

Additional records of three *Scyllarides* species (Palinura: Scyllaridae) from Brazil, with the description of the fourth larval stage of *Scyllarides aequinoctialis*

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Abstract

The genus *Scyllarides* is found in tropical and subtropical regions, with 5 species occurring in the Western Atlantic – *Scyllarides aequinoctialis*, *S. brasiliensis*, *S. deceptor*, *S. delfosi*, and *S. nodifer*. Existing information regarding their distribution is contradictory. Larvae of *S. aequinoctialis* and adults *S. brasiliensis* and *S. delfosi* are recorded for the first time from Brazil (Northeast offshore region and Santa Catarina and Rio Grande do Sul states, respectively). The fourth larval stage of *S. aequinoctialis* is described herein. The geographic distribution of the genus *Scyllarides* in the Western Atlantic is reevaluated based on museum material and published information.

Key words: *Scyllarides aequinoctialis*, *S. brasiliensis*, *S. delfosi*, slipper lobsters, phyllosoma, Brazil.

Introduction

The family Scyllaridae Latreille, 1825, includes approximately 20 genera with 76 species distributed worldwide (Holthuis, 1991; 1993; 2002; 2006; Tavares, 1997; 2002). The genus *Scyllarides* Gill, 1898, is one of the most speciose with 13 species. In the Western Atlantic this genus is represented by 5 species, *Scyllarides aequinoctialis* (Lund, 1793), *S. brasiliensis* Rathbun, 1906, *S. deceptor* Holthuis, 1963, *S. delfosi* Holthuis, 1960, and *S. nodifer* (Stimpson, 1866).

Scyllarides is found from the intertidal zone to 380 meters depth. Many species prefer rocky substrates with cavities for shelter, whilst others are found on muddy or sandy bottoms in which they may dig their own burrows. Most species seems to be omnivores or scavengers. Some spe-

cies are attracted by dead fish put as bait in lobster traps, whilst others are rarely caught in such traps (Holthuis, 1991).

Spiny lobsters support important fisheries worldwide, particularly species of *Jasus* Parker, 1883 and *Panulirus* White, 1847, which form the subject of specialized fisheries and are the basis of important industries (Holthuis, 1991). Despite *Scyllarides* being large, and occurring throughout tropical and subtropical seas, they are nowhere sufficiently abundant to be of appreciable economic importance. However, several species are fished in various regions (Robertson, 1969; Tavares, 2002), and in the northeast region of Brazil, species of slipper lobsters are now part of the lobster artisanal fishery because of overexploitation of species of the Palinuridae (Vasconcelos, pers. comm.).

Despite their ecological and economic interest, information concerning the distribution pattern of the Western Atlantic *Scyllarides* species is still unsatisfactory. The most comprehensive studies include Schmitt (1935); Holthuis and Zaneveld (1958); Robertson (1969); Lyons (1970); and Holthuis (1991; 1993).

In the present paper we report the occurrence of larval material of *S. aequinoctialis* and describe its fourth phyllosoma stage, as well as incorporate unpublished museum material of *S. brasiliensis* and *S. delfosi*. Also, we take the opportunity herein to review the geographic range of the Western Atlantic *Scyllarides* species.

Material and Methods

The phyllosomas were collected in the first cruise of the 'REcursos VIvos da Zona Econômica Exclusiva – Região Nordeste (REVIZEE-NE)'. The cruise was conducted between August and October 1995 and covered areas surrounding the Fernando de Noronha and São Pedro e São Paulo archipelagos, and the north Brazilian seamounts (Fig. 2). Larval stage four of *Scyllarides aequinoctialis* (Lund, 1793), were collected from 4°10.08'S, 35°30.02'W using Bongo nets with 300 and 500 µm mesh in midwater trawls, between 50 and 100 meters depth. Robertson (1969) was used to identify the species and stage of development. Specimens were dissected, and mounted in polyvinyl lactophenol with acid fuchsin and/or chlorazol black stains. Specimens are lodged at the Museu de Zoologia da Universidade de São Paulo, Brazil, under register number MZUSP 17919.

Material of *S. brasiliensis* and *S. delfosi* are from the same museum:

Scyllarides brasiliensis – Baía do farol, Ilha do Arvoredo, Santa Catarina: 19 December 2003, 27°17'S and 48°21'W, 1♀ (MZUSP 16260), Dall'Occo, P. L. and Capece, A. det.

Scyllarides delfosi – Projeto GEDIP Rio Grande do Sul: 14 March 1969, st. 576, 34°28'S and 51°53'W, 154 m, 1♂ (MZUSP 15286), G. A. S. Melo det.

Results

Diagnose of the stage IV phyllosoma of *S. aequinoctialis* (Fig. 1A-F)

Cephalic shield pear-shaped (Fig. 1A). Antennule unsegmented with a bud indicating the flagellum; four terminal and two subterminal aesthetascs; two simple setae, one apical and one medial (Fig. 1D). Antenna biramous, shorter than antennule; endopod 2-segmented, distal segment incipiently 4-segmented with two distal simple setae (Fig. 1E). Maxillule biramous; anterior margin of basal endite elevated proximally, bearing seta; basal endite terminating in two teeth; coxal endite with two setae, one longer, and a subterminal spine. Maxilla 2-segmented, bearing four plumose apical setae on distal segment; margin of basal segment with three small, simple setae (Fig. 1F). First maxilliped as a minute bud posterior to base of maxilla. Second maxilliped 5-segmented; segments 1-2 without setae, segment 3 with distal simple seta, segment 4 with five plumodenticulate setae, distal segment with four simple setae and terminal spine (Fig. 1B). Third maxilliped 5-segmented, segments 1-3 without setae, segment 4 with two medial simple setae, three subterminal plumodenticulate setae, terminally with four plumodenticulate setae and two cuspidate setae, distal segment with five plumodenticulate setae apically (Fig. 1C). Pereiopods 1-3 with 9, 9 and 7 pairs of natatory setae respectively, coxal spine present. Pereiopod 4 elongated, with six segments, without natatory setae; dactyl short forming subchela. Pereiopod 5 showing as bud at base of abdomen. Abdomen longer than coxa of pereiopod 4, posteroventral margin on each side of segments 2-5 with small tubercle. Telson without spines.

Distribution of *Scyllarides* in the Western Atlantic

Previously published distributional records of the Western Atlantic *Scyllarides* known from the are summarized in table I. The geographic range of each species, based on published data plus the additional records listed above is shown in figure 2.

Discussion

Larval development is poorly known in *Scyllarides*, probably because of the long duration of development and scarcity of material. As a result it is difficult to assign identity to larval stages. It is not uncommon to find works describing phyllosomas collected in the plankton and referring them to *Scyllarides* sp. (e.g. Phillips *et al.*, 1981). Robertson (1969) described the larval development of *S. aequinoctialis* and compared it with *S. nodifer*. Robertson (1969) also provides distribution accounts for other *Scyllarides* species from

the Brazilian north seamounts region (most referred as *Scyllarides* sp.). The larval material of *S. aequinoctialis* (Fig. 1) presented here represent the first occurrence of the species from off coast of northern Brazil. The individuals collected may possibly be dispersers from the coast, caught offshore due to the long larval life characteristic of the group.

Scyllarides aequinoctialis is widespread in the Western Atlantic (table I). It was first described for Jamaican waters. Schmitt (1935) reported it from Florida to Brazil, and Robertson (1969), Rodriguez (1980), Holthuis (1991), and Nizinski

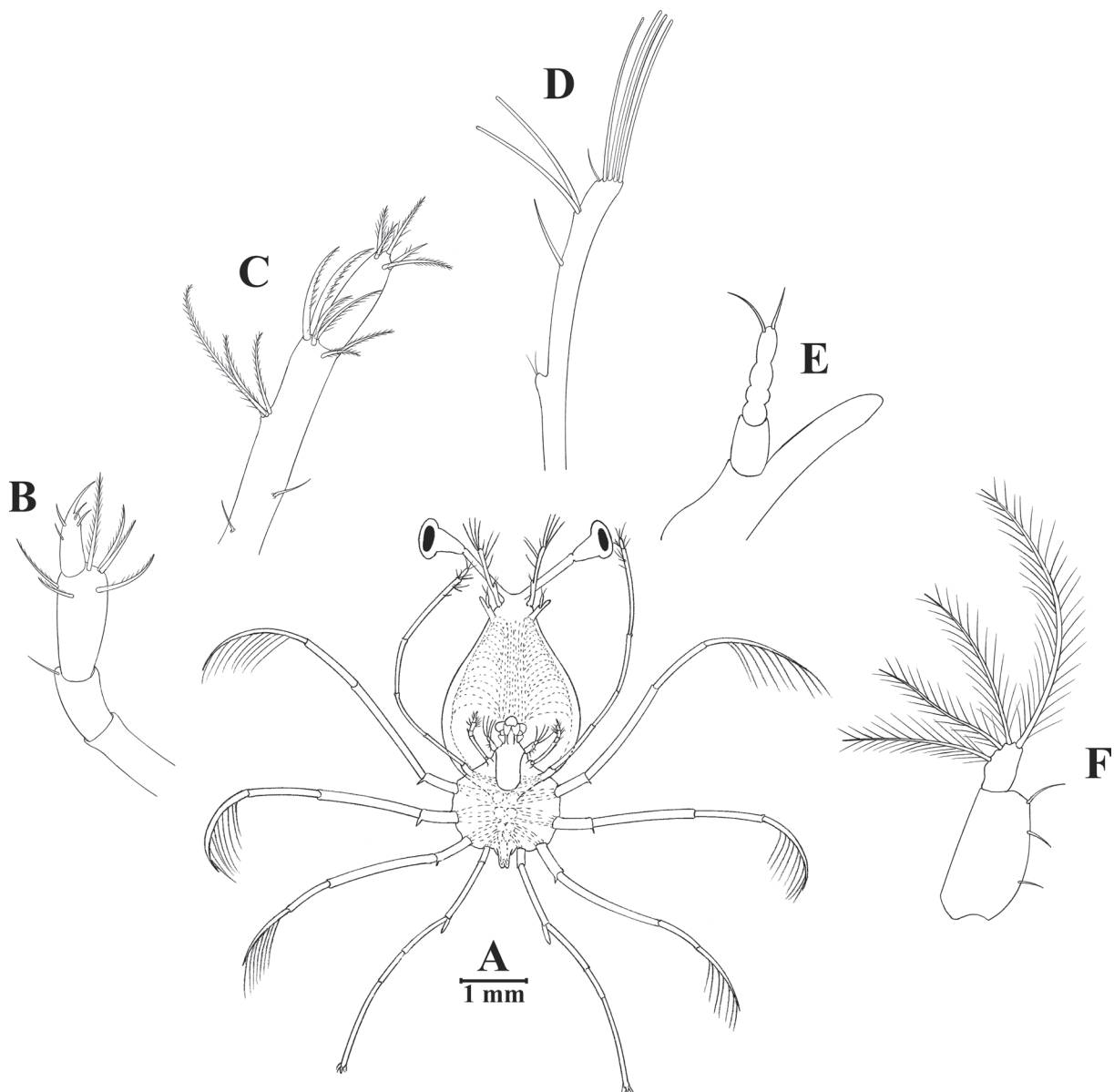


Figure 1. Stage IV of *Scyllarides aequinoctialis* (Lund, 1793). A, ventral view. B, detail of the second maxilliped. C, detail of the third maxilliped. D; antennule. E, antenna. F, maxilla.

(2003) confirmed this general pattern. Holthuis (1991) and Nizinski (2003) presented detailed distributions for this species, which includes southern Brazil (São Paulo State). Some authors overlooked the occurrence of *S. aequinoctialis* in Brazilian waters (Lyons, 1970; Coelho and Ramos-Porto, 1983/85; 1988; Williams, 1986; and Melo, 1999), whilst others mention it from a few localities (e.g. Manzanilla-Dominguez and Gasca, 2004; Manzanilla-Dominguez *et al.*, 2005) (Table I). Actually, *S. aequinoctialis* is known from Bermuda and Florida Keys through West Indies to Brazil (including now the north seamounts region).

Scyllarides delfosi is previously known from the northeast coast of South America, as far south as Ceará, Brazil. In the MZUSP collections there are specimens from Santa Catarina and Rio Grande do Sul indicating that *S. brasiliensis* and *S. delfosi* have a much wider distribution along the Brazilian coast than previously thought. These additional records reflect the scarcity of material upon which most current distributions are based.

We compiled herein the distribution records for the Western Atlantic *Scyllarides* species (Fig. 2). The distribution of *S. aequinoctialis* appears to overlap that of *S. brasiliensis*, *S. deceptor*

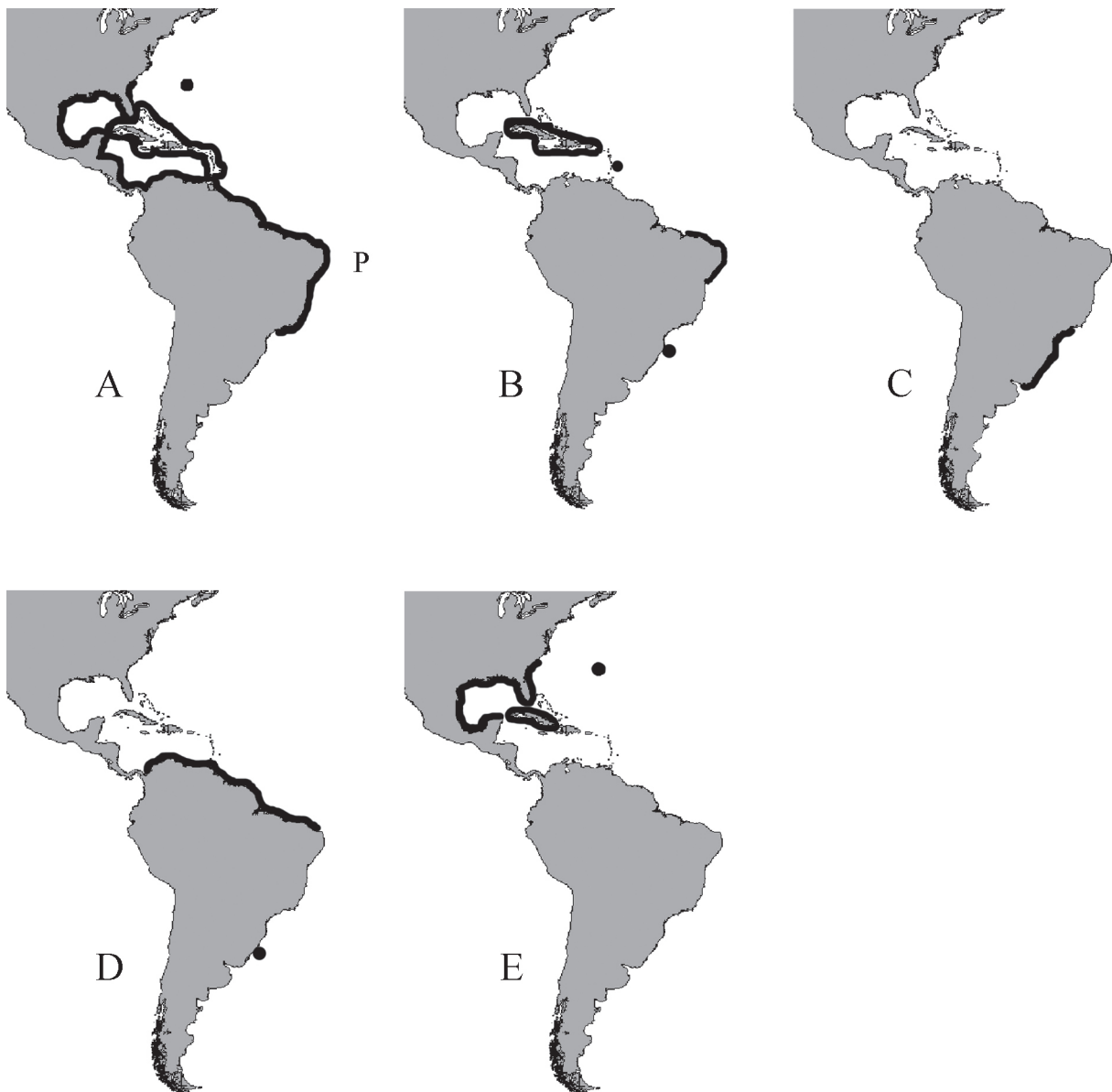


Figure 2. Distribution of Western Atlantic species of *Scyllarides* Gill, 1898. A, *S. aequinoctialis*. B, *S. brasiliensis*. C, *S. deceptor*. D, *S. delfosi*. E, *S. nodifer*. P – Indicates the collect site of the phyllosomas of *S. aequinoctialis*.

Table I. Records of the distribution of species of *Scyllarides* Gill, 1898 occurring in the Western Atlantic.

Species	Distribution	Reference
<i>S. aequinoctialis</i>	Bermuda and Florida Keys to Brazil; Porto Rico	Schmitt, 1935
	From Bermuda and Florida Keys to Brazil	Holthuis and Zaneveld, 1958
	From Bermuda and the Florida Keys through the West Indies to Brazil	Robertson, 1969
	West Indies and Caribbean Sea; Gulf of Mexico; Southern Florida to Bermuda	Lyons, 1970
	Bermuda, Cayos de Florida, Porto Rico, Dominica, San Martín, San Eustacio, Curacao, Bonaire, Los Roques, Bahia (Brazil).	Rodriguez, 1980
	From USA to Antilhas	Coelho and Ramos-Porto, 1983/85
	Bermuda, Gulf of México, South Florida and Caribbean Sea	Williams, 1986
	Bermuda; South Carolina to Southern Brazil, including the Gulf of Mexico, Caribbean Sea and West Indies	Lyons, 1970; Williams, 1984; Holthuis, 1991; Tavares, 2002; Nizinsky, 2003
	Colombian Caribbean (Islas del Rosario, Cartagena)	Navas and Campos, 1998
	Southern Gulf of Mexico	Manzanilla-Domínguez and Gasca, 2004
<i>S. brasiliensis</i>	Mexican Caribbean (Banco Chincorro)	Manzanilla-Domínguez <i>et al.</i> , 2005
	Brazil (from Ceará to Bahia)	Coelho and Ramos-Porto, 1983/85
	Brazil	Williams, 1986
	Brazil (from Maranhão State to Bahia State) and Dominica in the West Indies	Holthuis, 1991
<i>S. deceptor</i>	Antilhas and Brazil(from Maranhão to São Paulo State)	Melo, 1999
	From Brazil (Rio de Janeiro) to Argentina (Buenos Aires)	Coelho and Ramos-Porto, 1983/85
	São Paulo, Brazil	Williams, 1986
	From Southern Brazil (States of Rio de Janeiro, São Paulo, Santa Catarina) south to northern Argentina(Buenos Aires Province)	Holthuis, 1991
	Brazil (from Rio de Janeiro to Rio Grande do Sul) and Argentina	Melo, 1999
<i>S. delfosi</i>	Brazil (from São Paulo to Santa Catarina) and Buenos Aires, Argentina	Boschi, 1973
	North coast of South America, from Venezuela to Surinam	Rodriguez, 1980
	North coast of South America, Guianas, Brazil (Ceará State)	Coelho and Ramos-Porto, 1983/85
	Surinam	Williams, 1986
	North coast of South America from Venezuela (Sucre State) to Brazil (Ceará State)	Holthuis, 1991
	Colombian Caribbean (Pozos Colorados)	Navas and Campos, 1998
<i>S. nodifer</i>	North coast of South America, Guianas, Brazil (from Amapá to Ceará State)	Melo, 1999
	Bermuda; Cape Lookout, N.C., to Cuba; off Pensacola, Florida	Williams, 1965
	Bermuda and from Cape Lookout, North Carolina trough Florida, including the Gulf of Mexico, to Cuba	Robertson, 1969
	Gulf of Mexico; Yucatan and Cuba to North Carolina; Bermuda	Lyons, 1970
	Bermuda, Cape Lookout, N.C., to Florida and around Gulf of México to Yucatan.	Lyons, 1970; Williams, 1984, 1986; Holthuis, 1991; Tavares, 2002; Nizinsky 2003

and *S. nodifer* (Fig. 2). In Santa Catarina there is a slight overlap in the distribution of *S. brasiliensis* and *S. deceptor*, however, it may well be that the range of *S. brasiliensis* is even wider (Fig. 2). With the growing commercial interest in *Scyllarides* species, more accurate knowledge will be necessary to guarantee sustainable exploitation of lobster resources.

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