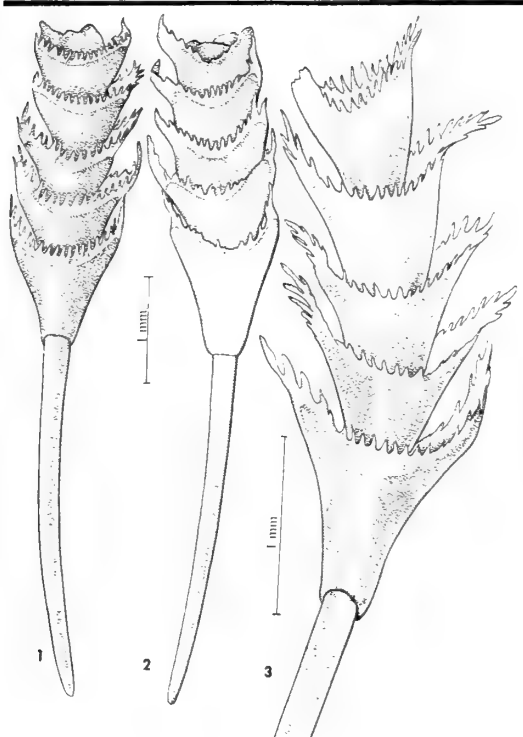
Bankia denticuloserrata Daniel



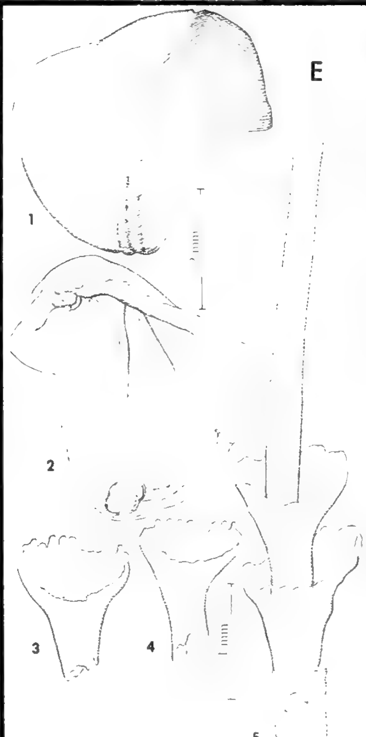
Bankia kingyokuensis Roch



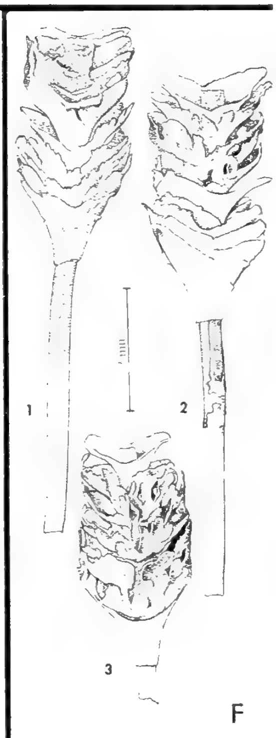
Bankia lineata Nair



Bankia bagidaensis Roch



Bankia johnsoni Bartsch



Bankia thielei Roch

PLATE 52

A. *Bankia gracilis* Moll — Singapore

Fig. 1. Remnant of pallet.
Fig. 2. Outer face of pallet.
Fig. 3. Inner face of pallet.
Fig. 4. Outer face of single cone.
Fig. 5. Inner face of single cone.

Figure 1 is of the holotype, Berlin Museum, and Figures 2-5 are of a specimen from Singapore, MCZ 169596. The stalk and part of the first cone is all that remains of the holotype which is dry. Heavy dark periostracum covers the stalk and distal portion of the cone. The base of the cone is white, calcareous and lobed. Figures 2-5 are of a preserved specimen taken from test boards. Figure 2 shows the characteristic 3-lobed upper margin of the calcareous portion of the cone.

B. *Bankia segaruensis* Roch — Togo

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.

Both figures are of the lectotype, Berlin Museum. Shells unknown. The periostracal margin of the cones narrow, a medium straw-brown in color, entire, and with short, blunt awns. Specimen dry and in rather poor condition.

Is *Bankia carinata* (Gray).

C. *Teredo brevis* Deshayes — Réunion Id.

Fig. 1. Inner view of shell.
Fig. 2. Outer view of shell.
Fig. 3. Outer face of pallet.

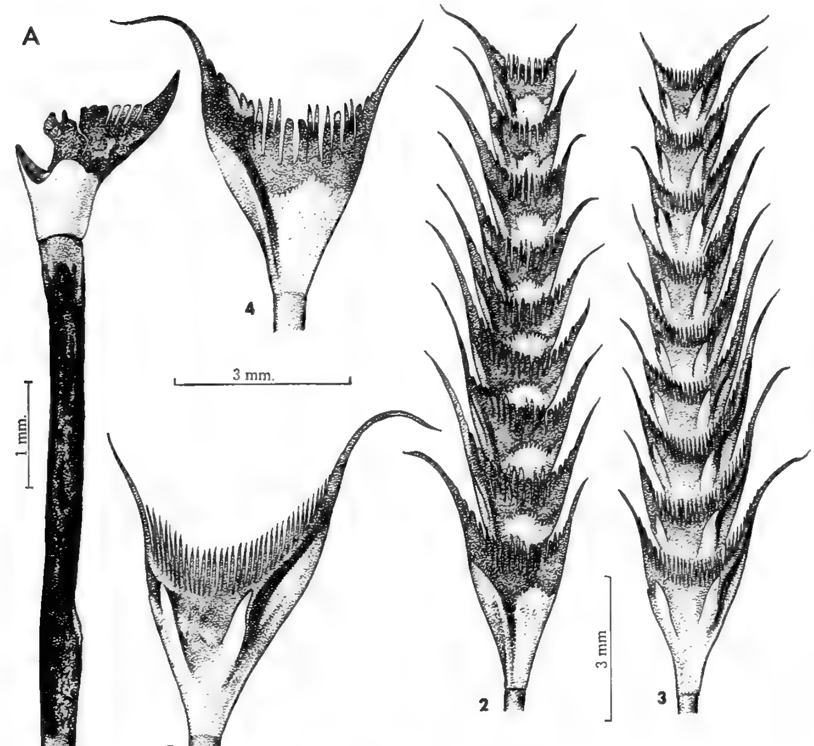
All figures are of the holotype, École des Mines, Paris. Only a fragment of the pallet remains, but this has light horn colored periostracum which extends into long curved awns.

Is *Bankia brevis* (Deshayes).

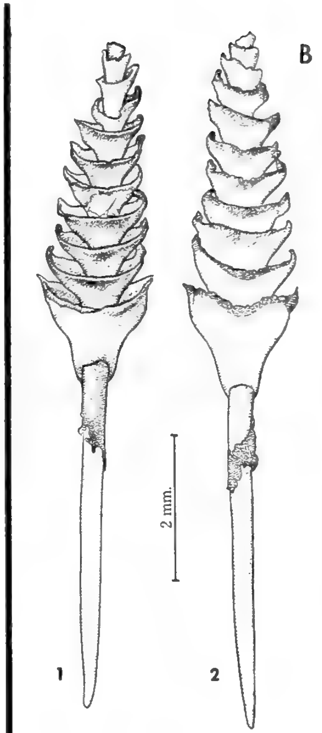
D. *Bankia anechoensis* Roch — Togo

Figs. 1 and 2. Outer faces of pallets.
Fig. 3. Inner face of pallet.
Fig. 4. Enlargement of the cones.

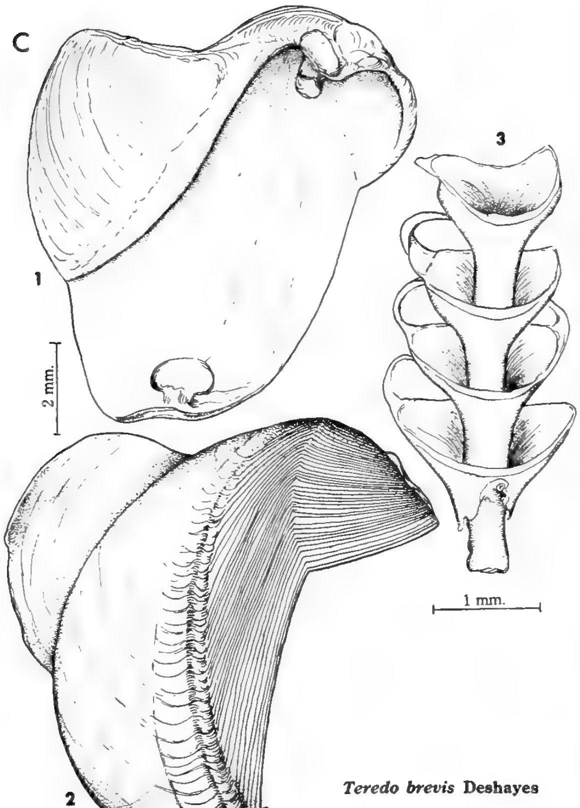
Figure 1 is of the lectotype and Figures 2-4 of paratypes, all Berlin Museum. Inner face of the pallets is flat, the periostracum very thin, a pale straw color and coarsely fringed. The outer face is covered with a rather heavy, finely fringed, straw-yellow periostracum, the calcareous portion of the individual cones heavy and white. Stalk thin and weak. Specimen dry and badly deteriorated, the detail of the fringe evident on only occasional cones.



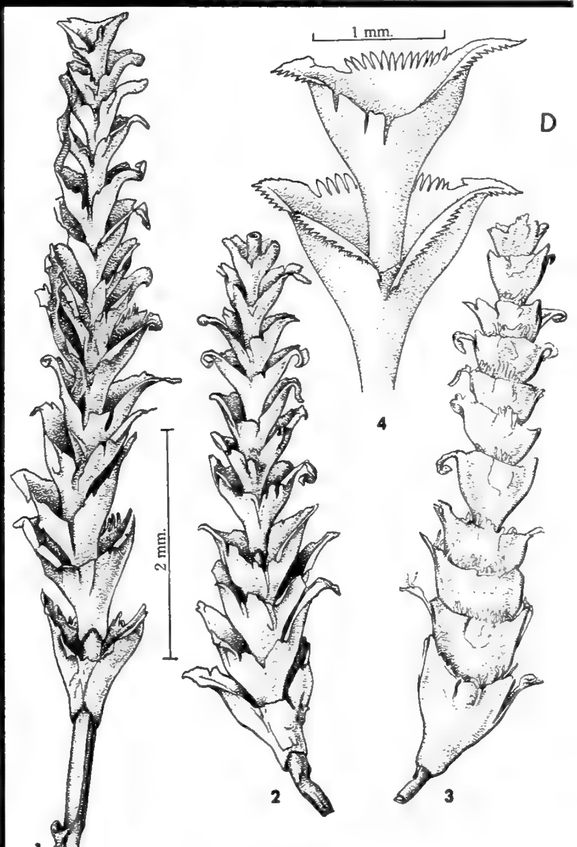
Bankia gracilis **Moll**



Bankia segaruensis **Roch**



Teredo brevis **Deshayes**



Bankia anechoensis **Roch**

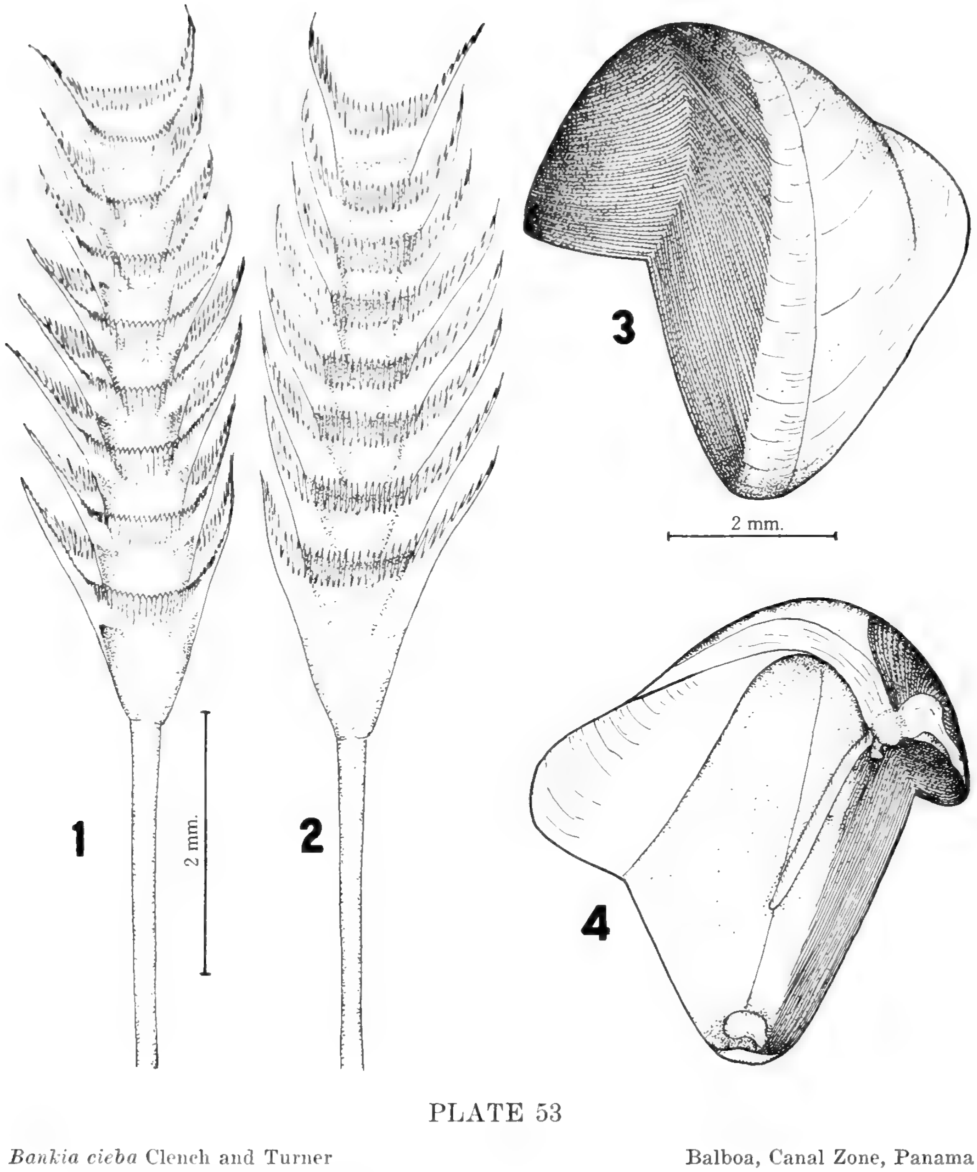


PLATE 53

Bankia cieba Clench and Turner — Balboa, Canal Zone, Panama

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

All figures are of the holotype, MCZ 168097. Figures taken from Clench and Turner (1946, pl. 16).

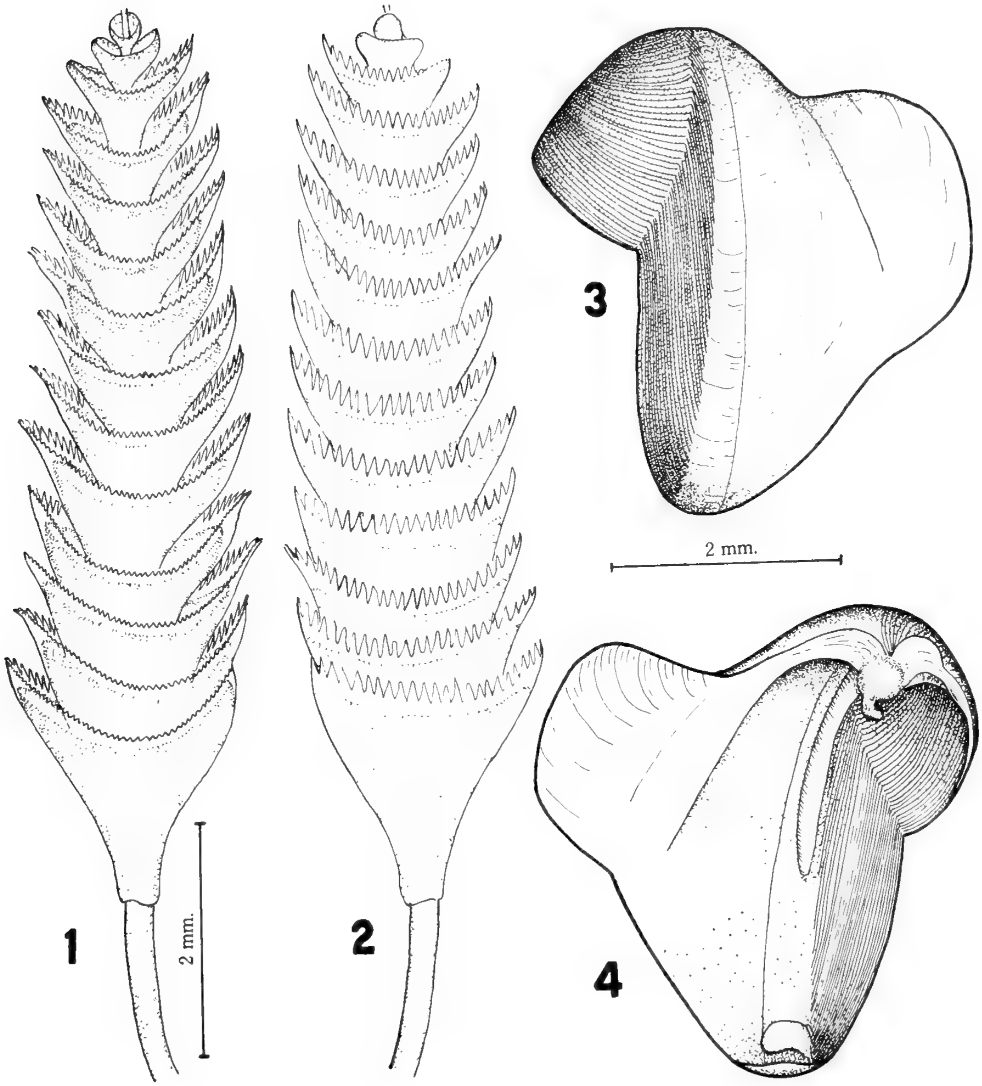


PLATE 54

Bankia destructa Clench and Turner La Cieba, Honduras

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

All figures are of the holotype, MCZ 123303. Figures taken from Clench and Turner (1946, pl. 13).

PLATE 55

Bankia fimbriatula Moll and Roch — Port au Prince, Haiti

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

All figures are of a specimen, MCZ 121249. Figures taken from Clench and Turner (1946, pl. 14).

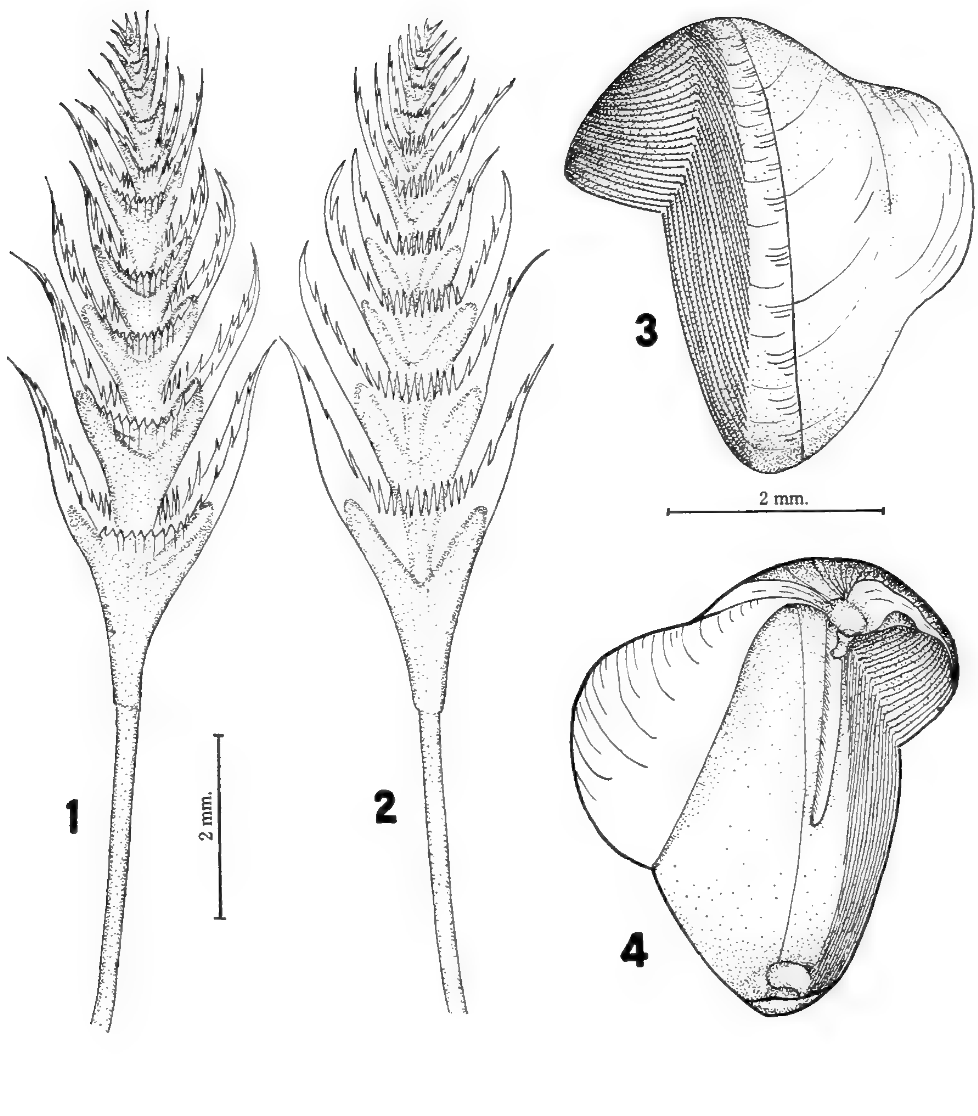

1
2
3
4
2 mm.
2 mm.

PLATE 56

A. *Teredo fimbriata* Jeffreys — in teak-wood, Leith, Scotland

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the lectotype, USNM 194214. Forbes and Hanley referred to this species as '*palmulata* Lamarck,' and Jeffreys, realizing it was not that species, named it *fimbriata*. The dried and shriveled pallet was soaked in water to expand the periostracal fringe before drawing. The calcareous portion of the pallet is deeply V-shaped; the periostracal border is finely fringed on the outer face, deeply so on the inner.

Is *Bankia fimbriatula* Moll and Roch.

B. *Bankia canalis* Bartsch — Balboa, Canal Zone, Panama

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

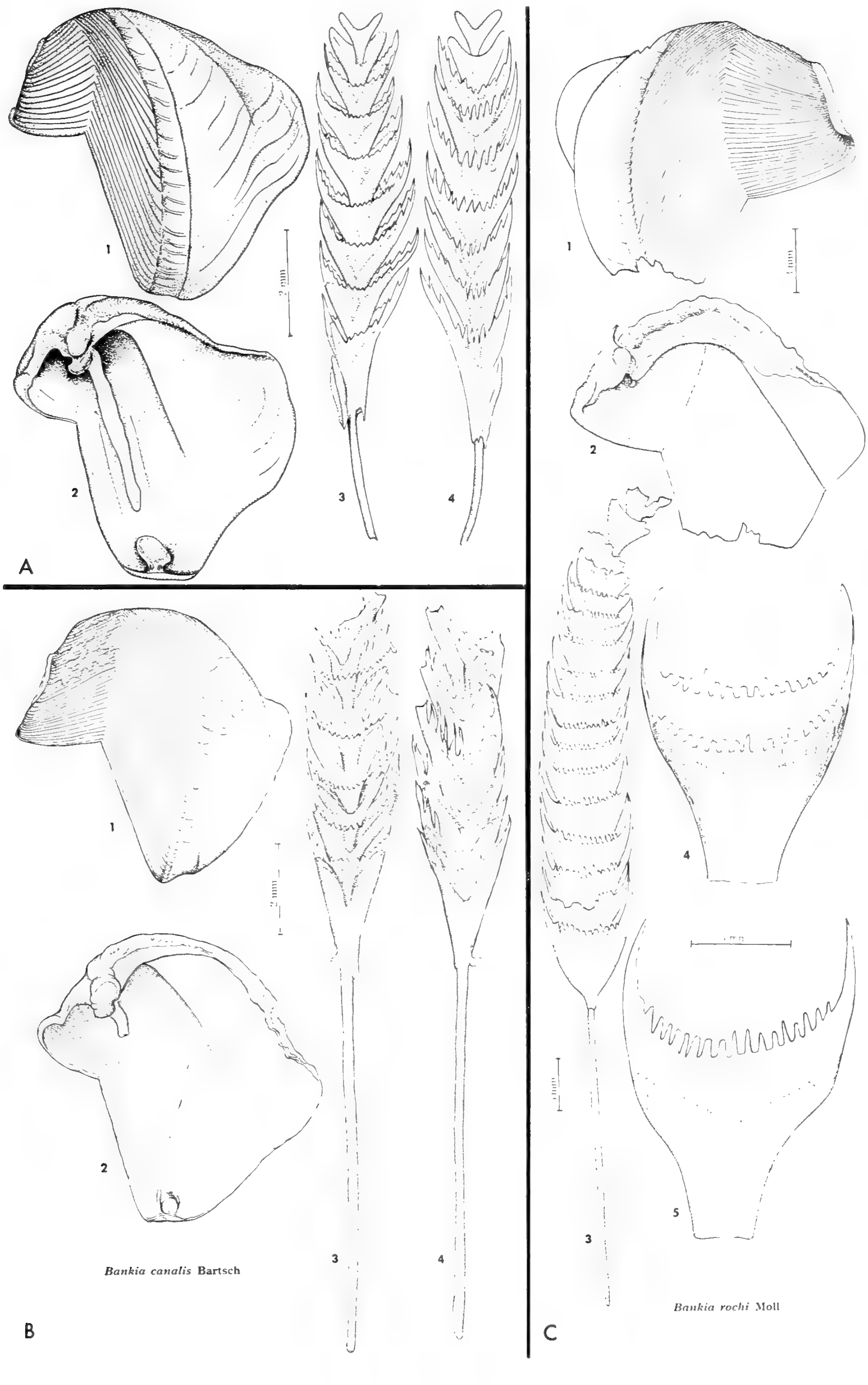
All figures are of the holotype, USNM 568817. The dried pallets were first soaked to expand the periostracal margin.

Is *Bankia fimbriatula* Moll and Roch.

C. *Bankia rochi* Moll — Christmas Id., S. of Java

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Outer face of enlarged cone.
Fig. 5. Inner face of enlarged cone.

All figures are of the holotype, BM(NH) 1905·5·7·39. The specimen, though preserved in alcohol, is in poor condition and extremely fragile and so was handled as little as possible. The illustrations of the individual cones were made without removing any from the pallet. See also illustrations of this species in the Introduction.



Bankia canalis Bartsch

Bankia rochi Moll

PLATE 57

Bankia fosteri Clench and Turner Santa Marta, Colombia

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

All figures are of the holotype, MCZ 122536. This species is close to *bipennata* Turton, but differs in that the cones are much more solid and tapering, and the serrations on the periostracal border coarser and more definitely shaped; and the shell is quite different, as shown in the illustration. These characters appear to hold true for large series. Figures taken from Clench and Turner (1946, pl. 15).

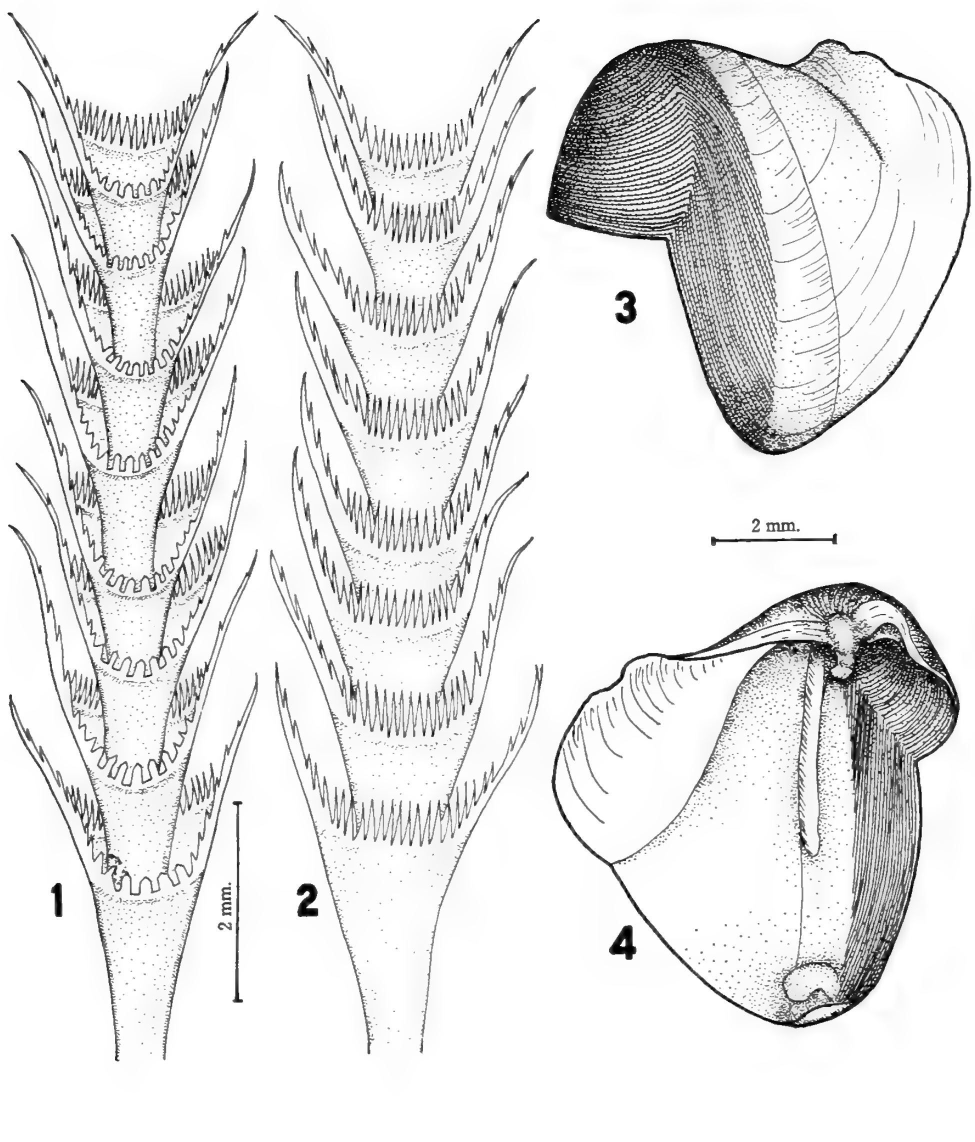

1
2
3
4
2 mm.
2 mm.

PLATE 58

A. *Teredo carinata* 'Gray' Sowerby — from driftwood, English Channel

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 4. Outer face of pallet.
Figs. 5 and 6. Inner face of pallet.

All figures are of the holotype, BM(NH). The periostracum is pale yellow and clinging to the dried out pallets. Under the periostracal sheath the stalk is very granular. The entire pallet (in 7 pieces) measures 10.5 cms.

B. *Teredo cucullata* Jeffreys — from driftwood, Guernsey, England

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Enlarged view of a single cone.

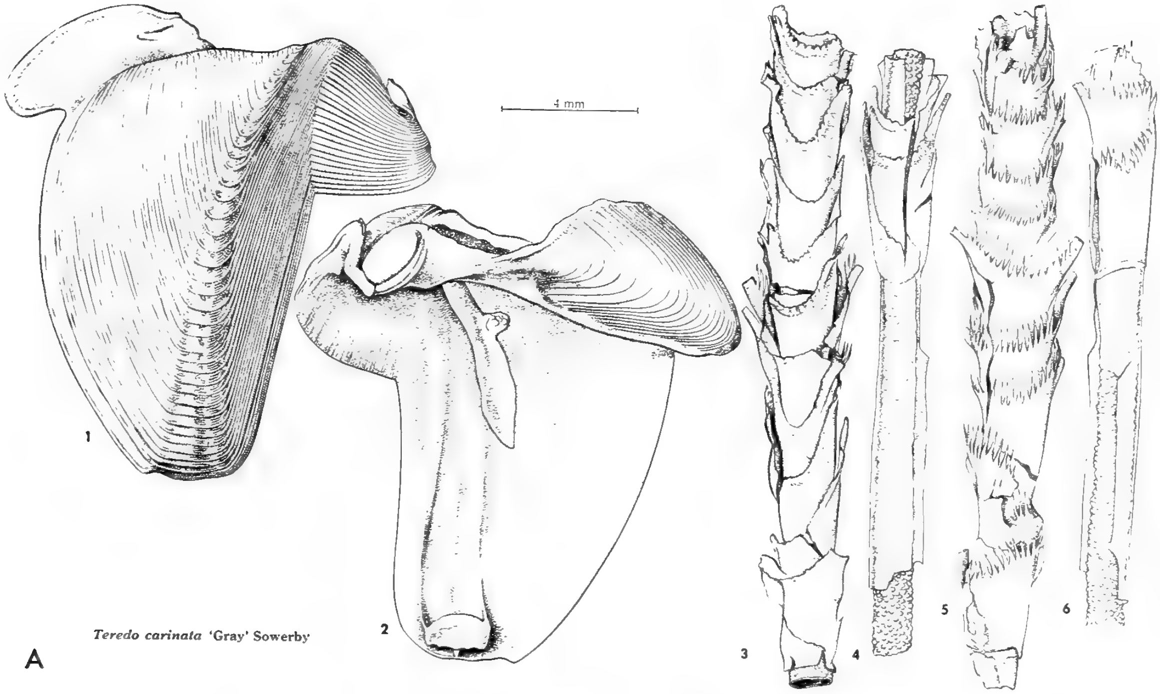
All figures are of the lectotype, USNM 194262 in the Jeffreys collection.

C. *Teredo bipennata* Turton — from driftwood, mouth of River Ex, Devonshire, England

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

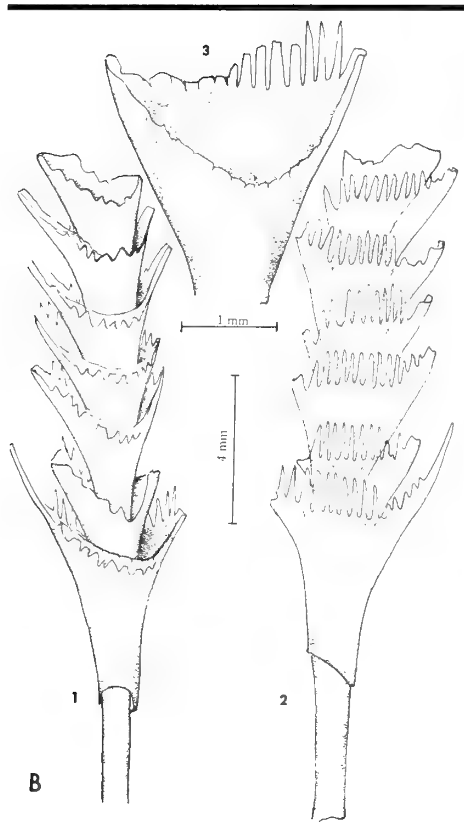
All figures are of the lectotype, USNM 194256 in the Jeffreys collection from Turton. The cones are solid with a narrow, light yellow periostracal fringe.

All of the species figured on this plate are now synonymized with *Bankia bipennata* (Turton).

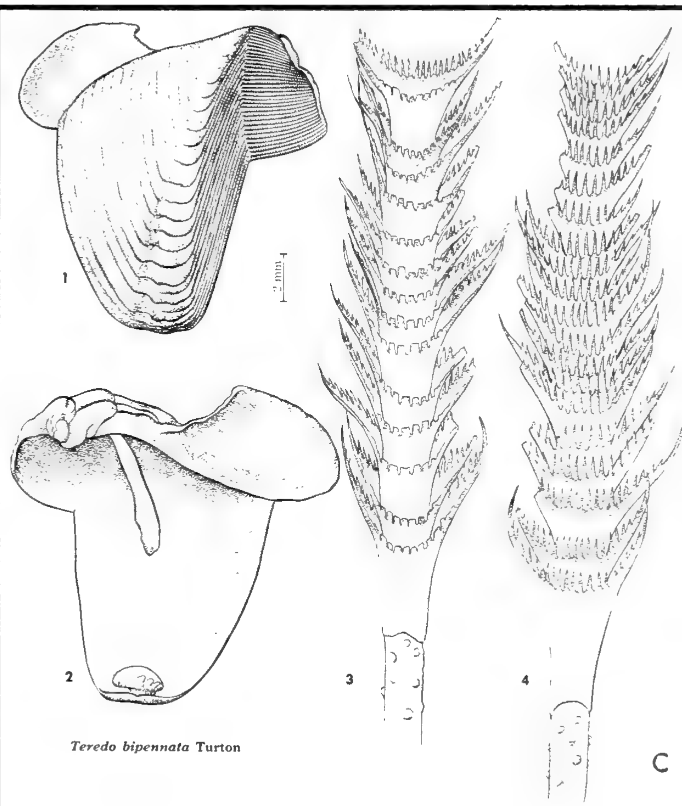


Teredo carinata 'Gray' Sowerby

A



B



Teredo bipennata Turton

C

PLATE 59

Bankia gouldi (Bartsch) Norfolk, Virginia

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer view of shell.
Fig. 4. Inner view of shell.

All figures are of a specimen, MCZ 168150. Figures taken from Clench and Turner (1946, pl. 9).

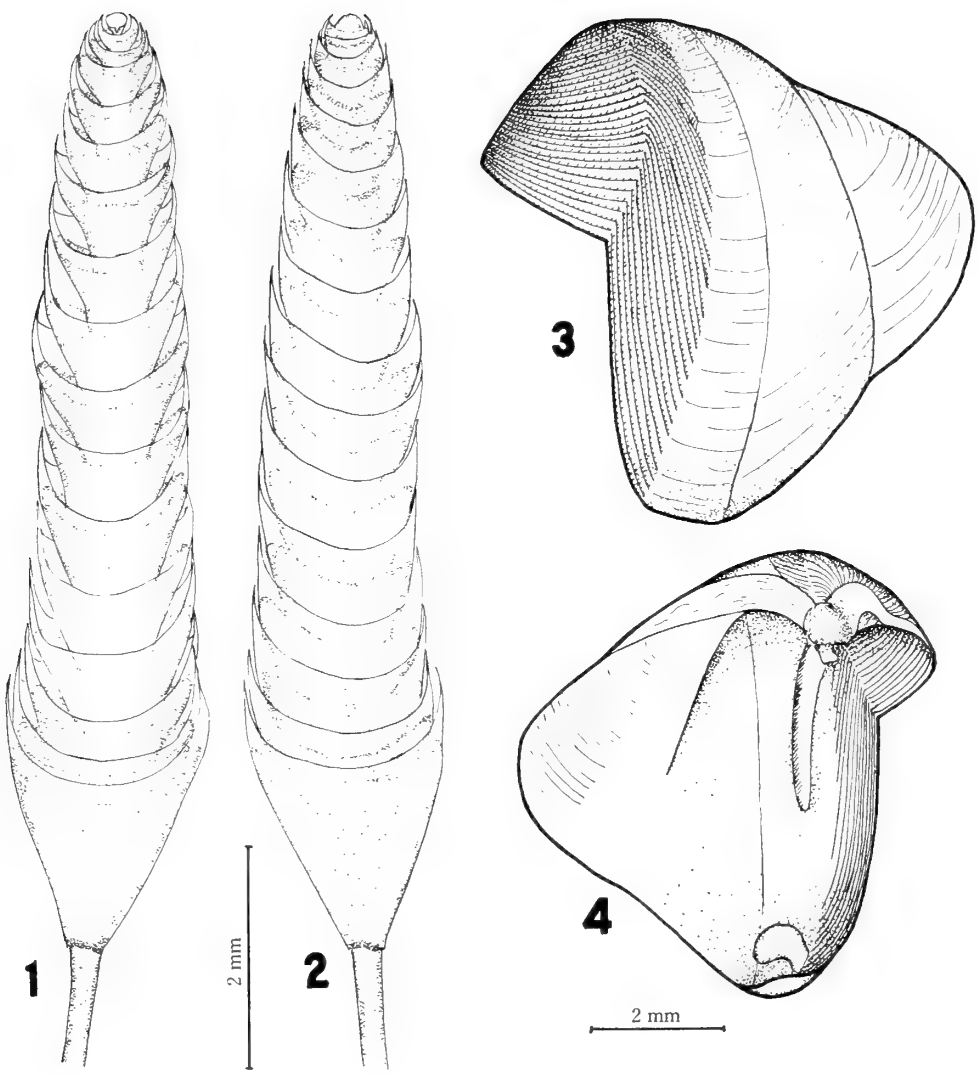

1
2
3
4
2 mm
2 mm

PLATE 60

A. *Xylotrya setacea* Tryon — San Francisco Bay, California

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Enlargement of a cone.
Fig. 4. Outer face of pallet.
Fig. 5. Inner face of pallet.

All figures are of the holotype, ANSP 50987 and drawn by N. Strekalovsky. Figure 3 shows the smooth edge of the periostracal border with longitudinal striations on the outer face, the long lateral awns, and the wide membranous border of the inner face.

Is *Bankia setacea* (Tryon).

B. *Bankia sibirica* Roch — Soviet Harbor, USSR

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.
Fig. 3. Outer face of a cone.
Fig. 4. Inner face of a cone.

All figures are of the holotype, Berlin Museum. Shells unknown. Pallet dry, in poor condition, with the remaining periostracum heavy and a medium brown. Margin of the periostracum probably smooth.

Is probably *Bankia setacea* (Tryon).

C. *Xylotria* [*sic*] *devoluta* Vincent — Eocene. Sables de Wemmel, Neder-over-Heembeek, Belgium

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Figs. 3 and 4. Cones from a pallet.

Figure 1 is of the holotype, Brussels Museum 126; Figure 2 is of a specimen from the Lutetien of Vaudancourt; Figures 3-4 of a paratype, all Brussels Museum.

Is a *Bankia*, probably the same lineage as *tournali* (Leymerie).

D. *Teredo tournali* Leymerie — Upper Cretaceous. France

The holotype, École des Mines, Paris.

Is a *Bankia*.

E. *Bankia lincolnensis* Durham and Zullo — Middle Oligocene. Lincoln Formation, near Porter, Washington

Pallet of the holotype, University of California Museum of Paleontology 34672.

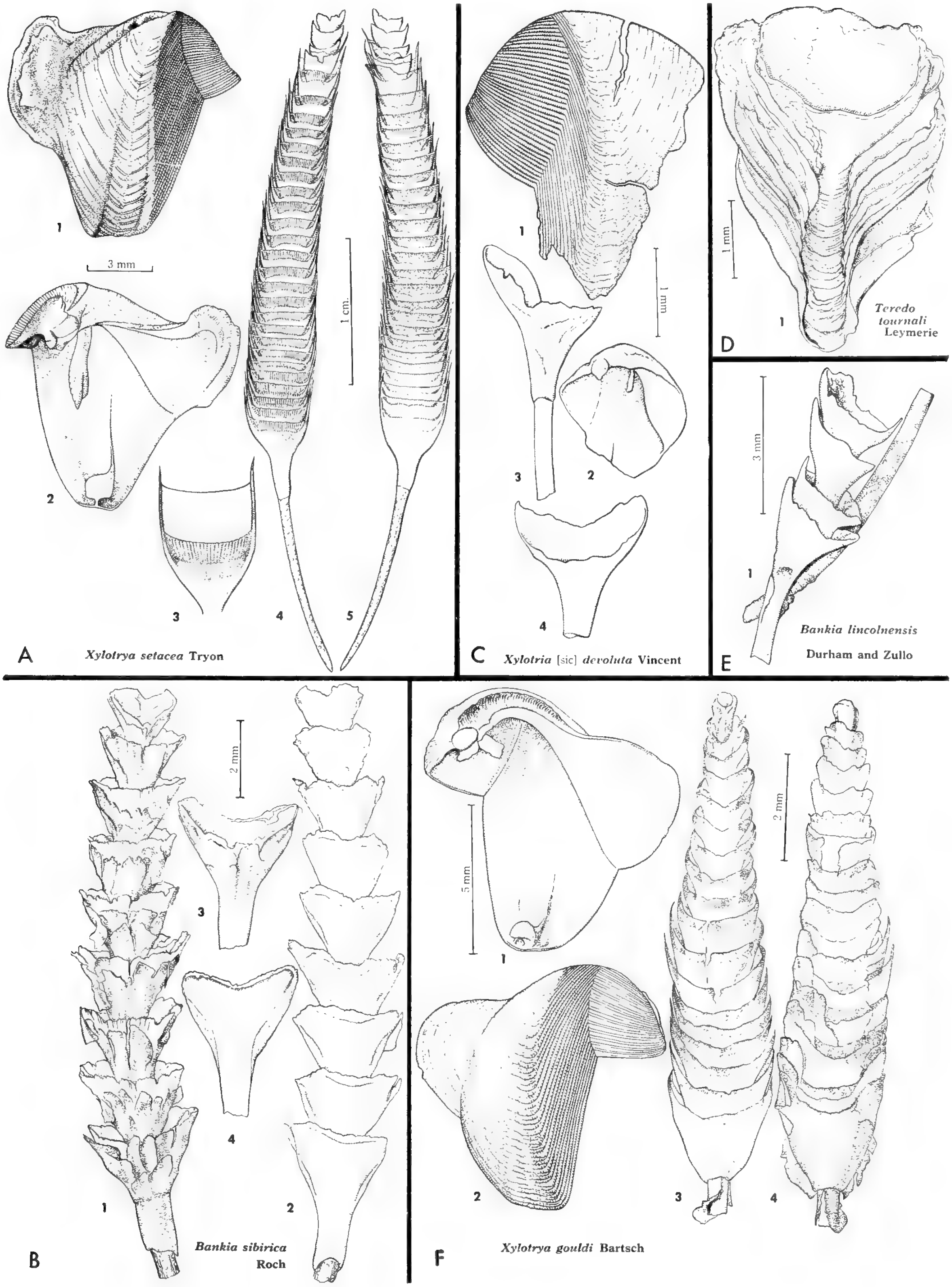
Is very close to, if not the same as, *Bankia setacea* (Tryon). Pallets of *Bankia setacea* shaken from a thoroughly dried-out log can be matched with this fossil form.

F. *Xylotrya gouldi* Bartsch — Norfolk Harbor, Virginia

Fig. 1. Inner view of shell.
Fig. 2. Outer view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, USNM 27415. Specimen is dry and the periostracum, where it still exists, is clinging to the cups. It is a golden brown and very thin. The stalk is broken. See Plate 59 which illustrates a preserved specimen.

Is *Bankia gouldi* (Bartsch).



1
3 mm
2
3
4
5
1 cm.
A
Xylotrya setacea Tryon
1
1 mm
3
2
4
C
Xylotria [sic] devoluta Vincent
1 mm
1
Teredo tournali Leymerie
D
3 mm
1
Bankia lincolnensis
Durham and Zullo
E
2 mm
3
4
1
2
Bankia sibirica Roch
B
5 mm
1
2 mm
2
3
4
F
Xylotrya gouldi Bartsch

PLATE 61

A. *Bankia argentinica* Moll — Buenos Aires, Argentina

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Side view of a cone.
Fig. 4. Outer face of single cone.
Fig. 5. Outer face of pallet.
Fig. 6. Inner face of pallet.

All figures are of the holotype, Berlin Museum. The pallets are covered by a thin straw colored periostracum which is finely fringed on the outer face and has strong awns which are partially serrated. These serrations could only be seen with strong magnification as the pallets were dry and the periostracum curled. Figures 3-4 are reconstructions to show detail of the cones.

D. *Teredo martensi* Stempell — Punta Arenas, Chile

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Enlargement of a portion of a cone, showing the lateral awns and the serrations which extend to about the mid-point.
Fig. 5. Outer face of a cone.
Fig. 6. Inner face of a cone.

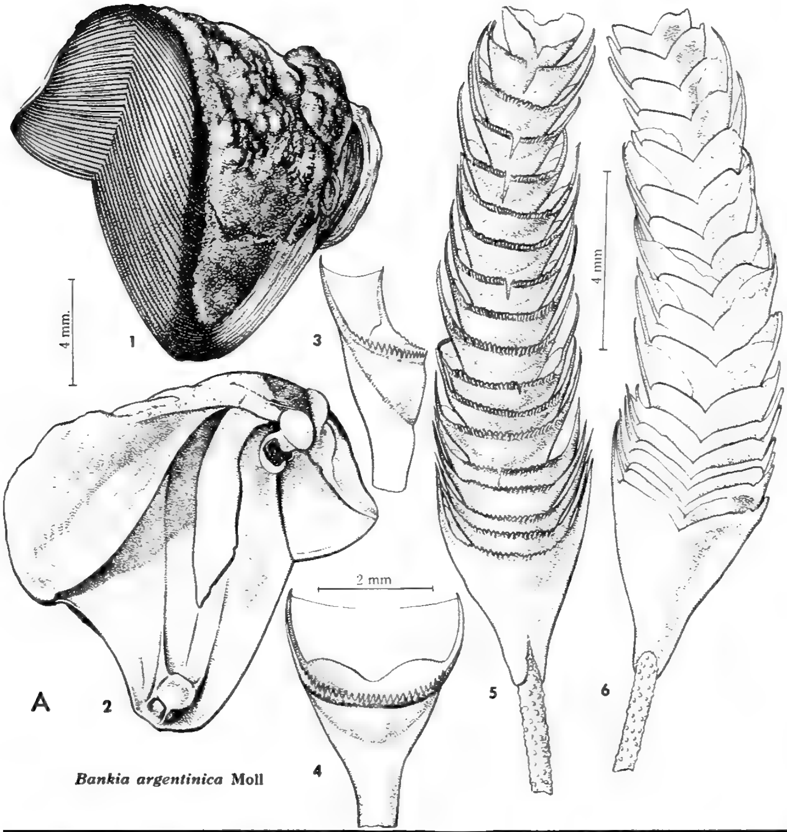
Figures 1-4 are of the holotype, copied from Stempell (1899, pl. 12, figs. 24-27). Figures 5-6 are cones from a specimen, MCZ 201404, from Puerto Mott, Chile.

C. *Bankia odhneri* Roch — Port William, Falkland Ids.

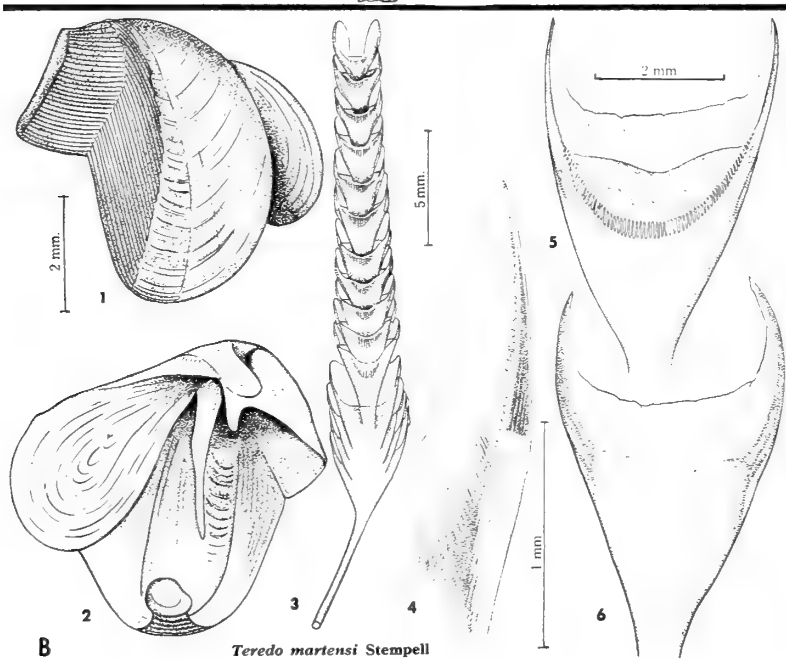
Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Inner face of pallet.
Fig. 4. Outer face of pallet.

All figures are of the holotype, Stockholm Museum 5094. The serrations and awns are evident on only a very few of the cones. Roch stated that the pallets were in poor condition as the specimens had been treated accidentally with caustic soda.

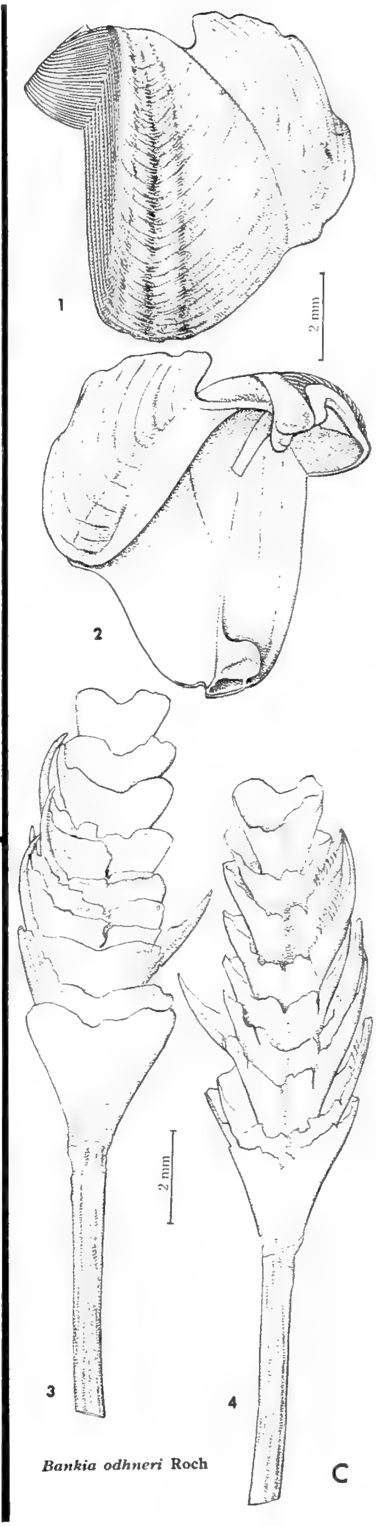
All of the species figured on this plate are now considered *Bankia martensi* (Stempell).



Bankia argentinica Moll



Teredo martensi Stempell



Bankia odhneri Roch

PLATE 62

A. *Xylotrya capensis* Calman — Simonstown, South Africa

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Enlarged detail of single cone.
Fig. 4. Stalk.
Figs. 5 and 6. Outer faces of pallets.
Fig. 7. Inner face of pallet.

All figures are of the holotype, BM(NH) 1921·5·19·39. The broad periostracal border of the cones is finely serrated and marked with longitudinal striations on the outer face. Laterally it is produced to form awns. The specimen, preserved in alcohol, is very fragile.

Is *Bankia martensi* (Stempell).

B. *Bankia chiloensis* Bartsch — Chiloé Id., Chile

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

All figures are of the holotype, USNM 348498. Pallets dry and fragmented. Periostracal border on the outer face of the cones marked with longitudinal striations.

Is *Bankia martensi* (Stempell).

C. *Bankia occasiuncula* Iredale — Goat Id., Port Jackson, New South Wales, Australia

Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.

Both figures are of a paratype, MCZ 168016.

Is *Bankia australis* (Calman).

D. *Bankia philippinensis* Bartsch — *Albatross* sta. 5243, Pujada Bay, Mindanao, Philippine Ids.

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Outer face of pallet.
Fig. 4. Inner face of pallet.

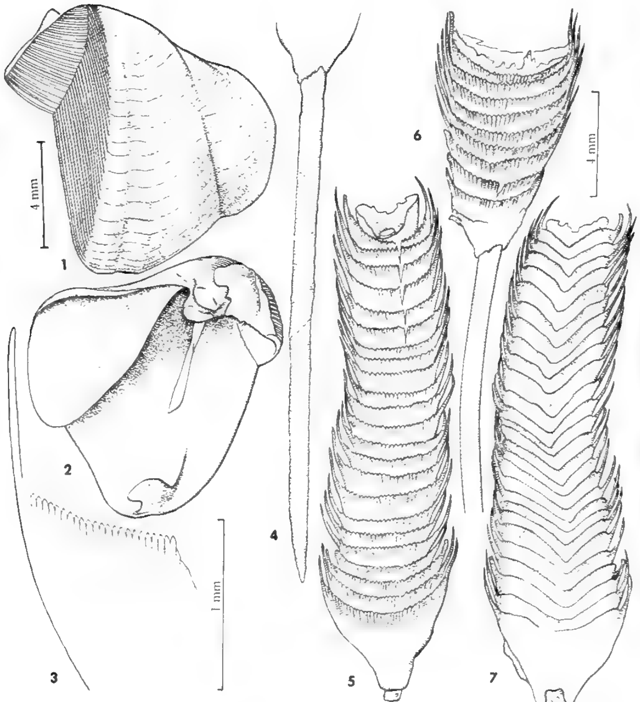
All figures are of the holotype, USNM 310970. The thin, pale straw colored periostracum extends as a narrow, finely fringed border of both the outer and inner faces of the cones. The pallets are delicate with a thin stalk. The shell appears to be abnormal and stenomorphic, and in fact may not belong with the pallets.

E. *Bankia barthelowi* Bartsch — *Albatross* sta. 5266, Batangas Bay, Luzon, Philippine Ids.

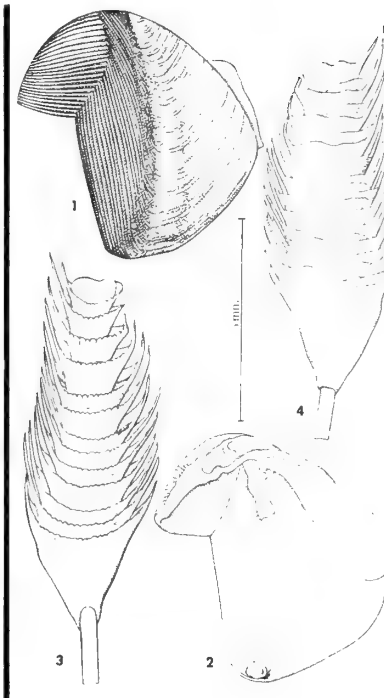
Fig. 1. Outer face of pallet.
Fig. 2. Inner face of pallet.

Both figures are of the holotype, USNM 310968. The shell is unknown. No periostracum is left on the pallets of the holotype, which is very fragmentary. The species is known only from three pallets taken from a piece of wood dredged in 100 fathoms.

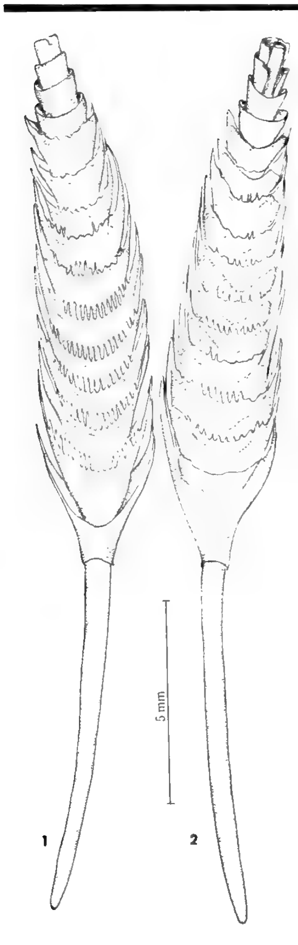
Bankia davaoensis Bartsch (Plate 44 E) is this species.



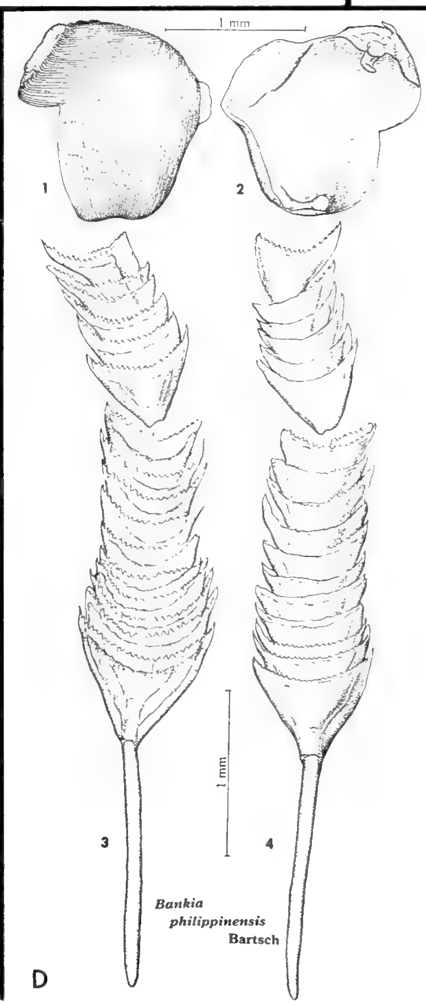
A *Xylotrya capensis* Calman



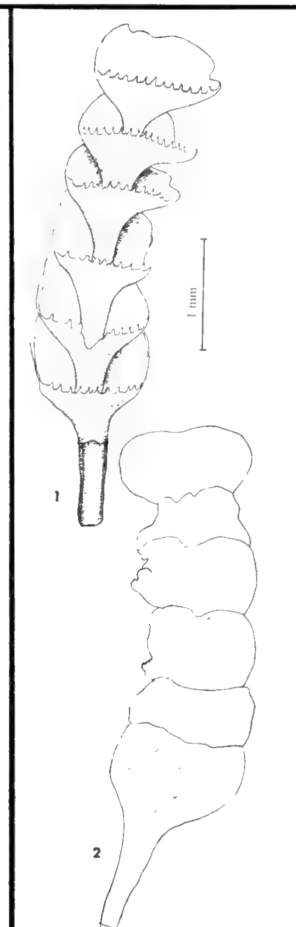
B *Bankia chiloensis* Bartsch



Bankia occasiuncula Iredale
C



Bankia philippinensis Bartsch
D



Bankia barthelowi Bartsch
E

PLATE 63

A. *Bankia australis* (Calman) — mouth of Brisbane River, Queensland, Australia
- Fig. 1. Outer face of pallet.
- Fig. 2. Inner face of pallet.
- Figs. 3 and 4. Enlarged views of individual cones.
- Fig. 5. Outer view of shell.
- Fig. 6. Inner view of shell.

All figures are of a nearly perfect specimen, MCZ 229506, from the second locality mentioned by Calman in the original description. The enlarged view of the cone shows the extension of the calcareous portion of the cone into the fringed periostracal border.

B. *Bankia archimima* Iredale — Pyrmont, Port Jackson, Sydney Harbour, New South Wales, Australia
- Fig. 1. Outer view of shell.
- Fig. 2. Inner view of shell.
- Fig. 3. Outer face of pallet.
- Fig. 4. Inner face of pallet.

All figures are of the holotype, copied from Iredale (1932, pl. 4, figs. 5-8).

C. *Bankia debenhami* Iredale — Pyrmont, Port Jackson, Sydney Harbour, New South Wales, Australia
- Fig. 1. Inner face of pallet.
- Fig. 2. Outer face of pallet.
- Fig. 3. Enlargement of a cone.
- Fig. 4. Detail of the fringing of a cone, showing the extension of the calcareous portion up into the periostracal border.

All figures are of a paratype, MCZ 229349. Periostracum a pale yellow.

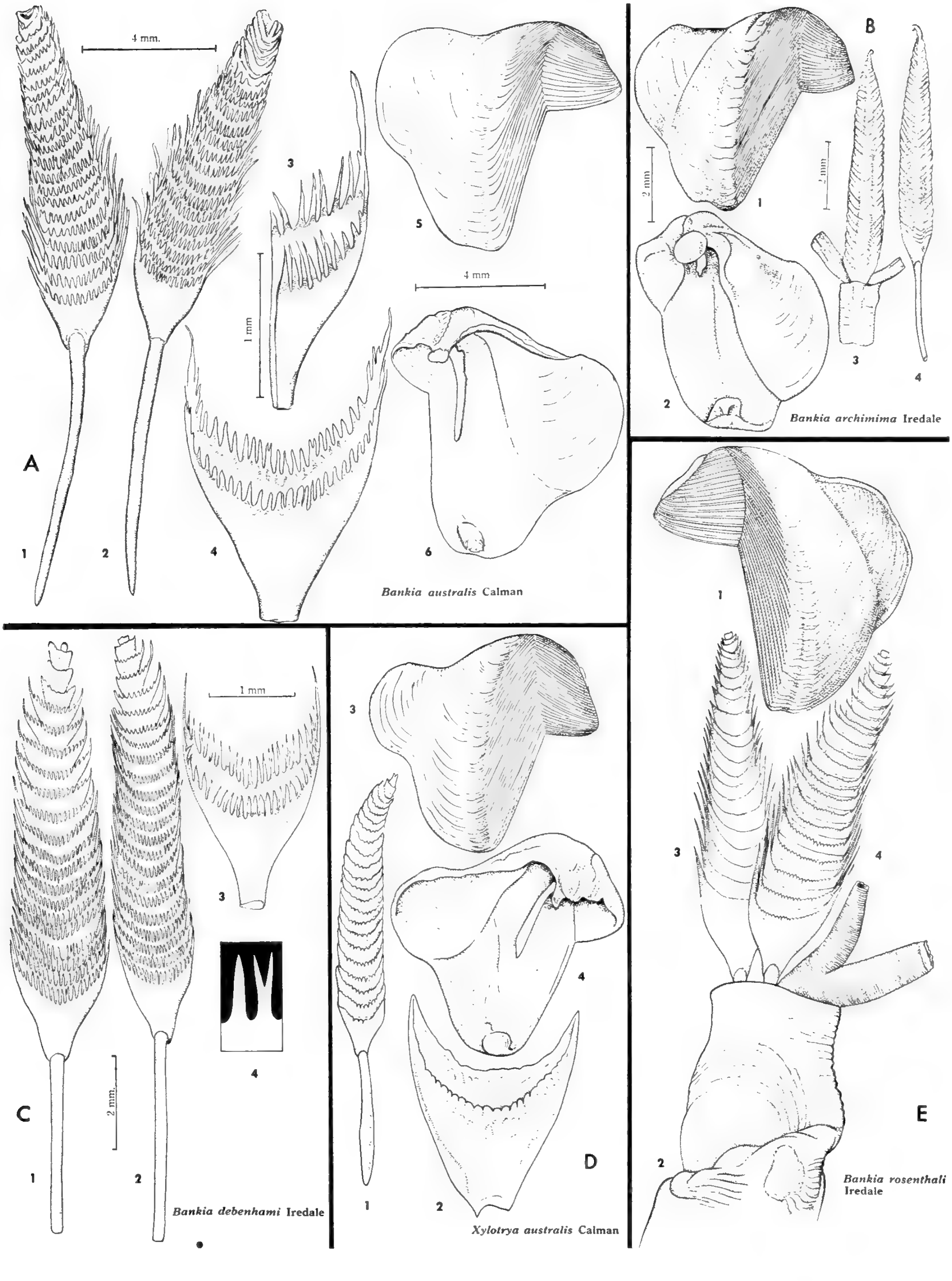
D. *Xylotrya australis* Calman — Auckland, New Zealand
- Fig. 1. Outer face of pallet.
- Fig. 2. Enlarged view of a cone.
- Fig. 3. Outer view of shell.
- Fig. 4. Inner view of shell.

All figures are of a syntype, copied from Calman (1920, p. 399, figs. 6-7). (Measurements not given.) A rather worn specimen was illustrated by Calman, though in the original description he stated that "the distal margins of the segments are concave or obtusely V-shaped, with a delicate membraneous border, at the base of which the calcified portion shows a series of coarse and somewhat irregular serrations which become very conspicuous in dried specimens."

E. *Bankia rosenthali* Iredale — Oyster Cove, Port Jackson, New South Wales, Australia
- Fig. 1. Outer view of shell.
- Figs. 2-4. Posterior end of animal showing the siphons and the inner (3) and the outer (4) faces of the pallets.

All figures are of a paratype, MCZ 168015.

All of the species figured on this plate are now considered *Bankia australis* (Calman).



A. *Bankia australis* Calman

B. *Bankia archimima* Iredale

C. *Bankia debenhami* Iredale

D. *Xylotrya australis* Calman

E. *Bankia rosenthali* Iredale

PLATE 64

A. *Teredo ancilla* Barnard — from log in mangrove swamp, Umlalazi estuary, Zululand

Figs. 1 and 2. Outer views of shells.
Fig. 3. Inner view of shell.
Fig. 4. Posterior view of shell.
Fig. 5. Outer face of pallet.
Fig. 6. Inner face of pallet.
Fig. 7. Entire animal.

All figures are of the holotype, and are copied from Barnard (1964, p. 569, fig. 36). The animal measured 40 mm in length. (The pallets and shells, 3 ×.)

Is *Dicyathifer manni* (Wright).

B. *Teredo duplicata* Stinton — Upper Eocene. Middle Barton Beds, Horizon C, Highcliffe, Hampshire, England

Fig. 1. Outer face of pallet.
Figs. 2 and 3. Inner faces of pallets.

All figures are of the types in the BM(NH) [Fig. 3, the holotype, BM(NH) L87335], copied from Stinton (1957, p. 172, pl. 25, figs. 15-17). (All 7 ×.)

Is probably a *Teredora* and the adult of *ungulata* Stinton.

C. *Bankia tumida* Stinton — Upper Eocene. Lower Barton Beds Horizon A3, Highcliffe, Hampshire, England

Fig. 1. Outer view of shell.
Fig. 2. Inner view of shell.
Fig. 3. Inner face of section of a pallet.
Fig. 4. Inner face of a single cone.
Fig. 5. Outer face of a single cone.

All figures are of the types in BM(NH), and are copied from Stinton (1957, p. 172, pl. 25, figs. 1-5). Figure 3 is of the holotype, BM(NH) L87321. (All 7 ×.)

Is probably the same as *parisiensis* (Deshayes).

D. *Teredo parisiensis* Deshayes — Upper Eocene. Calcaire grossier inférieur, Chaumont, France.

Fig. 1. Outer face of fragment of pallet.
Fig. 2. Side view of fragment of pallet.

Both figures are of the holotype in the École des Mines, Paris, copied from Deshayes (1860, p. 115, pl. 3, figs. 2-3). (All 7 ×.)

Is a *Bankia*.

E. *Bankia minima hemicalix* Tauber — Upper Miocene. Tortonien, Kalksburg, Austria

Fig. 1. Section of a tube with a fragmented pair of pallets. The upper one shows the inner face; the lower one the outer face (7 ×).
Fig. 2. Enlargement of lower pallet shown in Figure 1 with a section of the stalk adhering to it (11 ×).
Fig. 3. Fragment of pallet in tube (8 ×).

All figures are of the types [Figures 1 and 2 of the holotype, Nat. Hist. Mus. Wien], copied from Tauber (1954, p. 25, pl. 1, figs. 1-2).

F. *Teredo divisa* Ryckholt — Eocene. Tertiaire, Brabant, Belgium

Probably the inner face of the tip of a pallet (2 ×), copied from Ryckholt (1852, p. 113, pl. 5, fig. 13).

Is *Bankia burtini* (Ryckholt).

G. *Teredo burtini* Ryckholt — Eocene. Tertiaire, Brabant, Belgium

Outer face of lower portion of a pallet (2 ×).

Is a *Bankia*, possibly *parisiensis* (Deshayes).

H. *Teredo ungulata* Stinton — Upper Eocene. Middle Barton Beds, Horizon F, Barton, Hampshire, England

Figs. 1 and 4. Inner views of shells.
Figs. 2 and 3. Outer views of shells.
Fig. 5. Outer face of pallet.
Figs. 6 and 7. Inner faces of pallets.

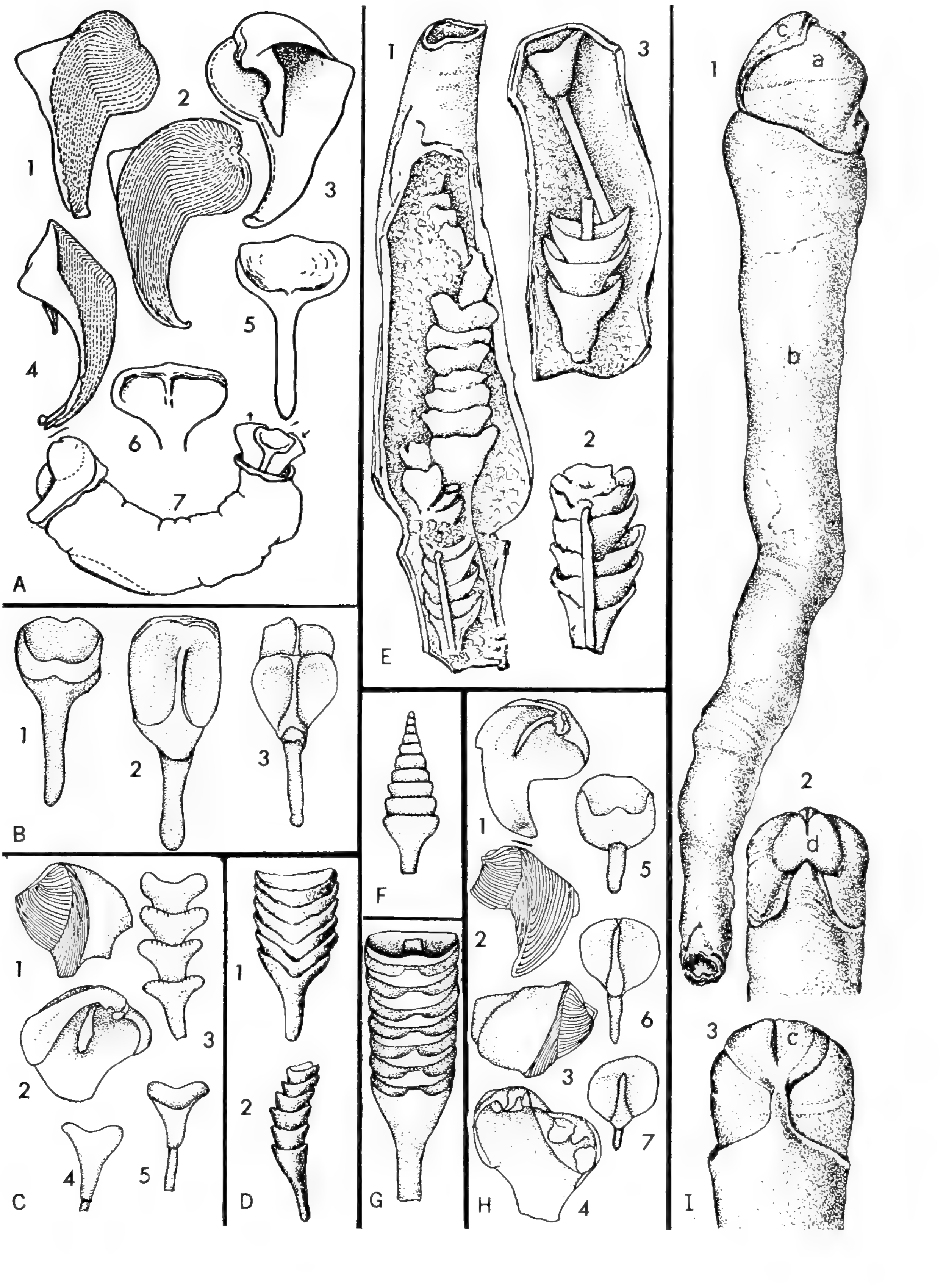
All figures are of the types in the BM(NH) [Fig. 6, holotype, BM(NH) L87328], copied from Stinton (1957, p. 170, pl. 25, figs. 8-14). (All 7 ×.)

Is probably a *Teredora* and the young of *duplicata* Stinton.

I. *Teredina personata* (Lamarck) — Eocene. Paris Basin

Fig. 1. Side view of entire specimen showing the shell (a), calcareous tube (b) and callum (c).
Fig. 2. Dorsal view of anterior end showing the accessory dorsal plate (d).
Fig. 3. Ventral view of anterior end showing the callum (c).

Teredina is a genus in the Pholadidae. Species of *Teredina* are known only as fossils. A figure of *personata* (copied from Deshayes, 1860, pl. 3, figs. 11-13) is given here because in the early literature the *Teredina* were often confused with the Teredinidae, and because it may be from this genus that the Teredinidae arose. (All natural size.)


A
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Geographic Listing of Names

The following list includes the valid names of the living teredinids, grouped into general areas on the basis of their type localities. *Nomina nuda, nomina dubia,*[1] emendations, substitute names, misspellings, and species no longer placed in the Teredinidae are not included. The limitations of the areas are not consistent because of the great variation in the amount of work done in different areas. Hence, the listing is an indication not only of the richness of the fauna but also a reflection of the amount and type of work done in a given region.

The species are listed under the genus in which they were originally described. Their present generic allocation, if different, is given in brackets, or the species with which they are considered synonymous is indicated. Further information concerning the synonyms indicated is given in the Catalogue. Of the 297 names listed, 208 are considered synonyms, 21 are probably synonyms, leaving only 66 good species; of these 66 several may prove to be synonyms when more material is available for study.

At this time it is not possible to list all species known to be capable of reproduction in each geographic region. To make such a list would require local collecting from fixed structures or test panels over a period of time. The presence of living specimens in driftwood does not mean that the species is capable of breeding in the area. It is even possible that larviparous species arriving in drift might release their brood of veliger larvae if conditions are suitable. These could then invade the local wood, but unless they grow to maturity and breed successfully they cannot be considered part of the established fauna.

EUROPE (Atlantic Coast)

Those species marked with an asterisk (*) are known warm-water species carried to Europe, mainly to the British Isles, by wood floating in the Gulf Stream or by ships.

Original Name	Synonym of
batavus Spengler, *Teredo*	*Teredo navalis*
**bipartita* Jeffreys, *Teredo* [*Lyrodus*]	
**bipennata* Turton, *Teredo* [*Bankia*]	
borealis Roch, *Teredo navalis*	*Teredo navalis*
**carinata* Sowerby, *Teredo*	*Bankia bipennata*
**cucullata* Jeffreys, *Teredo*	*Bankia bipennata*
denticulata Sowerby, *Teredo*	*Psiloteredo megotara*
**excavata* Jeffreys, *Teredo* [*Teredothyra*]	
excisa Jeffreys, *Teredo megotara*	*Psiloteredo megotara*
fatalis Quatrefages, *Teredo*	*Nototeredo norvagica*
**fimbriata* Jeffreys, *Teredo*	*Bankia fimbriatula*
**fusticulus* Jeffreys, *Teredo* [*Nausitora*]	
malleolus Turton, *Teredo* [*Teredora*]	
megotara Hanley, *Teredo* [*Psiloteredo*]	
microtara Jeffreys, *Teredo subericola*	*Psiloteredo megotara*
minor Jeffreys, *Teredo subericola*	*Psiloteredo megotara*
mionota Jeffreys, *Teredo megotara*	*Psiloteredo megotara*
navalis Deshayes, *Teredo*	*Nototeredo norvagica*
navalis Linnaeus, *Teredo*	
navalis Montagu, *Teredo*	*Nototeredo norvagica*
navalis Turton, *Teredo*	*Psiloteredo megotara*
**nigra* Blainville, *Teredo*	*Nototeredo norvagica*
norvagicus Spengler, *Teredo* [*Nototeredo*]	
occlusa Jeffreys, *Teredo navalis*	*Teredo navalis*
pedicellatus Quatrefages, *Teredo* [*Lyrodus*]	
sellii van der Hoeven, *Teredo*	*Teredo navalis*
**spatha* Jeffreys, *Teredo* [*Spathoteredo*]	
striatior Jeffreys, *Teredo megotara*	*Psiloteredo megotara*
subericola Jeffreys, *Teredo*	*Psiloteredo megotara*
teredo Müller, *Pholas*	*Teredo navalis*
teredo da Costa, *Serpula*	*Teredo navalis*
truncata Jeffreys, *Teredo pedicellata*	*Lyrodus pedicellatus*

MEDITERRANEAN

Original Name	Synonym of
aegyptia Roch, *Teredo*	*Teredo bartschi*
bipalmata delle Chiaje, *Teredo*	*Bankia carinata*
bipalmulata delle Chiaje, *Teredo*	*Bankia carinata*
bruguierii delle Chiaje, *Teredo*	*Nototeredo norvagica*
divaricata Fischer, *Teredo*	*Nototeredo norvagica*
franziusi Roch, *Teredo*	*Lyrodus pedicellatus*
helleniusi Moll, *Teredo*	*Lyrodus pedicellatus*
jaffaensis Roch, *Teredo*	*Teredora malleolus*
lamyi Roch, *Teredo*	*Lyrodus pedicellatus*
minima Blainville, *Teredo*	*Bankia carinata*
navalis Spengler, *Teredo*	*Bankia carinata*
nodosa Roch, *Teredo*	*Lyrodus pedicellatus*
syriaca Roch, *Bankia*	*Bankia carinata*
utriculus Hanley, *Teredo*	*Nototeredo norvagica*

[1] For this report any name instituted on the basis of shell and tubes only (the pallets being unknown) is considered a *nomen dubium.*

AFRICA (West Coast)

Original Name	Synonym of
adami Moll, *Teredo*	*Psiloteredo senegalensis*
anechoensis Roch, *Bankia*	
bagidaensis Roch, *Bankia*	*Bankia*, probably *bipennata*
congoensis Roch, *Teredo*	*Nototeredo knoxi*
dalli Moll and Roch, *Teredo*	*Lyrodus pedicellatus*
dicroa Roch, *Teredo*	*Lyrodus*, probably *takanoshimensis*
digitalis Roch, *Teredo*	*Nototeredo knoxi*
lieberkindi Roch, *Teredo*	*Uperotus*, possibly *panamensis*
lomensis Roch, *Teredo*	*Lyrodus pedicellatus*
petitii Récluz, *Teredo*	*Psiloteredo senegalensis*
segaruensis Roch, *Bankia*	*Bankia carinata*
senegalensis Blainville, *Teredo* [*Psiloteredo*]	
togoensis Roch, *Teredo*	*Lyrodus pedicellatus*
tritubulata Moll, *Teredo*	*Teredothyra excavata*

AFRICA (East Coast), MADAGASCAR, RED SEA and PERSIAN GULF

Original Name	Synonym of
adanensis Roch, *Teredo*	*Teredo clappi*
aegyops Moll, *Teredo*	
alfredensis van Hoepen, *Teredo*	*Teredora princesae*
ancilla Barnard, *Teredo*	*Dicyathifer manni*
arabica Roch, *Teredo*	*Lyrodus pedicellatus*
bicorniculata Roch, *Teredo*	*Teredo fulleri*
capensis Calman, *Xylotrya*	*Bankia martensi*
grobbai Moll, *Teredo*	*Teredo bartschi*
laciniata Roch, *Teredo*	*Teredo furcifera*
lanceolata Moll, *Teredo*	*Teredothyra smithi*
madagassica Roch, *Nausitora*	*Nausitora dunlopei*
massa Lamy, *Teredo* [*Lyrodus*]	
palula Roch, *Teredo*	*Spathoteredo obtusa*
pennaanseris Roch, *Bankia*	*Nausitora dunlopei*
petersi Moll, *Teredo*	*Teredora princesae*
radicis Moll, *Teredo*	*Teredo somersi*
robsoni Roch, *Teredo*	*Lyrodus pedicellatus*
thielei Roch, *Bankia*	*Bankia*, possibly *rochi*
unguiculata Roch, *Teredo*	*Teredothyra matocotana*

INDIA and INDIAN OCEAN ISLANDS

Original Name	Synonym of
affinis Deshayes, *Teredo* [*Lyrodus*]	
bengalensis Nair, *Bankia*	*Bankia campanellata*
bengalensis Nair, *Teredo*	*Teredothyra smithi*
bipalmulata Lamarck, *Teredo* [*Bankia*]	
brevis Deshayes, *Teredo* [*Bankia*]	
campanellata Moll and Roch, *Bankia*	
clava Gmelin, *Teredo* [*Uperotus*]	
corniformis Lamarck, *Fistulana*	*Uperotus clavus*
denticuloserrata Daniel, *Bankia*	*Bankia bipennata*
dunlopei Wright, *Nausitora*	
edmondsoni Nair, *Bankia*	*Bankia carinata*
furcata Moll, *Teredo*	*Teredo furcifera*
gabrieli Nair, *Bankia*	*Nausitora hedleyi*
gregata Lamarck, *Fistulana*	*Uperotus clavus*
indica Nair, *Bankia*	*Bankia carinata*
indica Nair, *Teredo*	*Lyrodus pedicellatus*
lanceolata Rajagopal, *Nausitora*	*Nausitora dunlopei*
linearis Nair, *Teredo*	*Teredothyra excavata*
lineata Nair, *Bankia*	*Bankia bipennata*
madrasensis Nair, *Bankia*	*Nausitora dunlopei*
madrasensis Nair, *Teredo*	*Lyrodus pedicellatus*
madrasensis Nair, *Teredo parksi*	*Teredo furcifera*
minori Nair, *Teredo*	*Teredora princesae*
nambudalaiensis Nair and Gurumani, *Teredo*	*Teredothyra smithi*
nucivorus Spengler, *Teredo*	*Uperotus clavus*
pennatifera Blainville, *Teredo*	*Bankia bipennata*
pochhammeri Moll, *Teredo*	*Lyrodus pedicellatus*
rehderi Nair, *Teredo*	*Uperotus*, probably *clavus*
roonwali Rajagopalaiengar, *Bankia*	*Bankia rochi*
sajnakhaliensis Rajagopal, *Nausitora*	*Bankia nordi*
tondiensis Nair and Gurumani, *Teredo*	*Nototeredo edax*
vattanansis Nair and Gurumani, *Teredo*	*Uperotus rehderi*

AUSTRALIA and NEW ZEALAND

Original Name	Synonym of
archimima Iredale, *Bankia*	*Bankia australis*
austini Iredale, *Teredo*	*Teredo navalis*
australis Wright, *Calobates*	*Bactronophorus thoracites*
australis Calman, *Xylotrya* [*Bankia*]	
balatro Iredale, *Teredo*	*Teredo bartschi*
calmani Roch, *Teredo*	*Lyrodus pedicellatus*
caroli Iredale, *Dicyathifer*	*Dicyathifer manni*
debenhami Iredale, *Bankia*	*Bankia australis*
edax Hedley, *Teredo* [*Nototeredo*]	
elegans Iredale, *Glumebra*	*Uperotus clavus*
fragilis Tate, *Teredo*	
gabrieli Cotton, *Bankia*	*Bankia australis*
grenningi Iredale, *Bankia*	*Bankia australis*
messeli Iredale, *Nausitora*	*Nausitora dunlopei*
occasiuncula Iredale, *Bankia*	*Bankia australis*
pertingens Iredale, *Teredo*	*Lyrodus pedicellatus*
pocilliformis Roch, *Teredo*	*Teredo navalis*
poculifer Iredale, *Teredo*	
queenslandica Iredale, *Nausitora*	*Nausitora dunlopei*
remifer Iredale, *Nototeredo*	*Nototeredo edax*
rosenthali Iredale, *Bankia*	*Bankia australis*
saulii Hedley, *Calobates*	*Bankia australis*
shawi Iredale, *Teredo*	*Teredo bartschi*
subaustralis Iredale, *Bactronophorus*	*Bactronophorus thoracites*
tristi Iredale, *Teredo*	*Lyrodus pedicellatus*

PACIFIC ISLANDS, SOUTHEAST ASIA, INDONESIA and NEW GUINEA

Original Name	Synonym of
amboinensis Taki and Habe, *Psiloteredo*	*Spathoteredo obtusa*
arenaria Lamarck, *Septaria*	*Kuphus polythalamia*
australasiatica Roch, *Teredo*	*Teredo furcifera*

Original Name	Synonym of
bataviana Moll and Roch, *Teredo*	*Spathoteredo obtusa*
bayeri Roch, *Teredo*	*Teredo*, probably *mindanensis*
carinata Gray, *Teredo* [*Bankia*]	
consularis Moll, *Bankia*	*Bankia*, probably *carinata*
fluviatilis Hedley, *Calobates*	*Nausitora dunlopei*
furcelloides Gray, *Teredo*	*Bactronophorus thoracites*
furcifera von Martens, *Teredo*	
furcillatus Miller, *Teredo*	*Teredo furcifera*
gazellae Roch, *Teredo*	*Teredora princesae*
gigantea Home, *Teredo*	*Kuphus polythalamia*
gracilis Moll, *Bankia*	
hedleyi Schepman, *Nausitora*	
hermitensis Roch, *Teredo*	*Teredo clappi*
indomalaiica Roch, *Teredo*	*Teredo fulleri*
infundibulata Roch, *Teredo*	*Lyrodus massa*
juttingae Roch, *Teredo*	*Nototeredo edax*
malaccana Roch, *Teredo*	*Lyrodus pedicellatus*
mannii Wright, *Kuphus* [*Dicyathifer*]	
murrayi Moll, *Teredo*	*Spathoteredo obtusa*
nordi Moll, *Bankia*	*Bankia*, possibly *orcutti*
palauensis Edmondson, *Teredo*	*Teredothyra*, probably *excavata*
palmulatus Lamarck, *Teredo*	*Bankia bipalmulata*
polythalamia Linnaeus, *Serpula* [*Kuphus*]	
renschi Roch, *Teredo*	
rochi Moll, *Bankia*	
samoaensis Miller, *Teredo*	*Teredo clappi*
schneideri Moll, *Nausitora*	
semoni Moll, *Teredo*	*Lyrodus pedicellatus*
siamensis Bartsch, *Teredo*	*Nausitora dunlopei*
sinensis Roch, *Teredo*	*Spathoteredo obtusa*
singaporeana Roch, *Teredo*	*Lyrodus pedicellatus*
smithi Bartsch, *Bankia*	*Teredo navalis*
stutchburyi Blainville, *Teredo*	*Lyrodus massa*
taiwanensis Taki and Habe,	*Nausitora dunlopei*
Teredo	*Bankia carinata*
thoracites Gould, *Teredo* [*Bactronophorus*]	*Lyrodus pedicellatus*

PHILIPPINE ISLANDS

Original Name	Synonym of
apendiculata Sivickis, *Teredo*	*Nototeredo edax*
barthelowi Bartsch, *Bankia*	
bartschi Sivickis, *Teredo*	*Dicyathifer manni*
chamberlaini Bartsch, *Teredo*	*Teredothyra matocotana*
davaoensis Bartsch, *Bankia*	*Bankia barthelowi*
diederichseni Roch, *Teredo*	*Teredora princesae*
dubia Sivickis, *Teredo*	*Kuphus polythalamia*
edulis Sivickis, *Bactronophorus*	*Bactronophorus thoracites*
filoteoi Sivickis, *Bactronophorus*	*Bactronophorus thoracites*
globosa Sivickis, *Bankia*	*Nausitora dunlopei*
hydei Sivickis, *Teredo*	*Nototeredo edax*
johnsoni Bartsch, *Bankia*	*Bankia*, probably *bipennata*
linaoana Bartsch, *Teredo*	*Lyrodus pedicellatus*
matocotana Bartsch, *Teredo* [*Teredothyra*]	
mindanensis Bartsch, *Teredo*	
obtusa Sivickis, *Teredo* [*Spathoteredo*]	
oryzaformis Sivickis, *Bankia*	*Bankia carinata*
philippinensis Bartsch, *Bankia*	
princesae Sivickis, *Teredo* [*Teredora*]	
pujadana Bartsch, *Teredo*	*Teredothyra matocotana*
quadrangularis Sivickis, *Bankia*	*Nausitora dunlopei*
radcliffei Bartsch, *Teredo*	*Teredothyra smithi*
rubra Sivickis, *Bankia*	*Bankia bipalmulata*
sivickisi Miller, *Teredo*	*Dicyathifer manni*
smithi Bartsch, *Teredo* [*Teredothyra*]	
sparcki Roch, *Teredo*	*Teredora princesae*
subicensis Edmondson, *Teredo*	*Teredothyra*, probably *excavata*
tanonensis Bartsch, *Teredo*	*Teredothyra smithi*
tenuis Sivickis, *Bankia*	*Bankia philippinensis*
triangularis Sivickis, *Bankia*	*Nausitora dunlopei*
variegata Sivickis, *Teredo*	*Spathoteredo obtusa*

JAPAN

Original Name	Synonym of
hibicola Kuronuma, *Teredo*	*Lyrodus*, probably *pedicellatus*
japonica Clessin, *Teredo*	*Teredo navalis*
kamiyai Roch, *Nausitora*	*Bankia carinata*
kiiensis Taki and Habe, *Kuphus*	*Teredothyra*, probably *smithi*
kingyokuensis Roch, *Bankia*	*Bankia bipennata*
kirai Taki and Habe, *Psiloteredo*	*Nototeredo edax*
komaii Taki and Habe, *Bankia*	*Bankia*, possibly *rochi*
kuronumii Roch, *Bankia*	*Bankia carinata*
nakazawai Kuronuma, *Bankia*	*Bankia carinata*
orientalis Roch, *Nausitora*	probably *Bankia carinata*
osumiensis Mawatari and Kitamura, *Bankia*	*Bankia*, probably *setacea*
pentagonalis Taki and Habe, *Psiloteredo*	*Nototeredo*, probably *edax*
septa Mawatari and Kitamura, *Psiloteredo*	*Nototeredo*, probably *edax*
shionomisakiensis Habe, *Glumebra*	*Uperotus*, probably *clavus*
takanoshimensis Roch, *Teredo* [*Lyrodus*]	
tateyamensis Kuronuma, *Teredo*	*Lyrodus pedicellatus*
teredoides Taki and Habe, *Kuphus*	*Teredo triangularis*
yakushimae Habe, *Psiloteredo*	*Nototeredo*, probably *edax*
yatsui Moll, *Teredo*	*Lyrodus pedicellatus*

NORTHWESTERN PACIFIC

Original Name	Synonym of
sibirica Roch, *Bankia*	*Bankia*, probably *setacea*
zenkewitschi Bulatoff and Rjabtschikoff, *Zachia*	

HAWAIIAN ISLANDS and MIDWAY ISLAND

Original Name	Synonym of
bensoni Edmondson, *Teredo*	*Teredo furcifera*
gregoryi Dall, Bartsch and Rehder, *Teredo*	*Teredora princesae*
hawaiensis Dall, Bartsch and Rehder, *Teredo*	*Lyrodus pedicellatus*

Original Name	Synonym of
hawaiiensis Edmondson, *Bankia*	*Bankia bipalmulata*
hiloensis Edmondson, *Teredo*	*Teredo bartschi*
honoluluensis Edmondson, *Teredo*	*Lyrodus pedicellatus*
kauaiensis Dall, Bartsch and Rehder, *Teredo*	*Lyrodus pedicellatus*
konaensis Edmondson, *Bankia*	*Bankia bipalmulata*
medilobata Edmondson, *Teredo* [*Lyrodus*]	
midwayensis Edmondson, *Teredo*	*Lyrodus pedicellatus*
milleri Dall, Bartsch and Rehder, *Teredo*	*Lyrodus affinis*
oahuensis Edmondson, *Bankia*	probably a young *Nausitora*
parksi Bartsch, *Teredo*	*Teredo furcifera*
triangularis Edmondson, *Teredo*	
trulliformis Miller, *Teredo*	*Teredo clappi*

NORTH AMERICA (West Coast)

Original Name	Synonym of
beachi Bartsch, *Teredo*	*Teredo navalis*
diegensis Bartsch, *Teredo*	*Lyrodus pedicellatus*
setacea Tryon, *Xylotrya* [*Bankia*]	
townsendi Bartsch, *Teredo*	*Lyrodus pedicellatus*

NORTH AMERICA (East Coast) and GREENLAND

Original Name	Synonym of
beaufortana Bartsch, *Teredo*	*Teredo navalis*
**chlorotica* Gould, *Teredo*	*Lyrodus pedicellatus*
denticulata Fischer, *Teredo*	*Psiloteredo megotara*
dilatata Stimpson, *Teredo*	*Psiloteredo megotara*
gouldi Bartsch, *Xylotrya* [*Bankia*]	
morsei Bartsch, *Teredo*	*Teredo navalis*
novangliae Bartsch, *Teredo*	*Teredo navalis*
sigerfoosi Bartsch, *Teredo*	*Nototeredo knoxi*
stimpsoni Bartsch, *Teredo*	*Nototeredo knoxi*
thomsonii Tryon, *Teredo*	*Teredora malleolus*

CENTRAL AMERICA (West Coast)

Original Name	Synonym of
canalis Bartsch, *Bankia*	*Bankia fimbriatula*
cieba Clench and Turner, *Bankia*	
excolpa Bartsch, *Bankia*	*Nausitora*, probably *fusticula*
jamesi Bartsch, *Bankia*	*Nausitora dryas*
mexicana Bartsch, *Bankia*	*Bankia gouldi*
orcutti Bartsch, *Bankia*	
panamensis Bartsch, *Teredo* [*Uperotus*]	
zeteki Bartsch, *Bankia*	

SOUTH AMERICA (West Coast)

Original Name	Synonym of
chiloensis Bartsch, *Bankia*	*Bankia martensi*
dryas Dall, *Xylotrya* [*Nausitora*]	
martensi Stempell, *Teredo* [*Bankia*]	
saulii Wright, *Nausitora*	
valparaisensis Moll, *Bankia*	*Bankia martensi*

SOUTH AMERICA (East Coast)

Original Name	Synonym of
argentinica Moll, *Bankia*	*Bankia martensi*
braziliensis Bartsch, *Bankia*	*Nausitora fusticula*
dagmarae Roch, *Teredo*	*Lyrodus pedicellatus*
katherinae Clench and Turner, *Bankia*	*Bankia campanellata*
krappei Moll, *Teredo*	*Teredo furcifera*
odhneri Roch, *Bankia*	*Bankia martensi*
reynei Bartsch, *Teredo* [*Neoteredo*]	
rosifolia Moll, *Teredo*	*Nototeredo knoxi*
schrencki Moll, *Bankia*	*Bankia gouldi*

GULF OF MEXICO and CARIBBEAN

Original Name	Synonym of
atwoodi Bartsch, *Teredo*	*Teredothyra dominicensis*
bartschi Clapp, *Teredo*	
batilliformis Clapp, *Teredo*	*Teredo bartschi*
bisiphites Roch, *Teredo*	*Nototeredo knoxi*
caribbea Clench and Turner, *Bankia*	*Bankia carinata*
clappi Bartsch, *Teredo*	
destructa Clench and Turner, *Bankia*	
dominicensis Bartsch, *Teredo* [*Teredothyra*]	
floridana Bartsch, *Teredo*	*Lyrodus pedicellatus*
fosteri Clench and Turner, *Bankia*	
fulleri Clapp, *Teredo*	
healdi Bartsch, *Teredo* [*Psiloteredo*]	
jamaicensis Bartsch, *Teredo*	*Nototeredo knoxi*
johnsoni Clapp, *Teredo*	
knoxi Bartsch, *Teredo* [*Nototeredo*]	
molli Roch, *Teredo*	*Spathoteredo spatha*
portoricensis Clapp, *Teredo*	
somersi Clapp, *Teredo*	
tryoni Bartsch, *Teredo*	*Nototeredo knoxi*

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ADDENDA

Two papers published since this manuscript went to press have been entered in the References above but additional mention should be made of them.

Rancurel (1965) described and figured the prodissoconchs of two species of teredinids, *Teredo thomsoni* Tryon [=*Teredora malleolus* Turton] and *Bankia anechoensis* Roch. The differences noted, particularly in the sculpture of the valves, are another indication that the characters of the prodissoconch may be of real value in systematic studies when sufficient species are known. Unfortunately adult specimens of the two species were not figured.

Townsley, Richy and Trussell (1965) demonstrated the presence of protoporphyrin in the siphons of *Bankia setacea* (Tryon), particularly in the male. They suggested that this "porphyrin may act as a photosensitizer or a chemical sensitizer for the detection of sexual products in the water" or for the detection of the "amount of frass or sediment accumulating in the exit area." From the brief mention of the activity of the siphons during 'copulation' it appears to be similar to that described for *B. gouldi* (see page 47). They also isolated myoglobin from the posterior adductor and heart muscle (see page 43).

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