



Chrysopetalidae Ehlers, 1864 (Annelida: Polychaeta) from Venezuela

OSCAR DÍAZ-DÍAZ¹, YURUANÍ FUENTES-CARRERO²
& VALENTINA VANEGAS-ESPINOSA³

¹ Universidad de Oriente, Instituto Oceanográfico de Venezuela, Dpto. Biología Marina. E-mail: ofdiazd@gmail.com

² Universidad de Oriente, Núcleo de Nueva Esparta, Escuela de Ciencias Aplicadas del Mar, Venezuela.

³ Universidad de Oriente, Oceanográfico de Venezuela, Postgrado en Ciencias Marinas.

Abstract. Chrysopetalidae Ehlers, 1864 are small worms characterized by the presence of gold colored flattened notochaetae covering the dorsal surface in many species. Twenty-two species in nine genera have been recorded from the tropical coasts of America, and eleven species are recognized in the Great Caribbean region. In Venezuela, up until now, only *Bhawania goodei* Webster, 1884 has been recorded. The material examined was collected over several systematic surveys carried out in shallow waters (1 - 2 m deep) on rocky and algal substrata, at 15 locations along Venezuelan coasts. This study contributes to the increasing knowledge of this family in Venezuela.

Key words: polychaetous, Phyllodocida, diversity, Great Caribbean region, taxonomy

Resumen. Chrysopetalidae Ehlers, 1864 (Annelida: Polychaeta) de Venezuela. La familia Chrysopetalidae Ehlers, 1864 está constituida por un grupo de gusanos marinos que se caracterizan por presentar notosetas de forma aplanada y de color dorado que cubren el dorso. Veintidós especies, en nueve géneros han sido registradas para las costas tropicales de América, y once para la región del Gran Caribe. En Venezuela, hasta la presente revisión tan sólo *Bhawania goodei* Webster 1884 había sido registrada. El material examinado fue recolectado en aguas someras (1 - 2 m) sobre substrato rocoso y algas, en 15 estaciones a lo largo de las costas venezolanas. Este estudio contribuye a incrementar el conocimiento de esta familia en Venezuela.

Palabras clave: poliquetos, Phyllodocida, diversidad, Gran Caribe, taxonomía

Introduction

Chrysopetalidae are generally small worms (adults with length of 1mm, others may reach up to 50 mm); they may have less than 20 segments (*Dysponetus* Levinsen 1879) or over than 300 (*Bhawania* Schmarda 1861), and are characterized by the presence of flattened, gold colored notochaetae covering the dorsal surface in species the most genera. Rouse & Pleijel (2001) divided the family into two groups considering the arrangement and morphology of the notochaetae. Chrysopetalids live mainly in coastal zones and are associated with rocky habitats, reefs and sandy bottoms. *Thrausmatos* Watson 2001 species, however, has been reported in hydrothermal vents and the cold seeps of the southwest Pacific (Papua, New Guinea) (Watson 2001), and *Strepternos* Watson Russell (in

Bhaud & Cazaux, 1987) is recorded from abyssal zones (Watson-Russell *In*: Bhaud & Cazaux 1987). A partial review of the family was undertaken by Perkins (1985) who described two new genera, *Hyalopale* Perkins 1985 and *Treptopale*, and identified other species close to Florida. Other important studies include: Gathof (1984) who examined specimens from the Gulf of Mexico and reported a previously undescribed species (*Paleanotus* sp.); San Martín (1986) who erected a new genus and species, *Acanthopale perkinsi*, from Cuba; Watson-Russell (1986) who made valuable contribution in erecting the new genus *Paleaequor* to include the two species described previously as *Paleanotus heteroseta* (Hartman 1945) and *Bhawania brevis* (Gallardo 1968), and also Watson-Russell (*in* Bhaud & Cazaux 1987) provided

identification keys for larvae and juvenile worms. This review led to the description of *Strepternos didymopyton* who also put forward a new genus *Arichlidon* (Watson-Russell 1998) to include *Bhawania reysi* (Katzmann, Laubier & Ramos 1974). A total of 42 nominal species in 12 genera are recognized in the Chrysopetalidae (Rouse & Pleijel 2001, Watson-Russell 2000) and of these, 22 species in nine genera have been recorded from the tropical coasts of America. Mora-Vallín (2009) enlisted the presence of 14 species in the Great Caribbean region, but warned that three of these might be the same as one of the other species collected or undescribed species. In this paper we characterize taxonomically three species of chrysopetalids from the Venezuelan coast, thereby increasing our knowledge of the diversity of polychaetes in this country.

Materials and Methods

The material examined was collected over several systematic surveys carried out in shallow waters (1 - 2 m deep) on rocky and algal substrata, at 15 locations (Fig. 1). Specimens were collected following the protocol described by Campos-Vásquez *et al.* (1999) and Fuentes (2011) and preserved in 70% ethanol. Semi-permanent microscope preparations of parapodia and chaetae were made in glycerin. Specimens were characterized according to the methodology described by Díaz & Liñero-Arana (2000) and the drawings were made following Coleman (2006). The examined and identified material is deposited in the Collection of Polychaeta at the Laboratorio de Biología de Poliquetos from Instituto Oceanográfico de Venezuela. A key to the species identified in this study is provided.

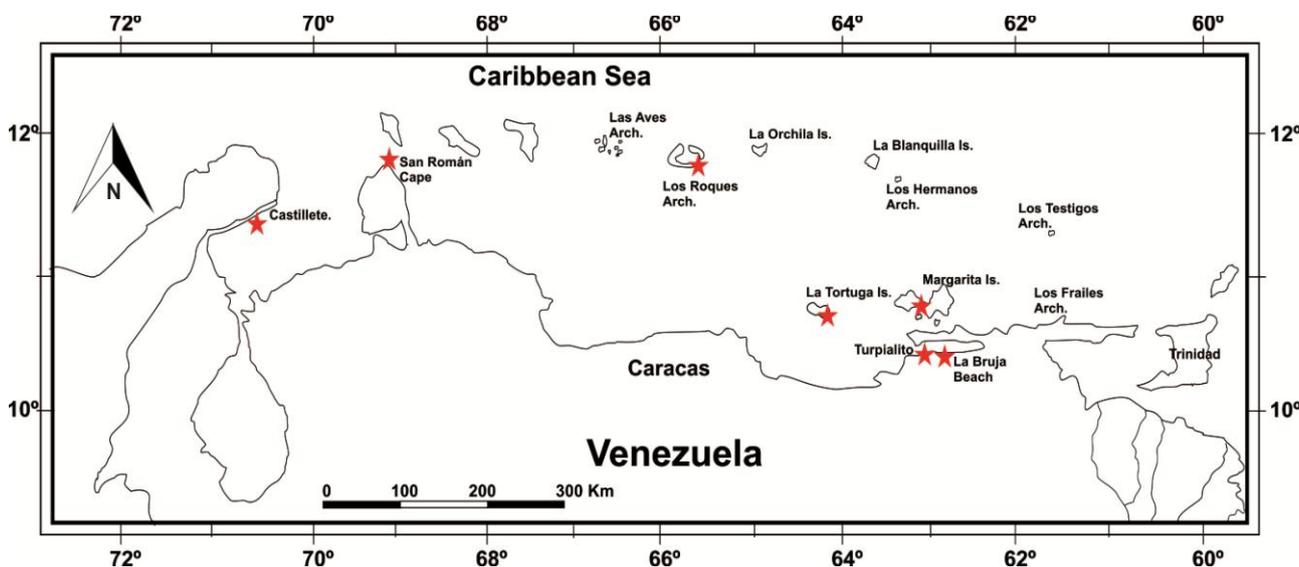


Figure 1. Study area map showing the location of the stations surveyed (red stars).

Results and Discussion

A total of 119 specimens of Chrysopetalidae family were examined comprising three species belonging to three genus the species identified were *Bhawania goodei* Webster, 1884, from northeastern Venezuela, associated with coral substrate; *Chrysopetalum floridanum* Perkins, 1985 collected from the Paraguaná Peninsula, Los Roques Archipelago and La Tortuga Island, and *Acanthopale cf. perkinsi* San Martín, 1986 from La Tortuga Island associated with the algae *Halimeda* sp. *B. goodei* showed the highest abundance with 98 individuos, *C. floridanum* with 17 and *A. cf. perkinsi* three specimens.

Key for species recorded from Venezuela

- 1a.-Nuchal fold present; prostomium visible between paleae of anterior segments..... 2
- 1b.-Nuchal fold absent; prostomium completely hidden by paleae of anterior segments.....
- *Bhawania goodei* Webster 1884
- 2a (1a).- Palea slender not covering dorsal midline, pygidium with a bulb or anal cirrus
- Acanthopale* San Martín 1986..... A. cf. *perkinsi* San Martín 1986.
- 2b (1a).- Paleae flattened, covering the entire dorsum, including dorsal midline; pygidium with

two anal cirri, long or short..... *Chrysopetalum*
Ehlers 1864 *C. floridanum* Perkins 1985.

Genus *Bhawania* Schmarda, 1861

Bhawania goodei Webster, 1884

Bhawania goodei Webster, 1884: 308-309, lam. 7I, figs. 10-15; Day. 1967: 118-19, fig. 2.1a-f; Fauchald 1977: 10; Perkins 1985: 895-899, fig. 21a-g; Ibarzábal 1986: 4; San Martín 1986: 18; Liñero-Arana 1999: 55, fig. 2.

Material examined: Six specimens from the Paraguaná Peninsula (Falcón state); two from Castillete (Zulia state); 12 from Bajo Cambuyo (Nueva Esparta state), 16 from Turpialito (Gulf of Cariaco), 33 from the Los Roques Archipelago; 25 from La Tortuga Island; four from La Bruja beach (Gulf of Cariaco).

Remarks. *Bhawania goodei* seems to be the most abundant and frequent species along the Venezuelan coast and the specimens collected were associated with a great variety of substrates: specimens from Castillete (Zulia) and the Cape of San Román (Falcón) were found on coral rock and in beds of *Thalassia testudinum*, those from the eastern region (Sucre and Nueva Esparta) were associated with mangrove roots, bivalves, rocky substrates, *Millepora alcicornis* and macroalgae, specimens collected from La Tortuga Island were found with *Halimeda* sp., and those from Los Roques were mainly associated with coral rocks although Liñero-Arana (1999) also recorded these last on the bivalve *Pernaviridis*.

Distribution. Atlantic coast of America: Bermuda Gulf of Mexico, from Florida to North Carolina (Perkins 1985); Cuba Venezuela (Liñero-Arana 1999); south coast of the Iberian Peninsula and probably the Atlantic and Indian coasts of Africa and the Red Sea (San Martín 1986).

Genus *Chrysopetalum* Ehlers, 1864

Chrysopetalum floridanum Perkins, 1985

Figure 2A-J

Chrysopetalum floridanum Perkins, 1985: 886-890, figs. 16-17, 18A-C. Mora-Vallín 2009: 127.

Material examined. Eighteen specimens. LBP-Ch0021 (13) specimens, Paraguaná Peninsula found on coral rock, LBP-Ch0021 (5) specimens, La Tortuga Island, associated with *Halimeda* sp.

Characterization. Largest complete specimen 10 mm long, 1 mm wide and with 42 chaetigers. Prostomium with two pairs of eyes on both the anterior and the posterior end; median antenna short and distally blunt, located dorsally behind the first pair of eyes (Fig. 2A); lateral antennae on anterior

end; caruncle partially covering the posterior end of the prostomium; palps originating ventrally near the anterior margin of the prostomium. Parapods 1 and 2, uniramous. Parapodia biramous from the third chaetiger (Fig. 2B). Notochaetae consisting of paleae and spines (Fig. 2C-F). Tips of paleae entire with dorsal surface knobbed; middle paleae from middle segments with obtuse tips and 9-10 internal ribs; lateral paleae decreasing to spine anteromedially. Neurochaetae falcigers with moderately long blade, inner margin serrate, serration extending near to falcate tip, upper few distinctly longer than middle and lower ones (Figs. 2G-I). Pygidium with two long anal cirri (Fig. 2J).

Variation. Two specimens complete; 6-7 mm long, 1 mm wide and with 36-39 segments; three specimens with one pair of eyes and five without them. One specimen without biserrate paleae in midline palea group.

Remarks. Six chrysopetalid species have been recorded for the Great Caribbean, but *C. occidentale* Johnson 1897 is considered questionable to region, because that its type locality is California, but is very close to *C. floridanum*, the difference between these is that in the former, the inner serration on the falciger blade does not extend to near the falcate tips, the median antenna is directed anteriorly and the anterior eyes are oval. Perkins indicated that the arrangement of the anterior notochaetae on the middle segments is the same for both species, but various forms of these chaetae are more often absent in *C. floridanum*. For the other species recorded for the area, *C. floridanum* differs *C. heteropalea* Perkins 1985 because the latter has transverse ridges paleas; differs from *C. elegans* Bush, in Verrill 1900 and *C. eurypalea* Perkins 1985 because the first has glands between noto and neuropodia zone, while the second has ciliated this zone, whereas *C. floridanum* has neither glands nor cilia between noto and neuropodia area but if has glands in neuropodia. Finally *C. floridanum* differs *C. hernancortezae* Perkins 1985, because this has tipped paleae uncovered and glands on dorsal cirrophorous.

Distribution. Florida (Perkins 1985), Great Caribbean region (Mora-Vallín 2009) and Venezuela.

Acanthopale cf. *perkinsi* San Martín, 1986

Figure 3 A-F

Acanthopale perkinsi San Martín, 1986:306-312, figs. 6-11. Mora-Vallín 2009: 125

Material examined. Three specimens from La Tortuga Island associated with coralline algae (*Halimeda* sp.).

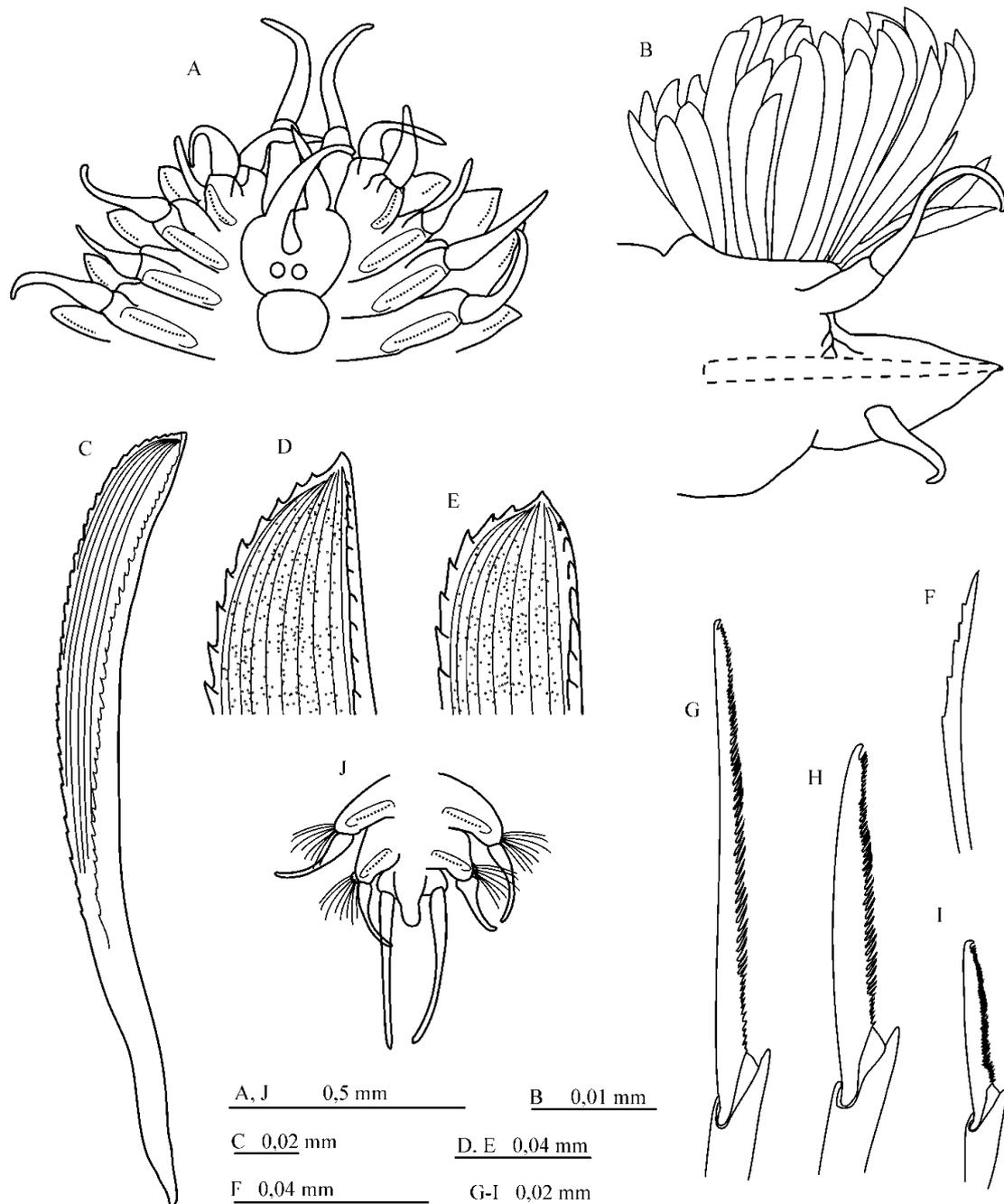


Figure 2. *Chrysopetalum floridanum*. A) Anterior end, dorsal view; B) median parapodium, posterior view; C) superior palea from median parapodium; D) distal end of superior palea; E) distal end of median palea; F) inferior palea or acicular; G) superior falciger; H) medial falciger; I) inferior falciger; J) posterior end, ventral view.

Characterization. All specimens incomplete, longest anterior fragment with 21 chaetigers. Body dorso-ventrally flattened. Prostomium rounded, partially covered by the notochaetae of anterior chaetigers. Two pairs of eyes. Median antenna short, emerging in front of the eyes (Fig. 3A). Two lateral antennae, twice as long as the median antenna but shorter than the tentacular cirri. Caruncle oval, posterior to prostomium. First segment achaetous, reduced dorsally, with a pair of dorsal and ventral cirri.

Second and third segments biramous, each with noto-neurochaetae and dorsal and ventral cirri. Notopodia with long and slender dorsal cirri, slightly bulbous basally; long, oval cirrophores; ventral cirri shorter than dorsal ones, and three groups of notochaetae (anterior, lateral and posterior (Fig. 3B)). All paleae very slender, two alternating series of triangular curved spines arranged in two perpendicular planes (Fig. 3C-E). In anterior group of paleae, closest to the middle of the body, spines

concave distally. Notochaetae in the anterior group, numbering 8-10 per group, thick and arranged in a broad row with tips curved towards the dorsal midline of the body; those in the lateral group, shorter and narrow, originating just in front of the anterior group above the notoaciculum and curving laterally. Notochaetae in the posterior group have two centers of origin; a median and lateral; those

emerging from the median center are thin and very long; up to three times as long as the paleae of the anterior group; those emerging from the lateral center are similar, but shorter and thinner, oriented laterally. Neurochaetae with strongly heterogomph shaft; articles long and distally bidentate, with two hooked teeth, secondary tooth larger than terminal one (Fig. 3F). Posterior end not observed.

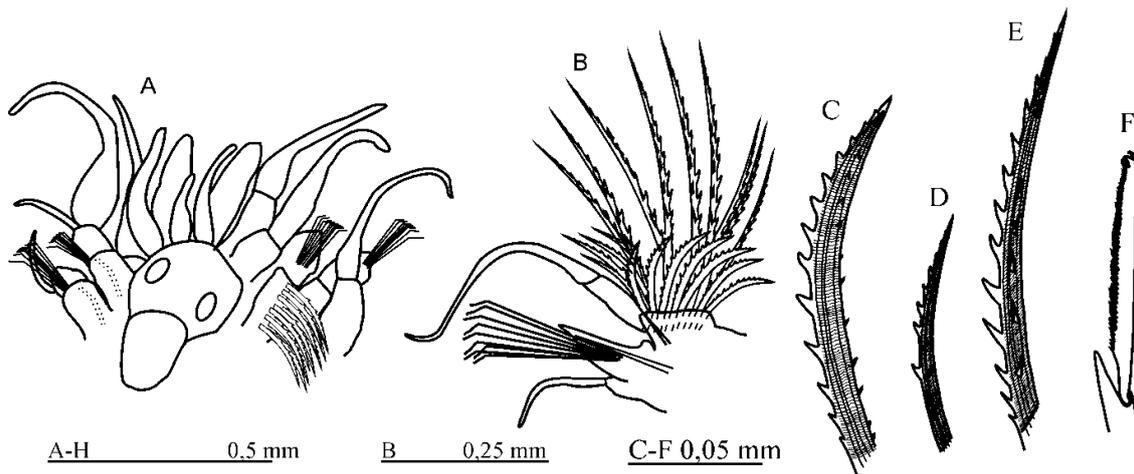


Figura 3. *Acanthopale* cf. *perkinsi*. A) anterior end, dorsal view; B) 20th parapodium, anterior view; C) inferior palea from 20th chaetiger; D) medial palea from the same chaetiger; E) superior palea from the same chaetiger; F) falciger neurochaetae.

Remarks. all specimens were broken, partially damaged, anterior fragments with 17-21 chaetigers. The features of the prostomium and the morphology and distribution of the chaetae on the anterior chaetigers agree well with the description of *A. perkinsi* given by San Martín (1986). However, we could not determine whether the morphology and distribution of the chaetae from the median and posterior body or the morphology of the pygidium are similar to that of this species. San Martín indicated that the *Acanthopale* genus differs from *Bhawania* Schmarida, 1861, *Paleanotus* Schmarida, 1861, *Hyalopale* Perkins, 1985 and *Treptopale* Perkins, 1985 in the shape and distribution of the paleae and in the arrangement of chaetae and cirri on the anterior three segments. *Acanthopale* is, however, similar to *Chrysopetalum* Ehlers, 1864 as regards the shape of the structures of the anterior region, although there are differences in the origin of the median antenna which is front of the eyes in *Acanthopale* but behind the anterior pair of eyes in *Chrysopetalum* as well as differences in the distribution and origin of the paleae. Further

analyses may be consulted in San Martín (1986). We need to examine and characterize complete, best preserved specimens in order to determine whether *A. perkinsi* is actually present in Venezuela, for now, the specimens from La Tortuga Island have been identified as *A. cf. perkinsi*.

Distribution. Venezuela

Acknowledgements

We wish to thank Consejo de Investigación - Universidad de Oriente for funding of this study (CI-02-030601-1680/10 and C.I-02-030601-1741/11 projects). We also wish to thank PhD Frances Osborn for reviewing the English version of the manuscript.

References

- Coleman, C. O. 2006. Substituting time-consuming pencil drawings in arthropod taxonomy using stacks of digital photographs. *Zootaxa*, 1360: 61-68.
- Díaz Díaz, O. & Liñero-Arana, I. 2000. Poliquetos asociados a substratos artificiales sumergidos

- en la costa nororiental de Venezuela I: Terebellidae. **Boletín del Instituto Oceanográfico de Venezuela, Universidad de Oriente**, 39(1&2): 56-70.
- Fuentes Carrero, Y. (2012) Macrofauna asociada a *Halimeda opuntia* en las islas Cubagua y La Tortuga, Venezuela. **Degree Thesis**, Universidad de Oriente, Nueva Esparta, Venezuela, 90 p.
- Fauchald, K. 1977. The polychaete worms. Definitions and keys to the orders, families and genera. **Natural History Museum Los Angeles City Science Series**, 28: 1-188.
- Gathof, J. M. 1984. Family Chrysopetalidae Ehlers, 1864. In: Uebelacker, J. M. & Johnson, P. G. (eds) **Taxonomic guide to the polychaetes of the northern Gulf of Mexico**. Barry A Vittor Mobile 7 pp: 26.1-26.10.
- Hartman, O. 1945. The marine annelids of North Carolina. **Bulletin Duke University Marine Station**, 2:1-54.
- Johnson, H. P. 1897. A preliminary account of the marine annelids of the Pacific coast, with descriptions of new species. Euphrosynidae, Amphinomidae, Palmyridae, Polynoidae, and Sigalionidae. **Proceeding of California Academy of Science, Zoology**, 1:153-190.
- Liñero-Arana, I. 1999. Poliquetos (Annelida: Polychaeta) asociados al Mejillón verde *Perna viridis*, de la Península de Araya, Venezuela. **Boletín del Instituto Oceanográfico de Venezuela, Universidad de Oriente**, 38 (2): 53-61.
- Mora-Vallín, Z. 2009. Chrysopetalidae Ehlers 1864 Pp:1-7 In: **Poliquetos (Annelida: Polychaeta) de México y América Tropical**. In: de León González J. A., Bastida Zavala, R., Carrera Parra, L. F., Hernández Alcántara, P., Salazar Vallejo S. I. & Solís Weiss, V. (Eds) **Poliquetos (Annelida: Polychaeta) de México y América Tropical**, Universidad Autónoma de Nuevo León, Monterrey, México: 735 pp.
- Perkins, T. H. 1985. *Chrysopetalum*, *Bhawania* and two new genera of Chrysopetalidae (Polychaeta) from Florida. **Proceeding of the Biological Society of Washington**, 98: 856-915.
- Rouse, G. W. & Pleijel, F. 2001. **Polychaetes**. Oxford University Press, Oxford, 354 pp.
- San Martín, G. 1986. *Acanthopale perkinsi* gen. et sp. n. (Polychaeta, Chrysopetalidae) from Cuba and Florida. **Zoological Scripta**, 15(4): 305-312.
- Schmarda, L. K. 1861. Neue Wirbellose Thiere, Beobachtet und Gesammelt auf einer Reise um Die erde 1853 Bis 1857. **Turbellarien Rotatorien und Anneliden**. Leipzig 1: 1-164.
- Verrill, A.E. 1900. Additions to the Turbellaria, Nemertina, and Annelida of the Bermudas, with revisions of some New England genera and species. **Transactions of the Connecticut Academy of Arts and Sciences**, 10(2): 595-671.
- Watson-Russell, C. 1986. *Paleaequor*, a new genus of polychaete worm (Chrysopetalidae). **Records of the Australian Museum**, 38: 153-174.
- Watson-Russell, C. 1987. Chrysopetalidae. In: Bhaud, M. & Cazaux, C. (Eds.): Description and identification of polychaete larvae; their implications in current biological problems. **Oceanus**. 13: 596-753.
- Watson-Russell, C. 1991. *Strepternos didymopyton* Watson Russell In: Bhaud, M. & Cazaux, C. 1987 (Polychaeta: Chrysopetalidae) from experimental wooden panels in deep waters of the western North Atlantic. **Ophelia, supplement 5 (Systematics, Biology and Morphology of World Polychaeta)**: 283-294
- Watson-Russell, C. 1998. Description of *Arichlidon* new genus and two new species from Australia; *Bhawania reynsi* redescribed and assigned to *Arichlidon* (Chrysopetalidae: Polychaeta). **The Beagle: Records of the Museums and Art Galleries of the Northern Territory**, 14:159-176.
- Watson-Russell, C. 2000. Description of a new species of *Arichlidon* (Chrysopetalidae: Polychaeta) from the West Atlantic and comparison with the East Atlantic species *Arichlidon reynsi*. **Bulletin of Marine Science**, 67(1): 465-477.
- Watson, C. 2001. New genus and species of Chrysopetalidae (Polychaeta) from hydrothermal vents (south-western Pacific). **The Beagle: Records of the Museums and Art Galleries of the Northern Territory**, 17: 57-66.
- Webster, H. E. 1884. Annelida from Bermuda, collected by G. Brown Goode. **Bulletin of the United States National Museum**, 25: 305-327.

Received December 2012

Accepted August 2013

Published online September 2013