

Histological Studies on the Ovaries of the Golden Silk Spider, *Nephila clavata* L. Koch, before and after Oviposition

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Shimojana (1970) reported that the golden silk spiders, *Nephila clavata* L. Koch, deposit egg masses twice at the rate of 17 percent in Okinawa, while in Honshu, the Main Island of Japan, only once. Kondo (1988) revealed recently that *N. clavata* of Honshu have potentiality of twice oviposition. Present report deals with histological structure of their ovaries before and after oviposition.

Ovary before the first oviposition

The ovary has oocytes at various stages of oogenesis, and small oocytes (40–100 μm) have a germinal vesicle (30–50 μm) and basophilic cytoplasm. The cytoplasm of median oocytes (100–200 μm) turns from basophilic into eosinophilic, and the egg membrane appears at this stage. In large oocytes (250 μm) eosinophilic yolk granules appear around the germinal vesicle. Mature eggs (800 μm) are filled with yolk granules (30–50 μm), which are concentrated in the center of the egg and sometimes scattered in the periplasm. In many cases the nucleus is located in the periplasm, but in some cases in the center of the egg. Rarely a vacuolated structure is found in the basophilic nucleus.

The lumen of the ovary expands among oocytes and is filled with eosinophilic fine granules composed of the oviposition fluid, and they are assumed an important role as cement substances of egg mass which may be identical with fine granules of 1 μm attaching to the surface of the chorion in the wolf spiders, *Pardosa astrigera* (*P. T-insignita*), *P. laura* and *P. pseudoannulata* (*Lycosa pseudoannulata*) (Kondo, 1969). At a glance, mature eggs seem to fill the lumen of the ovary, but ovulation has not occurred because the ovarian epithelium exists between mature eggs and eosinophilic fine granules (Fig. 1).

Ovary after the first oviposition

Oocytes in various size remaining outside of the ovary attach to the ovarian wall with egg stalks. The lumen of the ovary is completely closed (Fig. 2). Any released eggs or eosinophilic fine granules are not found in the lumen of the ovary.

Ovary after the second oviposition

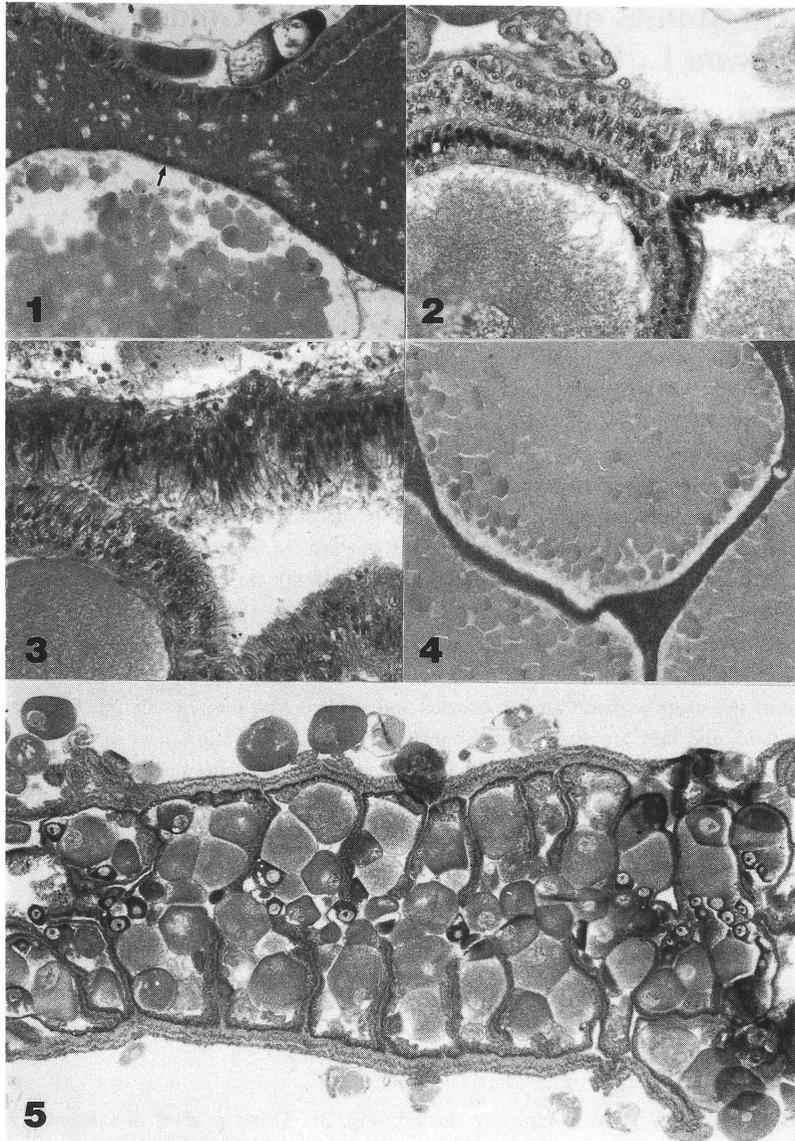
The lumen of the ovary is not completely closed (Fig. 3). Other profiles of the ovary resemble to the ovary after the first oviposition.

Ovary of a female failing in oviposition

Oviposition in the golden silk spiders is carried out by middle November. We examined a female which was reared in laboratory from late October and did not deposit any egg masses until middle December. In this female the majority of mature eggs has been released in the lumen of the ovary (Fig. 4). Generally, ovulation of spiders is carried out at the time of formation of the oviposition sheet, so this female is thought to fail in the behaviour of egg-laying. Plump females of the golden silk spiders found in field after reproductive season may be under the same situation.

Fundamental structure of the ovary

Through our observations on serial paraffin sections the ovary of the golden silk spider seems to be not tubular, but cisternal and elongates dorso-ventrally. Left and right ovaries may be connected with connective tissues, and not with a ladder-like ovarian wall (Fig. 5).



- Fig. 1 The ovary before the first oviposition. The arrow indicates the ovarian epithelium between a mature egg and the lumen. $\times 110$.
- Fig. 2 The ovary after the first oviposition. The lumen is completely closed. $\times 220$.
- Fig. 3 The ovary after the second oviposition. The lumen is partly not closed. $\times 220$.
- Fig. 4 The ovary of a female failing in oviposition. Mature eggs are directly embedded in eosinophilic fine granules. $\times 110$.
- Fig. 5 A horizontal section of the ovary after the first oviposition shows not a ladder-like structure of the ovary. $\times 43$.

References

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