

Short Communication

Size at Sexual Maturity in the Red Mangrove Crab *Neosarmatium meinerti* (De Man, 1887) (Brachyura: Grapsidae)

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Abstract—The sesarmid crab *Neosarmatium meinerti* is one of the most abundant species inhabiting the upper mangrove areas of many East African mangrove forests. However, several aspects concerning its reproduction are scarcely known. In this study, sexual maturity of *N. meinerti* is investigated. Samples were obtained during January and February 2002 at Saco da Inhaca mangrove, Inhaca Island, southern Mozambique. A total of 395 crabs were examined for gonad maturation. The mean size at sexual maturity was estimated at 17.3 mm for males and 15.6 mm CW for females.

INTRODUCTION

Among the macroinvertebrates commonly found in mangrove forests, brachyuran crabs are one of the most important taxa with regard to both number of species, density and biomass (Lee, 1998). The family Grapsidae contributes with the largest number of species among mangrove crabs (Lee & Kwok, 2002). Their burrowing and feeding activities may significantly affect mangrove primary productivity, tree colonization, nutrient cycling and energy flow (Lee 1998, Skov & Hartnoll, 2002).

Neosarmatium meinerti (De Man, 1887) is an ecologically dominant crab in the upper mangrove, from East Africa to Australia (Lee, 1998; Emmerson, 2001; Hartnoll *et al.*, 2002). This paper describes the size at sexual maturity of *N. meinerti* from the Saco da Inhaca mangrove in tropical-subtropical southern Mozambique.

MATERIALS AND METHODS

The Saco da Inhaca mangrove (26°07'S, 32°56'E) is located on Inhaca Island, southern Mozambique. *Neosarmatium meinerti* was sampled during January and February 2002 at low tide. Two observers scanned the sampling area for *N. meinerti* specimens during 1 hour, within a sampling area of about 300 m². Crabs were captured by hand and stored in 70% alcohol. Laboratory analysis determined the gender and carapace width (CW; at 0.05mm accuracy) of individuals, whereafter crabs were dissected for gonad analysis under a dissecting microscope. Five gonad developmental stages were recognised according to the size and colour pattern of the gonads (Table 1).

The minimum size at first maturation was determined using plots of the percentage of individuals with mature gonads (stage 3 or above) against CW size class (Mantelatto & Fransozo,

Table 1. *Neosarmatium meinerti* (De Man, 1887). Gonad development stages in males and females (modified from Lee & Kwok, 2002; Pinheiro & Fransozo, 2002; Ituarte *et al.*, 2004)

Stage	Females	Descriptions	Males
1	Not visible		Not visible
2	Filiform and translucent; with no visible oocytes		Vas deferens very thin and yellow-orange
3	ovaries still reduced, bright orange, oocytes begin to appear		Vas deferens clearly visible, coloration between brown and transparent
4	Ovaries occupying a large space, brown-red gonad with distinct oocytes		Testes partially convoluted; whitish
5	Dark red to brown gonad; occupying a larger volume than the hepatopancreas		Testes enlarged, bright white

1996). The minimum size at first maturation was that size class at which 50% of the individuals in the population had mature gonads.

RESULTS

A total of 395 crabs was obtained during the study period, being 215 males and 180 females. Males ranged from 4.0 to 48.6 mm CW (mean \pm SE: 28.5 \pm 12.16) and females from 7.0 to 46.3 mm CW (26.3 \pm 10.11), indicating a sexual dimorphism in

which males attain larger sizes than females (Student t-test, $t = 4.09$, $p < 0.05$).

The estimated sizes at which males and females reached sexual maturity were 17.3 mm CW and 15.6 mm CW, respectively (Figs 1 and 2).

DISCUSSION

Sexual dimorphism was confirmed in the present study, with males reaching larger sizes than females. This is common in crabs and females may

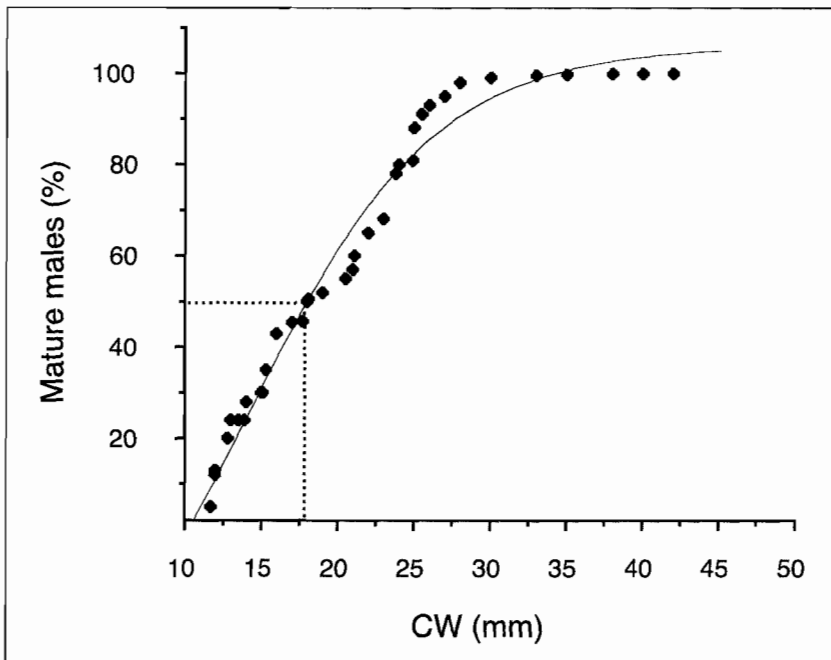


Fig. 1. *Neosarmatium meinerti* (De Man 1887). Relationship between percentage of mature males and carapace width (CW)

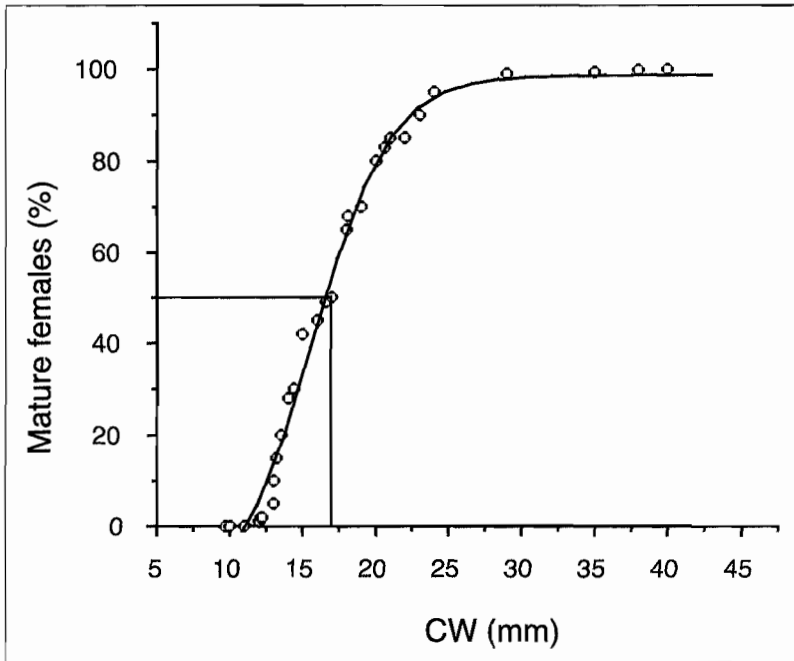


Fig. 2. *Neosarmatium meinerti* (De Man 1887). Relationship between percentage of mature females and carapace width (CW)

have reduced somatic growth compared to males because they concentrate their energetic budget for gonad development (Hartnoll, 1985). Moreover, males may reach larger sizes, since larger males have greater chances of obtaining females for copulation and win more intra-specific fights (Hartnoll 1985; Pinheiro & Fransozo, 1998). Females matured at a smaller size than males, a feature observed by many authors (e.g. Hartnoll, 1985; Meusy & Payen, 1988; Mantelatto & Fransozo, 1996; It is known that sexual maturity can vary considerably, when the different geographical locations are taken into account. According to Emmerson (1994), these trends are a function of temperature, metabolic differences, food availability and position within the latitudinal range of the species. Low temperatures lead to slow growth rates, with an increase in the time needed to reach sexual maturity, whereas high temperatures tend to stimulate growth, with an early beginning of gonad development and activity (Meusy & Payen, 1988; Ituarte *et al.*, 2004). In addition, in most subtropical and tropical areas, brachyuran crabs gonad maturation and reproduction occur during the warmer months, a

period when food sources are abundant in the plankton (Emmerson, 1994). This strategy also reduces larval competition for food in the plankton between species (Ituarte *et al.*, 2004). The sexual maturity of *Neosarmatium meinerti* has been partially described, but studies on morphological maturity, population dynamics, larval ecology and juvenile recruitment should be carried out to answer several questions about the reproductive cycle in the southern African region.

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