

Field ecology of some marine borers (Mollusca : Teredinidae) of mangroves in Sundarbans, India

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(With 1 Table and 1 Text-fig.)

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I—INTRODUCTION

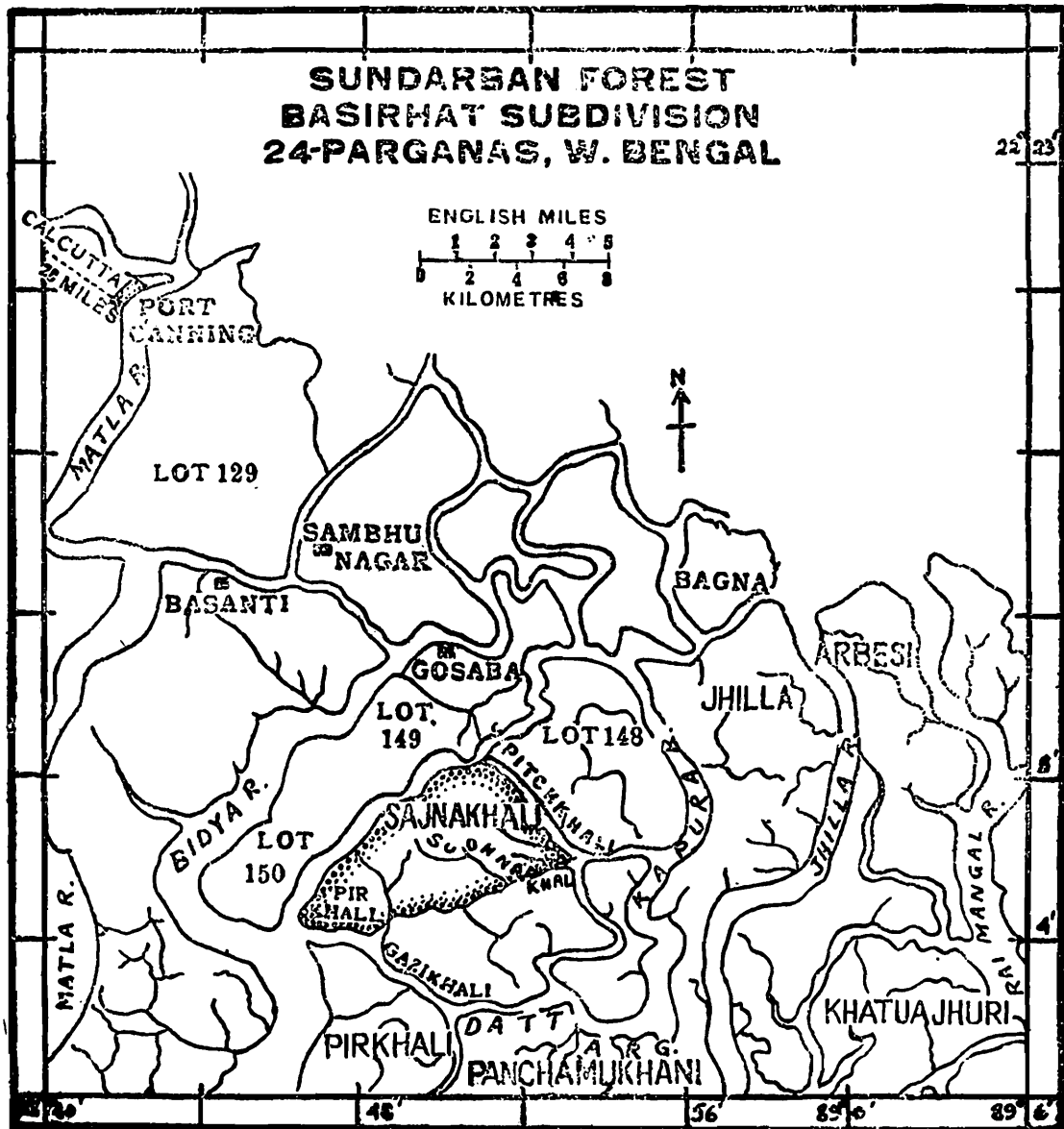
This paper is a report on the marine molluscan borers, collected in 1958 and 1961 from Port Canning and Sajnakhali, in the Sunderbans, West Bengal.

About 600 examples representing altogether four genera and six species were collected. The great majority of them were extracted from living mangrove trees which were lining the edges of khals, creeks and streams intersecting one another and subdividing the Gangetic delta ; others were obtained from dead stems or trunks of mangrove trees and other infested logs of wood, like piles of jetty. During high tide the mangrove trees at the edges of canals, creeks, etc., are partially or completely submerged, and when the tide ebbs they are again exposed. Thus, these trees under intermittent tidal influence become vulnerable to borer attack.

Rec. Zool. Surv. India, 62 (182), 1970.

The first study of the Teredinid borers of Sundarbans was by Roonwal (1954). He traced the destructive role of *Bactronophorus thoracites* (Gould) on living mangrove trees. Ganapati and Rao (1959) studied the borers from mangroves of Godavari estuary and reported the occurrence of four species. Three new species have been reported by Rajagopalaiengar (1961) and Rajagopal (1964) based on a study of a part of the above material. Three more species which were not accounted for earlier are dealt with here associating some remarks on field observations on each species.

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TEXT-FIG. 1.—Map of Sundarbans, Basirhat Subdivision, 24-Parganas, W. Bengal, indicating the area surveyed: Sajnakhali Reserve Forest (Shaded portion).

II—ECOLOGICAL ACCOUNT

1. *Teredo (Kuphus) manni* Wright

1866. *Kuphus manni* Wright, *Trans. Linn. Soc. Lond.*, London, 25(3), p 565, pl. 65, figs. 1-8.

Material.—LOT A.—(i) Coll. A. S. Rajagopalaiengar, 87 examples, Edge of Matla R. at low tide, Port Canning, 24-Parganas, 9-17 January, 1958, ex. a trunk of a dead tree. LOT B.—Coll. H. C. Ray, Sajnakhali. lat. 28° 7' N., long. 88° 50' E., 24-Parganas, 21-28. iii. 1958, as follows :—(ii) 4 examples, Forest Ghat, 21. iii. 1958, ex. a log of damaged wood. (iii) 40 examples, S. bank of Sajnakhali Khal, c. 2.5 Km. E. of Forest Office, 22-24 and 28. iii. 1958, ex. pieces of living mangrove trees. (iv) 3 examples, S. Bank of Sajnakhali Khal, W. of Forest Office, 24. iii. 1958, ex. pieces of living mangrove tree. (v) 10 examples, bank of Gomdi Khal near Pakhirala village, N. W. of Forest Office, 25. iii. 1958, ex. pieces of living mangrove trees. (vi) 2 examples, Tetulbaria camp area c. 13-18 Km. S. W. of Forest Office, 25-26. iii. 1958, ex. pieces of living mangrove trees. LOT C.—Coll. A. S. Rajagopalaiengar, Sajnakhali, lat. 28° 7' N., long. 88° 50' E., 24-Parganas, April-May, 1961, as follows :—(vii) 2 examples, Baentolla-Bharani, a creek c. 1 Km. W. of Forest Office, 26. iv. 1961, ex. a piece of *sundari* tree. (viii) 1 example, Baentolla-Bharani, a creek c. 1 Km. W. of Forest Office, 27. iv. 1961, ex. a piece of *baen* tree. (ix) 3 examples, Baentolla-Bharani, a creek c. 1 Km. W. of Forest Office, 27. iv. 1961, ex. a piece of *gengwa* tree. (x) 5 examples, S. bank of Sajnakhali Khal and Gomdi Khal c. 1.6 Km. W. of Forest Office, 28. iv. 1961, ex. a piece of *gengwa* tree. (xi) 4 examples, S. bank of Sajnakhali Khal and Gomdi Khal c. 1.6 Km. W. of Forest Office, 28. iv. 1961, ex. a piece of *dhundal* tree. (xii) 13 examples, S. bank of Sajnakhali Khal c. 3 Km. E. of Forest Office, 29. iv. 1961, ex. a piece of *gengwa* tree. (xiii) 1 example, S. bank of Sajnakhali Khal c. 3 Km. E. of Forest Office, 29. iv. 1961, ex. a piece of *goran* tree. (xiv) 6 examples, bank of Gomdi R. c. 5 Km. W. of Forest Office, 30. iv. 1961, ex. a piece of *khalshi* tree. (xv) 11 examples, bank of Pichkhal c. 6 Km. E. of Forest Office, 1. vi. 1961, ex. a piece of *gengwa* tree. (xvi) 6 examples, Sajnakhali Forest Office jetty, 2. v. 1961, ex. a piece of *pussur* wood. (xvii) 4 examples, Sudhanyakhali c. 13 Km. S. of Forest Office, 2. v. 1961, ex. a piece of *sundari* tree. (xviii) 10 examples, Sudhanyakhali c. 13 Km. S. of Forest Office, 3. v. 1961, ex. a piece of *baen* tree.

Observations.—This is by far the commonest species. For its attack it seems to favour *baen* and *gengwa* in preference to other trees. When freshly extracted from the trees, the borer in living condition is dull bluish in its anterior third. When occurring in other kinds of trees it generally acquires the same colour as of the wood infested. It usually attains great length—an example measuring 91.44 cm. (ca. 3 feet) in living condition was obtained. The burrow or tunnel is lined with a thick calcareous shell-tube which is extra hard posteriorly. At the posterior end the aperture of the shell-tube is, as a rule, divided by a horizontal septum into upper and lower compartments for the projection of exhalent and inhalent siphons.

TABLE 1.—Measurements (in mm.) of some Teredinid borers from Sundarbans, West Bengal.

Body-part	<i>Teredo</i> (<i>Kuphus</i>) <i>mannii</i>	<i>Bankia</i> (<i>Liliobankia</i>) <i>campenellata</i>	<i>Bactronophorus</i> <i>thoracites</i>
	(15 exs.)	(12 exs.)	(2 exs.)
1. Total length	25-405 (in spirit) 91.44 (living)	33-80 (in spirit)	180-215 (in spirit)
2. Length of shell	4-12 (in spirit)	4-8 „	11.5-13.0 „
3. Height of shell	4-12 „	4-8 „	11.5-13.0 „
4. Length of pallet	3-9 „	5-20.5 „	17-21 „
5. Length of stalk	1.5-5.0 „	3-7 „	6.0-7.50 „
6. Length of blade	1.5-6.0 „	2.5-14.0 „	11.0-13.50 „
7. Diameter of blade	1-3 „	—	—

Distribution.—Indian Ocean (East African Coast, Kerimba Islands, Madagascar, Reunion) ; Malaya : Singapore ; Cochin-China ; Tonkin ; Indonesia : Sumatra : Bebalan, Belawan Deli, Pantai Tjermin, Soengsang ; Rhiouw-Archipelago : Tandjoeng Balei, Tandjoeng Pinang ; Moena (South Celebes), Ambonia ; New Guinea ; Bismarck Archipelago ; Philippines ; Australia (Brisbane).

2. *Bankia* (*Liliobankia*) *campenellata* Moll and Roch

(Table 1)

1931. *Bankia campenellata* Moll and Roch, *Proc. malac. Soc. Lond.*, London, 19 (4), p. 215.

1955. *Bankia* (*Liliobankia*) *campenellata* Roch, *Zool. Meded.*, Leiden, 34 (8), p. 140, figs. 7-j&k.

Material.—LOT A.—(i) Coll. A. S. Rajagopalaiengar, 15 examples, edge of Matla R. at low tide, Port Canning, 24-Parganas, 12-16 January, 1958, ex. a trunk of a dead tree. LOT B.—H. C. Ray, Sajnakhali, lat. 28° 7' N., long. 88° 50' E., 24-Parganas, 23-25. iii. 1958 as follows :—(ii) 2 examples, S. bank of Sajnakhali Khal, c. 2.5 Km. E. of Forest Office, 23. iii. 1958, ex. pieces of living mangrove trees. (iii) 4 examples and 2 pallets, Tetulbaria camp, c. 17 Km. S. W. of Forest Office, 25. iii. 1958, ex. pieces of living mangrove trees. LOT C.—Coll. A. S. Rajagopalaiengar, Sajnakhali, lat. 28° 7' N., long. 88° 50' E., 24-Parganas, April-May, 1961, as follows :—(iv) 14 examples and 9 pallets, Baentolla-Bharani, a creek c. 1 Km. W. of Forest Office, 26-27. iv. 1961. ex. a piece of *gengwa* tree. (v) 12 examples, bank of Gomdi R., c. 5 Km. W. of Forest Office, 30. iv. 1961, ex. a piece of *goran* tree. (vi) 15 examples, Sajnakhali Forest Office jetty, 1-3. v. 1961, ex. pieces of *pussur* wood. (vii) 2 examples, Sudhanya Khal c. 13 Km. S. of Forest Office, 3. v. 1961, ex. a piece of *baen* tree.

Observations.—Clench and Turner (1946) traced in detail the extent of confusion that prevails under the old name *Bankia campanulata* and

hinted that the present species may possibly be their *B. katherinae*. Roch (1955), while relegating it to subgenus *Liliobankia*, regards it as distinct from *katherinae*.

This species is less common than the previous one. It does not attain great length. Full-grown borers of more than 100 mm. in length are rare. The species seems to prefer *gengwa* tree, and occasionally *goran* and *pussur*. Its occurrence in *baen* was met with only once. When freshly extracted, the anterior half of the body is bright red in the living condition. Also, the rhythmic functioning of the heart is visible clearly through the almost transparent mantle. The burrow is lined with a thin tube of shell-material which is flimsy and often comes off when the borer is extracted. The posterior end of the tube is more or less conical and the aperture is without a septum.

Distribution.—Reunion Is., India ; Malaya Archipelago ; Indonesia : Sumatra.

3. *Bactronophorus thoracites* (Gould)

1856. *Teredo thoracites* Gould, *Proc. Boston Soc. nat. Hist.*, Boston, 6, p. 15.

Material.—Coll. H. C. Ray, Sajnakhali, lat. 28° 7' N., long. 88° 50' E., 24-Parganas, 23-24. iii. 1958, as follows :—(i) 1 example, S. bank of Sajnakhali Khal, E. of Forest Office, 23. iii. 1958, ex. pieces of living mangrove trees. (ii) 1 example, S. bank of Sajnakhali Khal, W. of Forest Office, 24. iii. 1958, ex. pieces of living mangrove trees.

Observations.—This is the least common species in the area as can be judged from the number of examples (only two) obtained. It seems to grow to a fairly large size and has large and stout shells. The siphons are rather short and conjoined almost to the tip. The shell-lining of the tunnel, though quite thick, is fragile.

Distribution.—India (Bombay, Visakhapatnam) ; Burma (Mergui Archipelago) ; Cochin-China ; Singapore ; Indonesia (Sumatra : Belawan Deli ; Rhiouw Archipelago : Tandjoeng Balei ; Borneo, Moluccas) ; New Guinea ; Philippines ; Australia (North Australia, Queensland).

III—FIELD OBSERVATIONS

In the Sundarbans, West Bengal, the following mangrove trees were observed to be commonly attacked by the Teredinid borers :—

<i>Popular name (Bengali)</i>	<i>Scientific name</i>	<i>Family</i>
1. Bacn	<i>Avicennia officinalis</i> L.	} Verbenaceae
	„ <i>alba</i> Blume	
	„ <i>marina</i> Vier- happer	
2. Dhundal	<i>Carapa obovata</i> Blume	Meliaceae
3. Gengwa	<i>Excoecaria agallocha</i> L.	Euphorbiaceae

<i>Popular name (Bengali)</i>	<i>Scientific name</i>	<i>Family</i>
4. Goran	<i>Cerriops decandra</i> Ding Hou (= <i>C. roxburghiana</i> Arn.)	} Rhizophoraceae
	<i>Cerriops taqal</i> (Perry) Robin- son (= <i>C. candolleana</i> Arn.)	
5. Khalsi	<i>Aegiceras corniculatus</i> (L.)	Myrsinaceae
6. Pussur	<i>Xylocarpus molluccensis</i> Roemer (= <i>Carapa molluccensis</i> Lam.)	} Meliaceae
7. Sundari	<i>Heretiera fomes</i> Buchnan- Hamilton	Sterculiaceae

It was noticed that none of the Monocot plants showed any sign of attack.

Four genera namely *Teredo*, *Bankia*, *Nausitora* and *Bactronophorus*, altogether comprising six species occur in this area. *Teredo* and *Bactronophorus* are represented by a single species each, while the other two genera by two each. The following is the complete list of species occurring here :—

1. *Teredo (Kuphus) mannii* Wright.
2. *Bankia (Liliobankia) campenellata* Moll & Roch.
3. *Bankia (Neobankia) roonwali* Rajagopalaiengar.
4. *Nausitora lanceolata* Rajagopal.
5. „ *sajnakhaliensis* Rajagopal.
6. *Bactronophorus thoracites* (Gould).

There seems to be a degree of preference on the part of these borers to the kind of trees they attack. *Teredo (Kuphus) mannii* seems to favour *baen* and *gengwa* in which it occurs in larger numbers than in other trees. *Bankia (Neobankia) roonwali* and *Nausitora lanceolata* appear to prefer *goran*, *pussur* and *sundari*. *Bankia (Liliobankia) campenellata* occurs commonly in soft woods like *gengwa*, and less commonly in *goran*, *pussur* and *sundari* and rarely in *baen*. All the three examples of *Nausitora sajnakhaliensis* were obtained from *goran*. Whether this indicates any preference cannot be conclusively stated. No observation was possible regarding *Bactronophorus thoracites* since only two examples were obtained.

The most dominant species in respect of numbers and size is *T (K.) mannii* and the rarest are *N. sajnakhaliensis* and *B. thoracites*. Of the remaining three species, *B.(L.) campenellata* is the least common and the other two occur in more or less equal numbers.

The Isopod borer, *Sphaeroma* sp., was also found to attack wood infested by the Teredinid borers in one or two instances. However, *Maresin* (family Pholadidae) was conspicuous by its absence.

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