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On Absolute Individual Fecundity of Shrimp
(*Pandalus borealis*) at Flemish Cap

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Abstract

Coefficient of maturity of *Pandalus borealis* pre-spawning gonads at Flemish Cap was used as a criterion in the gonade maturation assessment. It varied from 6.1 to 16.2%, being 10.5% on the average and is comparable to this of others species with the same type of gonade maturation. It allows to suggest that no losses of reproductive production at the stage of its formation have been found.

Study of oocytes number in pre-spawning gonade (absolute individual fecundity: Burukovsky, 1993) showed that it fluctuated between 601 (carapace length-21 mm) and 2242 oocytes (27 mm) (1350 oocytes - on the average).

Number of eggs recently laid down varied from 686 (carapace length - 21mm) to 2380 eggs (29 mm) (being 1330 on the average). It has been suggested that losses of eggs at the stage of laying down on pleopods were practically absent.

Introduction

Phenomenon of losses of eggs during bearing in pleopods was found early (Burukovsky, Sudnik, 1997). The initial realized fecundity of northern shrimp was twice less than in shrimp of comparative size from the waters of West Spitsbergen and is comparable to that of shrimp from the Barents Sea (1428 eggs on the average); losses for the time of bearing in pleopods reached 80%. Besides, great number of dead eggs was found in layings.

It allowed to formulate working hypothesis that reproduction of northern shrimp population in Flemish Cap area at the account of their own reproductive potential was limited and they may be recruited due to outward transportation of larvae.

The aim of this study, as a first step for the verification of this hypothesis was investigation of absolute individual potential fecundity (Burukovsky, 1993) of *Pandalus borealis* in Flemish Cap area, to ascertain:

- if maturation of gonads of shrimp is normal;
- the percent of eggs losted in the process of laying down on pleopods;

We have no data on investigations of absolute individual fecundity of *P. borealis* in Flemish Cap area.

Material and methods

Material , presented in this paper, was collected with the bottom shrimp trawl from 8th May, 1996 to 17th August, 1996 in the north-western slops of Flemish Cap at the depth from 263 to 340 m .Totally 110 females were examined; 60 of them had pre-spawning gonads and 50 bore recently laid down eggs on their pleopods.

Length of shrimp carapace was measured from orbits to rear edge along dorsal side to the nearest 0.1mm (Burukovsky, 1992).

Absolute individual fecundity (number of oocytes in pre-spawning gonade-AIF: Burukovsky, 1993) was determined using standard approach:

Gonade was derived from carapace and weighted on torsion balance after light drying on filter paper. Then a sample was taken from a gonade and also weighted on torsion balance to the nearest 0.001g and number of oocytes in the sample was calculated based on the results of a respective proportion estimation.

Initial realized fecundity (number of eggs recently laid down on pleopods (IRF: Burukovsky, 1993) was estimated by the commonly adopted method.

Stages of gonads maturity in femals and stages of eggs embrional development were determined by five-mark scale(Burukovsky, 1992).

Coefficient of gonads maturity was calculated as relation of a gona de weight ($V_{stage\ of\ maturity}$) to the whole shrimp weight multiplied by 100%.

Oocytes and eggs were measured using micrometer with magnifying glass MBS-9 to the nearest 0.01 mm.

Results

Coefficient of maturity (C_m) of pre-spawning females was used to estimate gonads maturation . It is known that in unitimely spawning fishes C_m varies around 6% (4-6%, Zeytlin, 1989: result was obtained for 94 species of fishes of temperate and high latitudes).

In epibenthic (as *P.borealis*) shrimp *Plesionika heterocarpus* with IRF more than 6000 eggs C_m approaches 12.8% being 7-10% on the average (Burukovsky, Ostrovsky, 1983) and in mesopelagic *Systellaspis*

debilis with AIF exceeding no 25 oocytes Cm of pre-spawning gonads fluctuates from 5 to 10% (Burukovsky, 1992).

Cm of species investigated by us varied from 6.1 to 16.2% being 10.5% on the average. Consequently, Cm of *P. borealis* in Flemish Cap area was rather close to that of fishes and other shrimps species. It allows to suggest that *P. borealis* oogenesis is normal and no losses of laying formation are observed this stage.

Comparison of data on AIF of females with pre-spawning gonads and IRF (range of size composition of investigated females approximately coincides: from 20 to 34 mm and from 20 to 30 mm respectively) provided the following results .

Sizes of mature oocytes were from 0.93 to 1.42 mm (1.17 mm - on the average). Their number varied from 601 (in an individual of 21 mm carapace length) to 2242 oocytes (27 mm) being 1350 on the average.

IRF varied from 686 (in an individual of 21 mm) to 2380 eggs (29 mm) being 1330 eggs on the average.

Size of eggs at the initial stage of embryogenesis was 0.99-1.30×1.22-1.60 mm, i.e. it is comparable to mature oocytes size in gonade and close to that index in the Barents Sea *P. borealis* females (Berenboim, 1992).

On the basis of the above stated, it may be suggested that eggs losses in the process of laying down on pleopods, if any, are statistically unreliable.

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Absolute individual and initial realized fecundity of *Pandalus borealis* in Flemish Cap area, 1996

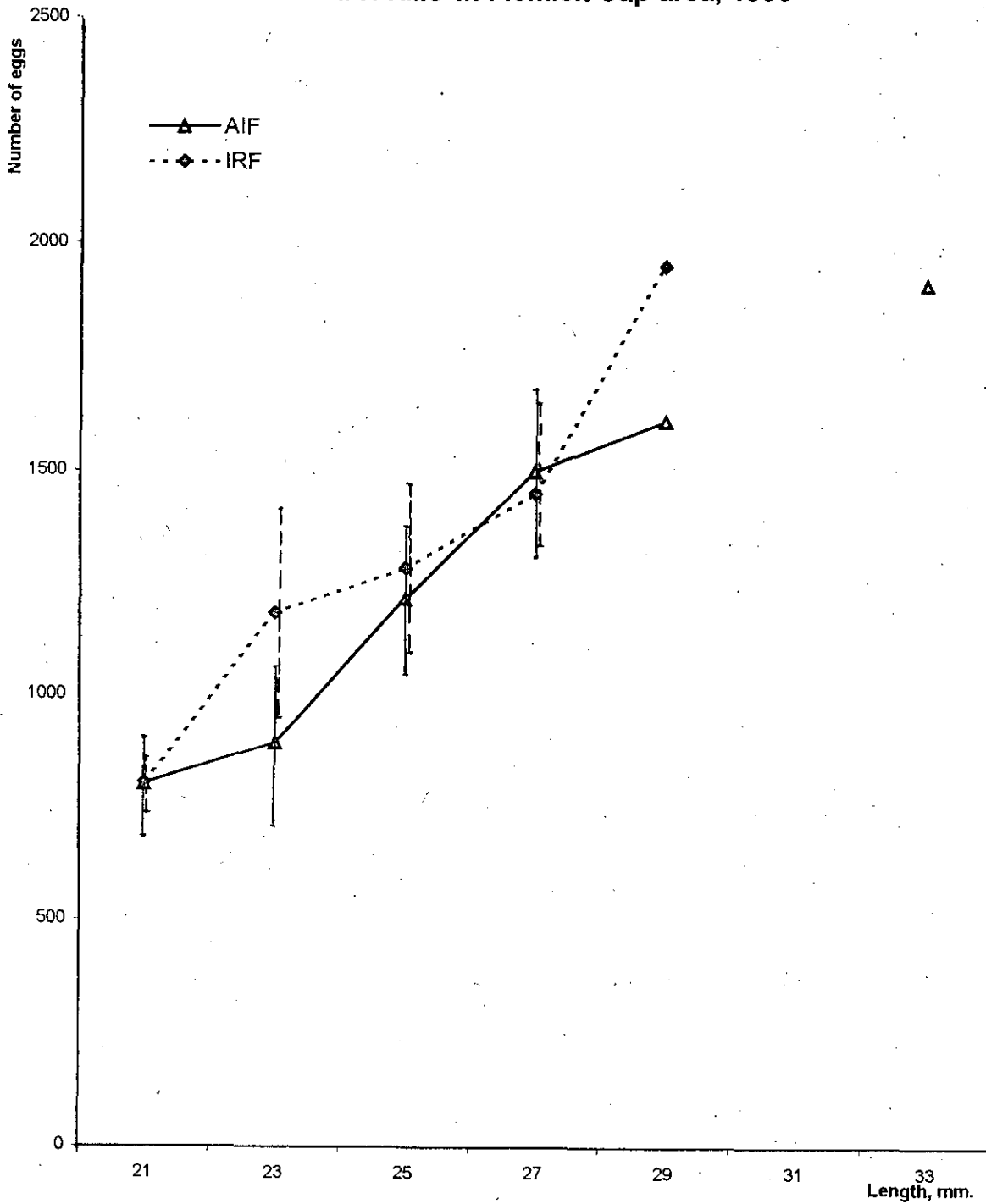


Fig. 1.