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SÉRIE DIGITAL

**NOTE OF A PATHOLOGICAL STUDY OF THE
COPEPOD PARASITE *Nicothoë astaci* IN
EUROPEAN LOBSTER, *Homarus gammarus***

Francisco Ruano e Luísa Monteiro

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**NOTE OF A PATHOLOGICAL STUDY OF THE COPEPOD PARASITE
Nicthoë astaci IN EUROPEAN LOBSTER, *Homarus gammarus*.**

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ABSTRACT

The occurrence of an infestation of European lobsters by the copepod parasite *Nicthoë astaci* is reported for the first time in Portugal. A short description of the morphology of the parasite is done. Pathogenic analysis of the host reveal large eroded areas of gill filaments with necrotic scars deep into the gill axis, caused by the parasite. The internal organs show an empty digestive tract, with a discoloured hepatopancreas. A normal epidermis reveals an intermolt stage and the gonads shows a female in maturation. Due to the heavy infestation and its weak condition, the host was rejected for sale. The available material and the lack of recorded information about the stocks of this species, does not allowed getting a correct perception on the prevalence of this disease in wild populations.

Key words: copepod parasite, European lobster, pathology.

Título – Nota de um estudo nosológico do copépode parasita, *Nicthoë astaci*, no lavagante, *Homarus gammarus*.

RESUMO

A ocorrência de infestações de lavagantes pelo copépode parasita *Nicthoë astaci*, é reportado pela primeira vez em exemplares, comercializados em Portugal. É feita uma breve descrição da morfologia do parasita. O exame anatomopatológico do hospedeiro revelou nos filamentos branquiais grandes áreas erodidas, com cicatrizes necróticas profundas no eixo branquial, causadas pelo parasita. Os órgãos internos mostram um trato digestivo vazio, com um hepatopâncreas descorado. A aparência da epiderme era normal e correspondia a um estado intermediário da fase de muda. As gônadas mostram uma fêmea em maturação. Devido à intensidade da infestação e à sua fraca condição, os animais foram rejeitados durante a inspeção em lota. A falta de informação sobre proveniência dos exemplares, não nos permitiu obter uma correta percepção da prevalência desta parasitose nas populações selvagens.

Palavras-chave: copépode parasita, lavagante, patologia

BIBLIGRAFIC REFERENCE

Ruano, F.; Luisa Monteiro and Sofia Palma, 2020 - Note of a pathological study of the copepod parasite *nicthoë astaci* in european lobster, *Homarus gammarus*. **Relat. Cient. e Tecn. do IPMA (<http://ipma.pt>) n° 27, 6pp.**

INTRODUCTION

During a routine fisheries inspection operation before the fish-auk in the commercial fishery port of Figueira da Foz, west coast of Portugal, a female specimen of European lobster, *Homarus gammarus*, 2 200 g (W) and 45cm (L), caught by cage nets in the offing, was rejected for sale. The animal was sent to the Pathology laboratory of IPIMAR, in order to identify the causes of its poor general condition that support the rejection. The presence of a massive infestation caused by the copepod parasite, cyclopoida, *Nicothoë astaci*, comes during necropsy. This disease, commonly known as lobster louse, was reported as prevalent in Scottish waters (Mason, 1958, 1959) also seen in lobsters being held in Netherlands (Korringa, 1957).

After this case and during routine inspections of crustaceans storing facilities, we detected the same disease in much lower incidence in two more lobsters imported from north Europe.

MATERIL AND METHODS

During the necropsy, samples of gill lamellae with copepod were collected and preserved in ethanol 70%.

Parasites were removed from the gills as well as their egg sacs, for scanning microscopy as well as light microscopy observation. After fixing and dehydrating, samples were submitted to the critical point in CO², put in a metallic support and covered by a gold film, observed in scanning microscope (JFK-1100 JEOL).

RESULTS AND DISCUTION

Parasite morphology

The peculiar image of the parasite body is the transformation of the first tow thoracic segments fused with the cephalothorax and the next three segments, in a pair of tow large wing shape lateral expansions, giving a very peculiar morphological characteristic to this specie. Inside these appendages, a great part of the internal space is occupied by tow bilateral ovary (Fig. 1) and a long oviduct can be seen in both sides of the body.

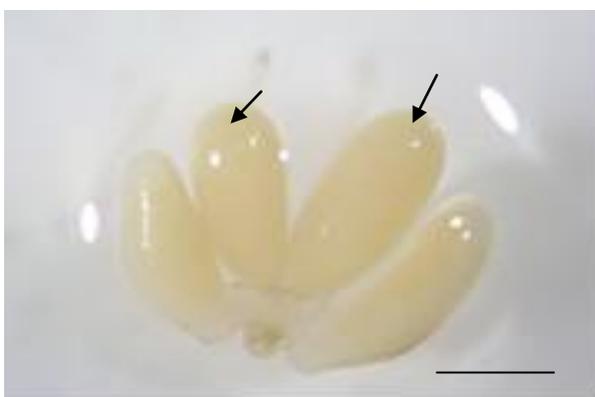


Figure 1. Wole parasite with a pair of egg sacs (arrows) and the peculiar wing shape lateral expansions, resulting of the fusion of the 3 thoracic segments. (10X10 – **bar**-1mm)

In the ventral face, located laterally on the anterior edge of the cephalic region are present, a pair of a long antenna and a pair of a small antenna in the 2nd. and the 3rd segments (Fig.2).

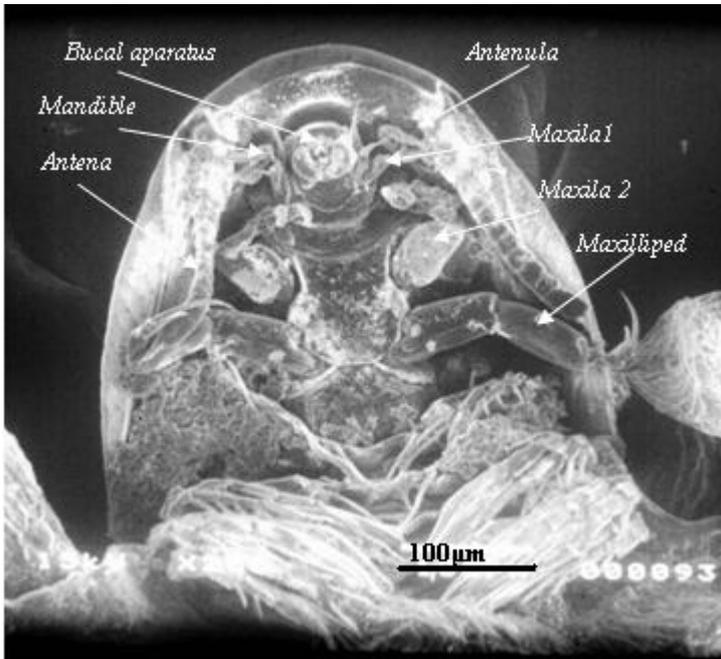


Figure 2. General view by scanning microscope of ventral face of the cephalothorax, showing, a pair of antenna, a pair of small antenna, the bucal apparatus, one pair of mandibles, 2 pairs of maxillas and 4 pairs of maxilipeds. (JFK-1100 JEOL).

The centre of the anterior half of the cephalic region is occupied by a buccal complex (Fig.3). It is formed by five pairs of buccal stylets that surround tow large labial palps, covered by thousand of suctory papilla. Between those palps is the mouth formed by tow small labia, followed by a large pharynx. This structure is strongly adapted to suctory functions.

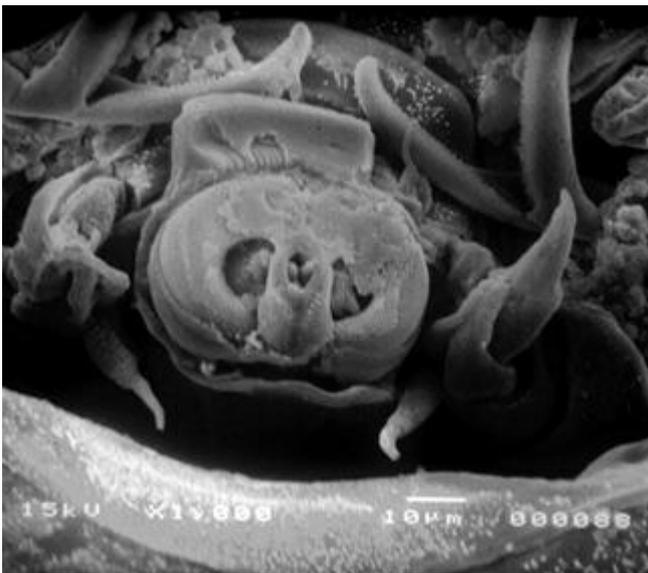


Figure 3. The buccal apparatus with the mouth in the middle of two large labial palps evolved by the buccal stylets.

The posterior half of the cephalic region, respectively the 4th, 5th and 6th segments are armed with a pair of mandibles and two pairs of maxillae.

Ventrally the first thoracic segment presents a pair of maxilliped, the next 4 has, each one, a pair of biramous limbs, and the last one, the 6th, a pair of uniramous limbs.

The abdomen has 4 distinct segments; the first is the genital where a pair of egg sacs full of embryos connects with the terminal part of the oviduct. The parasite body ends in the 4th abdomen segment, a bilobed and long caudal style (Mason – 59).

The length of the body, from the edge of the first cephalic segment until the tail extremity and the length of the wing shape appendages, from its tip until its junction with the trunk, measured in 280 specimens, are summarised in Table I.

Table I – Biometric parameters of the specimens collected from 5 different lamellae in both branchial chambers, average values (SD).

Branchial Lamellae	n. of Parasites	Wing length (mm)	Body length(mm)
#1	56	1,1 (0,15)	0,7 (0,08)
#2	70	1,0 (0,17)	0,72 (0,10)
#3	83	1,0 (0,08)	0,69 (1,13)
#4	43	1,1 (0,20)	0,7 (0,13)
#5	25	1,1 (0,16)	0,6 (0,13)

Pathology

The parasite attaches to the host gill filament with its suckorial mouth and sucking the host's blood after piercing the gill filament with the mandibles (Mason, 1959). In a massive infestation like the present case, adult parasite is incapable to move and once attached remains in the same position for life. At each moult of the host, attached copepods are shed with the old shell and die, but infestation by last-stage copepodites can occur shortly after the moult (Bower, 96).

Mason reported massive infestations with a maximum of 1,700 copepods on a single lobster and conclude that it could be harmful for the host.

Besides a general debilitation the gross examination of the exoskeleton shows large areas with lack of pigmentation, associated with melanotic lesions in the cephalothorax. The tail and particularly the telson were deeply wounded, the loss of the left clamp and the first periopode, complete the gross picture of lesions. The examination of internal organs shows an empty digestive tract, with a discoloured hepatopancreas. A normal epidermis reveals an intermolt stage and the gonads shows a female in maturation.

Inside the branchial chambers, most of the lamellae of epibranchia and hypobranchia show large areas covered by huge quantities of oval/spherical formations.

Those masses of parasites formed by egg sacs of ripe females of *Nicothoë*, and the apical extremity of their wings, gives to the organ the shape of small grapes (Fig.4), instead its normal filamentous structure with a clear cream colour.

Large eroded areas of gill filaments with necrotic scars deep into the gill axis, caused by the parasite, were observed. Pushing away the branchial filaments, the adult parasite is attached with their mandibles and buccal apparatus, not only in the filaments but more deeply into the gill axis (Fig.5), closer to larger hemolymphatic vessels.



Figure 4. Branchial lamella totally covered by a «grape» of parasites.



Figure 5. Mass of parasites deeply attached between the branchial filaments.

Some filaments are also eroded and necrotised in the apical parts due to previous presence of the parasite, probably the last free stage, copepodid, and the earliest stage, juveniles, seen on lobster gills.

In each one of the five gill lamellas sampled from both branchial chambers, we collected an average number of 55 adult female specimens. No males or young stages were observed. We calculate that the whole branchial tissue of the lobster (40 lamellae) was, covered by an estimated number of more than 1100 copepods, affecting more than half of the total respiratory area of this organ.

The main impact of the parasite seems to be caused by its intense hematophagous activity inducing a general debilitation of the host, due to the continuous spoliation of haemolymph, sucked from hemolymphatic vessel namely the dendroid branches of the epibranchial artery or eventually directly from that vessel. However, the shortage on oxygen levels in haemolymphatic stream due to the reduction of gill surface available for gas exchanges must be consider. Any other pathogen, bacteria, fungus or other parasitic protozoa were fund associated with this parasite in the gills.

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