

Systematics of Molluscan wood borers recorded from India¹

BY

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INTRODUCTION

Molluscan wood borers, because of the damage they cause to marine wood construction, have attracted active attention of scientists in most countries. In India appreciable work has been done on this group of pests under the scheme for "Protection of Timber against marine organisms' attack" sponsored by the Wood Preservation Branch of the Forest Research Institute and Colleges, Dehra Dun, and also by other workers. As a result of this about 57 species of *Teredinidae* and 4 species of *Pholadidae* have been recorded from various parts of the Indian coast, and out of the above *Teredinidae*, 20 have been described as new to science.

Turner (1959), while reviewing the problems inherent in the study of the *Teredinidae*, emphasised the need for a catalogue of the family and stated that "there are far more names available than there are good species". In a very valuable recent contribution, Turner (1966) has carefully examined the type specimens of all the species described under the *Teredinidae* and has suggested a new classification of the family that has resulted in reducing the number of valid species from over 600 to about 65. The reasons given by Turner for this drastic rearrangement are as follows:

1. Many species have been 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.
2. A number of new species have been introduced on the basis of zoogeographic provinces little knowing that the Teredinids are readily distributed by drift-wood and ships.
3. As the literature on the systematics of this group is scattered and no illustrated work covering the whole family available, different workers engaged in the study of local faunas created numerous synonyms.
4. All the subgenera have been scrapped in the new classification, as in most cases there are transitional species between them.

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5. Most of the work on shipworms has been done on the restricted basis of either a limited geographic area or a museum collection. Hence "the percentage of synonyms created has been directly proportional to the narrowness of outlook".

The new classification of the *Teredinidae*, proposed by Turner, thus appears justified and acceptable. Under this arrangement quite a number of *Teredinids* described from India are reduced to synonyms. In order to avoid confusion in future references to these "species" an attempt is made in this paper to arrange all the species recorded from India under Turner's new classification. The genera and species are arranged in alphabetical order and under each species the localities from which it is recorded are given and against each locality the synonyms by which it was reported together with the name of the author and the year of publication.

SYSTEMATICS AND DISTRIBUTIONAL RECORDS

PHYLUM	MOLLUSCA
CLASS	PELECYPODA
ORDER	EULAMELLIBRANCHIATA
FAMILY	TEREDINIDAE
SUBFAMILY	TEREDININAE

Genus *BACTRONOPHORUS* Tapparone Canefri

1. *Bactronophorus thoracites* (Gould)

Bombay	<i>Teredo</i> (<i>Bactronophorus</i>) <i>thoracites</i> Gould (Palekar & Bal 1957; Palekar, Santhakumaran & Bal 1964).
Sunderbans (West Bengal)	<i>Teredo</i> (<i>Bactronophorus</i>) <i>thoracites</i> Gould (Roonwal 1954, 1966).
Visakhapatnam	<i>T.</i> (<i>Bactronophorus</i>) <i>thoracites</i> Gould (Nagabhushanam 1955).

Genus *DICYATHIFER* Iredale

2. *Dicyathifer manni* (Wright)

Bombay	<i>Teredo</i> (<i>Kuphus</i>) <i>manni</i> (Wright) (Palekar, Santhakumaran & Bal 1964).
Cochin	<i>Teredo manni</i> (Nair 1964), <i>Teredo</i> (<i>Kuphus</i>) <i>manni</i> Wright (Saraswati 1964).
Karwar	<i>T.</i> (<i>Kuphus</i>) <i>manni</i> (Wright) (Palekar & Bal 1957 a).

- Madras *T. (Kuphus) manni* (Wright) (Daniel 1958).
T. manni (Nair 1964).
- Pulicat lake (Tamil Nadu) *T. (Kuphus) manni* (Wright) (Nair 1963).
- Sunderbans (West Bengal) *T. (Kuphus) manni* (Wright) (Roonwal 1966).
- Visakhapatnam *T. (Teredothyra) manni* Wright (Nagabhushanam 1955).

Genus *LYRODUS* Gould3. *Lyrodus affinis* (Deshayes)

- Visakhapatnam *Teredo (Lyrodus) milleri* Dall, Bartsch & Rehder (Nagabhushanam 1960).

4. *Lyrodus pedicellatus* (Quatrefages)

- Bombay *T. (Lyrodus) malaccana* Roch, *T. (Lyrodus) pedicellata* Quatrefages (Palekar, Santhakumaran & Bal 1964).
- Cochin *T. (Teredops) diegensis* Bartsch, *T. (Teredops) samoensis* Miller (Erlanson 1936). *T. malaccana* (Nair 1964), *Teredo (Lyrodus) malaccana* Roch (Saraswati 1964).
- Kayamkulam (Kerala State) *T. (Teredo) madrasensis* Nair (Nair 1954).
- Madras *T. (Teredo) madrasensis* Nair, *T. (Teredo) indica* Nair (Nair 1956).
T. singaporeana Roch (Nair 1964).
- Mylapore, Madras *T. (Teredo) madrasensis* Nair (Nair 1954).
- Pamban, Rameswaram (Tamil Nadu) *T. (Teredo) madrasensis* Nair, *T. (Lyrodus) malaccana* Roch (Nair 1962).
- Tondi (Tamil Nadu) *T. (Teredo) indica* Nair, *T. (Teredo) madrasensis* Nair (Nair & Gurumani 1957a).
- Adirampatnam (Tamil Nadu) *T. (Teredo) madrasensis* Nair (Nair & Gurumani 1957a).

- Visakhapatnam *T. (Teredops) diegensis* Bartsch, *T. (Teredops) samoensis* Miller (Nagabhushanam 1955).
T. (Coeloteredo) singaporeana Roch, *T. (Lyrodus) malaccana* Roch (Nagabhushanam 1960).

Genus *TEREDO* Linnaeus5. *Teredo bartschi* Clapp

- Visakhapatnam *T. (Teredo) bartschi* Clapp (Nagabhushanam 1955).

6. *Teredo clappi* Bartsch

- Bombay *T. clappi* Bartsch (Santhakumaran 1966).
 Cochin *T. renschi* (Nair 1964), *Teredo (Coeloteredo) renschi* Roch (Saraswati 1964).
 Godavary estuary, near Yanam *T. (Zopoteredo) trulliformis* Miller (Ganapati & Rao 1959).
 Madras *T. (Teredo) renschi* Roch (Daniel 1958).
 Visakhapatnam *T. (Zopoteredo) trulliformis* Miller (Nagabhushanam 1955).

7. *Teredo furcifera* Von Martens

- Bombay *T. (Teredo) parksi* Bartsch (Palekar, Santhakumaran & Bal 1964).
 Cochin *T. furcifera* (Nair 1964), *Teredo (Teredo) furcifera* Martens (Saraswati 1964).
 Godavary estuary, near Yanam *T. (Teredo) furcillatus* Miller (Ganapati & Rao 1959).
 Kayamkulam (Kerala State) *T. (Teredo) furcillatus* Miller (Nair 1955).
 Madras *T. (Teredo) parksi madrasensis* Nair (Nair 1955).
T. (Teredo) furcifera Martens, *T. (Teredo) parksi* Bartsch, *T. (Teredo) furcillatus* Miller (Nair 1956).
T. (Teredo) furcifera Martens (Daniel 1958).

- Pulicat lake
(Tamil Nadu) *T. (Teredo) australasiatica* Roch (Nair 1963).
- Tondi (Tamil Nadu) *T. (Teredo) parksi* Bartsch (Nair & Gurumani 1957a).
- Visakhapatnam *T. (Teredo) parksi* Bartsch, *T. (Teredo) furcillatus* Miller (Nagabhushanam 1955).
T. (Teredo) bensoni Edmondson (Nagabhushanam 1960).

8. **Teredo fulleri** Clapp

- Pamban, Rameswaram
(Tamil Nadu) *T. (Teredothyra) indomalaica* Roch (Nair 1962).

9. **Teredo triangularis** Edmondson

- Visakhapatnam *T. (Zopoterodo) triangularis* Edmondson (Nagabhushanam 1960).

Genus **TEREDORA** Bartsch

10. **Teredora princesae** (Sivickis)

- Cochin *Teredo (Dactyloterodo) diderichseni* Roch (Saraswati 1964).
T. diderichseni (Nair 1964).
- Madras *T. (Teredora) gregoryi* Dall, Bartsch & Rehder (Nair 1954, 1956).
T. (Teredora) minori Nair (Nair 1955).
T. (Dactyloterodo) diderichseni Roch (Daniel 1958).
- Pamban, Rameswaram
(Tamil Nadu) *T. (Dactyloterodo) diderichseni* Roch (Nair 1962).

Genus **TEREDOTHYRA** Bartsch

11. **Teredothyra excavata** (Jeffreys)

- Royapuram, Madras *T. (Teredothyra) liniaris* Nair (Nair 1955).

12. **Teredothyra smithi** (Bartsch)

- Madras *T. (Zopoterodo) bengalensis* Nair (Nair 1954).
- Pamban, Rameswaram
(Tamil Nadu) *T. (Nototerodo) nambudalaiensis* Nair & Gurumani (Nair 1962).

Ramnad (Tamil Nadu) *T. (Nototerredo) nambudalaiensis* Nair & Gurumani (Nair & Gurumani 1957).

Tondi (Tamil Nadu) *T. (Zopoterredo) bengalensis* Nair (Nair & Gurumani 1957a).

Genus *UPEROTUS* Guettard

13. *Uperotus clavus* (Gmelin)

- Madras *Teredo clava* Gmelin (Gravely 1941).
T. (Uperotus) clava Gmelin, *T. (Teredora) rehderi* Nair (Nair 1954).
T. (Teredora) rehderi Nair (Nair 1956).
T. (Uperotus) clava Gmelin (Daniel 1958).
- Ramnad (Tamil Nadu) *T. (Teredora) vattanansis* Nair and Gurumani (Nair & Gurumani 1957b).

Subfamily BANKINAE

Genus *BANKIA* Gray

14. *Bankia bipalmulata* (Lamarck)

- Kovilam (20 miles South of Madras) *B. (Bankia) bipalmulata* (Lamarck) (Nair 1954).
- Madras *B. (Bankia) bipalmulata* (Lamarck) (Nair 1954; Daniel 1958).
- Pamban, Rameswaram (Tamil Nadu) *B. (Bankia) bipalmulata* (Lamarck) (Nair 1962).
- Pondicherry *B. bipalmulata* (Lamarck) (Lamy 1929).

15. *Bankia bipennata* (Turton)

- Madras *B. (Neobankia) denticuloserrata* Daniel (Daniel 1956, 1958).
B. (Neobankia) lineata Nair (Nair 1955a; Daniel 1958).
- Pamban, Rameswaram (Tamil Nadu) *B. (Plumulella) lineata* (Nair) (Nair 1962).
- Visakhapatnam *B. (Plumulella) lineata* (Nair) (Nagabhushanam 1960).

16. *Bankia carinata* (Gray)

- Adirampatnam (Tamil Nadu) *B. (Bankiella) indica* Nair (Nair & Gurumani 1957a).

- Calcutta *B. carinata* (Nair 1964).
- Cochin *B. carinata*; *B. edmondsoni* (Nair 1964).
Bankia (*Bankiella*) *carinata* Gray, *Bankia* (*Bankiella*) *consularis* Moll (Saraswati 1964).
- Godavary estuary,
near Yanam *B. (Bankiella) edmondsoni* Nair (Ganapati & Rao 1959).
- Madras *B. (Bankiella) indica* Nair, *B. (Bankiella) edmondsoni* Nair (Nair 1954, 1956).
B. (Bankiella) consularis Moll, *B. (Bankiella) carinata* (Gray) (Daniel 1958).
- Mylapore, Madras *B. (Bankiella) indica* Nair (Nair 1954).
- Pamban, Rameswaram
(Tamil Nadu) *B. (Bankiella) indica* Nair (Nair 1962).
- Tondi (Tamil Nadu) *B. (Bankiella) edmondsoni* Nair (Nair & Gurumani 1957a).
- Visakhapatnam *B. (Bankiella) carinata* (Gray) (Nagabhushanam 1960).

17. *Bankia campanellata* Moll and Roch

- Bombay *B. (Liliobankia) campanellata* Moll and Roch (Palekar, Santhakumaran & Bal 1964).
- Cochin *B. campanellata* (Nair 1964), *Bankia (Liliobankia) campanellata* Moll and Roch (Saraswati 1964).
- Godavary estuary,
near Yanam *B. (Liliobankia) campanellata* Moll and Roch (Ganapati & Rao 1959).
- Madras *B. (Liliobankia) campanellata* Moll and Roch (Daniel 1958; Nair 1964).
- Mylapore, Madras *B. (Bankia) bengalensis* Nair (Nair 1954).
- Sunderbans
(West Bengal) *B. (Liliobankia) campanellata* Moll and Roch (Roonwal 1966).
- Tributary of Ganges
river *Teredo campanulata* 'Deshayes' Sowerby (Clessin 1893).

Visakhapatnam

B. (Bankia) setacea (Tryon) (Nagabhushanam 1955).*B. (Liliobankia) campanellata* Moll and Roch (Nagabhushanam 1960).18. *Bankia nordi* Moll

Bombay

B. nordi Moll (Santhakumaran 1966).Pamban, Rameswaram
(Tamil Nadu)*B. (Bankiella) nordi* Moll (Nair 1962).

Sajnakhali (West Bengal)

B. (Nausitora) sajnakhaliensis Rajagopal (Rajagopal 1964; Roonwal 1966).19. *Bankia rochi* Moll

Bombay

B. (Bankiella) minima Blainville, *B. (Neobankia) roonwali* Rajagopal (Palekar, Santhakumaran & Bal 1964).Sunderbans
(West Bengal)*B. (Neobankia) roonwali* Rajagopal (Rajagopal 1961; Roonwal 1966).

Visakhapatnam

B. (Plumulella) thielei Roch (Nagabhushanam 1960).Genus *NAUSITORA* Wright20. *Nausitora dunlopei* Wright

Hoogli River (Calcutta)

Nausitora dunlopei Wright (Wright 1864).Royapuram and
Triplicane, Madras*B. (Nausitora) madrasensis* Nair (Nair 1954, 1956).

Sajnakhali (West Bengal)

B. (Nausitora) lanceolata Rajagopal (Rajagopal 1964; Roonwal 1966).

Visakhapatnam

B. (Nausitora) excolpa Bartsch (Nagabhushanam 1955), *B. (Nausitora) dunlopei* Wright (Nagabhushanam 1960).21. *Nausitora hedleyi* Schepman

Bombay

Nausitora hedleyi Schepman (Santhakumaran 1971).Ernakulam, (Cochin)
(Kerala State)*B. (Nausitora) gabrieli* Nair (Nair 1955).
Nausitora hedleyi Schepman (Nair 1964; Saraswati 1964).

- Madras *B. (Nausitora) gabrieli* Nair (Nair 1956).
 Pulicat lake *B. (Nausitora) hedleyi* Schepman (Nair
 (Tamil Nadu) 1963).

Genus *NOTOTEREDO* Bartsch

22. *Nototeredo edax* (Hedley)

- Bombay *Nototeredo edax* Hedley (Santhakumaran
 1971).
 Godavary estuary,
 near Yanam *T. (Dactyloteredo) juttingae* Roch (Gana-
 pati & Rao 1959).
 Tondi (Tamil Nadu) *T. (Psiloterredo) tondiensis* Nair and Guru-
 mani (Nair & Gurumani 1956, 1957a).
 Visakhapatnam *T. (Teredora) thomsoni* Tryon (Nagabhushan-
 shanam 1955).
T. (Dactyloteredo) juttingae Roch (Naga-
 bhushanam 1960).

FAMILY PHOLADIDAE

SUBFAMILY MARTESIINAE

GENUS *MARTESIA* (LEACH) SOWERBY

SUBGENUS *MARTESIA* (LEACH) SOWERBY

23. *Martesia (Martesia) fragilis* Verrill & Bush

- Cochin *Martesia fragilis* (Nair 1964).
 Madras *M. (Martesia) fragilis* Verrill & Bush
 (Daniel 1958; Daniel & Srinivasan 1956;
 Srinivasan 1959).
 Porto Novo *M. (Martesia) fragilis* Verrill & Bush
 (Tamil Nadu) (Srinivasan 1959).

24. *Martesia (Martesia) striata* (Linnaeus)

- Bombay (Palekar & Bal 1955).
 Calcutta (Annandale 1923).
 Cochin (Erlanson 1936).
 Kayamkulam (Srinivasan 1959).
 (Kerala State)

- Krishna estuary (Andhra Pradesh) (Rao, Murthy & Krishnakumaran 1957).
 Krusadai Island (Tamil Nadu) (Satyamurthy 1956).
 Madras (Daniel & Srinivasan 1956; Daniel 1958; Srinivasan 1959).
 Porto Novo (Tamil Nadu) (Srinivasan 1959).
 Tuticorin (Tamil Nadu) (Srinivasan 1959).
 Visakhapatnam *M. (Martesia) striata* Linnaeus, *M. (Diploplax) americana* Bartsch (Nagabhushanam 1955).

Subfamily XYLOPHAGINAE

Genus *XYLOPHAGA* Turton25. *Xylophaga* sp.

- Mahanadi estuary, off Puri (Ganapati & Rao 1961).
 (Orissa State)

Two more species of shipworms, namely *Teredo (Teredo) elongata* Quatrefages and *Teredo (Teredo) navalis* Linnaeus, have also been reported from Indian waters. Of these *T. elongata*, mentioned by Becker (1958), is a *nomen dubium*. Similarly *T. navalis* recorded from Visakhapatnam (Nagabhushanam 1955) is probably *Teredo bartschi* Clapp and that recorded from the Madras coast (Nair 1955, Nair & Gurumani 1957a) is probably *Teredo furcifera* Martens. (Turner, personal communication.)

Thus, although a survey of the literature on *Teredinidae* from the Indian coasts shows the presence of about 57 species, only 22 of them are actually valid in the light of the new classification put forward by Turner (1966). She has redefined the genera on the basis of the anatomical characters of the soft parts, and of the 14 teredinid genera recognised by her, 10 are represented in Indian waters. Among the various species of molluscan wood-borers, *Lyrodus pedicellatus* Quatrefages, *Dicyathifer manni* (Wright), *Teredo furcifera* Martens, *Bankia campanellata* Moll and Roch, *Bankia rochi* Moll, *Bankia carinata* Gray and *Martesia striata* Linnaeus are the most destructive and widely distributed.

It is necessary to mention in this connection that there are vast stretches of coast line which still remain unexplored and the richness of the already recorded borer species indicates that a thorough survey

all along the coast can reasonably be expected to bring to light several manuscript and making the necessary corrections.

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