



Biological synopsis of *Photocryptus* Viereck (Hymenoptera, Ichneumonidae, Cryptinae), with eight new host records and fourteen new geographic records

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Abstract

The host records of *Photocryptus* Viereck are revised. Nine species from seven genera and four families, all aculeate Hymenoptera, are recognized as hosts for species of *Photocryptus*. Published host records were compiled for three species, and eight new records are provided for four species, as follows: *P. concinnus* (Brullé) is parasitoid of *Auplopus militaris* (Lynch-Arribalzaga) (Pompilidae, Pepsinae) **new record**, *Sceliphron assimile* (Dahlbom) (Sphecidae, Sceliphrinae), **new record**, and *Trypoxylon maidli* Richards (Crabronidae, Trypoxyloninae), **new record**; *P. fumatus* (Hancock) is parasitoid of *Santamenes novarae* (Saussure) (Vespidae, Eumeninae), and *Sceliphron assimile*, **new record**; *P. pachymenae* (Cresson) is parasitoid of *Pachymenes* sp. (Vespidae, Eumeninae), and *Sceliphron fistularium* (Dahlbom); *P. photomorphus* Viereck is parasitoid of *Sceliphron* sp. and *Brachymenes dyscherus* (Saussure) (Vespidae, Eumeninae); *P. testaceoniger* (Taschenberg) is parasitoid of *Sceliphron fistularium*, **new record**; *P. testaceus* (Taschenberg) is parasitoid of *Sceliphron fistularium*, **new record**, *Trypoxylon albitarse* Fabricius, **new record**, and *T. nitidum* F. Smith, **new record**. A non-identified species of *Photocryptus* is recorded in the literature parasitizing *Trigonopsis violascens* Dalla Torre (Sphecidae, Sceliphrinae). Original data provides the first evidence of two species of *Photocryptus* attacking the same host nest, namely *P. testaceoniger* and *P. testaceus* on a nest of *S. fistularium*; ovipositor length vs. nest dimensions are also compared for these species, suggesting either incidental attack or avoidance of confrontation behavior. Fourteen new geographic records are provided for seven species.

Key words: Nematopodiina, Osprynchotina, Phygadeuontinae, Sphecidae, Vespidae, Pompilidae, Crabronidae

Introduction

Photocryptus Viereck (Hymenoptera: Ichneumonidae) is the only exclusively Neotropical genus of Osprynchotina, with ten known species occurring from Mexico to Paraguay. This genus is characterized by the long mandible, about 4.5 as long as median width, first metasomal tergite long and slender, about 4.0 as long as wide, cell 1+2Rs (areolet) pentagonal, large (0.6–0.8 as high as crossvein 2m-cu) and a long ovipositor, at least as long as length of hind tibia, with the tip distinctly depressed. All known species are brightly colored in hues of yellow, black, and white, and some have a distinct spot at the tip of the fore wing (see Fig. 1).

Townes & Townes (1966) list five host records for three from ten species of the genus. In Yu (1998), however, only one host record is listed, from Hancock (1926): *Santamenes novarae* (Saussure) (Vespidae) as host of *P. fumatus* Hancock. Some other hosts have already been documented for the genus, but always without specific determination of the parasitoid: *Trypoxylon albitarse* Fabricius (= *paliditarse* Saussure) (Crabronidae) in Freeman (1981), *Auplopus militaris* (Pompilidae) in Gonçalves *et al.* (2004) and Loyola & Martins (2006), and *Trigonopsis violascens* (Dalla Torre) (Sphecidae) in Hook (2006).

The paucity of precise, specific information about the biology of *Photocryptus* can be partially due to the

logistic difficulty associated with species identification in the genus. There are no published keys for its species, and almost all determinations depend on careful examination of the original descriptions, which are often difficult to obtain or are severely outdated, or both. The aim of this paper is to revise the biology of *Photocryptus*, combining literature information and original records.

Material and methods

The available literature on the biology of *Photocryptus* was revised and the pertinent information compiled. Whenever possible, host and parasitoid specimens reported in the literature were borrowed and re-examined, to confirm or establish its species-level identification. New information was added from original records obtained from material borrowed from nine institutions: ANSP, Academy of Natural Sciences, Philadelphia, United States; BMNH, The Natural History Museum, London, UK; CNCI, Canadian National Collection of Insects, Ottawa, Canada; DEIC, Deutsches Entomologisches Institut, Eberswalde, Germany; INPA, Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil; MPEG, Museu Paraense Emílio Goeldi, Belém, Brazil; UFES, Universidade Federal do Espírito Santo, Vitória, Brazil; UFMG, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil; and ZSMC, Zoologische Staatssammlung, Munich, Germany. Specific determinations were aided by two-way comparisons of pictures of regular or holotype specimens for *P. fumatus* Hancock, *P. nigrosignatus* Kriechbaumer, *P. pachymenae* Cresson, *P. photomorphus* Viereck, and *P. apicipennis* Brèthes. Such comparisons were performed by the authors and by Gavin R. Broad (BMNH), Stefan Schmidt (ZSMC), Andreas Taeger (DEIC), and Jason Weintraub (ANSP), specifically for this work. For *P. apicalis* Schmiedeknecht, information was interpreted from illustrations in the original work (Schmiedeknecht 1908), which does not provide a textual description; its type is lost and apparently there are no determined specimens deposited in collections. The undetermined specimens of *Photocryptus* parasiting *Trigonopsis violascens* in Hook (2006) could not be examined.

A nest of *S. fistularium* (Dahlbom), originally preserved in a drawer at INPA, associated with two emerged specimens of *Photocryptus*, was dismantled, providing five fully formed pupae of the host; one pupa was opened, and a male imago removed and mounted for study; the sphecid species was determined by APA, based on comparison with determined material by the late Abraham Willink.

The habitus illustration was prepared from a single specimen, photographed with the EntoVision system (GTVision, Hagerstown, Maryland), including a Leica M16 zoom lens attached to a JVC KY-75U 3-CCD digital video camera that feeds image data to a desktop computer. The program Archimed 5.3.1 was used to merge an image series into a single in-focus image. The final image was further processed with Corel PHOTO-PAINT v12. Lighting was achieved using techniques summarized in Buffington *et al.* (2005).

Results

New geographical records are underlined. The hosts of four species, *P. apicalis*, *P. apicipennis*, *P. ater*, and *P. nigrosignatus* remain unknown.

1. *Photocryptus ater* Cushman

Biology. Unknown.

Examined material. CNCI: 1 ♀, PANAMA, Canal Zone, Barro Colorado Island, 26.V.1956, C.W. & M.E. Rettenmeyer; 1 ♀, MEXICO, 15 mi. East Texiutlan Pueb, 5–6.VIII.1960, H.F. Howden.

2. *Photocryptus concinnus* (Brullé)

(Fig. 1)

Biology. Parasitoid of *Auplopus militaris* Lynch-Arribalzaga (Pompilidae, Pepsinae), **new record**, in Central Brazil (19°52'26"S, 43°58'20"W). This record is based on 36 *Photocryptus* specimens reared from trap-nests between 1992 and 2004, by Gonçalves *et al.* (2004) and Loyola & Martins (2006), but without specific determination. Parasitoid of *Sceliphron assimile* (Dahlbom) (Sphecidae, Sceliphrinae), **new record**, in Trinidad. This record is based on the study of material from Mayaro Central, Trinidad (10°10'48"S, 61°07'33"W), collected and reared by B. E. Freeman. Parasitoid of *Trypoxylon maidli* Richards (Sphecidae, Trypoxyloninae), **new record**, as reared by B. E. Freeman from material collected in a "forest area" of Trinidad; from the same nest, also emerged a *Brachymeria* sp. (Chalcididae) and a *Plega?* viz. *fasciatella* (Neuroptera, Mantispidae) (original label reads "*Trichoscella?* sp. nr *fasciatella*").



FIGURE 1. Habitus of *Photocryptus concinnus* (Brullé), the commonest species of the genus in Brazil. By Berthil B. Longo.

Examined material. BMNH: 2 ♀♀, 3 ♂♂ from BRAZIL, Santa Catarina, Nova Teutônia, 21.X.1951, F. Plaumann; 2 ♂♂, same data except 17.XII.1953; 1 ♀ from TRINIDAD, Mayaro Central, 1980, B.E. Freeman;

1 ♀, same data except Toro road, B1/15, 22.III.1980. **UFMG**: 3 ♀♀, 2 ♂♂ from BRASIL, Minas Gerais, Belo Horizonte, Estação Ecológica UFMG, 01.III.1993, trap-nest, H.R. Pimenta; 4 ♀♀, same data except 29.III.1993; 1 ♀, same data except 17.I.1993; 3 ♀♀, 2 ♂♂, same data except 01.III.1993; 1 ♀, same data except 06.X.1993; 1 ♀, same data except 20.III.1992; 2 ♂♂, same data except 15.XII.1992; 1 ♀, same data except 26.VIII.1993; 1 ♀, same data except 18.XII.1992; 1 ♀, same data except 12.XI.1992; 1 ♂, same data except 23.VIII.1993; 1 ♀, same data except 17.XI.1992; 1 ♂, same data except 24.IX.1993; 1 ♂, same data except 16.XI.1992; 1 ♀, same data except 14.X.1993; 1 ♀, same data except 21.XII.1993; 1 ♂, same data except 25.VII.1992; 1 ♂, same data except 16.IX.1992; 1 ♂, same data except 18.II.1993; 1 ♂, same data except 20.VII.1992; 4 ♀♀, 2 ♂♂, same data except R.D. Loyola, 20.III.2004; 2 ♀♀, same data except 14.IV.2004; 1 ♂, same data except 15.VII.2004; 1 ♀, same data except 08.IX.2004.

3. *Photocryptus fumatus* (Hancock)

Biology. Parasitoid of *Santamenes novarae* (Saussure) (Vespididae, Eumeninae), recorded in the original description (Hancock 1926) from Teresópolis, Rio de Janeiro, southeastern Brazil (22°24'45"S, 42°57'00"W); three females reared from one nest, 9.IX.1923. Parasitoid of *Sceliphron assimile* (Sphecidae, Sceliphrinae), **new record**, reared by B. E. Freeman in Trinidad, Mayaro Central, in 1980 (Mayaro: 10°10'48" S 61°07'33"W).

Examined material. **BMNH**: Paratype ♀ from BRASIL, Rio de Janeiro, Teresópolis, en avant [emerged in] 8.X.1923, G.L.R. Hancock, 9.IX.1923, parasiting *Santamenes novarae* (Saussure); 1 ♂ from TRINIDAD, Mayaro Central, 1980, B.E. Freeman. **UFES**: 1 ♀ from BRASIL, Espírito Santo, Cariacica, Reserva Biológica de Duas Bocas (20°16'21"S, 40°28'40"W), 26.IV–03.V.2005, Malaise trap, A.P. Aguiar *et al.*

4. *Photocryptus nigrosignatus* (Kriechbaumer)

Biology. Unknown.

Examined material. Pictures of holotype, and 8 ♀♀. **BMNH**: 1 ♀ from COLOMBIA, Putumayo, Villa Garzon, 400–600 m, 3.V.1993, M. Cooper. **INPA**: 1 ♀ from BRASIL, Amazonas, AM-010 Km 31 Embrapa, 12.XII.1990, L.P. Albuquerque & J. Binda; 1 ♀ with same data except 26.VI.1991; 1 ♀ same data except 25.IX.1991; 1 ♀ same data except 18.XI.1991; 1 ♀ same data except 26.XI.1992; 1 ♀ same data except 15.I.1992; 1 ♀: same data except 22.IV.1992.

5. *Photocryptus pachymenae* (Cresson)

Biology. Parasitoid of a species of *Pachymenes* Saussure (Vespididae, Eumeninae), probably *P. obscurus* Smith, from Orizaba, Mexico (19°32'35" N, 96°55'48"W), as recorded in the original description (Cresson 1874); also cited as parasitoid of *Sceliphron fistularium* (Dahlbom) (Sphecidae, Sceliphrinae) from Barro Colorado, Panama (9°09'55" N, 79°50'70"W) by Cushman (1931).

Examined material. Pictures of the holotype.

6. *Photocryptus photomorphus* Viereck

Biology. Parasitoid of a species of *Sceliphron* (Sphecidae, Sceliphrinae) according to Schrottky (1915), at Puerto Cantera, Paraguay (27°11'58"S 55°38'25"W); Schrottky reports females using the ovipositor as a drill to dig into the clay of the host's nests. Also reported as parasitoid of *Brachymenes dyscherus* (Saussure) by the

same author in the same site.

Examined material. 5 ♀♀, including pictures of the holotype of *Distantella fisheri*. **BMNH:** 1 ♀ from BRAZIL, Santa Catarina, Nova Teutonia, 27°11'S, 52°23' W, 7.XII.1937, Fritz Plaumann; 1 ♀, same data except 14.VII.1935; 1 ♀, same data except 8.II.1937. **UFES:** 1 ♀ from BRASIL, Espírito Santo, Pancas, Fazenda Juliberto Stur, Area 2, 19°12'54.8"S, 40°47'52.5" W, 24-31.I.2003, Malaise trap, M.T. Tavares, C.O. Azevedo et al.

7. *Photocryptus testaceoniger* (Taschenberg)

Biology. Parasitoid of *Sceliphron fistularium* (Sphecidae, Sceliphrinae), **new record**, from Parque Nacional do Viruá, Roraima, northern Brazil (1°08'16.5"N, 61°09'32.8"W). One male specimen emerged from the parasitized nest, the same nest from where emerged a specimen of *P. testaceus* (Taschenberg) (see below). Seven unidentified Tachinidae (Diptera) were also reared from the same nest, which also contained six non-parasitized pupae.

Examined material. 1 ♀ and 1 ♂. **INPA:** 1 ♂ reared from nest of *S. fistularium* collected in BRASIL, Roraima, Parque Nacional do Viruá, 12.V.2005, B. Ronchi-Telles, nest dissected (destroyed); 5 pupae and 1 ♂ of *S. fistularium*, same data. **MPEG:** 1 ♀ from BRASIL, Pará, S. Francisco, 02.VI.1979, R. B. Neto.

8. *Photocryptus testaceus* (Taschenberg)

Biology. Parasitoid of *Sceliphron fistularium* (Sphecidae, Sceliphrinae), **new record**, from Parque Nacional do Viruá, Roraima, northern Brazil (1°08'16.5"N, 61°09'32.8"W). One female specimen emerged from the parasitized nest, the same nest from where emerged a specimen of *P. testaceoniger* (Taschenberg) (see above); seven unidentified Tachinidae (Diptera) were also reared from the same nest, which also contained six non-parasitized pupae of the sphecid. Parasitoid of *Trypoxylon albitarse* Fabricius (Sphecidae, Trypoxyloninae), **new record**, reared by Laura Cliffs, in Trinidad, 14.IV.1980. This is probably the record cited in Freeman (1981), but without specific determination. Parasitoid of *Trypoxylon nitidum* F. Smith (Sphecidae, Trypoxyloninae), **new record**, reared by B.E. Freeman in Trinidad (one specimen from Talpara East, 20.III), 1980.

Examined material. 4 ♀♀ and 3 ♂♂. **AMNH:** 1 ♀ from GUYANA, Bartica District, Katabo, 30.V.1919. **BMNH:** 2 ♂♂ from TRINIDAD, 1980, B. E. Freeman; 1 ♂, same data except Talpara East; 1 ♀, same data except 14.IV.1980, Laura Cliffs. **INPA:** 1 ♀ from BRASIL, Roraima, Parque Nacional do Viruá, 12.V.2005, B. Ronchi-Telles; 1 ♀: same data except Amazonas, AM-010 Km 31, Embrapa, 15.III.1991, L.P. Albuquerque e J.E.Binda.

Comments and discussion

The results corroborate, at least for *Photocryptus*, Townes' (1970) general observations that genera of Osprynchotina are essentially parasitoids of "nests of wasps that are made of mud or contain mud." Eight species from five genera and four families, all aculeate Hymenoptera, are now recognized as hosts for species of *Photocryptus*. The relatively low host specificity observed, with a same parasitoid species attacking up to three host families, is expected for idiobiont ectoparasitoids, such as Cryptinae (Gauld 2006). This information, combined with the record of two species parasiting a single nest of *Sceliphron fistularium*, suggest a significant competition for hosts among sympatric species of *Photocryptus*.

Schrottky (1915), the only available report on oviposition behavior of *Photocryptus*, indicates that females use the ovipositor as a drill to dig into the clay of the host nests. This strategy might be relevant in

avoiding host confrontation, but other host manipulating systems (or limitations) may be involved. It is also interesting to note that, in the case of *P. testaceus* and *P. testaceoniger*, their ovipositor sizes (8.6–10.0 and 4.3 mm, respectively; original data) are clearly insufficient to reach two or more consecutive cells of a *S. fistularium* nest, which have up to 54 cells, measuring each from 7.6 to 11.7 mm in diameter (Camillo 2002). Accordingly, the six non-parasitized pupae of *S. fistularium* reported in this work were exactly those found in the deepest cells of the nest. The female *Photocryptus* may thus not be able to reach the innermost chambers of the host nest.

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