PROTECTION OF WOOD AGAINST MARINE WOOD-BORING ORGANISMS

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Protection of wooden hulls of ships from marine borer attack is a subject of primary concern to the Navy. The Naval Chemical and Metallurgical Laboratory, Bombay, started investigations on this problem from the middle of 1957, as a result of the severe damage observed on the wooden hulls of Indian Navy's Inshore Minesweeper, INS BIMLIPATAM. It was observed that the damage was caused by the two main types of wood destroying organisms, the molluscan borer, *Martesia* and the crustacean borer *Sphaeroma* occurring in Cochin waters. In Bombay harbour, where IN Ships are berthed, the prevailing wood boring species are *Teredo* and *Bankia*. It is known that the shipworms of the Teredinidae family, *Teredo* and *Bankia* species are capable of digesting cellulose and starch and consequently depend upon the bored wood for their nutrition. The molluscan borer, *Martesia Striata* does not possess cellulose digesting enzymes and bores he wood only for protection and not for nutrition. It depends upon the plankton available in the open sea for its nutrition. The crustacean wood-borer *Sphaeroma* does not depend at all upon living on wood, not being a wood-eating organism. Observations carried out at Bombay reveals decrease in *Bankia* activity during the monsoon, while at Cochin, *Martesia* and *Sphaeroma* are known to be active even at very low salinities prevailing during the monsoon. The borer problem is, therefore, more severe in Cochin due to the presence of these organisms even during the monsoon, when other forms of Biology susceptible to salinity changes are excluded. Leaching of impregnants would also be accelerated in the low salinity sea water causing premature failure of impregnated systems like Ascu.

Exposures of various systems were carried out at Bombay and Cochin harbours. Exposures at Bombay revealed that untreated Himalayan Fir was damaged extensively in 3 months by Bankia (Photograph I). Copper naphthenate, cashewnut shell liquid and heat treated Bhilawan oil impregnated in Himalayan Fir failed extensively in 11 months exposure. Ascu and creosote treated Himalayan Fir were effective for more than one year. Glass fibre epoxy-resin laminate on Himalayan Fir was effective for two years. All these systems were devoid of any antifouling effect and were consequently heavily fouled. NCML's experimental copper powder based antifouling paint resisted both borers and fouling organisms in Bombay for one year.

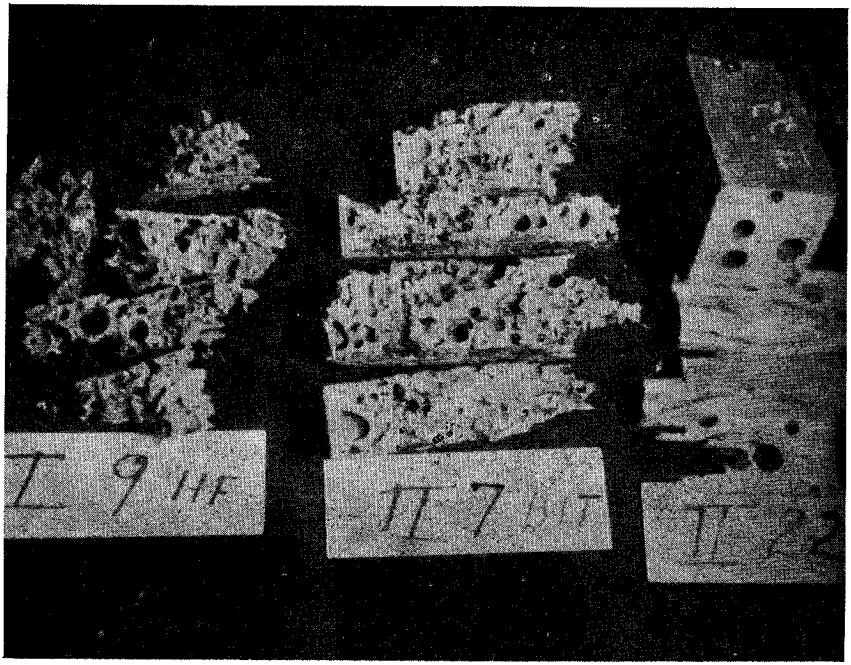
Exposures carried out at Cochin revealed that Ascu, copper penta-chlorophenol, bitumin-sand, and glass fibre cloth fixed by nails on Himalayan Fir failed in 6 months. The most effective systems after one year's continuous exposure were glass fibre epoxy-resin laminate and NCML's copper based antifouling paint. Creosote was also reasonably good but was very heavily fouled. This has also another disadvantage that it does not permit application of anti-fouling paints due to softening effect. The glass fibre system has also got to be painted with antifouling paints if used for protection of hulls of fast moving ships. NCML's paint, however, combines both antifouling effect and borer resistance in one system.

Photographs I, II and III, show the extent of attack at Bombay and Cochin and also the successful systems after one year's exposures at Cochin.

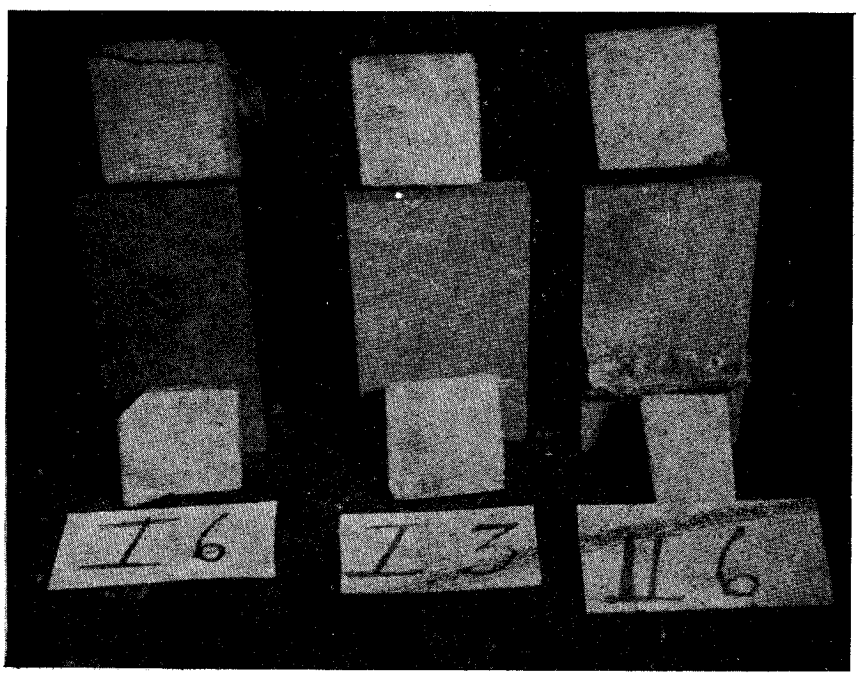
NCML is also investigating durability of borer resistant, British Guiana, Green Heart timber. Preliminary exposures carried out for one year at Bombay and Cochin indicate limited susceptibility to *Bankia* and *Martesia* and resistance to *Sphaeroma* attack.

A pilot scale production of NCML's antifouling paint for service trial on Navy's Inshore Minesweepers (using closed loop sweep) has been planned. It is hoped that this might be satisfactory sclution for the problem.

Photograph I



Photograph II



Photograph III