

Original article

First Record of *Parasphaerosyllis malimalii* (Polychaeta: Syllidae) from Gorgona Island (Colombian Pacific)

Primer registro de *Parasphaerosyllis malimalii* (Polychaeta: Syllidae) en la isla Gorgona (Pacífico colombiano)

Edgardo Londoño-Cruz^{1,2,*}, María Fernanda Cardona-Gutiérrez¹,
Mario H. Londoño-Mesa³

¹ Grupo de Investigación en Ecosistemas Rocosos Intermareales y Submareales Someros (LITHOS), Universidad del Valle, Cali, Colombia

² Instituto de Ciencias del Mar y Limnología (INCIMAR), Universidad del Valle, Cali, Colombia

³ Grupo de Investigación LimnoBasE y Biotamar, Instituto de Biología, Universidad de Antioquia, Medellín, Colombia

Abstract

A new polychaetes species, *Parasphaerosyllis malimalii* (Syllidae), inhabiting coral colonies of *Pocillopora* spp., was described on Coiba Island (Pacific coast of Panama). For a more precise description and additional ecological remarks, we examined and measured 73 *P. malimalii* specimens found in dead fragments of *Pocillopora* spp. in the context of two research projects on bioerosion in Gorgona Island (Colombian Pacific coast) between March 1998 and December 1999, and June 2015 and August 2018. The average (\pm SD) length (in mm) of the specimens from the first (n=38) and second (n=35) projects were 2.84 (0.42) and 8.86 (3.24), respectively. The largest specimen was collected in the second project and measured 15.4 mm. The pygidium of this species has a pair of cirri slightly thicker and longer than the parapodial cirrus. These polychaetes usually inhabit dead corals and nest in vacant galleries left by borers. This record extends *P. malimalii* distribution range southward to Gorgona Island. We are confident to find the species in other coral reefs in the area, and we propose to circumscribe its distribution to the Tropical Eastern Pacific.

Keywords: Taxonomic description; *Pocillopora* spp.; Coral reefs; Cryptofauna; Tropical Eastern Pacific.

Resumen

Una nueva especie de poliqueto, *Parasphaerosyllis malimalii* (Syllidae), fue descrita habitando colonias del coral *Pocillopora* spp. en la isla Coiba (costa pacífica de Panamá). Para mejorar su descripción y proporcionar características ecológicas adicionales, se examinaron y midieron 73 especímenes de *P. malimalii* encontrados en fragmentos muertos de *Pocillopora* spp en el marco de dos proyectos de investigación sobre bioerosión coralina en la isla Gorgona (costa pacífica colombiana) durante marzo de 1998 y diciembre de 1999 y junio de 2015 y agosto de 2018. La longitud (mm) promedio (\pm DE) de los especímenes del primer (n=38) y segundo (n=35) proyectos fue de 2,84 (0,42) y 8,86 (3,24), respectivamente. El espécimen más grande se recolectó en el segundo proyecto y midió 15,4 mm. El pigidio de esta especie tiene un par de cirros ligeramente más gruesos y largos que los cirros parapodiales. Estos poliquetos habitan principalmente coral muerto y anidan en las galerías vacías dejadas por organismos perforadores. Con este registro, el rango de distribución de *P. malimalii* se extiende al sur hasta la isla Gorgona. Confiamos en que la especie habite en otros arrecifes coralinos del área, así que proponemos que su distribución se circunscriba al Pacífico Este Tropical.

Palabras clave: Descripción taxonómica; *Pocillopora* spp.; Arrecife de coral; Criptofauna; Pacífico Este Tropical.

Citation: Londoño-Cruz E, Cardona-Gutiérrez MF, Londoño-Mesa MH. First Record of *Parasphaerosyllis malimalii* (Polychaeta: Syllidae) from Gorgona Island (Colombian Pacific). Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales. 48(186):79-85, enero-marzo de 2024. doi: <https://doi.org/10.18257/raccefyn.1982>

Editor: Hernando Campos

***Corresponding autor:**
Edgardo Londoño-Cruz;
edgardo.londono@correounivalle.edu.co

Received: August 31, 2023

Accepted: January 23, 2024

Published on line: February 7, 2024



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Introduction

According to several authors (**Zapata & Robertson**, 2007), the inventory of marine species is far from being complete, and almost daily new species or records are reported for specific regions. Although all taxa listings are incomplete, the distribution of the “lack of knowledge” is biased towards certain groups that contribute more to the list of new species than others. These groups (*e.g.*, mollusks in marine ecosystems and insects in terrestrial ones) support more “pressure” on researchers and fans, and this, among others, may explain the imbalance between taxa in the report of new species (**Bouchet**, 2006).

It is believed that most groups of marine organisms have a huge potential to contribute to the lists of new species and the efforts to know the total number of species. Polychaetes are a highly diverse and ecologically important group with around 25000 species (**Dean et al.**, 2011, **WoRMS**, 2023). They can outnumber common groups like mollusks and crustaceans in some habitats (*e.g.*, sediments). Still, they are frequently overlooked due to the cryptic lifestyle of most species (**Londoño-Cruz et al.**, 2003). This allows for increasing the list of known species for the group. Although Colombia is recognized as a highly biodiverse country, the reporting of new species is not as common as would be expected. According to **Bouchet** (2006; see Fig 2.3), the scarcity of new findings in developing countries like Colombia might be due to low research funds for this kind of task.

At the beginning of the century, **Capa et al.** (2001a) described a new species of polychaete (*Parasphaerosyllis malimalii*) belonging to the Syllidae family inhabiting coral colonies of the genus *Pocillopora* on Coiba Island (Panama Bight region, Pacific coast). Regardless of recent efforts (**Cardona-Gutiérrez & Londoño-Cruz**, 2020a), the knowledge of the polychaete fauna in the Colombian Pacific coast is still poor, including relatively well-studied localities like Gorgona Island (in the same biogeographic region as Coiba Island). Here we report for the first time on the island the presence of this relatively common species of polychaete in coral reefs to complement *P. malimalii* description and provide some ecological remarks on the species (*e.g.*, habitat preferences). This record extends the distribution range for the species from Coiba to Gorgona Island and perhaps to the entire Tropical Eastern Pacific (TEP).

Materials and methods

During 1998-1999 and 2015-2018, two independent research projects on coral reef bioerosion were carried out on Gorgona Island, Pacific coast of Colombia. Due to the lack of knowledge of this group and the focus on boring organisms (including polychaetes), specimens of *P. malimalii* found during the first project were overlooked. During a visit of Guillermo San Martín (co-author of *P. malimalii* original description) to Universidad del Valle (Cali, Colombia), preserved samples from the first project were rechecked, and some specimens of the species previously described on the Panamanian island were found, a finding reconfirmed with fresh ones collected during the second research project.

The samples were collected from dead branches of corals (*Pocillopora* spp.) in Playa Blanca and La Azufrada fringing reefs in the southeast of Gorgona Island (2°58'10" N; 78°11'05" W, on the Colombian Pacific) (**Figure 1**) between March 1998 and December 1999 (P1) and between June 2015 and August 2018 (P2). The experimental units were deployed at depths between 1 and 4 meters during low tide (5 to 8 meters in high tide); after collection, they were examined, and the associated cryptofauna (including the worms) was sorted and identified (**Londoño-Cruz**, 2001; **Londoño-Cruz et al.**, 2003; **Cardona-Gutiérrez & Londoño-Cruz**, 2020a, b). In these projects, 38 (P1) and 35 (P2) *Parasphaerosyllis malimalii* Capa, San Martín & López, 2001 (Syllidae, Polychaeta) specimens were found.

The specimens were described, and photographs of the body and setae were taken (**Figure 2**). Then, they were hydrated with distilled water (approx. 4 hrs), cleared using chloral hydrate, and stained with acid fuchsin at the same time for approximately 40 min.



Figure 1. Sites (Playa Blanca and La Azufrada fringing reefs) in Gorgona Island (Colombian Tropical Eastern Pacific – TEP), where *P. malimalii* specimens were found and collected

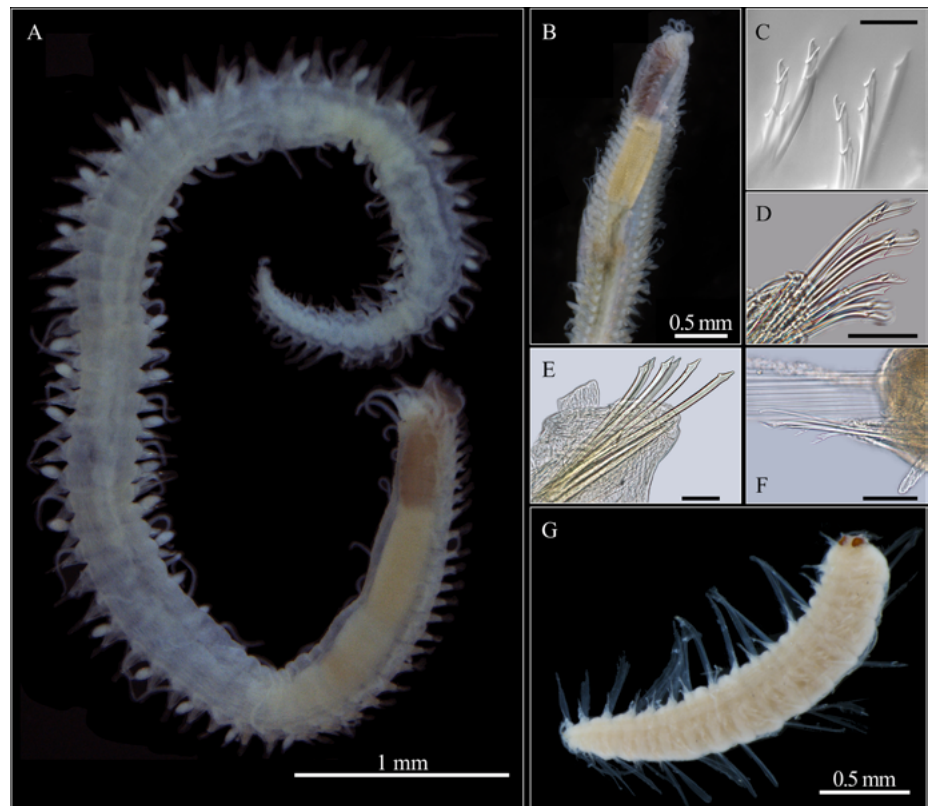


Figure 2. *Parasphaerosyllis malimalii*: **A.** Complete specimen. **B.** Anterior end and pharynx. **C.** Anterior most neuropodial falcigers. **D.** Anterior neuropodial falcigers. **E.** Posterior neuropodial hooks. **F.** Epitoke. **G.** Epitoke middle neuropodial falcigers

Finally, they were dehydrated with copal-phenol (approx. 30 min) and mounted on slides with Canadian balsam. The P1 project specimens were lost; however, their data (i.e., length) was saved in a database. The P2 project specimens were deposited in the Reference Collection of Marine Organisms at Universidad del Valle in Cali, Colombia (CRBMUV), under voucher numbers UNIVALLE: CRBMUV:2017-001 to UNIVALLE: CRBMUV:2017-018. Holotype and paratype (from Coiba Island, Panama) were deposited at the National Museum of Natural Science in Madrid, Spain (MNCN 16.01/6107).

Results

Taxonomy

Class Polychaeta Grube, 1850

Order Phyllodocida Dalles, 1962

Family Syllidae Grube, 1850

Genus *Parasphaerosyllis* Monro, 1937

Species *Parasphaerosyllis malimalii* Capa, San Martín & López, 2001

General description

Following **Capa et al.** (2001a), species belonging to *Parasphaerosyllis* are characterized by a prostomium wider than long with two pairs of eyes and three monoliform antennae; palps oval, slightly longer than prostomium, fused at their bases. They present bulbous, lemon-shaped dorsal cirri alternated with moniliform cirri on the middle posterior part of the body. Specifically, *P. malimalii* is characterized by anterior parapodia, each with 6-7 compound chaetae with bidentate, falcigerous blades, distal tooth acute and proximal one smaller, with short spines. The number of chaeta on each parapodium progressively decreases, having enlarged shafts in the dorsal ones and no blades. The midbody posterior region has long moniliform cirri alternating with other dorsal cirri, ovoid and bulbous, with an unarticulated terminal knob. **Capa et al.** (2001a) mention that the first bulbous cirri appear on chaetigers 20 (left side) and 24 (right side) and on paratype bulbous cirri on chaetigers 25 and 27, respectively. Our specimens match the paratype's description in the first bulbous cirri on chaetigers 25 (left side) and 27 (right side). Middle and posterior segments only have simple, very thick chaetae, with 3-5 on each parapodium, and two aciculae in each anterior parapodium. The pharynx extends through nine segments and the pharyngeal tooth is on the anterior end. While in **Capa et al.** (2001a) specimens, the proventriculus extends through six chaetigers, in ours, it extends through eight. They have thick, simple chaetae on the midbody and posterior parapodia and shorter blades of compound chaetae, with very small proximal tooth, as in **Capa et al.**'s specimens (2001a).

Although no statistical analyses were performed for this work, it is clear from our data that the average (\pm SD) length (mm) of the P2 project specimens, 8.86 (3.24, n=35), was much larger than that of P1 specimens, 2.84 (0.42, n=38); the largest worm collected at Playa Blanca fringing reef measured 15.4 mm. The average size (6.6 mm), then, of the type material (two specimens: the holotype and one paratype) is within our specimens' size range.

All specimens showed clear segmentation, with segments as long as twice the notopodial length (**Figure 2A**); short palps and anterior antennae (**Figure 2A, B**); pharynx evident; alternating long notopodial cirri with short, bulb-like notopodial cirri in contiguous segments from middle (about segment 21) to posterior end. Notopodia with capillary chaetae, anterior most neuropodia with short-blade falcigers, and subsequent neuropodia with long-blade falcigers (**Figure 2C, D**); middle and posterior neuropodia with simple hooks without blade, a pair of aciculae below them (**Figure 2E**), and pygidium with a pair of cirri slightly thicker and longer than the parapodial cirri. Epitoke appears short, with two big amber eyes (**Figure 2F**), the first four segments with short capillary notochoetae and, after, capillary chaeta as long as four times the notopodial length, and neuropodial falcigers with short blade (**Figure 2G**).

Discussion

Genus *Parasphaerosyllis* Monro, 1937 comprises only five described species: *P. ezoensis* Imajima & Hartman, 1964; *P. indica* Monro, 1937; *P. malimalii* Capa, San Martín & López, 2001; *P. setoensis* Imajima, 1966, and *P. uschakovi* (Chlebovitsch, 1959) (Read & Fauchald, 2021). The genus' main characteristic is the presence of bulbous, lemon-shaped dorsal cirri alternating with moniliform cirri towards the middle-posterior body region (Capa *et al.*, 2001a; San Martín *et al.*, 2008). *Parasphaerosyllis malimalii* was first found and described from samples of *Pocillopora* corals collected at the Coiba National Park in Panama. The description was based only on two specimens with no posterior end.

From the records, we can say that *P. malimalii* inhabits coral reefs. All three specimens collected (Capa *et al.*, 2001b, and the two projects in this paper) were associated with *Pocillopora* spp. colonies or fragments of coral branches from species belonging to this genus. It is hard to state that *P. malimalii* inhabits exclusively corals of this genus, but pocilloporids are the most common and abundant TEP corals (Londoño-Cruz *et al.*, 2003), so there is a positive link. It is worth noting that the individuals found at Gorgona Island appeared in the experimental units exposed for one year or longer in all the zones in both reefs (Londoño-Cruz, 2001). It was also common at a reef patch (Gorgonilla Island patch reef), which may reflect *P. malimalii* selectivity for older (perhaps degraded) reef substrate and the fact that it is not an early colonizer, preferring experimental units highly bored and covered with coralline algae instead of green and brown fresh algae or live tissue. The galleries (tubes) where *P. malimalii* was found were broader than the specimens, and, therefore, the species can be classified as a nester, i.e., those using cavities made by borers (Cantera *et al.*, 2003; Hutchings, 2008). The Panama specimens were found in a similar habitat: dead coral covered with coralline algae (Capa *et al.*, 2001a). Another interesting fact is that the Playa Blanca and La Azufrada fringing reefs (Gorgona Island) and the Rosario reef (northern Coiba Island) are leeward reefs so we may assume that they prefer relatively calm environments.

Finally, polychaetes from the Colombian Pacific are poorly studied. Up to date, there are only seven Syllidae species reported, six occurring in Gorgona Island: *Branchiosyllis exilis* (Gravier, 1900); (as *Syllis fuscoturata* in Monro, 1933); *Haplosyllis spongicola* (Grube, 1855); *Syllis cornuta* Rathke, 1843; *S. gracilis* Grube, 1840; *S. hyalina* Grube, 1863, and *Trypanosyllis taeniaeformis* (Haswell, 1886) (Herrera, 2011). This number is low compared to the records in the Galapagos (Ecuador) and Coiba (Panama) islands, with more than 40 species in each location (Blake, 1991; Westheide, 1991; Capa *et al.*, 2001b; Salazar-Vallejo & Londoño-Mesa, 2004; Capa & Hutchings, 2006) and Cocos Island (Costa Rica), with 20 recorded species (Dean *et al.*, 2011), most of them present in the three islands. Gorgona, Coiba, Galapagos, and Cocos islands belong to the same biogeographical region and are part of the TEP Biological Corridor, so they are expected to have similar marine fauna because of the seasonal geostrophic currents (Rodríguez-Rubio *et al.*, 2003) connecting the marine biota on this region. With this new record, the distribution range of *P. malimalii* is extended hundreds of nautical miles to the south; we are confident that it inhabits other coral reefs in the area for which we propose to circumscribe its distribution to the entire TEP, at least where coral reefs exist, and branched pocilloporid coral species are present and abundant. It is not strange for polychaetes to have large distribution ranges since they usually spend long periods as plankton and can be dispersed over large distances depending on ocean circulation (Caley *et al.*, 1996; Ekman, 1996). However, further research is required to unambiguously confirm the presence of this species at the locations we hypothesize it must exist since Dean *et al.* (2011) did not record it at Cocos Island.

Acknowledgments

We thank Guillermo San Martín (Universidad Autónoma de Madrid) for identifying the P1 project specimens and Dr. Ranulfo González for helping with the photographs.

Universidad del Valle provided logistical support to E. Londoño-Cruz and M.F. Cardona-Gutiérrez (contribution No. 25, Instituto de Ciencias del Mar y Limnología (INCIMAR), Universidad del Valle).

Author contributions

ELC conceived and executed the research projects in whose context the samples presented in this manuscript were collected. ELC and MFCG executed field activities, collection, and identification of specimens. MFCG and MHLM corroborated species identification and completed their description. ELC wrote the manuscript, and MFCG and MHLM proofread and reviewed it.

Conflict of interests

The authors declare no conflicts of interest.

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