Histology of the gonads of *Rhopilema nomadica* (Cnidaria, Scyphozoa) First observations

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The jellyfish *Rhopilema nomadica* GALIL, 1990 - a new lessepsian migrant into the Mediterranean (GALIL *et al.*, 1990) - has been appearing since the mid-1980's in large swarms along the Levantine coast. During massive swarming periods dense aggregations of up to 25 specimens per cubic meter were observed to extend more than a 1000 m^2 - an enormous mass of jellyfish. Mass swarming occurs mostly in summer, during July and August, but a sizable presence has been witnessed during winter too, with individuals bearing mature gonads occurring during both summer and winter.

Laboratory studies of the life cycle of *R. nomadica* (LOTAN *et al.*, 1992) and its congener *R. esculenta* Kishinouye (DING & CHEN, 1981), have supplied us with descriptions of the various developmental stages. However, the duration and rhythm of the reproductive period in the natural environment are still unknown. In order to assess the duration of the reproductive period, we have analyzed the histological structure of the gonads of *R. nomadica* as part of a joint research effort between the Universities of Trieste, Haifa and the National Oceanographic Institute of Israel to study the biology, morphology and distribution of the new lessepsian migrant.

The four ribbon-like gonads are situated on the subumbrellar surface of the gastrovascular cavity, over the proximal portion of the perradial canals, at the base of the arm disc. The gonad is situated over the lateral borders of the scapulets, on the lateral wall of the gastric pouch, distally close to the emergence of the perradial canals in the scapulets and proximally divergent; viewed from below they seem V-shaped. Each gonad seems to be divided into two segments, so that at low magnification they seem as four pairs.

At the base of each gonad are found several small gastric filaments, bearing numerous nematocysts (mainly of eurytele type). Distally close to them there is the emergence of the evagination of the gonad, which is delimited by a monostratified layer of endodermal cells, cylindrical in the gastric pouch surface and flattened in the inner surface (which delimits the genital sinus). The latter layer (the secondary endoderm) gives rise to the follicles (in the testicles) and to the oocytes (in the ovaries).

In the male gonad the follicles are initially sub spherical and compact. Later, they turn polygonal. The follicles are monostratified in the gonadal ribbon. Each follicle is delimited by a monostratified wall of cubic cells which, mainly in the side opposite the secondary endoderm, gives rise to the first elements of the spermatogenesis. All specimens with umbrella diameter larger than 12 cm contain fully developed sperm. The trigonal sperm heads are positioned in the middle of the follicle, while their flagella, often packed in parallel bundles, are placed near the side in contact with the secondary endoderm. In mature follicles the cells in contact with the secondary endoderm are much flattened and, during sperm discharge, may separate and/or degenerate, allowing the sperm to exit into the genital sinus.

In the ovaries we observed no maturation gradient and the oogonia seem to originate everywhere in the secondary endoderm, which cells are flattened or cuboid. Different stages of oocyte development may be observed in each gonad. A mature oocyte measures about 100 µm in diameter. The oocytes adhere to the secondary endoderm, though they do not seem to form a distinct cell population. The cytoplasm development during vitellogenesis is similar to that observed in *Rhizostoma pulmo* (AVIAN & ROTTINI SANDRINI, 1991).

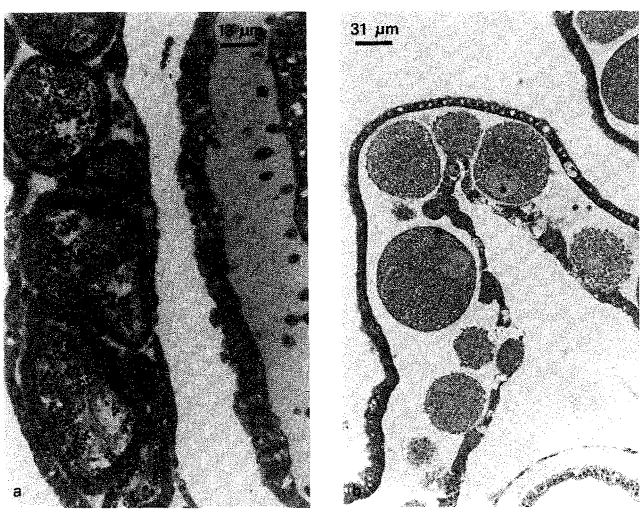

Fig. 1. **a**, light micrograph of a male gonad. **b**, light micrograph of an ovary.

Fecundity in *R. nomadica* seems very high, with estimated egg masses of 34 x 10^5 in specimens with umbrellar diameter of 30-40 cm. This high fecundity, together with an extended reproductive period may be the key to the rapid expansion of its populations along the Levantine coast.

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