females, 14 were males. Both fish from the Minas Basin region were males, 4 and 5 years of age, and 43.3 and 46.0 cm in length, respectively.

During the present survey, specimens of E. labracis were found only on the gills of striped bass. Preferred site of attachment was observed to be the outer surface of the upper gill arch. Newly attached juvenile females and females with egg sacs were found. No males of the species were observed. Hyperplasia of the gill filaments was often observed in association with infections of E. labracis.

This record of E. labracis from striped bass in Canadian waters extends the known distribution of this parasite northward to the Gulf of St. Lawrence.

Specimens of Ergasilus labracis are deposited in the Atlantic Reference Collection, Department of Fisheries and Oceans, Biological Station, St. Andrews, New Brunswick, E0G 2X0, Catalogue no. 2583.

REFERENCES


Received for publication 19 December 1983.

‘RIGHT HANDEDNESS’ IN HETEROCHELOUS CALAPPOID AND XANTHOID CRABS - SUGGESTION FOR A FUNCTIONAL ADVANTAGE

BY

PETER K. L. NG and LEO W. H. TAN
Department of Zoology, National University of Singapore, Singapore

Tweedie (1950) found that amongst the Xanthoid crabs which had one of their chelae grossly enlarged (heterochelous condition), the right chela was usually the larger one. This ‘right handedness’ he noted, was most extreme in the Menippids he studied; Sphaerozius nitidus Stimpson, 1858 and Lydia annulipes (H. Milne Edwards, 1834). Recently, we examined over 150 specimens of the Calappoid crab, Calappa philargius (L., 1758), and all were right handed. The question posed by Tweedie was why this particular handedness should exist – a question that has remained unanswered for the past thirty years.

Considering that crabs are regarded as one of the major predators of molluscs (Vermeij, 1975), the authors here propose that this handedness is due
to the fact that almost all marine gastropod shells are dextral (i.e., when the shell opening is oriented to face the observer, it is on the right side of the shell) (Vermeij, 1975). In studies carried out by the authors on the peeling behavior of Calappa philargius on gastropod shells (Ng & Tan, 1984), it was found that the crab cuts its way spirally into the shell, starting at the aperture. Specialised teeth present at the base of the fingers of the major chela are used for this purpose.

This behavior was first recorded by Shoup (1968), and studied in greater detail by Vermeij (1982) on other species of Calappa. We found that the manner in which the major chela and the structures are used for peeling would be most efficient when the shell is dextral. If the shells were sinistral (with the aperture on the left), the crab would have great difficulty in manipulating the shell so as to orientate it to continue the peeling process. For shells with tall spires, peeling would be even more difficult. For dextral shells, peeling continues merely by simply turning the shell on its own axis. Since dextral shells evolved earlier than their crab predators, natural selection would have favoured right handed crabs.

This hypothesis is corroborated by our observations that all the specimens of nine other species representing three genera (Calappa, Cycloes and Mursia) of the family Calappidae examined also have the major chela on the right side, and their peeling structures are all well developed. On examining the 11 specimens of Lydia annulipes deposited in the Zoological Reference Collection, National University of Singapore (the former Raffles Museum collection), which were all right handed, it was noted that they also had strongly developed peeling structures on the major chela. Two other Menippids which have this structure are Epixanthus dentatus (White, 1847) and E. frontalis (H. Milne Edwards, 1834) and all the 41 specimens examined had the major chela with the peeling structure on the right side. In none of these three species of Menippids has this structure been documented or function explained before. Sphaerozius also has an enlarged tooth on the dactylus of the major chela, which is probably associated with opening of gastropods, but less efficiently than those of Calappa, Lydia and Epixanthus. Less well developed peeling structures are also present in many Portunids like Thalamita spinimana Dana, 1852, Charybdis feriata (L., 1758) and Portunus sanguinolentus (Herbst, 1783), and in all the 44 specimens examined, the slightly larger chela and its associated peeling structure is on the right side. In looking at the numerous illustrations of American Panopeids (see Rathbun, 1930), it was noticed that those species showing what are almost certainly peeling structures, the major chela is almost always on the right.

The evidence is thus strongly suggestive for right handedness in these and other crabs with this peeling structure, to be owing to the presence of predominantly dextral marine gastropod shells.