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A hermaphrodite guitarfish, *Rhinobatos horkelii* (Müller & Henle, 1841) (Rajiformes: Rhinobatidae), from southern Brazil

Michel Donato GIANETI* and Carolus Maria VOOREN
Departamento de Oceanografia, Laboratório de Elasmobrânquios e Aves Marinhas,
Fundação Universidade Federal do Rio Grande (FURG), Caixa Postal 474, CEP 96201-900, Rio Grande - RS, Brazil
**Corresponding author: mgnine@hotmail.com*

Abstract: A specimen of *R. horkelii* possessing female gonads and claspers was found in the southern Brazil coast. The specimen had total length and weight of an adult but, by the morphology of its gonoduct and claspers, the ray could be unable to reproduce.

Résumé : *Une raie guitare hermaphrodite,* Rhinobatos horkelii *(Müller & Henle, 1841) (Rajiformes : Rhinobatidae), des côtes sud du Brésil.* Un spécimen de *R. horkelii* possédant des gonades féminines et des ptérygopodes a été récolté sur les côtes sud du Brésil. Le spécimen avait la longueur totale et le poids d´un adulte mais, par la morphologie de son gonoducte et de ses ptérygopodes, la raie n´était probablement pas capable de se reproduire.

Keywords: *Rhinobatos horkelii* ● Hermaphroditism ● Brazil ● Elasmobranchs

Introduction

From the few documented cases of hermaphrodites in elasmobranchs, there are two main types that have been recognised: the pseudo-hermaphrodites, with one sex internally and externally another; and the true-hermaphrodites, with gonads of the two genders and claspers that could function as both male and female if mature (Cadenat, 1960; Yano & Tanaka, 1989; Wetherbee, 1996; Irvine et al., 2002; Jones et al., 2005). Most of the cases described came from Squaliformes (dogfish) specimens.

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There is no previous record of hermaphroditism from Rhinobatidae and this abnormality is still rare among elasmobranchs (Artz, 1964), specially from Rajiformes species.

Results and Discussion

A hermaphrodite Brazilian guitarfish *Rhinobatos horkelii* (Müller & Henle, 1841) was caught in southern Brazil (33°26’ S; 52°44’ W) with bottom trawl net, on January 1982, between depths of 14 to 16 m. When considering the above definitions, this specimen could be called a pseudo-hermaphrodite as it possesses both ovaries and claspers (Fig. 1).

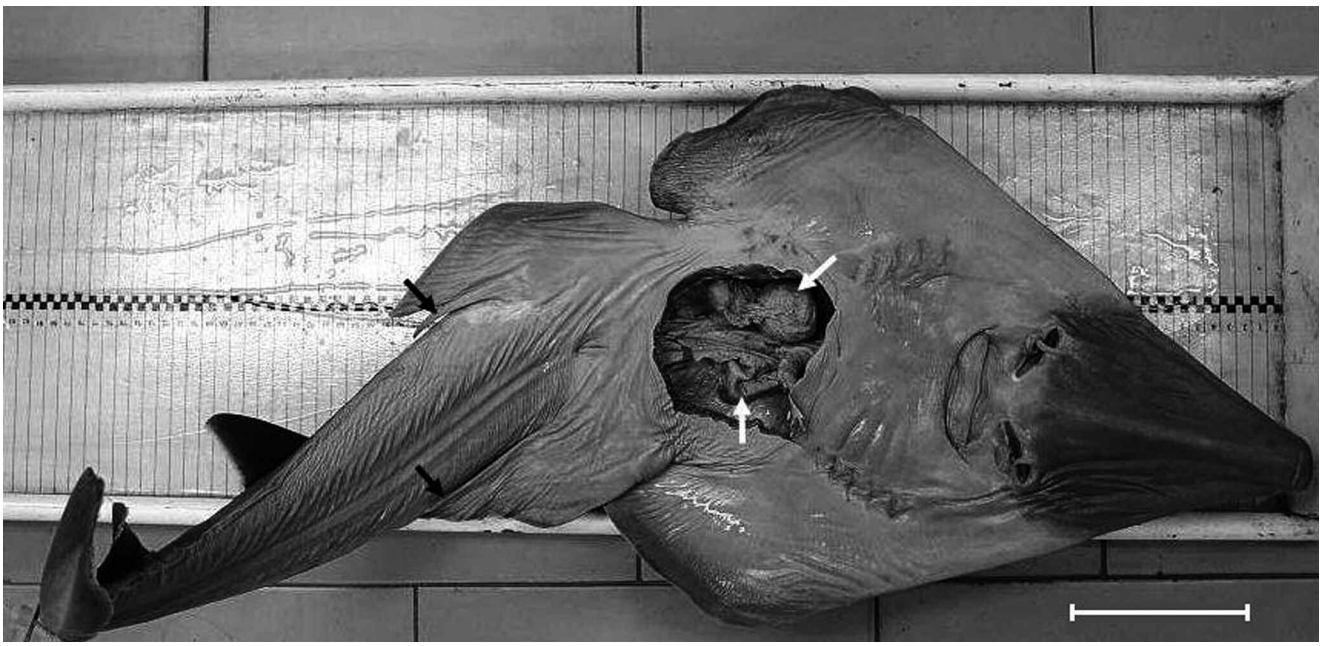

Figure 1. *Rhinobatos horkelii.* Ventral view of the hermaphrodite Brazilian guitarfish. White arrows = ovaries; black arrows = claspers. Scale = 10 cm.

Figure 1. *Rhinobatos horkelii.* Vue ventrale de la raie guitare hermaphrodite du Brésil. Flèches blanches = ovaires ; flèches noires = ptérygopodes. Échelle = 10 cm.

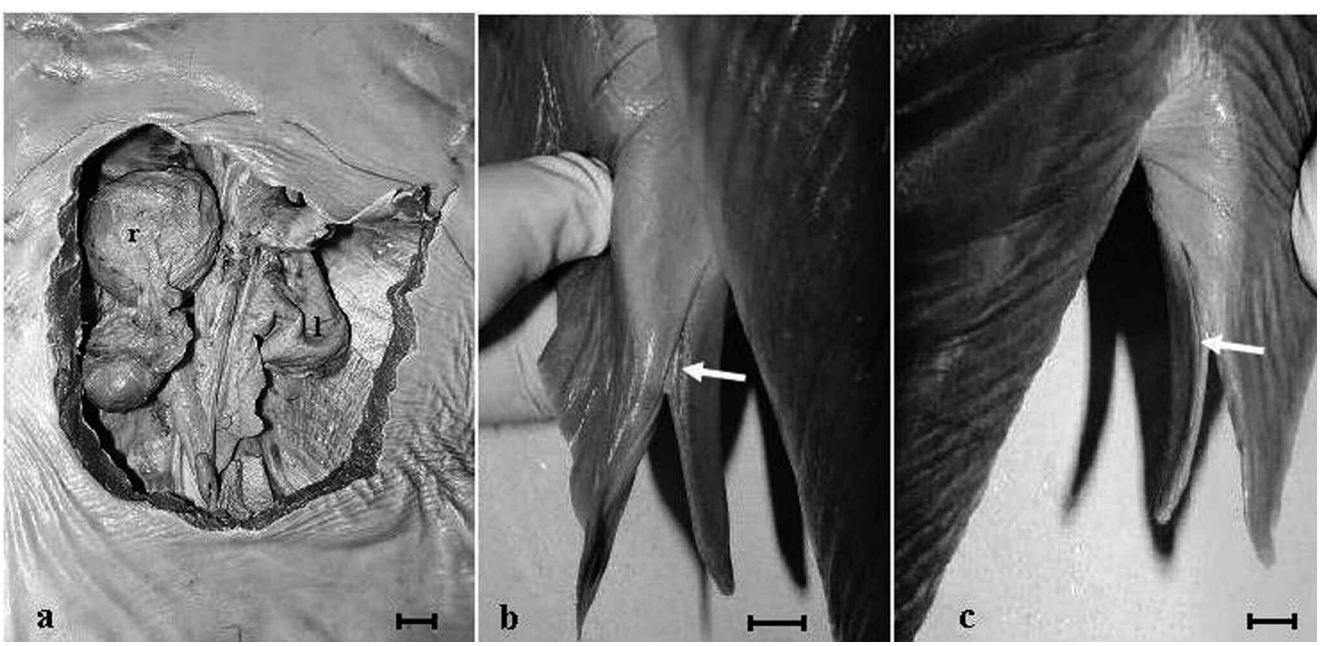

Figure 2. *Rhinobatos horkelii.* **a.** Detail of the ovaries: left ovary (l) and right ovary (r). **b.** Detail of the dorsal view of the left clasper. **c.** Detail of the dorsal view of the right clasper. Arrows = grooves. Scales = 1 cm.

Figure 2. *Rhinobatos horkeli*. **a.** Détail des ovaires : ovaire gauche (1) et ovaire droit (r). **b.** Détail de la vue dorsale du ptérygopode gauche. **c.** Détail de la vue dorsale du ptérygopode droit. Flèches = sillons dorsaux. Échelle = 1 cm.

The specimen was fixed in 10 % formalin, and without its liver and the other digestive organs it had a total length (TL) of 98 cm and a total fresh weight of 3.3 kg. Disc length and width were 42.5 cm and 33 cm, respectively. The right ovary had three well developed and yellow colored follicles (Fig. 2a), with a maximum diameter of 3.8 cm; the left ovary contained only small and non-developed follicles (Fig. 2a). The specimen also had two soft (uncalcified) claspers that did not exceed the free rear tip of pectoral fin. The right clasper was 7.1 cm long and left was 9.5 cm long; both claspers had a dorsal groove (Fig. 2b and c).

Rhinobatos horkelii is an aplacental viviparous ray that can reach 138 cm TL for females and 110 cm TL for males. Females mature at 90 to 120 cm of TL, whereas males mature at 75 to 89 cm TL (Lessa et al., 1986). In the hermaphroditic *R. horkelii*, the occurrence of vitellogenic ovarian eggs is in accordance with its TL as a mature specimen, but clasper length was below the expected (Lessa et al., 1986). Other evidence of maturity is that the specimen was caught during the reproductive period, when females migrate to coastal waters to mate and give birth (Lessa et al., 1986, Lessa & Vooren, 1986).

The presence of claspers indicates that the specimen is a genetic male (Chieffi, 1959; Dodd, 1983) but asymmetric tissue response to hormones in early development may have caused the abnormality by differentiation of the female gonads (Chieffi, 1959). In spite of the apparent functional morphology of the ovary, the specimen was unlikely to reproduce due to its inconspicuous oviducts, uterus and nidamental glands.

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