ABSTRACT

A statistical treatment on the data of egg size, i.e., inner (embryo) and outer (egg capsule) diameters, and thickness of the perivitelline space, has been carried out for the Barents Sea euphausiid, *Thysanoessa raschii*. Investigations demonstrate that (1) there is environmental adaptation (i.e., to temperature and salinity) of euphausiid egg size; (2) egg size (embryo diameter) is similar throughout the reproductive area, but reaches either lower or higher values in the expatriate zones; (3) both embryo size and female fecundity are controlled by natural selection.

INTRODUCTION

Egg size is an important parameter of the life cycle of marine invertebrates, and sometimes it is the only index that allows to evaluate the contribution of individual generations to the total of progeny, in a quantitative sense. Variation in egg size within one species is usually bound by limits that are very species-specific and that are predetermined by embryogeny and morphological constraints. Variability as such, i.e., interpopulation variability, represents the reaction of this fecundity parameter on the variability of the habitat (Tokin, 1977; Maynard Smith, 1978; Kasyanov, 1989).
By quantity, euphausiid crustaceans are the mass representatives of marine zooplankton. Some species are regionally of commercial importance, e.g., *Euphausia superba* Dana, 1852, *E. pacifica* Hansen, 1911, and *Meganyctiphanes norvegica* (M. Sars, 1857). Also, the current state of knowledge on crustaceans is sufficiently high to effectively exploit this resource. Yet, the early stages of development, and especially the eggs, are still studied insufficiently, and available data do not allow to gain an exhaustive insight into the reproductive strategies of these animals. Perhaps, the Barents Sea euphausiids, *Thysanoessa inermis* (Krøyer, 1846) and *T. raschii* (M. Sars, 1864) are an exception. For these species, (1) peculiarities of egg abundance dynamics over many years, (2) the influence of temperature on size and egg development, (3) change of egg size during the spawning period, (4) variability of egg size within a given habitat, and (5) the mortality of eggs and its determining factors have been studied (Timofeev, 1996). But even in this case, there is a number of questions that should be answered, for example, variability of egg size in different parts of the habitat according to its functional importance, i.e., in zones of reproduction and of expatriation, respectively. The Barents Sea is an ideal basin for this kind of investigations: it is possible to distinguish zones of non-sterile and of sterile immigration, because this is the far north-eastern part of the area of distribution for the species of euphausiids under concern (terminology according to Beklemishev, 1969). Material at our disposal allowed to study size characteristics of the eggs of one of the abundant species of euphausiids, *T. raschii* in the various zones of the Barents Sea, and to get an idea regarding some of the abiotic factors that influence egg size.

**MATERIAL AND METHODS**

Material was collected in different parts of the Barents Sea in the period 1981-1996 (fig. 1, table I). A Juday plankton net (opening 0.1 m$^2$, mesh gauze 168 µm) was used for zooplankton collection. Eggs of euphausiids were extracted from samples fixed in a 4% solution of neutral formalin and measured under a magnification of 56×. Measurements involved: the inner (embryo, = d) and outer (egg capsule, = D) egg diameters, and the thickness of the perivitelline space [as PP = (D – d)/2]. Since size characteristics of the egg change during its development (Timofeev, 1996), only eggs in early stages of embryogeny were compared (i.e., up to the transition from blastula to gastrula: stages I-III according to Ponomareva, 1956).

**RESULTS**

Size characteristics of the egg of *Thysanoessa raschii* are presented in tables II-IV. The diameter of the embryo increases from the east to the west (from the