

**FIRST RECORD OF *FICOPOMATUS USCHAKOVI* (PILLAI, 1960)  
SERPULIDAE (POLYCHAETA: ANNELIDA) FOR THE WESTERN ATLANTIC**

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### RESUMO

**Primeiro registro de *Ficopomatus uschakovi* (Pillai, 1960) Serpulidae, (Polychaeta: Annelida) para o Atlântico Ocidental.** Exemplares de *F. uschakovi* (Pillai, 1960) foram coletados no rio de maré do Sossego (7°08'39"S 34°53'46"W), João Pessoa, Paraíba, Brasil. Esta espécie forma aglomerados de tubos calcários sobre madeira morta de mangue, que se encontra semi-submergida no riacho, com margens completamente recobertas por vegetação de mangue. Este é o primeiro registro da espécie para o Atlântico Ocidental.

**Palavras-chave:** Serpulídeos, rio de maré do sossego, distribuição geográfica, Brasil.

### ABSTRACT

**Fist record of *Ficopomatus uschakovi* (Pillai, 1960) Serpulidae, (Polychaeta: Annelida) for the Western Atlantic.** Specimens of *F. uschakovi* (Pillai, 1960) were collected in the tidal creek Sossego (7°08'39"S 34°53'46"W), João Pessoa, Paraíba, Brazil. The species forms conglomerates of calcareous tubes on dead trunks of mangroves semi-submerged in the tidal creek, the margins of which are covered by a rich mangrove vegetation. This is the first record of the species for the Western Atlantic.

**Keywords:** Serpulids, sossego tidal creek, geographical distribution, Brazil.

### INTRODUCTION

Serpulid polychaetes are common on hard substrates, being conspicuous for their coloured branchial crown (BATISDA-ZAVALA & SALAZAR-VALLEJO, 2000). The body is separated into two regions: a thorax with a thoracic membrane usually present, and dorsal capillary or limbate setae, and an

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abdomen with ventral setae and dorsal uncini (FAUCHALD, 1977). The branchial crown is formed by two pairs of lobes, and there may be a radiole transformed into an opercule (HOBSON & BANSE, 1981). Calcareous tubes are always present (FITZHUGH, 1989; FAUCHALD & ROUSE, 1997). The genus *Ficopomatus* SOUTHERN, 1921 belongs to the subfamily Ficopomatinae PILLAI, 1960, and is characterized by the following features: white tube, gradually increasing in diameter towards the anterior end and semicircular in cross-section; seven thoracic segments, with six uncinigerous; collar setae coarsely serrated and limbate; thoracic uncini saw-like, exceptionally partly rasp-like with six to twelve teeth; abdominal setae geniculate with denticulate edge; abdominal uncini saw-like or rasp-like with one or four rows of teeth, each one with six to fourteen teeth; operculum consisting of bulbous fleshy part, terminating by a horny plate; peduncle smooth (TEN HOVE & WEERDENBURG, 1978). This genus is represented by four species, *F. enigmaticus* (FAUVEL, 1923), *F. macrodon* (SOUTHERN, 1921), *F. miamiensis* (TREADWELL, 1934), and *F. uschakovi* (PILLAI, 1960).

## MATERIAL AND METHODS

Specimens of *F. uschakovi* were collected in the Sossego tidal creek (7°08'39"S 34°53'46"W), a tributary of the Sanhuaú river. This tidal creek is located 23,4 km from the estuary of the Rio Paraíba do Norte, in João Pessoa, Paraíba, Brazil (Fig. 1). Specimens were collected during low tides on December 12, 2004 and March 21, 2005. Water for chemical analyses was sampled at low and high tide (Table 1). Both the length and the depth of the brook were measured. The identification of specimens was based on the taxonomic key of TEN HOVE & WEERDENBURG (1978) and on the descriptions of PILLAI (1960) and HARTMANN-SHRÖDER (1971). Drawings were made with the help of a camera lucida, emphasis being put on the anterior region of specimens, the parapodial structures, and the tube morphology. Measurements are in millimeters. Specimens are deposited in the Marine Invertebrate Collection, Federal University of Paraíba (CIM-POL-UFPB).

## STUDY AREA

The Sossego tidal creek is still well preserved with a rich mangrove vegetation along its margins, dominated by *Rhizophora mangle* L. . The water is dark, rich in suspended organic material, and with abundant semisubmerged tree-trunks and branches. Water currents are weak, varying in intensity according to the tidal regime. (Fig. 1)

The conglomerates of calcareous tubes of *Ficopomatus uschakovi* were found at a distance of 105 m from the entrance to the mangrove, on dead

mangrove trunks, measuring from 80 cm to 1.50 m in length and from 8 to 10 cm in diameter. Trunks with *Ficopomatus* tubes were spaced 3 to 4 meters from each other and occupied both vertical and horizontal orientations in relation to the water level. The worm tubes occurred at low water level during low tides

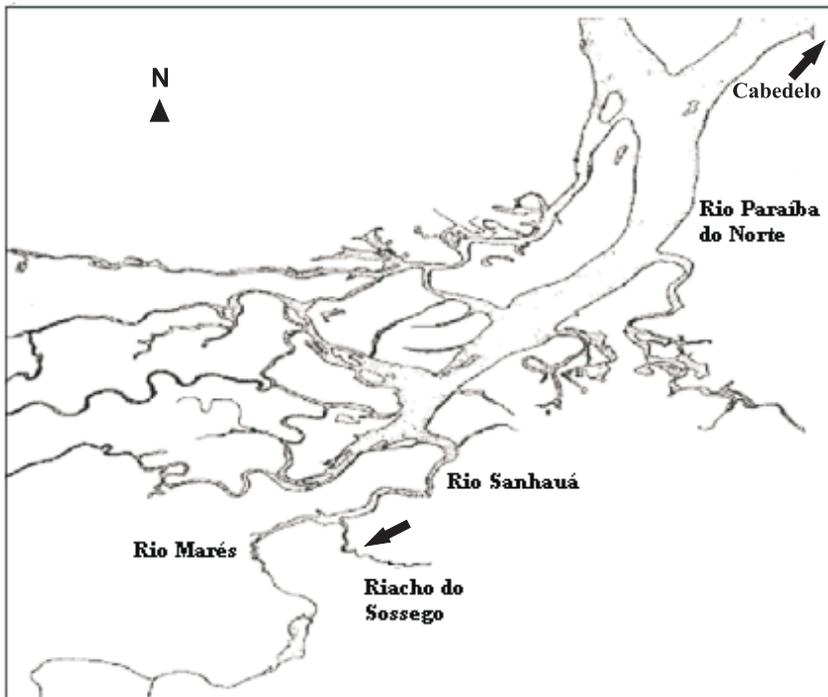


Figure 1. Location of the Sossego tidal creek

and were completely free of the mud. At the spot where the *Ficopomatus* tubes were collected, the brook measured 4.10 m in width and 1.80 m in depth during high tide, and 1.20 m and 0.50 m during low tide.

The water analysis provided the following parameters (Table 1):

Table 1. Chemical variation of the water of the Sossego creek.

Tide	Alcalinity	Total hardness	Nitrate	Nitrite	Ammonium	Salinity
High	35 ug/L	1.890 ug/L	313,8 ug/L	14,29 ug/L	262,92 ug/L	11
Low	62 ug/L	347 ug/L	992,4 ug/L	84,29 ug/L	0,28 ug/L	4

## RESULTS AND DISCUSSION

*Ficopomatus uschakovi* (PILLAI, 1960)  
(Figure 2 A-G)

**Synonyms:** *Mercierella enigmatica* FAUVEL, 1931, p. 1069 , *Neopomatus uschakovi* PILLAI, 1960, p. 28, *Neopomatus similis* PILLAI, 1960, p. 32, *Ficopomatus enigmaticus*.- STRAUGHAN, 1967, p. 59-64

**Description:** The tube is shining white, with orange spots, measuring approximately 12 mm in length by 1.9 mm in width. It is semicircular in cross-section, having prominent longitudinal and transversal keels from the border to the posterior region (Fig. 2A).

The branchial crown corresponds to  $\frac{1}{4}$  of total body length, having 13 to 15 radioles arranged into a semi-circle, without a branchial membrane. Pinnules along radioles are unequal in size. Each radiole measures on average 2.2 mm in length. In some specimens the radioles had an orange tinge and 4 to 8 dark-brown horizontal bands.

The peduncle is larger at the base of the operculum, becoming narrower towards the base of the branchial crown, measuring approximately 1.26 mm in length and 0.30 mm in width. In cross section, the peduncle is subtriangular, with a clear constriction at the base of the funnel.

The operculum is orange or whitish, pear-shaped, 0.43 to 0.55 mm in length, having one to four crowns of strong, pointed, chitinous spines pointing outwards at its apex. In the interior of the crown of spines there is much sediment as a consequence of the high content of organic material at the collecting site.

The collar is elevated with a complete border and an undulating margin that continues dorsally with a thoracic membrane, being fused ventrally in the anterior segments.

The thorax is composed of 7 setigerous segments, with a collar setiger, and 6 uncinigerous setigers. Dark-brown rectangular areas are present in the uncinigerous setigers. In the last segments these pigmented areas coalesce forming a semilunar-shaped outline (Fig. 2B). Setae in the notopodial thoracic tufts are coarsely serrated (Fig. 2C), or limbate (Fig. 2D). The uncini along the entire thorax have a simple row of 7 to 8 curved teeth (Fig. 2E).

The abdominal region has 40 to 43 setigerous segments, with geniculate setae on the notopodia (Fig. 2F). The abdominal uncini are rasp-like along entire abdomen, and have 10 to 12 teeth (Fig. 2G). The anus is located between two terminal folds.

Complete specimens have 47 to 50 setigerous segments, measuring 0.9 to 10 mm in total length. Specimens are uniformly light-brown in alcohol 70%.

**Material examined.** Brazil, **Paraíba:** João Pessoa, Sossego tidal creek, 7°08'39"S 34°53'46"W (CIM-POL-UFPB 220, 20 specimens; CIM-POL-UFPB 223, 6 specimens; CIM-POL-UFPB 228, 14 specimens).

**Geographical distribution.** According to TEN HOVE & WEERDENBURG (1978), *F. uschakovi* is known from West Africa at the Ivory Coast and Nigeria, from South Africa, southern India, Sri Lanka, Malaysia, Indonesia, the Philippines, the Solomon and Guadalcanal Islands, and Eastern Australia. CARLTON (1979) cites this species for San Francisco, on the Pacific coast of the USA. In this paper we extend the known distribution of *F. uschakovi* to the Western Atlantic, northeast Brazil, State of Paraíba.

**Remarks.** The specimens are similar to the original description of PILLAI (1960), agreeing with the later descriptions of DAY (1951), HARTMANN-SHRÖDER (1971), ZIBROWIUS (1973), and with the generic redescription of TEN HOVE & WEERDENBURG (1978). Our specimens presented a larger number of horizontal bands on the branchial crown (4 to 8, contra 3 to 6 in the original description). These bands were not mentioned by ZIBROWIUS (1973) and TEN HOVE & WEERDENBURG (1978). Our specimens were also larger than the original material from Sri Lanka, which measured 7.0 mm (PILLAI, 1960), but similar to the specimens from Lunga Point in Salomon Islands, which measured 10mm (GIBBS, 1971).

For a long time *F. uschakovi* was confused with *F. enigmaticus* (FAUVEL, 1923). However, HARTMANN-SHRÖDER (1971) and PILLAI (1971) clarified that these two species were separated geographically. *F. uschakovi* occurs in tropical regions, while *F. enigmaticus* is restricted to subtropical and temperate areas. DAY (1967) suggests that the species now named *F. enigmaticus* was possibly transported by ships from Indian to French estuaries.

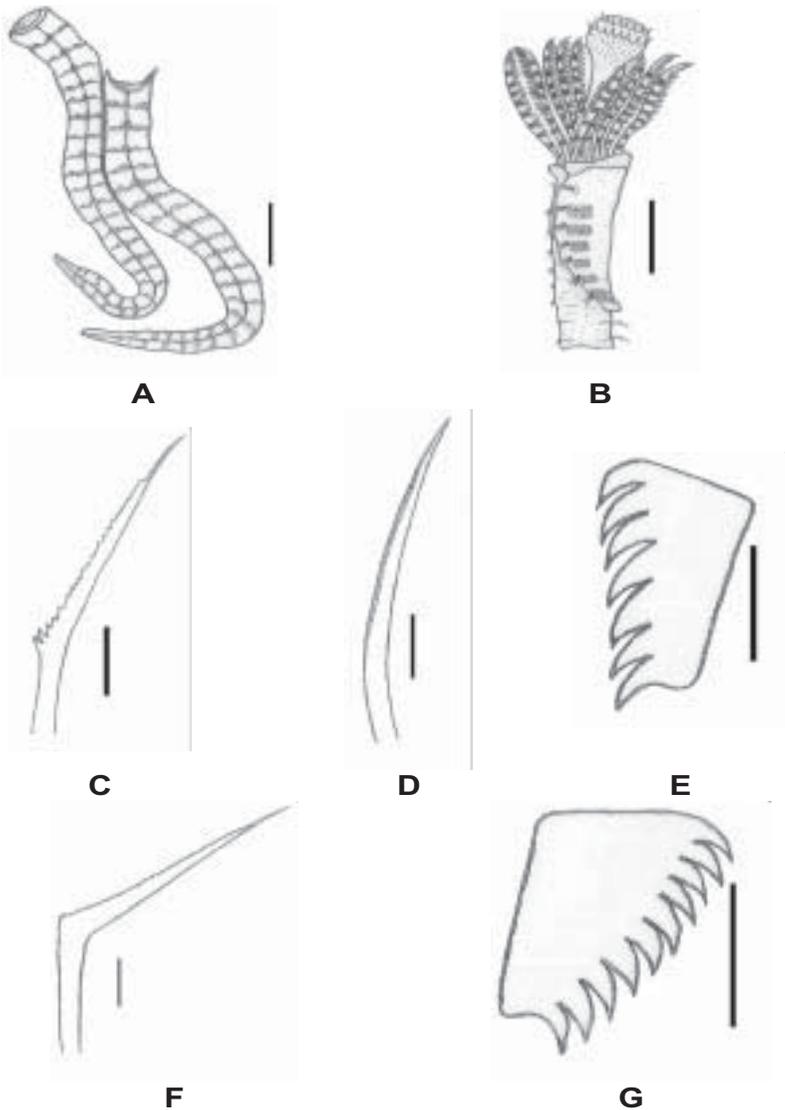


Figure 2. *Ficopomatus uschakovi*. A, tube; B, anterior end in lateral view; C, notosetae thoracic; D, notosetae limbate; E, neuropodial thoracic uncinus; F, notosetae abdominal; G, abdominal uncinus

Scales bars: A and B: 1mm; C, D, E, F and G: 0,1mm

BIANCHI (1981) considered *F. enigmaticus* a cosmopolitan species of the temperate zones, and SCHWINDT & IRIBARNE (2000) considered it a truly cosmopolitan species. We reinforce its present status as a circumtemperate species.

CARLTON (1979) registered *F. uschakovi* as an invasive species colonizing estuarine environments of the Pacific USA through transportation by ships. The occurrence of this species in the estuarine environment of the Sossego tidal creek, State of Paraíba, Brazil, may be explained by two hypotheses. The first is dispersion by ballast water or of individuals attached to the wood of vessels able to survive in high salinities and then migrate to inner, low salinity tidal creeks, where they would become adapted. Perhaps a molecular analysis of specimens from different localities could shed further light on this possibility. The second is that the present distribution of the species reflects a Gondwanan pattern of distribution. This possibility could perhaps be tested phylogenetically by current methods of vicariance biogeography applied to elements of the biota presenting a pattern of distribution congruent with this scenario. We consider *F. uschakovi* to have primarily a circumtropical distribution, with one possible introduction into San Francisco temperate waters.

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