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Marine Biodiversity of Costa Rica: The phyla Sipuncula and Echiura

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Abstract: Fourteen species of Sipuncula belonging to 9 genera have been reported from Costa Rican waters, mostly from the Pacific coast. Three of these species are new records for Costa Rica (*Phascolion strombus* (Montagu 1804), *Aspidosiphon (Aspidosiphon) muelleri* Diesing 1851, and *Aspidosiphon (Aspidosiphon) gracilis schnehageni* (W. Fisher 1946)). One species of Echiura, *Thalassema steinbecki* Fisher 1946, in the order Echiuroinea, has been reported from the Pacific coast of Costa Rica.

Key words: Sipuncula, Echiura, Costa Rica, biodiversity.

There are approximately 150 described species of Sipuncula classified within six families and 17 genera (Cutler 1994). These "peanut worms" are unsegmented organisms with a retractable introvert and a dorsal anus usually found anteriorly on the trunk. They are predominantly deposit feeders although some may ingest sediments or scrape material from surfaces (rock, sediment, coral, etc.). The species found in Costa Rica have been collected from intertidal to shallow waters in soft sediments, coral and coral rubble, or crevices and burrows in rock. Several species (members of the genus *Aspidosiphon* and *Phascolosoma strombus*) were collected living in empty gastropod shells or had bored into coral heads.

The first Sipunculans reported from Costa Rican waters were collected between 1845-1848 from Puntarenas and described by Grube (1859). There were no other published reports of this phylum in Costa Rican for over 120 years until Maurer *et al.* (1984) listed a "sipunculid sp." from trawl samples taken in the Gulf of Nicoya in 1979 (this single specimen cannot be located for identification (Vargas, pers. comm.). Cutler *et al.* (1992) later described nine species of Sipunculans based mainly on the collections of the Museo de Zoología, Universidad de Costa Rica. Subsequently, Dean and Cutler (1998) added *Nephasoma pellucidum* (Keferstein, 1865) and *Apionsoma pectinatum* (Keferstein, 1867), both collected in the Gulf of Nicoya, to the list of Costa Rican Sipuncula. Fonseca and Cortés (1998) also reported *Aspidosiphon elegans* (Chamisso & Eysenhardt, 1821) found boring into corals in Golfo Dulce.

Presently there are 15 species of Sipuncula known from Costa Rica. In addition to the 12 species cited above, the present article includes 3 new species occurrences. *Phascolion strombus* Montagu, 1804; *Aspidosiphon gracilis schnehageni* (W. Fischer, 1913); and *Aspidosiphon muelleri* Diesing, 1851 have been identified by the present author from specimens in the collections of the United States National Museum (USNM) and the Museum of Comparative Zoo-

logy (MCZ). The citation in Cutler (1994) for the occurrence of *Sipunculus polymyotus* from "both sides of Costa Rica" has since been found to be in error and actually refers to the distribution of *Sipunculus phalloides* (Pallas, 1774) (Cutler, pers. comm.).

The Echiura, or "spoon worms", are a phylum of approximately 130 species of unsegmented organisms with a muscular, non-retrac-table proboscis (Stephens & Edmonds 1972). They are also predominantly deposit feeders although some (*Urechis*) seem capable of filter feeding. While regarded here as a separate phy-lum there is molecular and morphological evi-dence that they may actually be Annelids most closely allied with organisms included within the Polychaeta (McHugh 1997; Rouse & Fauch-ald 1998).

There has been only one published record of an Echiuran collected in Costa Rica. Dean & Cutler (1998) reported the occurrence of *Thalassema steinbecki* Fisher, 1946 collected from the intertidal of Punta Morales in the Gulf of Nicoya.

The purpose of this present publication is to inventory all known published reports of the Sipunculans and Echiurans collected in Costa Rican waters. This is part of an ongoing review of the different groups of marine invertebrates such as the sponges (Cortés 1996), the cnidarians (Cortés 1996-1997), the stomatopods (Vargas & Cortés 1997) and the shrimp and lobsters (Vargas & Cortés 1999 a & b), conducted primarily as an aid to future research efforts in the study of the marine ecology of Costa Rica. In addition, new records for three species of Sipuncula from Costa Rican waters is included.

Phylum Sipuncula

Class Sipunculidea
E. Cutler & Gibbs, 1985
Order Sipunculiformes
E. Cutler & Gibbs 1985
Family Sipunculidae
Rafinesque, 1814

Sipunculus (Sipunculus) nudus Linnaeus, 1766.
Material: Gulf of Nicoya, Puntarenas, Collector: M. D. Keferstein (1866), 1 spec. Gulf of Nicoya, R/V Skimmer: Station 27, 9º51'57"N -- 84º50'50"W, July 7, 1980; 1 specimen, 12 m muddy sand (UCR-02). Station 29, 9º54'55"N -- 84º45'15"W, July 7, 1980; 1 specimen, 18 m, muddy sand (UCR-03); Collectors: H. K. Dean, D. Maurer and J. A. Vargas, taken with modified Smith-McIntyre benthic grab. Gulf of Nicoya, Punta Morales, Playa Blanca, November 24, 1987; Collector: J. A. Vargas, intertidal silty sand, 1 specimen (UCR- 25).
Distribution: A cosmopolitan species generally collected from the intertidal to 30 m depth (Cutler, 1994).

Sipunculus (Sipunculus) phalloides phalloides (Pallas, 1774).
Material: Caribbean coast, Cahuita National Park, December 7, 1967; Collector: R.I. Nishimoto, under coral fragments, 1 specimen (UCR-04). Gulf of Nicoya, Puntarenas, Collector: E. Grube (1858), 1 spec. Gulf of Nicoya, Bahía Herradura, November 8, 1983; Collector: Bernal Burgos; in sand, 10m depth taken by trawl net; 1 specimen (UCR-06). Bahía Brasilito, Playa Conchal, May 4, 1976; Collector: J. A. Vargas, in fine sand, 1 specimen (UCR-05).
Distribution: A intertidal and shallow water species mainly collected from the Caribbean and the Eastern Tropical Pacific from Costa Rica and the Galapagos Islands (Cutler *et al.* 1992; Cutler 1994). A single specimen has also been reported from the Ivory coast in the Eastern Atlantic.

Xenosiphon branchiatus (Fisher, 1895).
Material: Bahía Brasilito, Playa Conchal, May 4, 1976; Collector: J. A. Vargas, intertidal in fine sand; 2 specimens (UCR-09). Gulf of Nicoya, Playa Curú, December 6, 1984; Collector: J. Campos, in fine sand; 1 specimen (UCR-07). Bahía Tamarindo, Playa Tamarindo, August 27, 1977; Collector: J. Cortés, in sand; 1 specimen (UCR-08).
Distribution: This species is found in shallow water in the eastern Pacific from Ecuador to California (U.S.A) and has been reported in the western Atlantic from Puerto Rico and Florida (U.S.A) (Cutler 1994). It was first reported for Costa Rica by Cutler *et al.* (1992).

Siphonosoma vastum (Selenka & Bülow, 1883).

Material: Isla de Caño, September 10, 1980; Collector: C. Gamboa, under rocks and coral fragments; 2 specimens (UCR-10).
Distribution: Widespread in the Indo-West Pacific tropical region as far north as Japan (Cutler 1994). First reported from the eastern Pacific based on Costa Rican material by Cutler *et al*. 1992.

Order Golfingiiformes
E. Cutler & Gibbs, 1985
Family Golfingiidae
Stephen & Edmonds, 1972

Nephasoma pellucidum pellucidum (Keferstein, 1865)
Material: Gulf of Nicoya, Punta Morales, Playa Blanca, August 1, 1996; Collector: H. K. Dean, beneath rocks, intertidal; four specimens (UCR-44-01). Gulf of Nicoya, Islas Cortezas, August 5, 1996; Collectors: H. K. Dean and J. A. Vargas, beneath rocks, intertidal; 2 specimens (MCZ collection).
Distribution: This is a shallow water species with a wide distribution in the Atlantic Ocean and the Southern and Western Pacific Ocean (Cutler 1994). It was first reported from the eastern Pacific, and Costa Rica by Dean & Cutler (1998).

Family Phascolionidae
E. Cutler & Gibbs, 1985

Phascolion (Phascolion) strombus (Montagu, 1804)
Material: Gulf of Nicoya, R.V. Skimmer: Station 29, 9º54'55"N -- 84º45'15"W, Apr. 1, 1982; Collectors: H. K. Dean, D. Maurer and J. A. Vargas, taken with modified Smith-McIntyre benthic grab; 1 specimen, 18m, muddy sand, in an empty gastropod shell (UCR -49-01).
Distribution: A subtidal (1-4030 m depth) species widespread in the North Atlantic, Arctic, Caribbean, Mediterranean, Red Sea Gulf of Aden, Madagascar, South Africa and the Antarctic. It has been reported in the Pacific from Chile, the South Pacific, New Zealand and Japan (Cutler 1994). This is the first record for this species in the Tropical Eastern Pacific Ocean.

Class Phascolosomatidea
E. Cutler & Gibbs, 1985
Order Phascolosomatiformes
E. Cutler & Gibbs, 1985
Family Phascolosomatidae
Stephen & Edmonds, 1972

Phascolosoma (Phascolosoma) nigrescens (Keferstein, 1865).
Material: Gulf of Nicoya, Puntarenas; Collector E. Grube (1858); 1 specimen. Bahía Brasilito, Playa Conchal, May 1, 1973; Collectors: M. M. Murillo and J. A. Vargas, in tide pools, under rocks; 1 specimen (UCR- 13). Golfo Dulce, Sándalo, March 14, 1996; Collector: A. C. Fonseca, from coral rubble; 1 specimen (MCZ collection).
Distribution: A circumtropical, intertidal, shallow-water species previously reported from nume-rous sites in the Indian, Pacific, and Atlantic Oceans (Cutler 1994) including the Pacific coast of Costa Rica (Cutler *et al.* 1992).

Phascolosoma (Phascolosoma) perlucens Baird, 1868.
Material: Golfo de Papagayo, Islas Murciélagos, August 12, 1990; Collectors: R. Chaves, R. Soto and J. A. Vargas, in sandstone, intertidal; 8 specimens (UCR-11). Gulf of Nicoya, Punta Morales, February 8, 1991; Collectors: E. Cutler and J. A. Vargas, in sandstone, intertidal; 25 specimens (UCR- 12). Pacific coast, Punta Judas, August 25, 1991; Collector: A. Kastner, in hardened clay; 8 specimens (UCR-20). Cabo Blanco, Mal País, July 30, 1991; Collector: A. Kastner, in limestone; 2 specimens (UCR-21). Isla del Coco, Bahía Wafer, October 27, 1991; Collec-tor: M. Marín, under rocks, intertidal; 10 spe-cimens (UCR-22). Golfo Dulce, Rincón de Osa, July 17, 1996; Collectors: J.A. Vargas & H. K. Dean, between rocks, intertidal; 11 spe-cimens (UCR-48-01).
Distribution: An intertidal, shallow water, rock-boring species reported from the Caribbean, Western Pacific, Eastern Atlantic and Indian Oceans. Also collected in the eastern Pacific off Panama and Northern Mexico (Cutler 1994).

Antillesoma antillarum (Grube, 1858).

Material: Gulf of Nicoya, Puntarenas; Collector Grube (1858); 1 specimen. Bahía Brasilito, Playa Conchal, March 30, 1975; Collectors: M. M. Murillo and J. A. Vargas, in tide pools, under rocks; 1 specimen (UCR-14). Bahía Brasilito, Playa Conchal, April 4, 1985; Collector: J. A. Vargas, in tide pools, under rocks; 6 specimens (UCR- 15). Gulf of Nicoya, Punta Morales, February 8, 1991; Collectors: E. Cutler and J. A. Vargas, in sandstone, intertidal; 1 specimen (UCR-17). Pacific Coast, Playa Sámara, December 20, 1990; Collector: A. Kastner, in silicified limestone; 3 specimens (UCR-24). Cabo Blanco, Mal País, July 30, 1991; Collector: A. Kastner, in limestone; 3 specimens (UCR-28). Pacific Coast, Punta Judas, August 25, 1991; Collector: A. Kastner, in hardened clay; 8 speci-mens (UCR-28). Golfo de Papagayo, Islas Mur-ciélagos, August 12, 1990; Collectors: R. Cha-ves, R. Soto and J. A. Vargas, in sandstone, intertidal; 9 specimens (UCR-16). Golfo Dulce, Rincón de Osa, July 17, 1996; Collectors: J. A. Vargas & H. K. Dean, between rocks, intertidal; 1 Specimen (UCR-48-02).

Distribution: Cosmopolitan in tropical and sub-tropical intertidal and shallow waters, usually in rock or coral crevices. It has been collected from Florida to Brazil on the western Atlantic and from Sierra Leone and the Gold Coast on the eastern Atlantic as well as the Indian Ocean, and the Indo-Pacific. This species has been re-ported to range from Baja California to Panama in the Eastern Tropical Pacific (Cutler *et al.* 1992; Cutler 1994).

Apionsoma (Apionsoma) trichocephalus Sluiter, 1902.

Material: Gulf of Nicoya, R. V. Skimmer: Station: 7, 9º56'42"N -- 84º57'50"W, Dec 7, 1980; 1 specimen, 15m, muddy sand (USNM 80419). Station 13, 9º52'30"N -- 84º43'50"W, Oct. 7, 1980; 2 specimens, 26 m, (USNM 80420). Station 14, 9º57'05"N -- 84º45'30"W, Nov. 7, 1980; 4 specimens, 9 m, sandy mud (USNM 80421). Station 25, 9º 50'05"N -- 84º52'00"W, Oct. 7, 1980; 15 specimens, 20 m, mud/sand (UCR 18). Station 25, 9º50'05"N -- 84º52'00"W, Oct. 7, 1980; 9 specimens, 20 m, mud/sand (USN M 80422). Station 26, 9º51'50"N -- 84º53' 20"W, Oct. 7, 1980; 1 specimen, 17 m, muddy sand (USNM 80423). Station 29, 9º54'55"N -- 84º45' 15"W, Nov. 7, 1980; 9 specimens, 18 m, muddy sand (USNM 80424 & 80424). Station 30, 9º54' 40"N -- 84º45'50" W, Nov. 7, 1980; 4 specimens, 18 m, muddy sand (USNM 80426). Station 31, 9º44'00"N -- 84º59'25"W, Sep. 7, 1980; 2 specimens, 20 m, mud/sand (USNM 80427). Station 32, 9º53'-47"N -- 84º49'35"W, Oct. 7, 1980; 1 specimen, 24 m, mud/sand (USNM 80428). Station 36, 9º55'32"N -- 84º45' 20"W, Sep. 7, 1980; 1 specimen, 18m, sandy mud (USNM 80429). Station 36, 9º55' 32"N -- 84º45'20"W, Nov. 7, 1980; 2 specimens, 18 m, sandy mud (USNM 80430). Station 44, 9º59'17"N -- 84º54' 25" W, Dec. 7, 1980; 1 specimen, 24 m, muddy sand (USNM 80416). Station 47, 10º06'08"N – 85º01'10"W, Dec.7, 1980; 1 specimen, 7 m, mud (USNM 80417). Collectors: H. K. Dean, D. Maurer and J. A. Vargas, taken with a Smith-McIntyre modified benthic grab.

Distribution: A circum-tropical intertidal, sha-llow-water species usually taken on sandy se-diments, recorded from the Southeastern Uni-ted States and Gulf of Mexico, West and South Africa, Indian Ocean, Indo-Pacific, Japan, Australia and New Zealand (Cutler 1994). First reported from the eastern Pacific, and Costa Rica, by Cutler *et al.* (1992).

Apionsoma (Edmondsius) pectinatum (Kefers-tein, 1867)

Material: Gulf of Nicoya, Bahía Herradura, October 16, 1994; Collector: C. Gamboa, intertidal, beneath rocks at low tide; 1 specimen (UCR-45-01). Golfo Papagayo, South end of Playa Panama, Aug, 1999; Collectors: J. A. Vargas & H. K. Dean, rocky intertidal; 1 specimen (MCZ Collection).

Distribution: An uncommon circumtropical, shallow-water species from the Caribbean, A-zores, Mauritius, Mayotte, Indonesia, Malaya, East China Sea. It is previously recorded in the eastern Pacific from Panama to Mexico (Baja California) (Cutler 1994; Dean & Cutler 1998).

Class Phascolosomatidea
E. Cutler & Gibbs, 1985
Order Aspidosiphoniformes
E. Cutler & Gibbs, 1985
Family Aspidosiphonidae
Baird, 1868

Aspidosiphon (Aspidosiphon) elegans (Chamisso & Eysenhardt, 1821)
Material: Golfo Dulce, Islotes, 1987-1989 and Sándalo, Jan. 1993; from dead coral colonies (*Porites lobata* Dana 1846); 12 specimens (UCR-42 & MCZ collection).
Distribution: Widespread in the Indian & western Pacific Ocean, the Red Sea, Israel, and the Caribbean From Brazil to the Florida Keys (Cutler 1994). First reported from Costa Rica by Fonseca & Cortés (1998).

Aspidosiphon (Aspidosiphon) gracilis schnehageni (W. Fischer, 1913).
Material: Gulf of Nicoya, R.V. Skimmer: Station 29, 9º54'55"N -- 84º45'15"W, Nov. 7, 1980; 1 specimen, 18 m, muddy sand (USNM 80411).
Distribution: This subspecies is known from gastropod shells collected in the shallow waters of Chile & the Pacific coast of Guatemala (Cutler 1994). This is the first record of this species from Costa Rica.

Aspidosiphon (Aspidosiphon) muelleri Diesing, 1851.
Material: Gulf of Nicoya, R.V. Skimmer: Station 2, 9º55'28"N -- 84º52'05"W, Dec. 7, 1980; 1 specimen, 18 m, muddy sand (USNM 80412). Station 27, 9º51'57"N -- 84º50'50"W, Oct. 7, 1980; 2 specimens, 12 m, muddy sand (USNM 80431).
Distribution: Known from the Eastern Atlantic, Mediterranean, Adriatic, Aegean, Red Sea and Gulf of Aden; also the east coast of Africa and scattered records in the Western Pacific from Japan to Australia (Cutler 1994). This is the first record for this species in Costa Rica. The only previous record from the Eastern Pacific was from the Juan Fernandez Island off Chile.

Aspidosiphon (Paraspidosiphon) parvulus Gerould, 1913.
Material: Caribbean Coast, Cahuita National Park, May 28, 1987; Collector: M. M. Murillo, inside coral heads; 3 specimens (UCR-19). Station 37, 9º57'38"N -- 84º 48'20"W, Jul 12, 1980; 1 specimen 14 m, muddy sand (MCZ collection).
Distribution: Reported from corals in the Western Atlantic Ocean from Cape Hatteras (U.S.A) through the Caribbean to Venezuela (Cutler and Cutler 1990; Cutler *et al*. 1992).

Phylum: Echiura

Order: Echiuroinea
Family: Echiuridae
Subfamily: Thalassematinae

Thalassema steinbecki Fisher, 1946.
Material: Gulf of Nicoya, Punta Morales, Playa Blanca, August 1, 1996; Collectors: H. K. Dean & S. Solano, intertidal, under rocks; 3 specimens (UCR-1-01 and UCR-2-01; MCZ collection).
Distribution: Known from the Eastern Pacific from California to Ecuador, reported from Costa Rica by Dean & Cutler (1998).

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