NOTES ON THE SYSTEMATICS, GEOGRAPHIC DISTRIBUTION AND BIOLOGY OF THE SANDY SHORE CRAB, MATUTA LUNARIS (FORSKAL)

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The systematics, geographic distribution, diet and reproductive biology of M. lunaris are described. These aspects are discussed in relation to M. lunaris as a surf zone species and as a food source in a subsistence economy such as that of the Philippines.

Matuta lunaris (Forskal) (Crustacea: Decapoda), commonly known in the Philippines as "kabag-kabag" (Cebuano) and "kumong" (Ilonggo), is a common inhabitant of tropical sandy shores. It has a widespread distribution which extends from the Red Sea and South Africa to Asia and Australia. This species has been reported to be of importance in the diet of the people in Third World countries such as India, where it is eaten by the poor population (Chappgar, 1959, in Guinot, 1966). M. lunaris is also fished in West Pakistan and in the Gulf of Siam. In Madras, India and in the Philippines, M. lunaris is considered to be an important edible brachyuran species along with Portunus spp. and Scylla serrata (Guinot, 1966; Schreiber and Cases, 1984). This paper is intended as an introduction to the species in Philippine waters and a review of published studies to date.

SYSTEMATICS

Matuta lunaris is a member of the family Calappidae, a group of burrowing crabs distinguished by the location of their inhalent branchial openings. In the Calappidae, these are located in front of the basal segment of the cheliped. However, the inhalent current does not enter directly at these points, as it does in most brachyurans, but flows in at the eye sockets and is carried along a canal at the surface of the pterygostomian region (Hale, 1927). The Calappidae is subdivided into two subfamilies, the Calappinae (the 'box crabs') and the Matutinae (the 'sand crabs'). This subdivision is based primarily on the location of the palp of the third maxilliped. In the Matutinae, it is hidden beneath the merus, which is elongate and pointed at the tip. In the Calappinae, where the merus is not elongate, it is exposed (Hale, 1927; Sakai, 1965). In the field, species in the Calappinae are distinguished by a winglike expansion on

each side of the carapace which covers the walking legs, whereas species in the Matutinae are characterized by flattened swimming legs and a prominent lateral spine or tubercule on each side of the carapace.

The Matutinae contains the single genus Matuta, which is represented in both the Indo-Pacific and Atlantic Oceans (Romimohtarto, 1972). At present, it contains seven species, three of which have been recorded from the Philippines: M. lunaris, M. banksii and M. inermis (Estampador, 1959).

M. lunaris was first described by Forskal in 1775 as Cancer lunaris (Tyndale-Biscoe and George, 1962). Species that have since been synonymized with M. lunaris include M. victor (Alcock, 1896 in: Romimohtarto, 1972) and M. victrix (Lanchester, 1900). Additional descriptions of M. lunaris have been made by Miers (1877), Tyndale-Biscoe and George (1962), Sakai (1965) and Romimohtarto (1972).

M. lunaris may be identified by the possession of an accessory stridulating organ with 24-26 striae on the outer face of the dactylus in males greater than 46.5 mm full carapace width (Romimohtarto, 1972; Perez, 1985), two well-developed lateral spines on the carapace and at least two distinct spines on the outer face of the propodus (Tyndale-Biscoe and George, 1962). Based on comparative observations of Matuta species from the reference collections in the Australian Museum, M. lunaris may be differentiated from other closely related species by the following features: the absence of a postero-lateral tubercule on the carapace (present in M. banksii) and the absence of a distinct red patch at the base of the lateral spines (present in M. granulosa). The carapace of M. lunaris is relatively flat and covered with red spots. In Australia, however, the color pattern of the carapace appears to be variable (Perez, 1985). Most individuals have fine red spots, some of which occasionally form loops and lines, scattered over the carapace. A few individuals have more numerous darker red spots scattered over the carapace.

Although the individuals of both sexes of M. lunaris appear very similar in the field, several morphological differences are apparent upon detailed examination. The female abdomen is wider than that of the male, with the width becoming more pronounced with increasing size. Likewise, the first chelae spine on the propodus becomes more prominent with increasing size in females, whereas it becomes reduced in males. A ribbing on the dorsal aspect of the dactylus is present in large males but absent in smaller males and all females (Fig. 1). The functional morphology of several morphological characters of M. lunaris has been studied by Perez (1985).

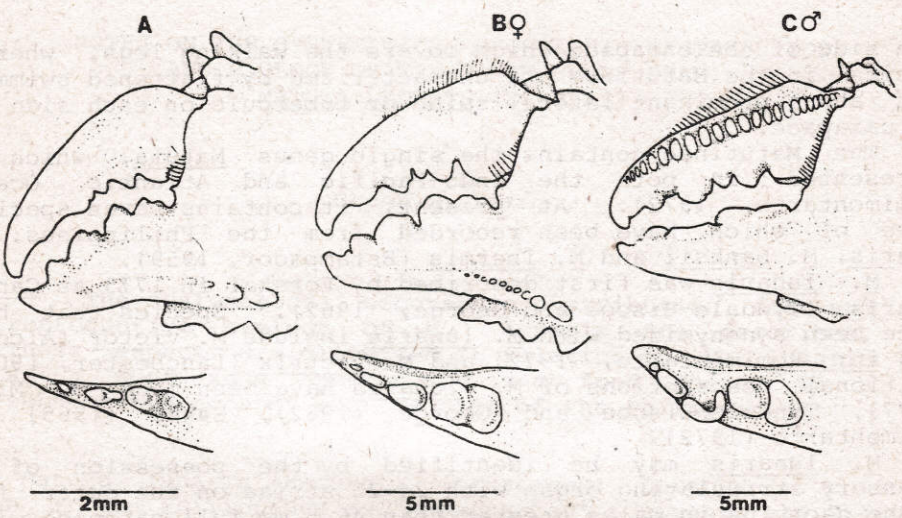

Figure 1. Details of the chela dentition of M. lunaris during ontogeny. A. Juvenile male, 15.4 mm carapace width. B. Adult female, 45.3 mm carapace width. C. Adult male, 53.9 mm carapace width.

GEOGRAPHIC DISTRIBUTION

The type locality of Matuta lunaris is the Red Sea (Forskal, 1775 in: Tyndale-Biscoe and George, 1962). It has since been recorded from the tropical beaches of numerous Indo-Pacific localities. In the Indian Ocean, M. lunaris has been recorded from the east coast of Africa (Barnard, 1950), Natal (Guinot, 1966), Somalia (Vannini, 1976), Pakistan (Hashmi, 1969) and India (Chappgar, 1957; Pillay and Nair, 1976). There are also records of collections from Madagascar (Guinot, 1966), the Andaman and Nicobar Islands (Sankarankutty, 1962), the Gulf of Siam (Guinot, 1966), and Singapore and Indonesia (Romimohtarto, 1972). Miers (1877) recorded M. lunaris from Sri Lanka, although the species identification is questionable.

In the Pacific Ocean, M. lunaris has been recorded as far north as Japan (Sakai, 1965) and as far east as Fiji (pers. obs., Australian Museum collections). It has also been recorded from the Philippines (Schreiber and Cases, 1984), the Solomon Islands (Australian Museum collections) and Australia (Tyndale-Biscoe and George, 1962; Perez, 1985).

In the Philippines, M. lunaris has been recorded from Rizal Province (Estampador, 1959), Leyte (Schreiber and Cases, 1984) and Negros (Estampador, 1959; pers. obs). In a preliminary survey of the sandy beaches of Negros Oriental, M. lunaris has been collected from the beaches of Amlan, Bantayan (Dumaguete

City) and Zamboanguita.

NOTES ON THE BIOLOGY OF MATUTA LUNARIS

M. lunaris is found in the surf zone of sandy beaches. Morphologically, it possesses two unusual characters: (1) four pairs of well developed, flattened swimming legs with paddle-like terminal joints, which enable it to maintain its position within the surf zone by either swimming in the water column or burrowing in the substratum; (2) a modified frontal opening of the respiratory channels which allows individuals to remain burrowed for extended periods of time.

In terms of total carapace width, male M. lunaris grow up to 72 mm while females grow to 62 mm. There is a considerable difference in the sizes at sexual maturity, which, in both sexes, is marked by gonad development and morphological changes. In a study of the reproductive biology of M. lunaris in Australia, it was found that the smallest sexually mature male collected was 43.5 mm carapace width, while the smallest sexually mature female was 41.0 mm carapace width (Perez, 1985).

The diet of M. lunaris is almost exclusively carnivorous. Analysis of the stomach contents of M. lunaris in Australia has indicated that it is a facultative scavenger and a predator of small crustaceans and molluscs. In Australia, the food items found in the stomach of M. lunaris included hermit crabs, sergestid shrimps, prawns, small bivalves and gastropods (Perez, 1985). Some cannibalism on small individuals was also noted.

There have been very few published accounts on the reproductive biology of M. lunaris. In India, the breeding pattern was reported to be seasonal (Pillay and Nair, 1976), while in Australia, reproductive activity in terms of gamete production, mating behavior and brood incubation was found to be continuous throughout the year (Perez, 1985). Female M. lunaris have been found to mate only once in their lifetime, that is, at the time of the puberty moult (Perez, 1985). Each female, however, was capable of producing at least two egg batches from a single copulatory event, with each batch containing approximately 65,000 eggs.

CONCLUSION

The surf zone of tropical sandy beaches is a unique environment (McLachlan, 1983). Organisms living in this hydrodynamically active region of the beach must deal constantly with a variety of problems including, food availability, exposure and wave action (Coull and Bell, 1983). The information to be gained from studies of the growth, feeding and reproduction of

surf zone species is invaluable, yet the biology of these species remains one of the least studied topics in tropical marine biology. Matuta lunaris is one such species. On many Indo-Pacific sandy beaches, M. lunaris is among the dominant members of the surf zone macrofauna. It is relatively unusual in that it spends all its postlarval life in the surf zone.

In the Philippines, where brachyuran crabs are of commercial importance both as a protein source in a subsistence economy and as marketable trading goods, M. lunaris is one of the edible crab species collected by the local inhabitants (Schreiber and Cases, 1983). It is collected by hand or by beach seine, usually for home consumption. Biologically, there is little information about M. lunaris in the Philippines. The restricted distribution of M. lunaris in an area which is easily accessible to subsistence fishermen, i.e. the surf zone, makes it vulnerable to overexploitation. The small populations of M. lunaris on many Philippine beaches compared with the large populations in Australia suggests that this may already be the case (Perez, 1985; pers. obs.).

The restricted distribution, nonspecialist diet and high reproductive output of M. lunaris make it a promising species for further research into possible "ranching" of areas along the beach in order to increase the yield of this species. Population and reproductive studies of M. lunaris in Australia (Perez, 1985) indicate that M. lunaris has a year-round reproductive cycle and a rapid growth rate. It would be interesting to determine the nature of the reproductive and growth patterns of Philippine populations. Such information would be invaluable in assessing the aquaculture potential of M. lunaris and in the development of policies that would facilitate prudent management of natural stocks.

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