



Observations on parasitism by *Thalassomyces fagei* on three euphausiid species in Southern Atlantic waters

Euphausiids
Parasitism
Gonadal development
Secondary sexual characters
Thalassomyces fagei
Euphausiacées
Parasitisme
Développement des gonades
Caractères sexuels secondaires
Thalassomyces fagei

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ABSTRACT

The inhibiting effects of the parasite *Thalassomyces fagei* (Ellobiopsidae, Dinophyceae) on gonadic development in euphausiids have already been reported by several authors. Such castrative action reaches significant proportions in these crustaceans, which are important components in the diet of many commercially exploited fishes. In the present work, 2641 furciliae, post-larvae and adults of *Euphausia lucens*, *E. vallentini* and *Thysanoessa gregaria* were examined. The samples were taken in Southern Atlantic waters by R/V "Walther Herwing" and "Shinkai Maru" between May 1978 and February 1979. Increasing incidence of parasitism was found at the end of winter and beginning of spring, the most commonly affected species being *E. vallentini* (9.9% of the total). Some reduction of secondary sexual characters was typically associated, though its extent was not constant.

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RÉSUMÉ

Observations du parasitisme de *Thalassomyces fagei* sur trois espèces d'euphausiacées de l'Atlantique Sud

Les effets du parasite *Thalassomyces fagei* (Ellobiopsidae, Dinophyceae) sur le développement des gonades des euphausiacées ont déjà été mentionnés par beaucoup d'auteurs. Son action peut atteindre des proportions importantes chez ces crustacés, qui sont une des proies principales des poissons exploités commercialement. Dans ce travail, 2641 individus ont été observés, comprenant les stades furcilia, post-larve et adulte des espèces *Euphausia lucens*, *E. vallentini* et *Thysanoessa gregaria*. Les échantillons ont été récoltés dans l'Atlantique Sud par les navires océanographiques "Walther Herwig" et "Shinkai Maru" entre mai 1978 et février 1979. Une augmentation du parasitisme a été observée à la fin de l'hiver et au début du printemps, *E. vallentini* étant l'espèce la plus affectée (9,9% du total). On a enregistré fréquemment une réduction des caractères sexuels secondaires chez les animaux parasités.

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INTRODUCTION

In 1983, Ramírez and Dato published results on population structure and ovarian development in *Euphausia lucens*, *E. vallentini* and *Thysanoessa gregaria*, sampled from an area in the South Atlantic. The presence of the parasite *Thalassomyces fagei* was observed in numerous specimens, indicating that a report on its incidence was called for. This organism prevents gonadic development in euphausiids; in most cases, a reduction of the secondary sexual characters in both males and females (petasma and thelycum

respectively) takes place. A total of 14 species of euphausiids have been reported as parasitized by *T. fagei* (Komaki, 1970). The present work is the first to record infestation of *E. lucens* and *T. gregaria*; *E. vallentini* has been previously mentioned as a host (Boschma, 1949).

Resulting in the loss of euphausiid reproductive capacity, infestation by *T. fagei* may be of economic importance, since euphausiids constitute food for commercial fishes. In Argentine waters, euphausiids are commonly found in the diet of hake (*Merluccius hubbsi*) and anchovy (*Engraulis anchoita*), two important species in the fishing sector.

Table 1
Real number and percentage of parasitized Euphausiids.
Nombres et pourcentage d'euphausiacées parasitées.

Months	<i>Euphausia lucens</i>			<i>Euphausia vallentini</i>			<i>Thysanoessa gregaria</i>		
	Observed specimens	Number parasited	% parasited	Observed specimens	Number parasited	% parasited	Observed specimens	Number parasited	% parasited
May	106	2	1.9	212	10	4.7	53	—	—
June	112	2	1.8	124	6	4.8	53	—	—
August (a)	232	9	3.9	76	7	9.2	92	1	1.1
August (b)	196	6	3.1	122	12	9.8	80	—	—
October	53	2	3.8	372	60	16.1	76	3	3.9
November	40	—	—	52	12	23.1	7	1	14.3
January	54	—	—	43	2	4.7	249	—	—
February	91	4	4.4	105	11	10.5	41	—	—
Totals	884	25	2.8	1106	120	10.8	651	5	0.77

METHODS

A total of 2641 euphausiids were sorted from 26 samples taken between 49°-54°S, and 61°-66°W. Sampling was performed by the R/V "Shinkai Maru" and "Walter Herwig" between May 1978 and February 1979 (for details, see Ramirez, Dato, 1983). As in our previous work, observations here are based on furciliae, post-larvae and adult specimens, females being prevalent. Degree of gonadal atrophy was not detailed.

thelycum and petasma (52%), while the remaining animals (48%) lacked such external evidence.

It has not been established when euphausiids become invaded by the parasite. It is supposed that both grow simultaneously. When an euphausiid approaches its adult phase, the parasite protrudes through the carapace integument, its trophomeres being externally visible. Table 3 shows the relation between increasing mean body length in populations of *E. vallentini* and the number of parasites extending from the carapaces.

Table 2
Parasitized Euphausiids with reduction of secondary sexual characters.
Euphausiacées parasitées avec réduction des caractères sexuels secondaires

Months	<i>Euphausia lucens</i>		<i>Euphausia vallentini</i>		<i>Thysanoessa gregaria</i>	
	Number parasited	Affected specimens	Number parasited	Affected specimens	Number parasited	Affected specimens
May	2	—	10	—	—	—
June	2	1	6	—	—	—
August (a)	9	9	7	—	1	—
August (b)	6	2	12	7	—	—
October	2	2	60	40	3	—
November	—	—	12	10	1	—
January	—	—	2	—	—	—
February	4	—	11	7	—	—
Totals	25	14	120	64	5	—

RESULT

Of the 2641 specimens, 150 were parasitized, 5.7% of the total. As shown in Table 1, observations on each species concern several hundred individuals. The highest incidence of parasitism during the studied period was found in *Euphausia vallentini* (10.8%), and the lowest in *Thysanoessa gregaria* (0.77%). In *E. vallentini*, a month-to-month increase in the proportion parasitized can be observed, the maximum appearing during spring (16 and 23% in October and November respectively), with a secondary inflection in summer (10.5% in February). A similar tendency was observed in *E. lucens* and *T. gregaria*, though values were lower. As previously mentioned by other authors (Mauchline, Fisher, 1980), this parasite "does not necessarily prevent development of the secondary sexual characteristics although it does tend to castrate its host". Table 2 shows monthly numbers of specimens with parasite-induced reduction in secondary sexual characters. Of a total of 150 individuals, 78 showed reduction of

As mentioned in the previous work (Ramirez, Dato, 1983), highest medial body length was reached in spring, accompanied by growth of their gonads (Stage III of maturity during October and November).

Table 3
Relation between monthly medial body-length in populations of *Euphausia vallentini* (according to Ramirez, Dato, 1983) and the number of observed parasites extending externally.
Relation entre la taille moyenne mensuelle des populations d'*Euphausia vallentini* (d'après Ramirez, Dato, 1983) et le nombre de parasites observés à l'extérieur.

Months	Mean size (mm)	Number of visible parasites	% of visible parasites
May	10.9	—	—
June	11.9	1	16.7
August (a)	9.7	5	71
August (b)	10.8	5	42
October	13.1	37	62
November	15.4	12	100
January	9.1	2	100
February	13.7	4	36

The proportion of *T. gregaria* infested by *T. fagei* was the lowest of the three observed species. It has been assumed that this parasite enters the host as a consequence of ingestion of its spores (Galt, Whisler, 1970). *T. gregaria* differs from the *Euphausia* species in that its second pair of thoracic legs are somewhat elongated, bearing spiniform marginal bristles. Such legs may function in the capture of animal prey. If *T. gregaria*, therefore, uses a mixed regime of feeding, retention of *T. fagei* spores might be less efficient than in the *Euphausia* species, which probably engage in relatively more random filtering for food. This could help to explain the lower values of parasitic incidence in *T. gregaria*.

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