

Aspects of oophagy in *Alopias vulpinus* (Elasmobranchii, Alopiidae) in the southern Brazil

Abstract

Oophagy of the genus *Alopias* was described by several authors, nevertheless, this paper presents some new aspects of the oophagy of *A. vulpinus*.¹ Four embryos of *A. vulpinus*, being three males with total lengths of 115.5cm (3.2kg), 116.5cm (3.6kg), and 118.8cm (3.3kg), and a female with 118.6cm (3.0kg), were obtained from a female caught by Brazilian artisanal fishing using in shore gillnet at a depth of 4.5m off *Peruibe* City, Sao Paulo State, Brazil in November, 2007. Five oocytes were integer, and the size ranged from 67 to 71mm. This study found clear evidence that embryos of *A. vulpinus* ingest the whole oocyte. No traces of smaller siblings were found in the four embryos stomachs, so the species probably do not perform adelphophagy.

Keywords: common thresher shark, food of embryos, oocytes, matrotrophic viviparity

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Introduction

Oophagy is a form of matrotrophic viviparity where, after initial yolk-sac nutrition, developing embryos ingest unfertilized eggs to support further development. The Lamniformes sharks are oophageal.²⁻⁷ The oophagy in the Lamniformes, throughout most of their pregnancy, mothers continuously produce unfertilized eggs which the developing embryos ingest and store in a large bulging yolk stomach.⁷ According to Cadenat⁴ oocytes are consumed by the developing embryos. This has been confirmed by Okate & Mizue⁸ for *A. pelagicus*, by Gilmore⁹ & Moreno, Moron¹⁰ for *A. superciliosus*, and Gubanov^{11,12} for *Alopias vulpinus*. This brief communication records the occurrence of integer oocytes in stomachs of *Alopias vulpinus* embryos.

Material and methods

Four embryos of *Alopias vulpinus* obtained from a pregnant female caught in November 2007 by Brazilian artisanal fishermen using gillnet at 4.5m depth off *Peruibe* City, Sao Paulo State, Brazil were donated to Fishery Research State Instituto “*Instituto de Pesca*” (Figure 1). The embryos were identified and measured according to Compagno¹³ and weighed with digital scale, in grams. The embryos had integer oocytes in their oral cavity were placed upside down to remove them and also had the stomachs opened

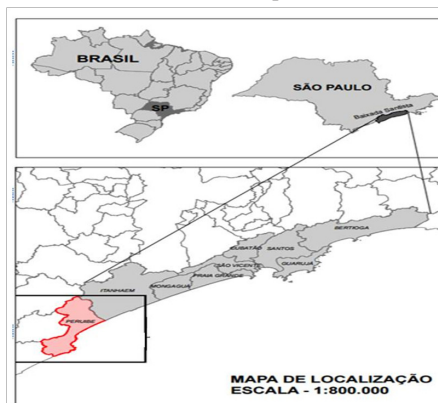


Figure 1 Maps of Peruibe City, Sao Paulo State, Brazil.

Results and discussion

Four embryos of *A. vulpinus* were obtained from a female caught being three males with total lengths of 115.5 cm (3.2kg), 116.5cm (3.6kg), and 118.8cm (3.3kg), and one female with 118.6cm (3.0kg). According to the characteristics of pigmentation, aspects identical to adult and embryo size were in the athermal stage, based on Bigelow & Schroeder¹³ ranging from 114 to 159cm. The embryos were probably performing oophagy and close to birth. Some embryos from 116.5 to 124cm were observed in November 2004 and newborn and juveniles are reported in shore waters from April to July.¹⁴ In Southern Brazil it was observed the presence of pregnant female, neonate and juvenile of *Alopias vulpinus*, from December to March.^{14,15} One male embryo had an integer oocyte in the oral cavity and in order to extract it the embryo was placed upside down. In addition to this oocyte, three others dropped from his stomach. The same procedure was done for the others and one more oocyte fell from the female (Figure 2). Five oocytes were integer, and the size ranged from 67 to 71mm. In addition, all the embryos' stomachs were opened observing a net mass of oocyte. This fact suggests that the embryos swallowed integer oocytes as a food source. According to Moreno et al.¹ The teeth can remain embedded or hidden until shortly before birth. Therefore, the oocyte capsule even being eaten did not break. Some authors as Shann,² Springer,³ Cadenat,⁴ Gilmore⁵ and Hamlett⁷ mentioned the oophagy in Lamniformes. According to Gubanov¹¹ *A. vulpinus* young fetus after resorption of their primitive yolk reserves absorbed eggs at the time of their descent into the oviduct, so the stocks of nutrients enable them to continue their development in the mother uterus without any connection with uterine walls and without specialized system enabling the absorption of nutritive juices thereof. Nevertheless this author did not mention anything about how embryo can ingest the oocyte. Moreno et al.¹ studied the reproductive biology and phenology of *A. Vulpinus* caught at some areas of Mediterranean and Atlantic oceans, giving, among others, information about size and morphology of embryos. Nevertheless, it has not been demonstrated as the ingestion of egg capsule occurs. This study found clear evidence that embryos of *A. vulpinus* of 115.5cm or larger ingest the whole oocyte. Capsule was whole in the stomach of the fish with out chewing, demonstrating that the rupture occurs in the stomach, characterizing the mode of ingestion. The absence of smaller siblings

or parts of it in the stomach of the embryos suggests that the species does not perform adelphophagy.

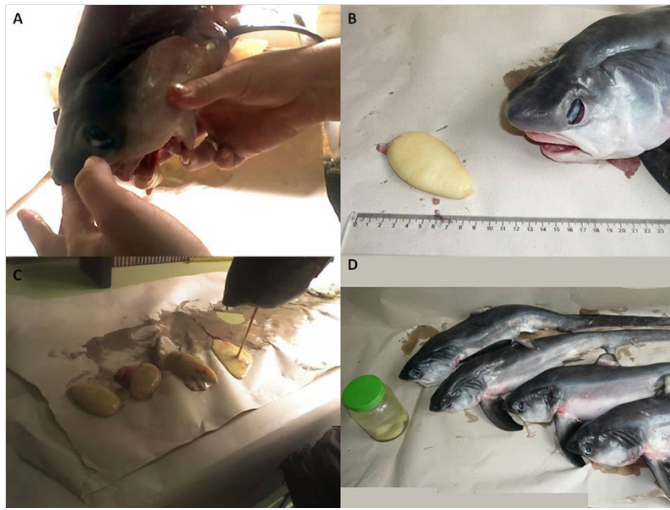


Figure 2 *Alopias vulpinus*: (A) Exemplar upside down for expulsion of the oocytes from the mouth; (B) Oocyte and embryo; (C) Integer oocyte and broken capsule; and (D) Four embryos of *A. vulpinus*.

Conclusion

This study found clear evidence that embryos of *A. vulpinus* of 115.5cm or larger ingest the whole oocyte. The absence of smaller siblings or parts of it in the stomach of the embryos suggests that the species does not perform adelphophagy.

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None.

Conflict of interest

The authors declare that there is no conflict of interest in this manuscript.

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