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Morphometric Analysis of *Chaceon affinis* (Brachyura: Geryonidae) in the Northwest of Iberian Peninsula

by

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Abstract

Spatial distribution, and some biological data, of *Chaceon affinis* (Brachyura: Geryonidae), in the northwest coast of Iberian Peninsula

Chaceon affinis is a member of the deep-water benthic community on the slope. In the study area, the commercial exploitation of this species began in the 1990s. At present, catches are scarce due to marketing problems and the elevated costs of their fishery.

Spatial distribution data were obtained from experimental fishing surveys carried out to explore the deep-water resources. Temporal evolution of catch rates was observed along a year, for two pilot vessels.

Biological samples were obtained from intermittent commercial catches, recording data relative to reproductive biology, morphometrics and individual intermoult stage. Relationships between different body measurement (cheliped length and cheliped height for both sexes, pleopod length in males and abdomen width in females) and body size were analysed. Length-weight relationships were calculated for males and females. The frequency-length compositions were used to research sexual differences in size.

Introduction

Chaceon affinis is widely distributed in the Northeast Atlantic, from Iceland to Azores, Madeira and Cape Verde Islands, inhabiting continental slope at depths ranging from 130 to 2047 m.

In 1980s and 1990s, exploratory surveys indicated good prospects for the commercial exploitation of this species in the northwest of Iberian Peninsula. In spite of its relative abundance and the quality of its meat, at present, there is no a fishery target to the deep-sea red crab.

Material and Methods

Samples analysed were restricted to sporadic landings provided by fishermen. Individuals were caught, as by-catch, by gill-nets target to anglerfish fishery, at depths between 400-800 m (Fig. 1).

Results and Discussion

Males showed a wider range of carapace length (CL), from 79.3 to 158.4 mm, than females, from 92.6 to 143.6 mm CL (Fig. 2). It was observed a bimodal distribution for males (modes: 118 and 133 mm CL) and a unique modal value of 121 mm CL for females.

The increment in weight with the carapace length was significantly different between sexes (ANCOVA, $F_{(1, 132)} = 21.80$, $P < 0.05$), being females proportionally lighter than males (Fig. 3). Morphological differences between sexes, like the chelae dimorphism, may affect size-weight relationship. There were no differences in weight between ovigerous and non ovigerous females (ANCOVA, $F_{(1, 35)} = 0.63$, $P > 0.1$) .

All individuals were heterochelic, with a major crushing chelae and a minor tearing chelae. There was a dominance of right-handedness in both sexes (89% and 84%, for males and females respectively). Crusher chelipeds were 13 % higher and 4 % longer than cutter chelipeds. This dimorphism may be related with a specific predatory behaviour.

For adult specimens, the allometry of different measurements was established using the linearized version of the regression equation for allometric growth (Table 1). Student's t-test was applied to determine whether the slope of the regression equation was statistically different from one. The relationship between carapace width and carapace length was negatively allometric for both sexes. However, females were proportionally wider than males. It was observed a sexual dimorphism in the cheliped growth of mature *C. affinis* (Fig. 4). For crusher and cutter chelipeds, the rate of relative growth of length and height were negatively allometric for females and positively in males (in all cases $P = 0.000$). A higher growth of chelipeds in males likely correlates to an advantage in agonist interactions. It was found a high variability in the pleopod length of adult males, which explains the bad fit of the allometric equation (Fig. 5a). In adult females, the abdomen width was proportional to body size ($t = 0.902$, $df = 69$, $P > 0.1$) (Fig. 5b).

References

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TABLE 1. Parameters of the allometric equations using carapace length as reference variable.

variable	sex	log a	b	r^2	n
Carapace width	males	0.243	0.929	0.954	69
	females	0.314	0.895	0.921	70
Crusher cheliped					
length	males	-0.678	1.303	0.938	66
	females	0.135	0.876	0.741	64
height	males	-1.271	1.383	0.880	66
	females	-0.255	0.853	0.503	64
Cutter cheliped					
length	males	-0.729	1.317	0.919	68
	females	0.210	0.832	0.693	66
height	males	-1.291	1.367	0.892	70
	females	-0.270	0.836	0.554	67
Pleopod length	males	0.165	0.624	0.436	70
Abdomen width	females	-0.215	0.992	0.742	68

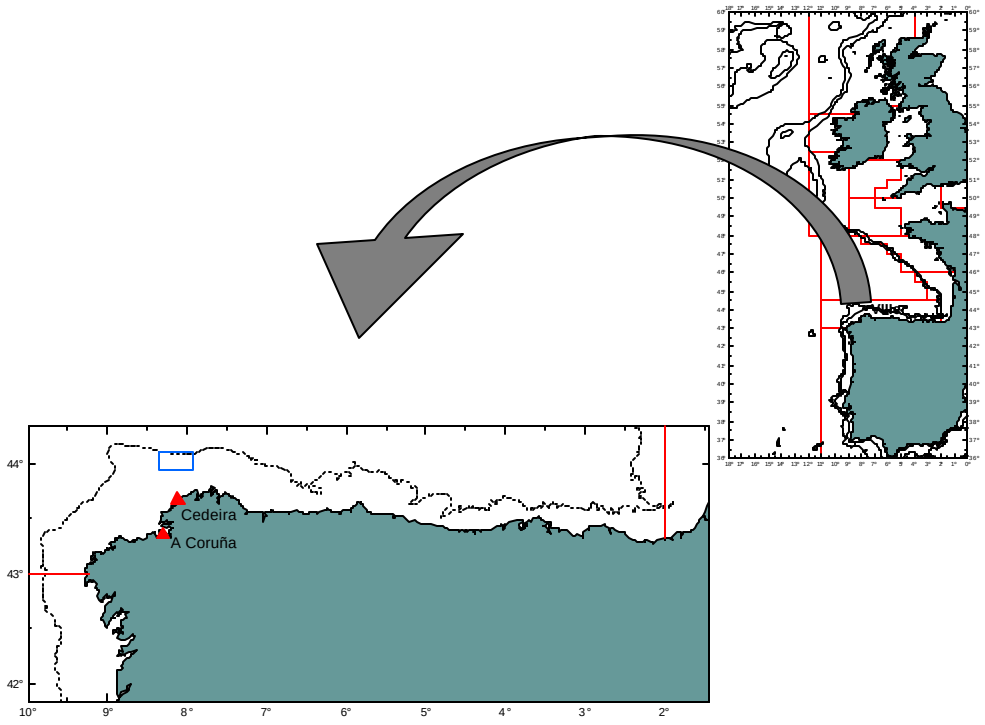

Fig. 1. Map northwest of Spain indicating the study area.

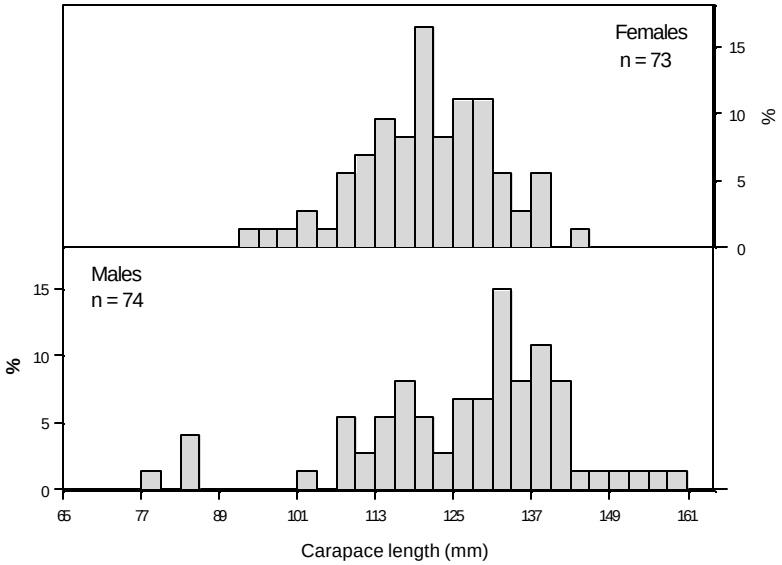

Fig. 2. Length-frequency distribution in 3 mm class.

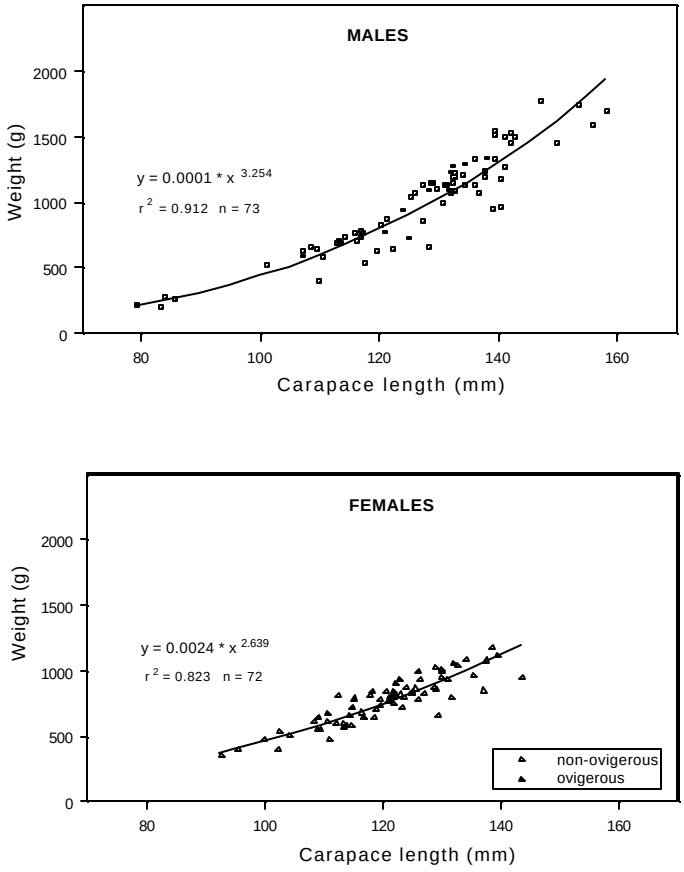

Fig. 3. Relationship between wet weight and carapace length for males and females.

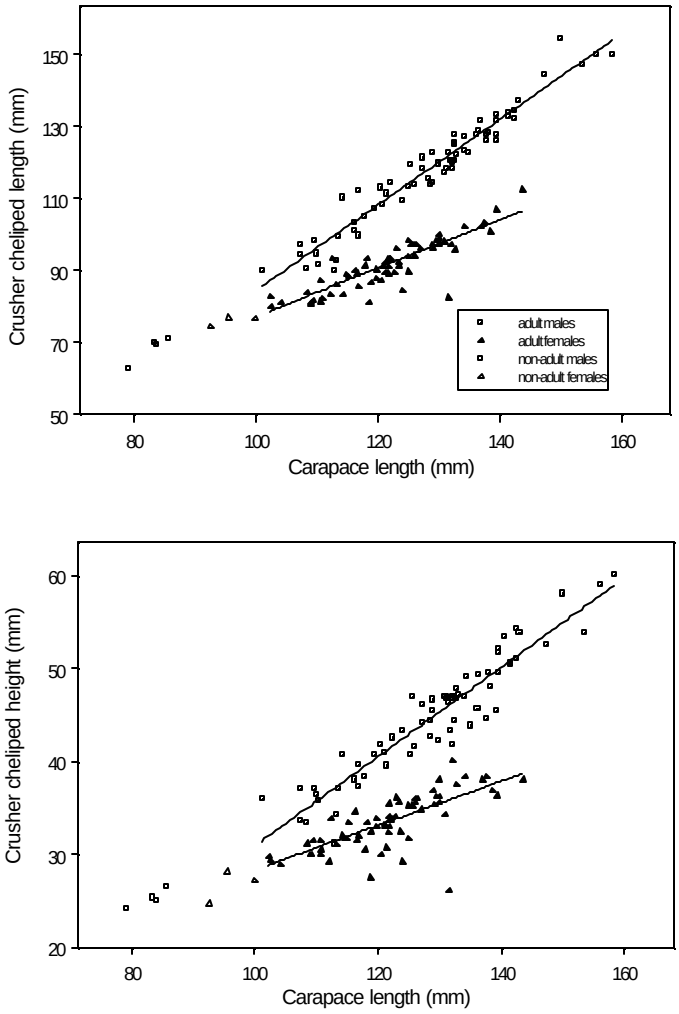

Fig. 4. Relationship between the crusher cheliped size (length and height) and carapace length.

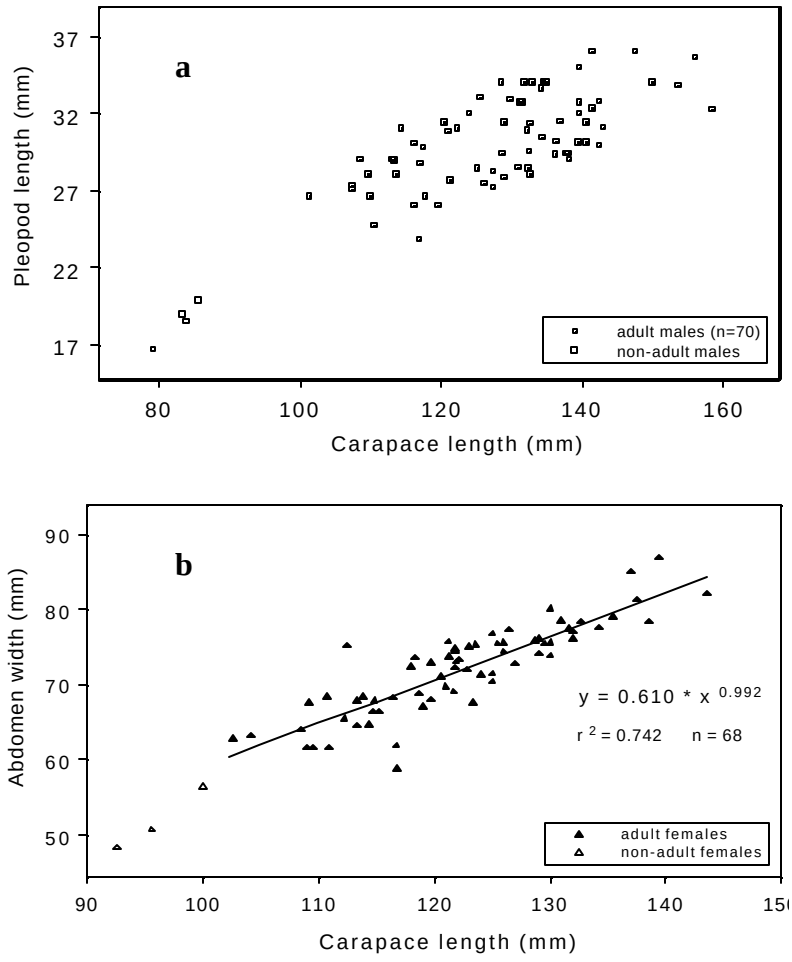

Fig. 5. Relationship between: a) pleopod length and carapace length for males; b) abdomen width and carapace length for females.