

Geographic distribution of *Thysanoteuthis rhombus* (Cephalopoda, Thysanoteuthidae) on the Brazilian coast

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ABSTRACT: Data on two female individuals of the diamondback squid, *Thysanoteuthis rhombus*, are presented with discussion of occurrences along the Brazilian coast.

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The diamondback squid, *Thysanoteuthis rhombus* Troschel, 1857, is a large (100–130 cm mantle length), muscular, nektonic squid. The mantle is thick and muscular, tapering to a blunt tip posteriorly. The fins are long, broad, and rhombic in form and occupy the entire length of mantle. The tentacular clubs have four rows of suckers, arm with two rows of suckers, buccal connectives attached to ventral borders of arms IV (Roper and Jereb 2010). As unique species of the family Thysanoteuthidae Keferstein, 1866, this species is a common circumglobal inhabitant of warm tropical and subtropical open waters. This species was already recorded at India (Batcha *et al.* 2009), Sulawesi (Billings *et al.* 2000), the Aegean (Salman *et al.* 2003; Salman 2012), Adriatic Sea (Bello 2009), Arabian Mediterranean (Chesalin and Zuyev 2002) and Caribbean Sea (Pulido-Lopez and Lopez-Pinto 2002; Salvat-Torres *et al.* 2009; Roper and Jereb 2010).

In the Atlantic Ocean, *Thysanoteuthis rhombus* occurs from latitude 30° N to 36° S and its southernmost distribution is bounded the displacement of the waters of the Brazilian Current (Brunetti *et al.* 1999). *Thysanoteuthis rhombus* has been known in Brazilian waters since 1985 but there is neither material deposited in scientific collections nor officially published records (Ferreira 1987). Records of both juvenile and adult individuals of *T. rhombus* from along the Brazilian coast are scarce, and for the Southern Atlantic Ocean, there are only three records in the literature (Haimovici *et al.* 1989; Haimovici and Perez 1991; Brunetti *et al.* 1999). Herein we report the presence of two adult specimens of the diamondback squid, *T. rhombus*, collected along the southern coast of Brazil.

The two female specimens were captured and collected by longline vessel at Mostardas, Rio Grande do Sul, Brazil (31°40'00" S 49°27'00" W) and are housed at the mollusc collection of the Museu de Zoologia da Universidade de São Paulo (MZSP 97741 and MZSP 97740). Measurements follow Jereb *et al.* (2010) and were taken with a measuring tape and a scale. The samples were fixed in 10% formalin solution and preserved in 70% alcohol. Both specimens

possess similar measurements (Table 1) and represent the southern occurrence of the species on Brazil (Table 2) (Figure 1).

Despite the length of the Brazilian coast and the 200 miles of exclusive economic area offshore, the capture of *Thysanoteuthis rhombus* adults (Figure 2) in this country is rare. These are incidental and are part of the bycatch of fisheries targeting the ommastrephid squid *Ommastrephes bartramii* (Lesueur, 1821) (Haimovici and Peres 1991). There is no directed fishing fleet for *T. rhombus* in Brazil. Nevertheless, *T. rhombus* has been considered as a target species with commercial interest in the Canary Islands (Báez and Marrero 2007; Pérez *et al.* 2012). In Japan, the annual catch increased from 339 tons in 1989 to almost 6000 tons in 2001, and during 1998–2003 the average catch was close to 4900 tons (Bower and Miyahara 2005). In Brazil, their presence was generally recorded indirectly by larvae (Nigmatullin *et al.* 1995; Haimovici *et al.* 2002) or stomach contents with beaks and partially digested specimens (Santos and Haimovici 2001, 2002; Vaske 2005; Vaske and Lessa 2005). Their low incidence is seen by the lack of representativeness in the stomachs of oceanic fishes (Vaske 2005; Leite *et al.* 2009).

We observed that, despite the limited data available, distribution of mature individuals in the Atlantic South is connected to the Brazil Current, with northern and southern distribution between 23° and 36° S (Brunetti *et al.* 1999; Haimovici *et al.* 1989). The Brazil Current begins at about 10° S. Near 12° C the continental shelf becomes wider and this current separates slightly from the coast (Peterson and Stramma 1991). Here, Nigmatullin *et al.*

TABLE 1. Biometric data of the two adult specimens of *Thysanoteuthis rhombus* herein reported.

BIOMETRIC DATA (cm)	MZUSP 97741	MZUSP 97740
Total Length	126	125
Mantle Length	68	62
Arm Length	50	53
Fin Length	67	64
Head Width	18	18

TABLE 2. Chronology of records of *Thysanoteuthis rhombus* in the Southern Atlantic Ocean.

CAPTURE DATE	LOCATION	SOURCE	REMARKS	
1	03/viii/1985	26°30'00" S 45°52'30" W	Ferreira 1987	Captured by gill net at 9 m of fishing depth
2	27/vii/1986	28°10'00" S 46°39'00" W	Ferreira 1987	Captured by gill net at 55 m of fishing depth
3	viii/1986	22°56'12" S 42°28'51" W	Haimovici <i>et al.</i> 1989	Captured by a fishermen at Itauna's beach, Saquarema
4	1986-1987	Off Rio Grande do Sul	Haimovici and Perez 1991	Captured with a dipnet, at night with the ship stopped and deck lights were lit.
5	1975-1990	northeast coast of Brazil	Nigmatullin <i>et al.</i> 1995	Larvae captured by zoological trawls and Isaacs-Kidd trawl at depth ranging from 0 to 100 m
6	iii/1999	33° 30' S 41° 30' W	Brunetti <i>et al.</i> 1999	Confirmed the presence of the species in Argentine waters

(1995) recorded *T. rhombus* larvae. The Brazil Current separation from the continental shelf varies anywhere between 33° S–38° S but it is usually about 36° S (Podesta *et al.*, 1991), where it collides with the north-flowing Malvinas (Falkland) Current. The Brazil Current is then, in part, deflected offshore east of Rio de la Plata, a region known as the Brazil-Malvinas Confluence Zone (Saraceno *et al.* 2004). We conclude that the distribution of the *Thysanoteuthis rhombus* is south of the confluence zone between the Brazil and Malvinas Currents. We also conclude that the presence of adult individuals indicate that this species can breed in Brazilian waters.

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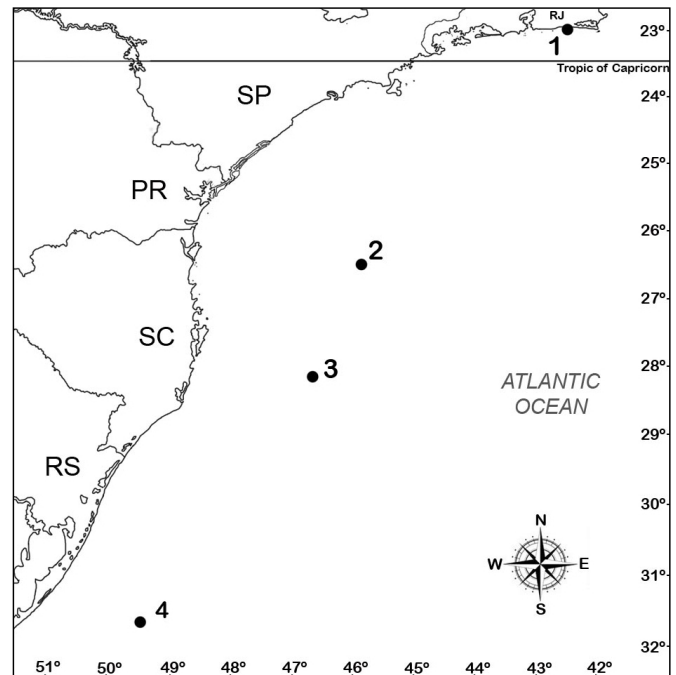


FIGURE 1. Distribution map of adult individuals of *Thysanoteuthis rhombus* catch in Brazil. Abbreviations: 1, Haimovici *et al.* 1989; 2 and 3, Ferreira 1987; 4, MZSP 97741 and MZSP 97740; RJ, Rio de Janeiro; SP, São Paulo; PR, Paraná; SC, Santa Catarina; RS, Rio Grande do Sul.

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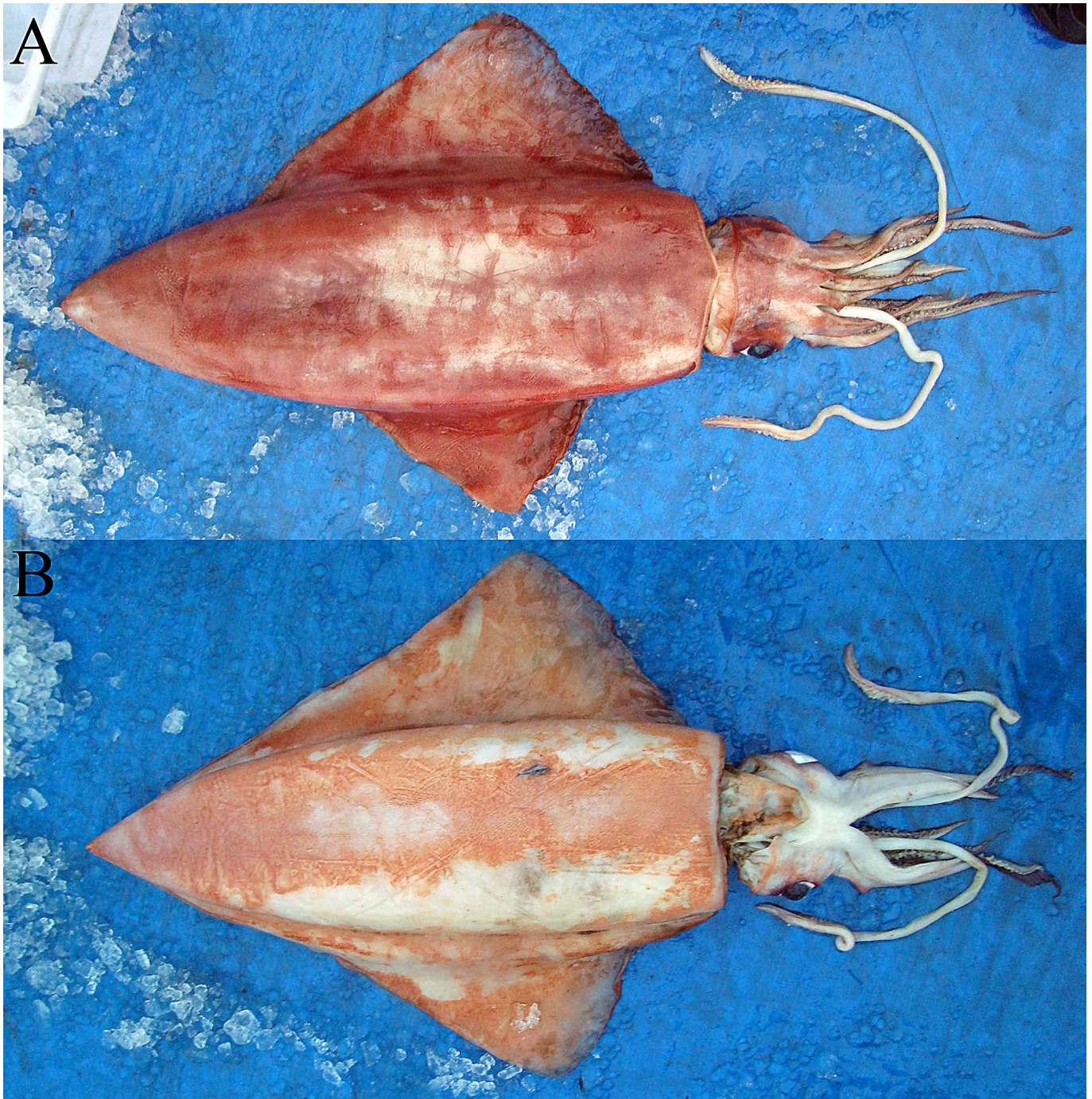


FIGURE 2. *Thysanoteuthis rhombus*, MZSP 97741 (total length = 126 mm). A: Dorsal view. B: Same, ventral view.

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