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Sabaco sinicus, a new species of Maldanidae (Annelida: Polychaeta) from Chinese coast waters

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Abstract

Sabaco sinicus sp. nov. is described based on material collected from Chinese coast. It has been misidentified as *Asychis gangeticus* Fauvel, 1932 since Uschakov and Wu (1962). Here, we recognized it as a new species based on combination of the following characters: dark-brown pigmentation spots on nuchal grooves and first three chaetigers; glandular pattern on chaetigers 4–6; preanal achaetigerous segments absent; anal plaque trumpet-shaped with a disc-shaped dorsal lobe; notochaetae consisting of geniculate capillaries and fine capillaries with or without spinose spiral bands; neurochaetae presented as a single row of rostrate uncini. *Asychis gangeticus* differ from the new species in having no pigmentations on body and a triangular dorsal lobe of anal plaque. Distribution region of this species have moved northward significantly from sea area south of Changjiang Estuary since the 1950s.

Key words: Polychaeta, Maldanidae, Maldaninae, taxonomy, China seas

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1 Introduction

Sabaco Kinberg, 1867 is one of seven genera within the subfamily Maldaninae of family Maladanidae Malmgren, 1867. The other genera are *Asychis* Kinberg 1867, *Maldane* Grube 1860, *Bathyasychis* Detinova 1982, *Chirimia* Light 1991, *Metasychis* Light, 1991 and *Paramaldane* Wang and Li, 2016. *Sabaco* was first erected by Kinberg (1867) and synonymized with *Asychis* Kinberg, 1867 by Arwidsson (1907). Light (1991) revised subfamily Maldaninae and resurrected *Sabaco* as a valid genus. The genus *Asychis* is restricted as having the following characters: cephalic rim with two lateral notches, nuchal organs J- or U-shaped, without collar on chaetiger 1, one preanal achaetigerous segment, pygidium well developed, foliaceous. *Sabaco* is characterized by crescentic nuchal grooves and well-developed collar on the first chaetiger. Now, four species in this genus have been described from Indo-West Pacific regions: *S. maculatus* Kinberg, 1867, from Indonesia; *S. javanicus* (Augener, 1934), from Java; *S. gangeticus* (Fauvel, 1932), from Ganges Delta; and *S. steineri* Light, 1991, from the Gulf of Thailand.

Only one species, *Sabaco gangeticus* (Fauvel, 1932), has been recorded from Chinese coast waters (Yang and Sun, 1988; Uschakov and Wu, 1962, 1963). After reexamining the specimens identified as *S. gangeticus* collected in 1958–2016, we recognized them as a new species, which is a common polychaete species from sea area south of the Changjiang Estuary.

2 Materials and methods

The materials were collected during the "National Comprehensive Oceanography Survey" (1958–1960), "Sino-Vietnam Joint Oceanographic Survey in the Beibu Gulf (1959–1960, 1962)" and other surveys carried out in 2015–2016. All specimens were deposited in the Marine Biological Museum (MBM), Chinese Academy of Sciences in Qingdao, China. Sampling sites are shown in Fig. 1.

The morphological observations and morphometric measurements were taken using a Zeiss Stemi 2000-C stereo microscope equipped with AxioCam MRc 5 microscopic camera. Methyl green was used for staining in order to describe the glandular pattern of the epidermis. For observations by scanning electron microscope (Hitachi S-3400 N), chaetae were dissected from the body, rinsed in distilled water for 12 h to remove salt crystals, run through a series of ethanol concentrations, and stored in 90% ethanol until observation.

3 Systematics

Class Polychaeta Grube, 1850

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Family Maldanidae Malmgren, 1867
Subfamily Maldaninae Malmgren, 1867
Genus *Sabaco* Kinberg, 1867

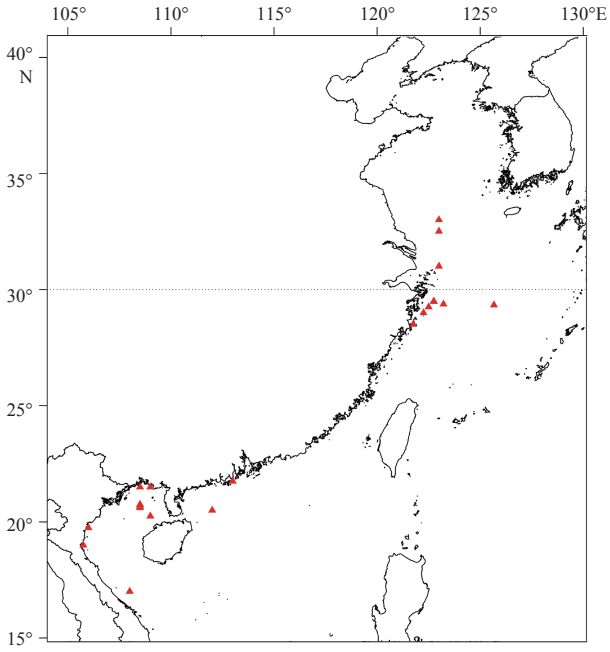

Fig. 1. Sampling sites of *Sabaco sinicus* sp. nov..

***Sabaco sinicus* sp. nov.**
(Figs 2–4)

Asychis gangeticus—Uschakov and Wu, 1962: 89–109, Pl. I, h, misidentification; 1963: 154–164, misidentification.

Asychis cf. *gangeticus*—Yang and Sun, 1988: 264–265, Fig. 125A–E.

Material examined. Holotype. MBM285975, East China Sea, Sta. 12300–5, 30.5°N, 123.0°E, mud sediment, 55 m, 16 October 2015.

Paratypes. MBM285976, Yellow Sea, Sta. I3, 33.0°N, 123.0°E, mud sediment, 33 m, 22 June 2016; MBM285977, Yellow Sea, Sta. I3, 33.0°N, 123.0°E, mud sediment, 32.8 m, 1 February 2015; MBM007985, East China Sea, Sta. 4059, 29°N, 122°E, mud sediment, 42 m, 26 October 1959.

Other materials examined. MBM201448, South China Sea, Sta. 7204, 20.61°N, 108.5°E, mud sediment, 49 m, 24 April 1962; MBM201447, South China Sea, Sta. 6285, 19°N, 105.75°E, 9 December 1959; MBM201446, South China Sea, Sta. 6279, 19.75°N, 106°E，mud sediment, 6 July 1960; MBM201445, South China Sea, Sta. 6214，20.75°N, 108.5°E, mud sediment, 42 m, 14 December 1959; MBM201444, South China Sea, Sta. 6211, 21.5°N, 108.5°E, silt sediment, 12 m, 18 July 1962; MBM201439, South China Sea, Sta. 6213, 20.75°N, 108.5°E, silt sediment, 27.5 m, 17 July 1960; MBM201534, South China Sea, Sta. 7101, 21.5°N, 109°E, silt sediment, 10 m, 26 August 1962; MBM007989, East China Sea, Sta. 4059, 29.25°N, 122.5°E, mud sediment, 42 m, 26 October 1959; MBM197508, East China Sea, Sta. G5, 29.333°N, 122.667°E, 46 m, 25 May 1986; MBM012649, South China Sea, Sta. 6074,

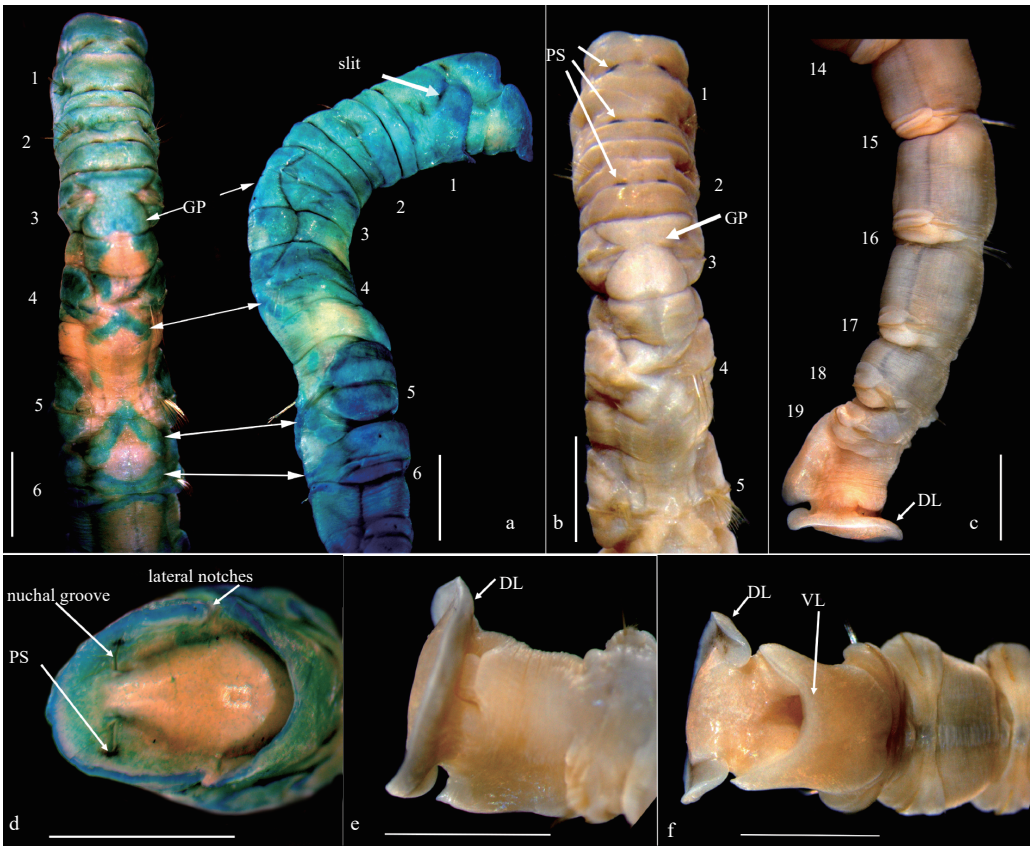

Fig. 2. *Sabaco sinicus* sp. nov. (Paratype MBM285976) (a and d were stained with methyl green, others not). a. Dorsal and lateral view of anterior body, arrows showing the same glandular areas; b. dorsal view of anterior body, showing pigmentation spots and glandular pad on chaetiger 3; c. posterior chaetigers and pygidium; d. cephalic plate; e. dorsal view of pygidium; and f. ventral view of pygidium. Scale bars: 2.0 mm. DL represents dorsal lobe of pygidium, GP glandular pad, PS pigmentation spots, and VL ventral lobe of pygidium.

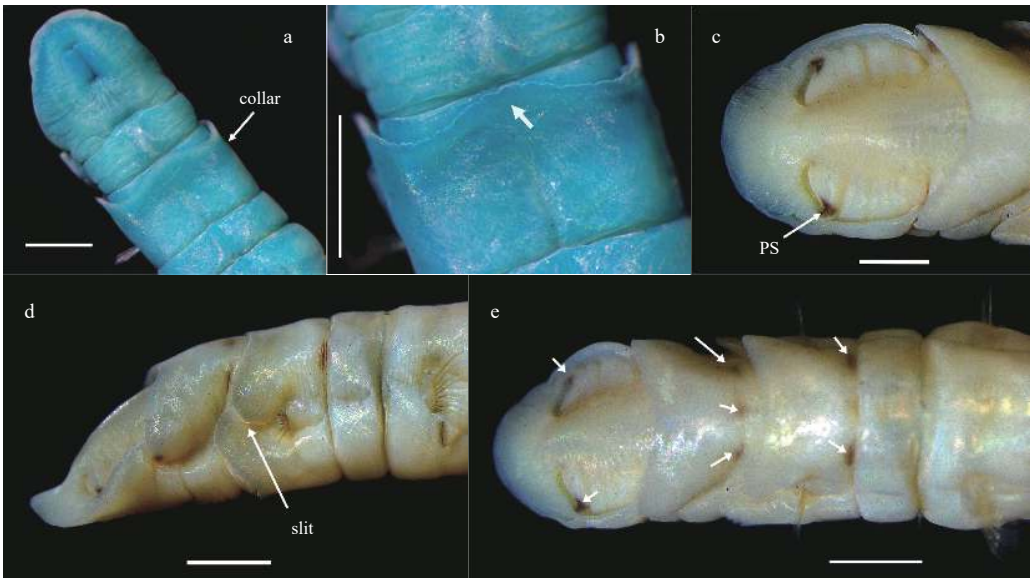

Fig. 3. *Sabaco sinicus* sp. nov. MBM201439 (a and b were stained with methyl green, others not). a. Ventral view of head; b. ventral view of collar on chaetiger 1, arrow showing projecting swelling; c. cephalic plate, dorsal view; d. lateral view of anterior body; and e. dorsal view of anterior body, arrows showing pigmentation spots. Scale bars: 1.0 mm. PS represents pigmentation spots.

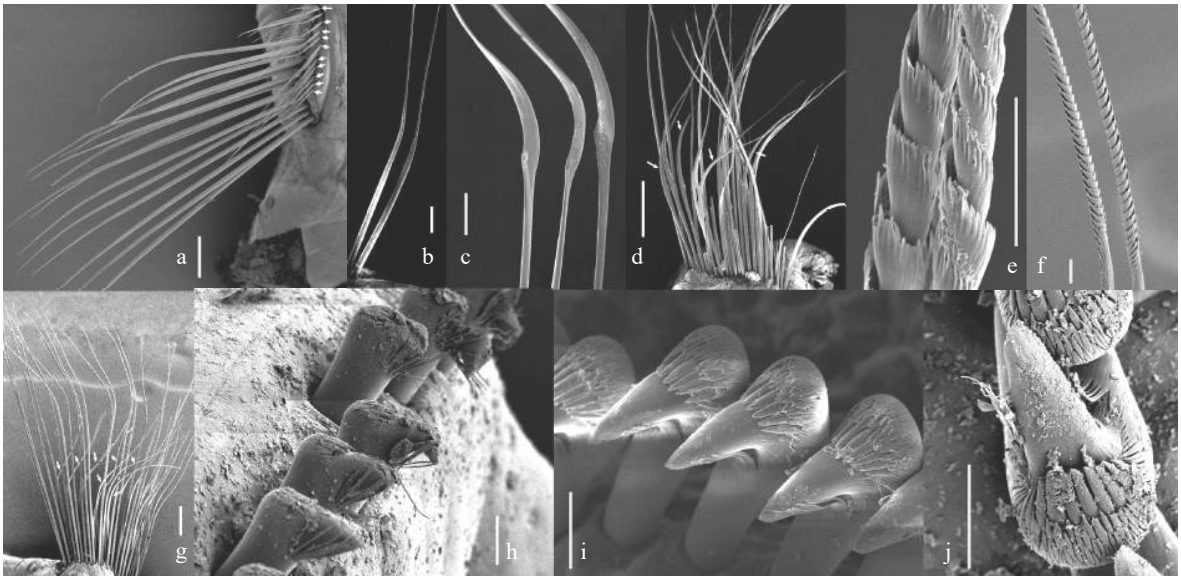

Fig. 4. Chaetae of *Sabaco sinicus* sp. nov. (MBM285977). a. Simple capillariy notochaetae from chaetiger 3; b. slender companion notochaetae from chaetiger 6; c. keel-shaped companion notochaetae from chaetiger 9; d. notochaetae from chaetiger 15; e. spinose spiral bands from chaetiger 15; f. spinose spiral bands from chaetiger 17; g. spirally fringed notochaetae from chaetiger 17; h–j. rostrate neurochaetae from chaetiger 3, 6 and 17, respectively. Arrows show companion notochaetae. Scale bars: 2.0 mm (a, d, f), 400 μm (b, c) and 200 μm (e, g–i).

21.75°N, 113°E, 18 m, 22 April 1959; MBM012612, South China Sea, Sta. 7204, 20.667°N, 108.5°E, 45 m, 27 August 1962; MBM012601, South China Sea, Sta. 6200, 20.25°N, 109°E, 34.5 m, 15 April 1960; MBM012508, East China Sea, Sta. 6245, 17°N, 108°E, 27 m, 23 February 1962; MBM012519 South China Sea, 6074, 21.75°N, 113°E, 19 m, 6 July 1959; MBM012662, East China Sea, Sta. 4061, 29°N, 122.25°E, 27 m, 21 October 1959; MBM012592, South China Sea, Sta. 6200, 20.25°N, 109°E, mud sediment, 32.5 m, 13 July 1960; MBM012661, South China Sea, Sta. 6106, 20.5°N, 112°E, silt sediment, 72 m, 2 April 1959; MBM012750, East China Sea, Sta. 4133, 29.5°N, 122.75°E, silt sediment, 10 July 1959.

Diagnosis. Body with 19 chaetigers. Anterior part of prostomium broad. Nuchal grooves crescent and transverse. Preanal achaetigerous segments lacking. Pygidium trumpet-shaped with a disc-shaped dorsal lobe. Notochaetae two kinds: simple capillaries and spirally fringed notosetae. Dark-brown pigmentation spots on nuchal grooves and first three chaetigers.

Description. Holotype about 130 mm long and 4.5 mm wide. Body cylindrical, consisting of 19 chaetigers and a trumpet-shaped pygidium. Head obliquely truncate with an elliptical cephalic plate. Cephalic rim smooth, with two deep lateral

notches (Fig. 2d). Lateral parts of the rim low and anteriorly fused with prostomium, while posterior part of the rim well-developed and forming a deep pocket coving the posterior part of the cephalic keel. The keel prominent, anteriorly narrow and getting broad posteriorly. Two nuchal grooves deep, crescent and transverse with dark-brown pigmentation spots on its distal ends (Figs 2d and 3c–e).

The first four chaetigers obviously biannulate in dorsal view (Fig. 2a). Two remarkable dark-brown pigmentation spots on each anterior part of first three chaetigers (Fig. 2b). Collar on chaetiger 1 with two deep lateral slits (Fig. 2a and 3d). Dorsal margin of collar smooth or slightly crenulate. Ventral margin crenulate with a projecting swelling (Fig. 3b). Anterior chaetigers with epidermal glands and heavily stained with methyl green. The glandular pattern on the dorsum of chaetigers 3–6 noteworthy (Figs 2a, b). Chaetigers 3 having a large glandular pad with inward contraction on its middle (Fig. 2b). Glandular pad V-shaped on chaetiger 4 and 5, crescent on chaetiger 6.

The last two chaetigers shorter than preceding ones (Fig. 2c). Preanal achaetigerous segments lacking. Pygidium well developed, trumpet-shaped (Figs 2e, f). Dorsal lobe of anal plate disc-shaped with smooth margin, separated from ventral lobe by deep lateral notches. A large broad mid-ventral notch on the ventral lobe (Fig. 2f).

Notochaetae two rows, including long capillaries with stout proximal shafts and slender companion notochaetae. Long capillary notochaetae simple on anterior chaetigers (Fig. 4a), posteriorly becoming spirally fringed in distal ends with spirally pectinate bands imbricated over the main shaft (Figs 4e, f). Companion notochaetae on anterior chaetigers short and slender (Figs 4a, b), on middle and posterior chaetigers getting longer and keel-shaped with lateral projection and long tips (Figs 4c, d, g).

Uncini present from second chaetiger, arranged in a row on neuropodial tori; rostrate in shape and similar on all chaetigers (Figs 4h–j). Capitium of uncinus with 3–5 transverse arcs of small teeth (Figs 4h–j). First arc with about 8 small teeth larger than on other arcs. A tuft of bristles under the main fang.

Etymology. The species name "*sinicus*" is a Latin word meaning "Chinese", and refers to the type location of this new species.

Remarks. This species was previously misidentified as *Asychis gangeticus* Fauvel, 1932, which was later accepted as *Sabaco gangeticus* by Light (1991). The two species are similar on shape of cephalic plate and collar but differ in the pigmentation spots. *Sabaco sinicus* has very stable pigmentation spots on cephalic plate and first three chaetigers, which is absent in *S. gangeticus*. Besides, the two species differ in the form of the pygidium. The dorsal lobe of pygidium in *Sabaco sinicus* sp. n. is disc-shaped, but that of *S. gangeticus* is triangular and has two lateral lobes rolled inwards. An identification key to the species of *Sabaco* recorded in Indo-West Pacific regions is provided below.

Geographic distribution. Significant distribution change of this species has occurred since the 1950s. Specimens were collected during the "National Comprehensive Oceanography Survey" (1958–1960) range from Beibu Gulf (17°N) northward to 30°N. Studies of Uschakov and Wu (1963) also showed that this species was distributed in the warm-temperate waters not beyond the south border of the Changjiang Estuary. However, recent surveys indicate that its distribution extend northward by 2°–3° latitudes (Fig. 1). This distribution change is perhaps a response to global climate change. There is growing evidence that warm-water species are currently extending their range northward under global climate change (Sun et al., 2016).

Key to the species of Genus *Sabaco*

1. Collar on chaetiger 1 with a wide lateral indentation (see Light 1991, Figs 2I–J); ventral lobe of pygidium without a midventral notch .....*S. steineri*
– Collar on chaetiger 1 with a narrow lateral slit; ventral lobe of pygidium with a distinctive midventral notch 2
2. Dark-brown pigmentation spots on nuchal grooves and first three chaetigers; Dorsal lobe of pygidium reduced, disc-shaped .....*S. sinicus* sp. nov.
– Dark-brown pigmentation spots lacking; dorsal lobe of pygidium reduced or expanded.....3
3. Dorsal lobe of pygidium reduced, disc-shaped .....*S. maculatus*
– Dorsal lobe of pygidium expanded, with ventrallateral flaplike projections 4
4. Dorsal lobe of pygidium with a longitudinal keel on midventral surface .....*S. gangeticus*
– Dorsal lobe of pygidium without a longitudinal keel on midventral surface.....*S. javanicus*

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