

Variation and distribution of the fish parasitic isopod *Nerocila orbigny* (Guérin-Méneville, 1829-1832) (Isopoda Cymothoidae)

Изменчивость и распространение *Nerocila orbigny* (Guérin-Méneville, 1829-1832), равноногого ракообразного — паразита рыб (Isopoda Cymothoidae)

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КЛЮЧЕВЫЕ СЛОВА: Isopoda, *Nerocila*, паразит рыб, изменчивость, распространение, Атлантика.

ABSTRACT: A collection of *Nerocila orbigny* (Guérin-Méneville, 1829-1832) from the North-West African shelf is evaluated with regard to the morphological variation of the population. Transitional forms connect different morphotypes of this species. The different behavior of the hosts appears to affect the evolution of local forms of *N. orbigny*.

РЕЗЮМЕ: На основе обработки материала по *Nerocila orbigny* (Guérin-Méneville, 1829-1832) из шельфа Северо-Западной Африки проведена оценка морфологической изменчивости данной популяции. Промежуточные формы связывают различные морфотипы этого вида. Оказалось, что различия в поведении хозяев воздействуют на эволюции местных форм *N. orbigny*.

Introduction

Species of the genus *Nerocila* Leach, 1818 are known to vary morphologically, although this has only been documented for a few species: Bowman [1978] for *N. sundaica* Bleeker, 1857; Brusca [1978] for *N. californica* Schjødte et Meinert, 1881; Bruce [1987] for *N. orbigny* (Guérin-Méneville, 1829-1832).

Bruce [1987] has described variation in Australian specimens, also in comparison with Mediterranean ones. He has redescribed the species and synonymised *N. cephalotes* Schjødte & Meinert, 1881 and several other names with *N. orbigny*. Earlier, the name *N. cephalotes* was widely used. The first morphological observations on that species (sub*N. cephalotes*) were made by Monod [1924]. On the basis of body shape, he created the forms "Alpha" and "Beta" and seven other morphological varieties. Such a profound variation has since been a source of misidentifications of the species [Trilles, 1975].

N. orbigny is a protandrous hermaphrodite beginning its adult cycle as a male. Later, through

a transitional stage, the adult male becomes an ovigerous female (Fig. 1).

On the North-West African shelf, three species of *Nerocila* have been recorded: *N. orbigny*, *N. armata* Dana, 1853, and *N. rhabdota* Koelbel, 1879 (= *N. armata* sensu Bruce [1987]). A fourth species, *N. maculata* M. Edwards, 1840, has been reported, but its identity remains to be resolved. Its type material must have been damaged prior to 1987 when Bruce considered *N. maculata* as a synonym of *N. orbigny*.

N. orbigny is the most abundant species on the North-West African shelf, as noted by Schjødte & Meinert [1881] from Goreé, Senegal, by Monod [1924, 1931] from Port Étienne, Mauritania, by Schuurmans-Stekhoven [1937] from West Sahara, by Trilles [1972, 1975, 1979] from Mauritania and Senegal, and by Rokicki [1981] from Cap Blanc, Mauritania. *N. orbigny* has been found on various host species, but most frequently on *Trichiurus lepturus* (Linné, 1758) and *Brama raii* (Bloch, 1791). According to Monod [1924], *N. orbigny* occurs frequently on Lutianidae (*Diagramma mediterraneum* Guichenot, 1850) and Serranidae, while Brian & Dartevelle [1949] found it on Carangidae off the coast of Congo. On the North-West African shelf, only one specimen of *N. orbigny* has been collected from Carangidae: *Pomatomus saltatrix* (Linné, 1758). This shows the lack of host specificity of this parasite.

As *N. orbigny* is a common fish parasite on the North-West African shelf, a full review can now be given, which is important to the determination of morphological variation.

Materials and methods

The present paper is based on 105 specimens (13 males, 11-21 mm; 8 transitional specimens, 18-30

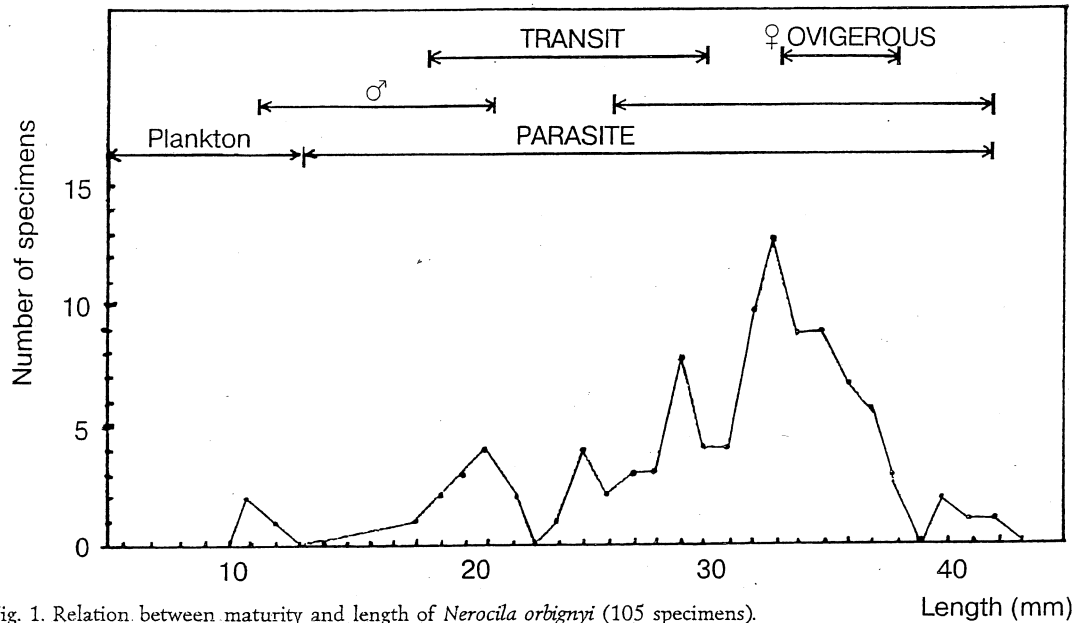


Fig. 1. Relation between maturity and length of *Nerocila orbignyi* (105 specimens).

Рис. 1. Соотношение между зрелостью и размером (длиной) *Nerocila orbignyi* (105 экземпляров).

Tab. 1. Distribution of *Nerocila orbignyi* between the hosts and over the North-West African shelf.
Табл. 1. Распределение *Nerocila orbignyi* по хозяевам и по шельфу Северо-Западной Африки.

Fish species	Locality	Number of fish	
		Examined	Infested
<i>Brama raii</i>	Mauritania	2150	59
Picked from fish nets	Mauritania	—	5
<i>Trichiurus lepturus</i>	West Sahara	840	30
<i>Trachurus trachurus</i>	Senegal	204	3
<i>Pomatomus saltatrix</i>	Morocco	143	1
<i>Lophius piscatorius</i>	Morocco	3	1
<i>Lagocephalus laevigatus</i>	Senegal	2	1
<i>Cynoglossus</i> sp.	Gambia	2	2

mm; and 84 females, 26-42 mm; see Fig. 1), collected mostly by the author on Polish fishing boats in October-November 1976 and 1977 on the fishing grounds off the coastal regions of North-West Africa. The isopods were picked from fish or, at times unattached, from a trawl net (Table 1). Almost all infested fish had only one isopod except for three *Brama raii* infested by two parasites each. *B. raii* were caught mainly near Cap Blanc (20°14'-20°43'N and 17°30'-17°38'W), while *Trichiurus lepturus* mainly in 22°36'-25°01'N and 15°32'-16°50'W. Some isopods were collected also off the coasts of Morocco and Senegal (Table 1). In addition, one specimen was taken on 6 February 1969 from a *Cynoglossus* sp., 64.8 km south of the Gambia estuary, by Krzeptowski. The material was dominated by females, 26-42 mm long (Fig. 1).

Variation in the following five characters was assessed: shape of cephalon, prolongation of posterolateral angle of pereonites 5 and 7, shape of uropod endopods, and colour patterns.

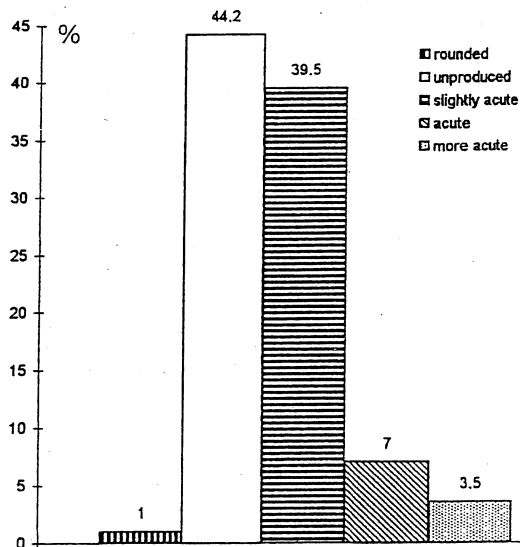


Fig. 2. Shape of posterolateral angles of pereonite 5 in *N. orbignyi*.

Рис. 2. Форма заднебоковых углов переонита 5 у *N. orbignyi*.

Specimens were fixed in 4% formaldehyde and later transferred to ethyl alcohol. Measurements were made using a standard stereomicroscope with an ocular scale. The material is kept in the Department of Invertebrate Zoology, Gdansk University, Poland and at the Crustacea Department, Zoological Museum, University of Copenhagen, Denmark.

Results

Variation in shape of the anterior margin of the cephalon

Fig. 6 shows two shapes of the head as found in the present investigation. Shape "a" is very com-

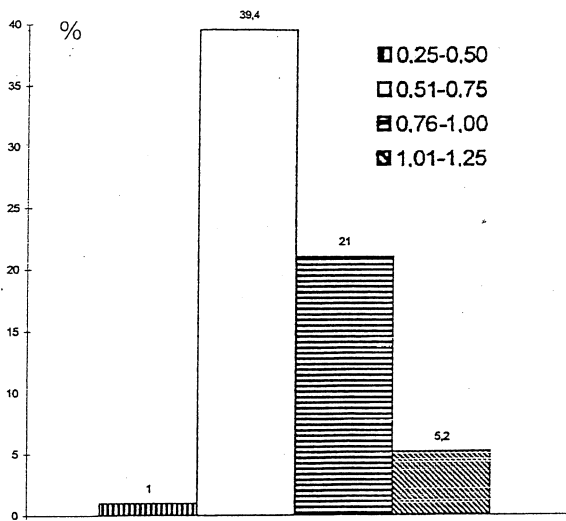


Fig. 3. Length differences between uropod exopod and endopod in *N. orbignyi* (in mm).

Рис. 3. Различия в длине между экзоподом и эндоподом уропода у *N. orbignyi* (в мм).

mon, while shape "b" occurs more rarely. The rounded shape of the frontal margin of the cephalon was found only in two out of all specimens (from *Cynoglossus* sp. from Gambia, Table 1). There was no corresponding differences in other aspects of morphological variation associated with the different shape of the cephalon.

Variation in the degree of prolongation of the posterolateral angle of the pereonite 5

Fig. 2 shows the observed variation in this character. The posterolateral angle of pereonite 5 is either weakly developed or rounded to more acute, but the unproduced (44.2%) and slightly acute (39.5%) forms dominate. The posterolateral angles of pereonite 5 of males and transitional specimens have a rounded or unproduced shape.

Variation in posterolateral angles of the pereonite 7

The posterolateral angles of pereonite 7 extend posteriorly to segment 4 of the pleon, rarely beyond it. In males, the posterolateral angles of pereonite 7 rarely extend beyond pleonite 2.

Variation in shape of the uropod endopods

The uropod endopods: shorter than exopod, lateral margin subparallel, dis-

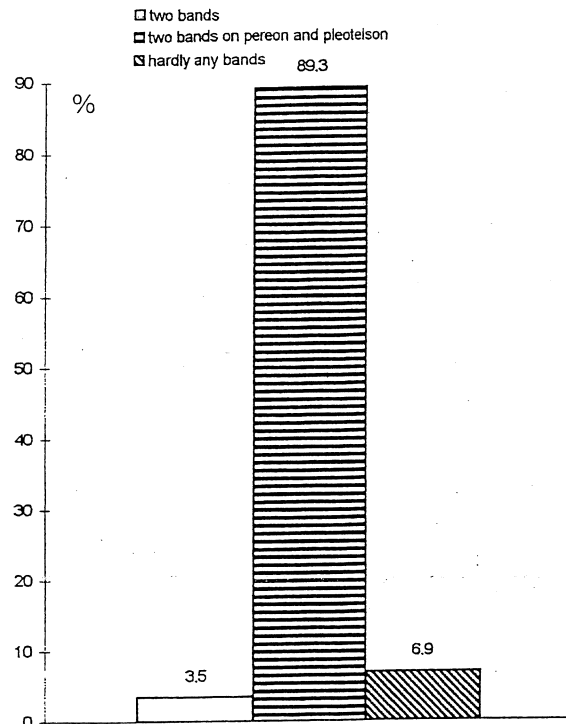


Fig. 4. Colour pattern in *N. orbignyi*.

Рис. 4. Тип окраски у *N. orbignyi*.

tal margin obliquely truncate and may have a prominent distomedial tooth (40%), a small tooth (40%) or lack a tooth (20% of the pool). The angle of the oblique distal margin to the lateral margin may also vary. Length differences between the uropod exopod and endopod were measured. The results of the measurements were grouped into four classes, the most common of which was a range of 0.25 to 0.75 mm (Fig. 3). All males and transitional

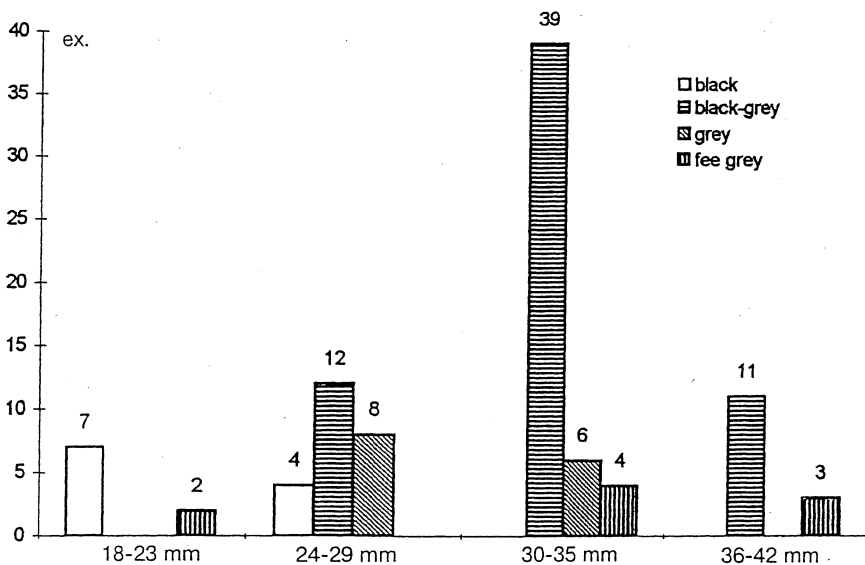


Fig. 5. Relation between eye colour and body length in *N. orbignyi*.

Рис. 5. Сотношение между окраской глаз и длиной тела у *N. orbignyi*.

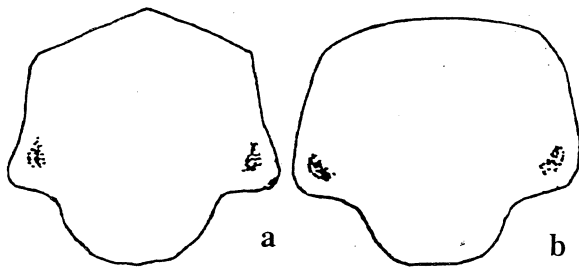


Fig. 6. Shape of cephalon of *N. orbigny* (a,b).
Рис. 6. Форма головного отдела *N. orbigny* (a,b).

forms fell in this group of difference between the uropod exopod and endopod.

Variation in colour pattern

On the pereon and pleotelson of adult and young individuals, two faint, pale, submedian longitudinal bands (89.3%) are observed (Fig. 4). Rarely, the bands are stretched all along the body, and sometimes they are absent. Thin bands are common in most species of *Nerocila*.

The colour of the eyes varies from black to grey, with age becoming increasingly well-covered by the cuticle. The darkest eyes were found in the smallest individuals (Fig. 5). The specimens taken from *Brama raii* are darker and larger than individuals deriving from *Trichiurus lepturus*.

Discussion

Nerocila orbigny, forma *cephalotes* sensu Monod [1931], lacks a produced angle of posterolateral pereonite 5 [Monod, 1931: fig. 6a, b]. It is most common on the North-West African shelf (44.2%, Fig. 2) and agrees with specimens from Palm Beach, Australia [Bruce, 1987: fig. 15F]. Trilles [1975] considers this shape to be "typical". *Nerocila orbigny*, forma *orbigny* sensu Monod [1931], which at Port Étienne and Naples has a slightly acute or acute angle [Monod, 1931: figs 7, 8d, 9], is common on the North-West African shelf: 39.5% with a slightly acute, 7% with an acute angle (Fig. 2). This shape corresponds also to that of *N. orbigny* reported off the coast of Western Australia, at Walpole [Bruce, 1987: fig. 13B, D]. Also, it is very similar to a more acute posterolateral angle recorded by Monod [1931: fig. 8b].

The colour and different pigment patterns of *N. orbigny* may be adaptations to the colour of the host. Specimens from *Brama raii*, which has a black skin, are dark. The specimens collected from *Trichiurus lepturus*, which are silver in colour, are paler. The colour becomes more intensive with age, as noted for material from Walpole by Bruce [1987]. The colour of the parasite seems to be linked more with that of the host than with its own age. The colour of the eyes is linked with length, hence probably age, of specimens. Only parasites less than 29 mm long have black eyes (Fig. 5).

A rounded shape of the frontal margin of the cephalon (Fig. 6b) has been found only in two individuals from the southern part of the shelf, closer to the Equator. The typical, slightly angular shape of the cephalon found in the remaining 103 individuals from the more northerly part of the shelf is similar to that described by Bruce [1987: fig. 12F].

Conclusions

N. orbigny on the North-West African shelf shows considerable variation in five different morphological characters, but this variation does not appear to be of specific importance for erecting new taxa.

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