

Direct Evidence for Oophagy in Thresher Shark, *Alopias pelagicus*

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(Received November 27, 1980)

Oophagy, a specialized mechanism for nourishing embryos, has been reported in *Lamna cornubica* (Calderwood, 1887; Shann, 1911, 1923), in *Lamna* spp. (Lohberger, 1910), and in *Odonaspis taurus* (Springer, 1948). The thresher shark, *Alopias vulpinus*, also seems to be oophagous on the basis of Gubanov's (1972) data since egg-capsules were found in oviducts of pregnant fish. Recently, the authors obtained pregnant females of *Alopias pelagicus* and collected direct evidence for oophagy in this species.

Eleven individuals of *A. pelagicus* (♂/♀; 4/7), 235~285 cm in total length and 33~62 kg in body weight, were caught by tuna long-line from the Nagasaki-Maru, training vessel of the

Faculty of Fisheries, Nagasaki University, in the eastern Indian Ocean (01°21'S, 98°17.5'E~04°45.5'S, 101°44.3'E) on Sept. 9~12 in 1979. The sharks were immediately killed on deck and dissected for confirmation of pregnancy. Pregnant individuals were examined for embryo, intrauterine wall and ovary. Identification of the species was mostly from Bigelow and Schroeder (1948).

Two of seven females were found to be pregnant and each had two embryos, one in each uterus (Table 1). There was no embryonic membrane. The embryos were pinkish-white with smooth skin, undeveloped denticles and sheathed teeth. Gill filaments did not project from the gill slits.

A whole egg-capsule covered with a soft, semi-transparent, yellowish shell membrane was found in the stomach of embryo-b₂ (see Table 1 for embryo symbols). The shape of this capsule was long-ovoid with a flat rectangular projec-

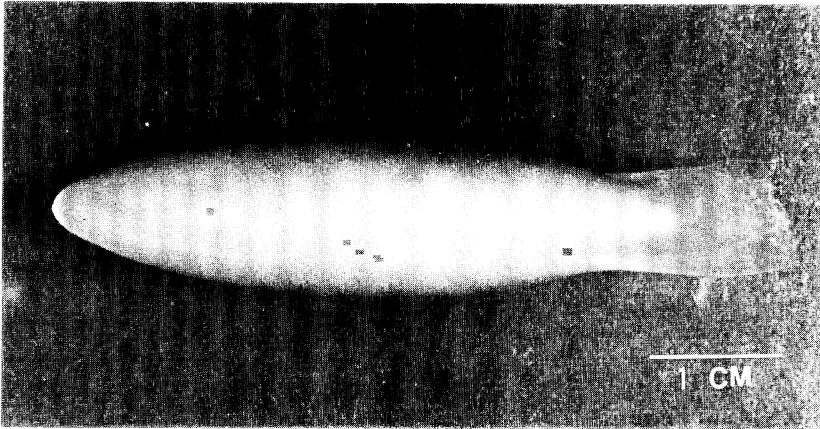


Fig. 1. Egg-capsule of *Alopias pelagicus*. Several ova are observed inside.

Table 1. Materials used in this study.

Maternal fish	Total length (cm)	Body weight (kg)	Ovary weight (g)	Number of embryos	Embryo		
					Sex	Total length (cm)	Body weight (g)
A	264	55	270	2	a ₁	45.4	175
					a ₂	42.1	—
B	282	62	230	2	b ₁	50.0	220
					b ₂	52.1	250

a₁, b₁: contained in right uterus of maternal fish.

a₂, b₂: contained in left uterus of maternal fish.

tion at one end (Fig. 1). It was 55 mm in length and 12 mm in maximum diameter, weighed 4 g, and its volume was 4 ml. From external observations, the number of ova in the egg-capsule was presumed to be about 20~30, with approximate diameters of 5 to 10 mm. An exact counting was not possible because their shapes were distorted.

Fish-A had two egg-capsules in the right intrauterus of almost the same size as that found in the stomach of embryo-b₂. Other embryos also had expanded stomachs, which contained large amount of yellow yolk material with several fragments of shell membrane. Furthermore, each pregnant fish had a large active ovary filled with many ova, 1 to 6 mm in diameter.

These facts indicate that the embryo of this species is nourished by the ova from the maternal fish. Consequently, *A. pelagicus* is considered to be oophagous. Additionally, the embryos had neither trace of yolk sac attachment nor pseudoplacenta, and no trace of placental structure was observed on the maternal intrauterine wall. Embryos in this study were in the middle stage of embryonic development on the basis of their body color, denticles and teeth. A histological connection between maternal and fetal tissue is not thought to be formed at the later stage because of the embryonic body having been almost accomplished. Although the possibility can not be denied, it seems unlikely that such a connection established in the earlier embryonic stage would completely degenerate by the middle stage. Therefore, a structure connecting maternal and fetal tissue may not develop during any stage of gestation in this species.

Acknowledgments

The authors thank captain S. Yada and the crew of T/V Nagasaki-Maruru for their assistance in collecting samples and Dr. William A. Watkins, Woods Hole Oceanographic Institution, for reading the manuscript.

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ニタリ胎児の食卵を示す新発見

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1979年9月に東部インド洋で採集されたニタリ *Alopias pelagicus* の妊娠個体2尾について、その胎児、子宮、卵巣を観察した。胎児はいずれも発生中期のもので、各個体に2尾ずつ計4尾採集された。このうち1尾の胎児の胃から、中に卵の詰まった卵殻が1個発見された。また他の胎児の胃は卵殻の破片の混在した卵黄物質で充満していた。母体の卵巣はいずれも卵形成を活発に行っており、母体子宮内からも卵殻は発見された。これらのことは本種の胎児の栄養摂取様式が母体から排卵された卵を食べて栄養とする、いわゆる食卵型であることを示すものである。なお胎児と母体子宮内壁には胎盤様構造は全く認められなかった。

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