

**Oogenesis of *Saurida undosquamis* (Richardson) from the  
South-Eastern Mediterranean**

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The present work deals with egg development in *Saurida undosquamis* as an example of Indo-Pacific species appeared in the Mediterranean on the fifteens of this century from the Red Sea crossing the Suez Canal and became one of the most important fisheries items. For histological analysis, one hundred ovaries collected during different periods of the year and egg diameter measured. Morphological study of oocytes in the fresh ovaries and relation between them at different phases of development is based on egg diameter measurements.

It was observed that process of oogenesis is divided into two phases, the first is the period of small growth (Protoplasmic) which could be subdivided into a Juvenile phase in which the ovules are represented by small oocytes with diameter 14.0 to 34.0 micron. The membrane is thin, cytoplasm is finely granulated, nucleus is relatively large occupying 60-80% of the egg cell. Eggs are transparent, chromosomes are not clear (phase B). b phase of egg cell with layered follicle in which the diameter of sexual cells ranges from 42-84 micron. The ovule consists of egg membrane and follicular membrane. The first is thin, while the second is double layered. Nucleus occupies about half the ovule diameter (Phase C).

The second period is that of intensive growth (Trophoplasmic), also this period can be subgrouped into three phases : a phase of primary yolk accumulation which is considered as the beginning of vitellogenesis and diameter of the egg cell fluctuates between 84 and 176 micron, yolk granules begin to appear at the periphery of the oocyte in vacuoles and gradually occupy its central part, they are of different sizes and have globe shaped form. The nucleus has nearly ovalshape, nucleoli are bigger than in the previous phase. The egg cell is not transparent having light yellow colour (Phase D). b phase of ovules filled with yolk. Diameter of the egg-cell ranges between 179 and 280 micron. The cell membrane is thickened (20-22 micron), cytoplasm is nearly full of yolk granules, nucleus is nearly oval occupying relatively smaller area. Micropyle begins formation at the end of this phase, the nucleus migrates to the animal pole at which there is a unique micropyle, chromosomes are not distinguished. Fresh ovule has bright yellow to orange colour (Phase E). c. Phase of ripe egg, diameter of eggs ranges from 280 to 360 micron, cell membrane becomes more thicker (28 micron). The micropyle is clear and a layer of fibers which may be produced by the follicular cells is found above zona radiate. In this stage, the deposition of yolk is accompanied by its hydration resulting in an increase in size of oocytes and eggs become transparent again. Nucleus is not distinguished. Based on diameter measurements, there are four peaks of diameter oocytes (Phase F). The smallest oocytes with diameter 50-200 micron, transparent and considered as reserve group. Second group of oocytes having diameter 200-450 micron, they are not transparent. The third group of oocytes which are in the period of trophoplasmic growth with diameter 450-700 micron, oocytes are light yellow to orange. The fourth group is that of mature and ripe oocytes in which the yolk deposition takes place, having diameter 700-1300 micron, this group is divided into two subgroups, the first comprises eggs at the beginning of yolk deposition (diameter 700-1500 micron). As a result of this process, the eggs become semitransparent. The second subgroup has eggs with diameter 1100-1300 micron. This subgroup is characterized by the end of yolk deposition process and eggs are transparent.

Based on results obtained from histological and morphological studies of gonads and oocytes, the maturity scale for *Saurida undosquamis* is as follows :

- Stage I : Ovaries and oocytes are thin and transparent, sexual cells cannot be visually differentiated, the oldest oocytes are in phase (B).
- Stage II : Ovaries are slightly increased but still are colourless and transparent occupying about half the body cavity. The oldest generation of oocytes are in phase (C).
- Stage III : Ovaries occupy more than half the body cavity. Oocytes are in the period of trophoplasmic growth having light-yellow to orange colour. The oldest oocytes belong to phases (D and E).
- Stage IV : Ovaries occupy about two thirds of the body cavity cloudy translucent eggs of comparatively big diameters appeared. The oldest generations of oocytes are in phase (F).
- Stage V : This characterizes the spawning fish in which ovaries attain the maximum size and occupy nearly all the body cavity. Ovaries contain perfectly transparent eggs discharged from follicles.
- Stage VI : Fishes discharge eggs. *Saurida undosquamis* is a partial spawning, therefore the oocytes which will be discharged in the recurrent spawning season grow at different times.

The present study reveals that asynchronous development of oocytes appears in stage III. After the discharge of the first egg portion, the ovary does not pass to stage VI as in the monocyclic spawning fish but passes to a stage in which the oocytes are found in a stage similar to stage III, however, this special case of maturity differs from stage III in that the next egg portion has empty follicles and so this stage is considered as VI-III<sub>2</sub>. If the fish discharges a second egg portion, so it will pass to stage VI-III<sub>3</sub> and then VI-IV<sub>3</sub>. When the fish discharges all portions of eggs, the ovary enters into stage III