Visakhapatnam[6] on the North-east coast and from Bombay[7,8] on the North-west coast of India. This species has also been reported from Australia, Queensland, New Zealand, Pacific islands, South-east Asia, Burma, Singapore, Indonesia, and the Philippine Islands[2,6]. The present report is noteworthy in that this is the first report of the occurrence of *B. thoracites* from the mangroves of South India. With this record, of the twenty eight species of shipworms reported from India, twenty-three are known to occur along the South-east coast.

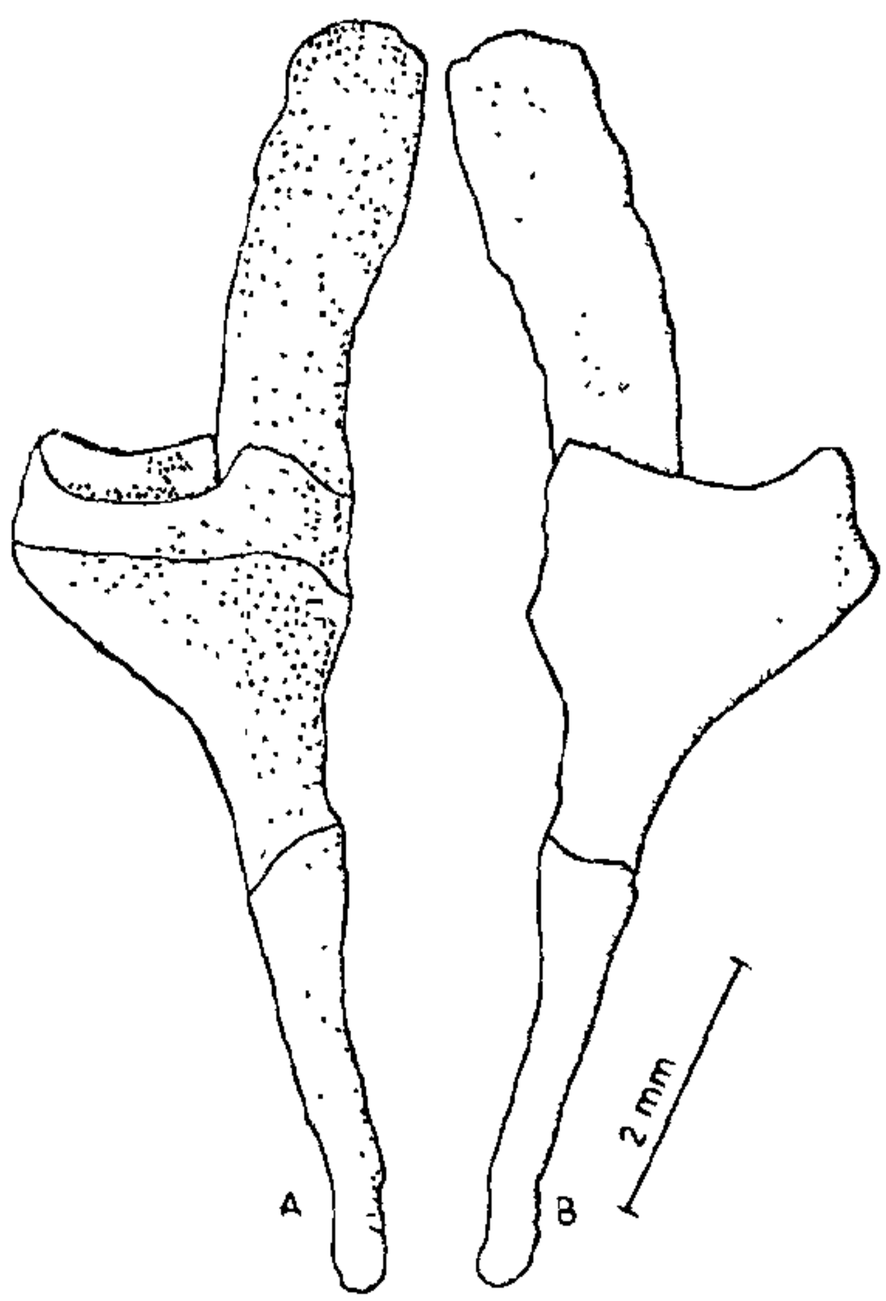


FIG. 1. Pallet of *Bactronophorus thoracites* (Gould): A—outer face, B—inner face.

The living mangrove trees at Pichavaram area are severely attacked by two species of sphaeromatids (*Sphaeroma terebrans* and *S. annandalei*). The dead stems and prop roots collected are found to contain the teredinids *Lyrodus pedicellatus* and *Nausitora hedleyi* and the pholad *Martesia striata* along with the sphaeromatids. The mangrove vegetation of the Godavary estuary also have been found to be severely infested by both molluscan and crustacean wood-borers[9]. Marine wood-borers are quite active and abundant in the Pichavaram mangrove forests. A detailed account of the wood-boring organisms occurring in the different aquatic biotopes of Porto-Novo will be published elsewhere.

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## EFFECT OF THE ALCOHOLIC EXTRACT OF *ZANTHOXYLUM ARMATUM* FRUITS ON CERTAIN HAEMATOLOGIC PARAMETERS OF *HETEROPNEUSTES FOSSILIS*

IT has been reported earlier[1] that there are about ten plants and their parts which are used as piscicidal agents in fish capture by the people in North-Eastern India. Among these, we found the extract of the fruits of *Zanthoxylum armatum* DC (=*Z. alatum* Roxb.) to be the most potent in its piscicidal activity. However, the mode of action of its toxicity is not yet fully understood. The detailed mechanism of action of the only piscicidal plant product, Rotenone, derived from Derris root has been investigated[2-4]. At the sub-cellular level, Rotenone is known to block the nicotinamide adenine dinucleotide dehydrogenase segment of the mitochondrial respiratory chain, resulting in reduced oxygen uptake by fishes[5,6] Many toxins are known to have a direct effect on the haematologic parameters[7-9]. The present study, was, therefore aimed to find out if the alcoholic extract of the fruits of *Z. armatum* had any similar effect on some of the haematologic parameters of the cat fish *H. fossilis*.

The fishes were collected from nature and were acclimatized to the laboratory conditions at 20 ± 2° C in aquaria for three weeks, and were fed on alternate days. The weight of the fishes ranged from 8–22 g and the length 10-15 cm. The fishes were weight-sorted into two groups (9–14 g and 15–20 g) in order to compare

the effect of the toxin. About 500 g of shade dried powdered fruits of *Z. armatum* were extracted with alcohol following Indian Pharmacopeia and concentrated to 39 g. A 10 l glass jar containing 6 l of tap water was used with 6 fishes for each set of experiment. Four different concentrations of the fruit extract (15, 20, 30 and 35 ppm) were used. The blood samples were taken from fishes treated with 15 ppm after 12 hrs, in 20 and 30 ppm treated fish after 6 hrs. and with 35 ppm treatment after 3 hrs, since the lethal time was different for different concentrations. The blood samples were collected through the caudal vein and the RBC number/mm$^3$ and Hb g% were estimated using haemocytometer and haemoglobinometer respectively[11]. The haematologic values like RBC number, Hb concentration and Hb/RBC ratio of control and treated fishes of the two weight groups were calculated (Table I). It could be seen from the data that the four different concentrations apparently had no significant effect on the two weight groups of fishes.

Certain pesticides, insecticides and piscicides have been reported to affect the different haematologic parameters like erythrocyte number, haemoglobin concentration, packed cell volume, mean corpuscular volume, erythrocyte haemoglobin, mean corpuscular haemoglobin and haematocrit[7–9]. Saponin is one of the plant derived piscicides known to cause haemolysis in fishes[12,13]. Beside toxins, the lower oxygen tension of water has been shown to change the haematologic parameters in fish[14]. However, in the present study, the authors did not observe any change in the oxygen levels of the experimental medium with change of time. Further, the experimental fish, *H. fossilis* being an air-breather would not be much influenced by the changes in oxygen concentration of waters The chemical analysis so far done on *Z. armatum* does not indicate the presence of the any of the known haemolytic factors such as Saponin or Rotenone$_{sr}$. Thus, it is evident from the foregoing account that piscicidal components present in the fruits of

TABLE I

*Effect of different concentrations of* Z. armatum (=Z. alatum) *friuits on the haematologic parameters of* H. fossili

| | | Average wt. of fish (g) | Average length of fish (cm) | RBC/mm$^3$* X $10^6$ | g% Hb* | g%Hb/RBC* × $10^{-6}$ |
|---|---|---|---|---|---|---|
| | 0 ppm. (control) (22) | 11·9 | 13–1 | 2·3±0·1 | 14·7±0·2 | 6·6±0·2 |
| | 15 ppm. (13) | 12·3 | 13·1 | 2·2±0·1 | 13·7±0·3 | 6·2±0·2 |
| 9–14 g. *Wt. group.* | 20 ppm. (11) | 12·2 | 12·9 | 2·2±0·1 | 13·6±0·3 | 6·1±0·4 |
| | 30 ppm. (14) | 12·2 | 12·4 | 2·2±0·4 | 13·6±0·2 | 6·4±0·4 |
| | 35 ppm. | 12·3 | 12·7 | 2·4±0·1 | 13·4±0·2 | 6·3±0·4 |
| | 0 ppm. (control) (16) | 17·1 | 14·2 | 2·7±0·2 | 15·3±0·3 | 5·8±0·2 |
| | 15 ppm. (6) | 17·2 | 13·6 | 2·4±0·2 | 14·0±0·3 | 5·9±0·4 |
| 15–20 g. Wt. group. | 20 ppm. (9) | 16·9 | 14·0 | 2·4±0·1 | 16·5±0·4 | 6·9±0·4 |
| | 30 ppm. (6) | 15·7 | 13·8 | 2·3±0·3 | 14·8—0·5 | 6·4±0·4 |
| | 35 ppm. (9) | 16·7 | 14·0 | 2·4±0·1 | 15·3±0·4 | 6·2±0·8 |

* The values expressed as Mean ± S.E.M.
Numbers in parentheses indicate the number of fishes used.

*Z. armatum* do not have haemolytic properties and the lethal effect could be due to interference in other physiological processes.

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## EFFECT OF GROUNDNUT ROOT EXUDATES ON DIFFERENT STRAINS OF *RHIZOBIUM* SP.

THE organic compounds exuded from plant roots are known either stimulate[1-3] or to inhibit[3-5] rhizosphere microorganisms. Root exudates are also known to attract zoospores of fungi[6-8] and specific bacteria. In the symbiotic relationship between legume roots and rhizobia, the seedling root exudates, presumably, play a primary role in attracting the bacterial cells towards the root surface. Egeraat[10] working with *Rhizobium leguminosarum* and pea seedlings showed that the bacterium was stimulated by homoserine liberated by the roots during emergence of lateral roots. In the present paper, the effect of root exudates of groundnut on four rhizobial strains *in vitro*, is reported.

Healthy seeds of groundnut variety TMV-2 were surface sterilized with 0·1% mercuric chloride, washed thoroughly through several changes of sterile distilled water and transferred to a specially revised apparatus for sterile culture of seedlings. The simple apparatus (Fig. 1) consisted of a glass test tube (20 × 5 cm)

FIG. 1

with 100 ml distilled water. A ring stand with three legs (height: 8 cm) improvised by bending ordinary glass rod was placed inside the test tube and a filter-paper (Whatman No. 1) cone with a small 2 mm diameter hole punched at the apex was fitted to the ring stand so that the tip of the cone just touched the water. The test tube was fitted with cotton plug and the set up was autoclaved at 15 psi for 15 min and cooled,