A New Species of *Diospilus* Haliday (Hymenoptera: Braconidae, Brachistinae, Diospilini) from Mexico

Author(s): José Antonio Sánchez-García, José Isaac Figueroa, Michael Joseph Sharkey, Víctor López-Martínez, Samuel Pineda, Ana Mabel Martínez, Roselia Jarquín-López, and Laura Martínez- Martínez

Source: Journal of the Kansas Entomological Society, 85(2):109-115. 2012.
Published By: Kansas Entomological Society
DOI: http://dx.doi.org/10.2317/JKES111214.1
URL: http://www.bioone.org/doi/full/10.2317/JKES111214.1

JOURNAL OF THE KANSAS ENTOMOLOGICAL SOCIETY
85(2), 2012, pp. 109–115

A New Species of *Diospilus* Haliday (Hymenoptera: Braconidae, Brachistinae, Diospilini) from Mexico

José Antonio Sánchez-García,[1] José Isaac Figueroa,[2,3] Michael Joseph Sharkey,[4] Víctor López-Martínez,[5] Samuel Pineda,[2] Ana Mabel Martínez,[2] Roselia Jarquín-López,[1] and Laura Martínez-Martínez[1]

ABSTRACT: A species of *Diospilus* from Mexico is described and illustrated. ***Diospilus sisyphus* Sánchez, Figueroa and Sharkey** new species attacks *Anthonomus sisyphus* Clark (Coleoptera: Curculionidae) on the fruit of red nanche, *Malpighia mexicana* A. Juss. A key is included to identify the described species of *Diospilus* of the New World.

KEY WORDS: Neotropical, parasitoid, taxonomy, *Anthonomus sisyphus*

Here we include *Diospilus* in Brachistinae following the phylogenetic placement of Sharanowski *et al.* (2011). The diospiline genera recorded in the New World are *Diospilus* Haliday, *Dyscoletes* Haliday, *Taphaeus* Wesmael, *Topaldius* Papp and *Vadum* Mason (Sharkey, 1997). Papp (1995) added *Aspigonus* Wesmael and *Austrodolops* Blanchard but Sharkey (1997), based on the descriptions of the respective types, suggested that they either do not belong to the tribe Diospilini or are not found in the New World. Members of *Diospilus* are cosmopolitan and common in both temperate and tropical regions. They are known to be endoparasites of coleopteran larvae, especially those of the families Anobiidae, Curculionidae and Nitidulidae (Williams *et al.,* 1984; Sharkey, 1997; Billqvist and Ekbom, 2001). Taxonomic studies of *Diospilus* have been conducted in Europe (Hellen, 1958; Abdinbekova, 1969; Tobias, 1986; Belokobylskij, 1990, 1993a, b, 1998; Belokobylskij and Lobodenko, 1997; Papp, 1993, 1998; Beyarslan *et al.,* 2008), North America (Rohwer, 1917; Gahan, 1916, 1927; Mason, 1968, 1978; Papp, 1995), Asia (Chou and Tsu, 1998) and Africa (Granger, 1949; Papp, 2005). Presently there are 54 described species of *Diospilus* in the world, five of which are found in the New World (*D. curticaudis* Gahan, *D. fomitis* Mason, *D. fulvus* Papp, *D. podobe* Papp and *D. washingtonensis* Rohwer). *Diospilus curticaudis* is the only species reported from Mexico (Papp, 1995; Yu *et al.,* 2005). Other nominal species, such as *Taphaeus californicus* (Rohwer), *T. neoclyti* (Rowher) and *T. polydrusi* (Gahan), were previously included in the genus *Diospilus* but these were transferred by Marsh

[1] CIIDIR-IPN-Unidad Oaxaca, Área de Control biológico, Hornos #1003, Santa Cruz Xoxocotlán, Oaxaca, C.P. 71230, México.
[2] Instituto de Investigaciones Agropecuarias y Forestales, Universidad Michoacana de San Nicolás de Hidalgo, Km. 9.5 carretera Morelia-Zinapecuaro, Tarímbaro, Michoacán, 58880, México.
[3] Corresponding author: figueroaji@yahoo.com.mx
[4] Department of Entomology, University of Kentucky, S-225 Ag. Science Center North, Lexington, Kentucky 40546-0091, USA.
[5] Facultad de Ciencias Agropecuarias, Universidad Autónoma del Estado de Morelos, Av. Universidad 1001, Col. Chamilpa, Cuernavaca, Morelos, C.P. 62209, México.

Accepted 6 May 2012; Revised 6 July 2012

(1974) and Papp (1995) to the genus *Taphaeus*. The objective of this study is to describe and illustrate a new species of *Diospilus* from Mexico, which was reared from *Anthonomus sisyphus* Clark on red nanche fruit, *Malpighia mexicana* A. Juss. The red nanche is a plant with edible fruits, used for crafts and medicine, as well as for the establishment of living fences (Morton, 1987). This plant is distributed in the Mexican states of Durango, Jalisco, Michoacán, México, Puebla, Guerrero, Oaxaca, Chiapas and Yucatán (Martínez, 1994; Guizar and Sánchez, 1997).

Material and Methods

Our description of the new species is based on 100 specimens, which were determined by comparison with a combination of specimen types and literature descriptions. Measurement data are based on the analysis of five females and five males and are given in millimeters or ratios. The terminology used in the descriptions follows Sharkey and Wharton (1997) except for the use of *precoxal sulcus* instead of sternaulus, which follows Wharton (2006). Photographs were taken with a Zeiss Stemi 2000-C stereoscope equipped with a Canon G9 digital camera. The illustrations were prepared using Adobe Illustrator 10.0.3. Acronyms used for collections are: CIIDIR-IPN, Unidad Oaxaca, Santa Cruz Xoxocotlán, Oaxaca, México; IIAF, Instituto de Investigaciones Agropecuarias y Forestales, Universidad Michoacana de San Nicolás de Hidalgo, México; USNM, Smithsonian National Museum of Natural History, Washington, D.C., USA; and TAMU, Texas A&M University, Texas, USA.

Systematics

Diospilus Haliday, 1833

***Diospilus sisyphus* Sánchez, Figueroa and Sharkey,** new species

(Figs. 1a–h)

Female

Body length: 2.30–2.42 mm. *Color*: head reddish brown or dark brown except eye dark green or gray; mesosoma dark brown or black except pronotum light brown, legs and tegula yellowish, fore wing with veins light brown and parastigma and pterostigma darker; metasoma dark brown except first and second terga, and ventral areas yellowish.

Head: Transverse in dorsal view; antenna length 1.90–2.06 mm, 23–24 antennal segments, first flagellomere 1.20–1.30 times longer than second, length of first, second and penultimate flagellomere 2.40–3.00, 2.00–2.50 and 1.20 times their respective widths; diameter of ocelli 0.05 mm, anterior ocellus rounded, posterior ocelli slightly elliptic and near to each other, OOL (distance between posterior ocellus and eye) 4.00 times as long as POL (distance between both posterior ocelli); eyes not protruding, 1.20–1.30 times as high as width in lateral view, eye length 1.00–1.15 times as long as temple in dorsal view; temple and occiput smooth with some isolated setae, occiput weakly excavated; occipital and hypostomal carinae meeting each other; frontal and malar sutures absent; malar space 0.92 times as long as basal width of mandible, mandible with basal notch; clypeus 2.92–3.00 times as wide as high, with two apical teeth and its ventrolateral margin denticulate; face 1.45–1.50 times as wide as high, with some small foveolae and isolated setae; frons, vertex and clypeus smooth, with some isolated setae.

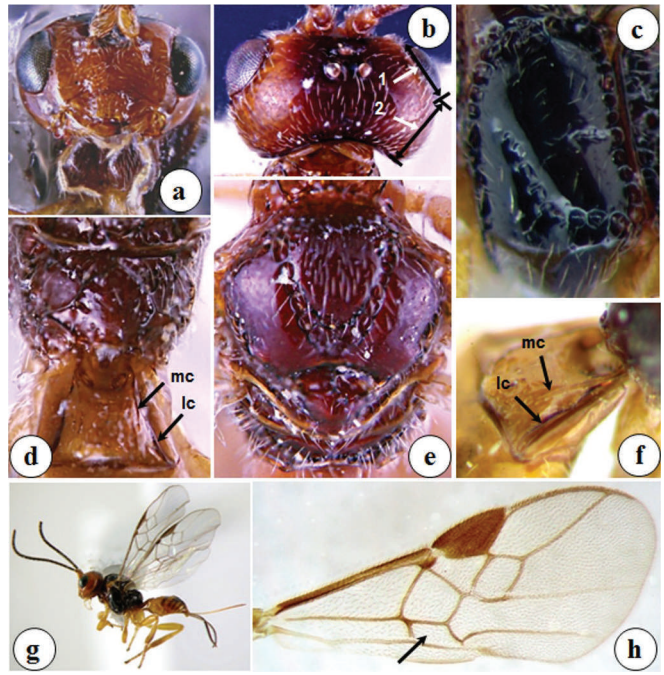

Fig. 1. ***Diospilus sisyphus* n. sp.** Female: a. anterior view of head, b. dorsal view of head, arrow "1" indicates eye length and arrow "2" indicates temple length, c. lateral view of mesopleuron, d. dorsal view of propodeum, e. tergum 1 in dorsal view, arrows indicate medial carinae (mc) and lateral carinae (lc), f. tergum 1 in lateral view, arrows indicate medial carinae (mc) and lateral carinae (lc), g. female habitus, h. fore wing, arrow indicates first subdiscal cell.

Mesosoma: Mesosoma length 1.12–1.17 times its height in lateral view; pronotum crenulate except dorsal area smooth; notauli deep and crenulate; mesonotum margined and crenulate; scutellar sulcus wide, deep and with three costulae; epicnemial carina crenulate; precoxal sulcus crenulate; propodeum medially with a large, smooth pentagonal areola that occupies most of the propodeum (0.90), maximum width of areola 1.0–1.6 times its maximum height, lateral areas of propodeum reticulate. *Wings:* fore wing 2.34–2.51 mm, about as long as body; pterostigma 2.60–2.75 times as long as high, radial vein issuing from its middle; r short, 0.15–0.33 times as long as 3RSa; 3RSa 0.68–0.71 times as long as 2RS; 2RS 0.27–0.28 mm, 1.00–1.09 times as long as r-m; second submarginal cell rectangular, 3RSb 3.85–4.00 times as long as 3RSa, and almost reaching tip of wing; R1 1.25 times as long as pterostigma; 1CUa very short, 0.32–0.59 times as long as 1CUb; first subdiscal cell as in figure h. *Legs:* length of femur, tibia and basitarsus of hind leg 4.00–4.13, 7.70–8.00 and 4.40–5.50 times its width, respectively; tarsal claws with a basal lobe.

Metasoma: Length of first tergite 1.08–1.21 times its apical width in dorsal view, pair of carinae laterally reaching hind margin of tergite, medial carinae extending three-quarter length of tergite; and hind half of tergite with short striae; ovipositor length 1.73–2.20 mm, apical end of ovipositor straight; ovipositor sheath 0.77–0.81 times longer than fore wing length.

Male

Similar to female, body length 2.36–2.42 mm; fore wing length 1.86–2.42 mm; antenna length 2.03 mm; first flagellomere 1.20–1.33 times longer than second; length of second and third flagellomere 2.4 and 1.80–2.0 times their widths, respectively; 23 antennal segments; length of first tergite 1.13–1.32 times its apical width.

Types: Holotype, female. MEXICO, Oaxaca. Jardín Etnobotánico, Oaxaca, 7-IX-2006, R. Jarquín, host: *Anthonomus sisyphus* on *Malpighia mexicana* Juss. (red nanche fruit) (CIIDIR Oaxaca). Allotype, male. MEXICO, Oaxaca, Atzompa, 14-X-2010, J.Sánchez and R. Jarquín, red nanche fruit (CIIDIR Oaxaca). Paratypes: MEXICO, Oaxaca: Jardín Etnobotánico: 1 female, same data as holotype; 3 female and 1 male, 27-V-2004; 2 female and 1 male 4-VIII-2005; 5 female and 2 male 6-VIII-2005; 1 male 13-VIII-2005; 3 female and 3 male 16-VIII-2005; 1 male 19-VIII-2005; 4 female 23-VIII-2005; 1 female 27-VI-2006; 4 female and 1 male 4-VIII-2006; 2 female 30-VIII-2006; 1 female 16-VI-2011; 1 female 9-IX-2011; 2 female 14-IX-2011; 1 male 20-IX-2011; Atzompa: 2 female and 1 male same data than allotype; 2 female 7-X-2010; 1 female 30-IX-2010; 1 male 4-VIII-2011; 2 male 19-VIII-2011; 2 female and 2 male 4-IX-2011; 11 female and 7 male 22-IX-2011; 7 female and 9 male 29-IX-2011; 2 female and 3 male 6-X-2011; San Lorenzo Cacotepec: 1 female 15-V-2007 R. Jarquín, red nanche fruit; 1 female 8-VI-2007; 2 female and 2 male 21-X-2010. Paratypes deposited in CIIDIR, IIAF, USNM, and TAMU (74, 20, 2, 2, respectively).

Etymology. The specific name refers to the host *Anthonomus sisyphus.*

Hosts. *Anthonomus sisyphus* Clark on *M. mexicana* (red nanche fruit).

Distribution: MEXICO (Oaxaca).

Diagnosis: Distinguished from other *Diospilus* species by the following combination of characters: *D. sisyphus* has a large areola in propodeum, eye length in dorsal view as long as temple, clypeus with two apical teeth and its ventrolateral margin denticulate, first tergite with medial carinae extending three-quarters length of tergite, and posterior half of first tergite with short striae.

This species is similar to *D. fulvus* Papp, and runs to the couplet containing this species in the key to New World species of *Diospilus* in Papp (1995:105). Six species of *Diospilus* are distinguished in the following key modified from Papp (1995).

1. Lower margin of clypeus not denticulate 2
- Lower margin of clypeus denticulate 5
2(1) Females; ovipositor at most 0.5 times the length of metasoma. Body length: 2.50 mm. . . . . *D. curticaudis* Gahan
- Females; ovipositor at least 1.0 times the length of metasoma. Body length: 2.80–6.00 mm 3
3(2′) Body length: 6 mm. Legs reddish-brown, apical fourth of the posterior tibia dark . . . . . *D. washingtonensis* Rohwer
- Body length: 3.00–4.00 mm. Legs yellow 4
4(3′) Head in dorsal view less transverse, 1.78 times as broad as long, eye not protruding. Distal 10 flagellomeres 1.4–1.6 times as long as broad. Face and clypeus sparsely and weakly punctate, interspaces smooth and shiny. Propodeum with a median pentagonal area, laterally areolated; surface of propodeum smooth to uneven, shiny. First tergite slightly shorter than

wide posteriorly, pair of keels reaching posterior margin of tergite, posterior half of tergite longitudinally striate. Ovipositor posteriorly straight. Female: 3.30 mm . . . . . *D. podobe* Papp

- Head in dorsal view more transverse, twice as broad as long, eye protruding. Distal 10 flagellomeres as long as broad (cubic). Face below antennal sockets and clypeus entirely aciculo-punctate. Propodeum postero-medially with a pair of weak longitudinal carinae, its surface rugose-rugulose. First tergite 1.2 times as long as wide posteriorly, posterior half rugose, pair of keels extending to basal half of tergite. Ovipositor posteriorly somewhat down-curved. Female: 3.00–4.00 mm, male: 2.80–3.50 mm . . . . . *D. fomitis* Mason

5(1′) Propodeum medially with small pentagonal areola that occupies 0.75 its length, areola width 0.8 times its height. First tergite as long as wide posteriorly, pair of rather weak carinae restricted to its basal third. Eye length in dorsal view one-third longer than temple. Female: 4.80 mm, male: 3.80 mm. . . . . *D. fulvus* Papp

- Propodeum medially with large pentagonal areola that occupies 0.90 its length, areola width 1.0–1.6 times its height (Fig. 1d). First tergite slightly shorter than wide posteriorly; pair of carinae laterally reaching posterior end of tergite, medial carinae extending three-quarters length of tergite (Fig. 1d, f); and posterior half of tergite with short striae. Eye length in dorsal view as long as temple. Female: 2.30–2.42 mm, male: 2.36–2.42 mm. . . . . *D. sisyphus* n. sp.

Acknowledgments

Thanks to Manuel Darío Salas Araiza (Universidad de Guanajuato, El Copal, Irapuato, México) for identification of *Anthonomus sisyphus,* César Chávez (Ethnobotanical Garden Santo Domingo, Oaxaca, México) for permits to collect samples of red nanche fruit. The Secretaría de Investigación y Posgrado (Instituto Politécnico Nacional) and the Coordinación de la Investigación Científica (Universidad Michoacana de San Nicolás de Hidalgo) provided financial support. JASG and JIF are grateful to the SNI-CONACYT for supporting from grants 31918-N and 41093, respectively.

Literature Cited

Abdinbekova, A. A. 1969. Braconid wasps (Hymenoptera, Braconidae) of Great Caucasus (within Azerbaidzhan). Izvestiya Akademii Nauk Azerbaidzhanskoi SSR. Ser. Biol. Nauk. 6:81–91.

Belokobylskij, S. A. 1990. A contribution to the systematics of the braconid genus *Diospilus* (Hymenoptera, Braconidae). Novosti faunistiki i sistematiki. Sbornik nauchnykh trudov. (Kiev)., 111–119.

Belokobylskij, S. A. 1993a. Contribution to the taxonomy of Braconidae (Hymenoptera) of the Russian Far East. Russian Entomological Journal 2(3–4):87–103.

Belokobylskij, S. A. 1993b. Three new braconid species (Hymenoptera, Braconidae) from the southern part of the Russian Far East. Zoologicheskii Zhurnal 72(12):63–70.

Belokobylskij, S. A. 1998. 1. Rhyssalinae, 2. Doryctinae, 3. Histeromerinae, 4. Exothecinae, 7. Gnamptodontinae, 9. Alysiinae (Alysiini), 10. Helconinae, 11. Cenocoeliinae, 12. Brachistinae, 14. Meteorideinae, 16. Xiphozelinae, 17. Homolobinae, 18. Charmontinae, 19. Orgilinae, 20. Ecnomiinae, 21. Sigalphinae, 23. Ichneutinae, 25. Cardiochilinae, 27. Dirrhopinae, 28. Miracinae, 29. Adeliinae: 41–162, 163–298, 411–520, 531–558. *In* P. A. Ler (ed.). Key to the insects of Russian Far East. Vol. 4. Neuropteroidea, Mecoptera, Hymenoptera. Pt 3. Dal'nauka, Vladivostok. 706 pp.

Belokobylskij, S. A., and Y. S. Lobodenko. 1997. Brief review of Palaearctic species of the genus *Diospilus* (Hymenoptera, Braconidae) with description of four new species. Zoologicheskii Zhurnal 76(8):915–924.

Beyarslan, A., O. E. Erdogan, and M. Aydogdu. 2008. *Diospilus belokobylskyji* Beyarslan sp. nov., with new records of Diospilini (Hymenoptera: Braconidae: Helconinae) from Turkey. Entomological News 119(4):403–410.

Billqvist, A., and B. Ekbom. 2001. Effects of host plant species on the interaction between the parasitic wasp *Diospilus capito* and pollen beetles (*Meligethes* spp.). Agricultural and Forest Entomology 3:2147–152.

Chou, L. Y., and T. C. Hsu. 1998. The Braconidae (Hymenoptera) of Taiwan VIII. Brulleiini, Diospilini and Helconini. Journal of Agricultural Research of China 47(3):283–314.

Gahan, A. B. 1916. Description of a braconid parasite of *Polydrusus impressifrons*. New York State Agricultural Experiment Station. Technical Bulletin 56:23–24.

Gahan, A. B. 1927. Miscellaneous description of new parasitic Hymenoptera with some synonymical notes. Proceedings of the United States National Museum 71(2676):1–38.

Granger, C. 1949. Braconides de Madagascar. Memoires de l'Institut Scientifique de Madagascar 2(A):1–428.

Guizar, E., and A. Sánchez V. 1997. Guía para el conocimiento de los principales árboles del alto Balsas, México. Universidad Autónoma de Chapingo.

Haliday, A. H. 1833. An essay on the classification of the parasitic Hymenoptera of Britain, which correspond with the Ichneumones minuti of Linnaeus. Entomological Magazine. 1(iii):259–276, 333–350.

Hellen, W. 1958. Zur Kenntnis der Braconiden (Hym.) Finnlands. II. Subfamilia Helconinae (Part.). Fauna Fennica 4:3–37.

Marsh, P. M. 1974. New combinations and new synonymis in North American Braconidae (Hymenoptera). Proceedings of the Entomological Society of Washington 76(3):285–289.

Martínez, M. 1994. Catálogo de nombres vulgares y científicos de plantas mexicanas. Fondo de Cultura Económica, México. pp. 276–278.

Mason, W. R. M. 1968. New Canadian Braconidae (Hymenoptera). Canadian Entomologist 100:715–728.

Mason, W. R. M. 1978. Ichneumonid parasites (Hymenoptera) accidentally introduced into Canada. The Canadian Entomologist 110:603–608.

Morton, J. F. 1987. Barbados cherry. *In* ISBN: 0-9610184-1-0. Creative Resource Systems, Inc. Fruits of Warm Climates, pp. 204–207. Miami, FL.

Papp, J. 1993. New Braconid wasps (Hymenoptera, Braconidae) in the Hungarian Natural History Museum, 4. Annales Historico-Naturales Musei Nationalis Hungarici 84:155–180.

Papp, J. 1995. New Diospiline taxa from the Neotropical region (Hymenoptera: Braconidae: Helconinae). Acta Zoologica Academiae Scientiarum Hungaricae 41(2):103–114.

Papp, J. 1998. Two new braconid species from Switzerland (Hymenoptera, Braconidae). Mitteilungen der Schweizerischen Entomologischen Gesellschaft 71:133–139.

Papp, J. 2005. A study of the Afrotropical diospiline wasp (Hymenoptera, Braconidae, Helconinae, Diospilini). Deutsche Entomologische Zeitschrift 52(2):229–239.

Rohwer, S. A. 1917. Descriptions of thirty one new species of Hymenoptera. Proceedings of the United States National Museum 53(2195):151–165.

Sharanowski, B. J., A. P. Dowling, and M. J. Sharkey. 2011. Molecular phylogenetics of Braconidae (Hymenoptera: Ichneumonoidea), based on multiple nuclear genes, and implications for classification. Systematic Entomology 36:549–572.

Sharkey, M. J. 1997. Subfamily Helconinae. *In* R. A. Wharton, P. M. Marsh, and M. J. Sharkey (eds.). Manual of the New World Genera of the Family Braconidae (Hymenoptera), pp. 261–272. Special Publication of the International Society of Hymenopterists. Special Publication No. 1.

Sharkey, M. J., and R. A. Wharton. 1997. Morphology and Terminology. *In* R. A. Wharton, P. M. Marsh, and M. J. Sharkey (eds.). Manual of the New World Genera of the Family Braconidae (Hymenoptera), pp. 20–37. International Society of Hymenopterists. Special Publication No. 1.

Tobias, V. I. 1986. Helconinae, Brachistinae. *In* G. S. Medvedev (ed.). 'Opredelitel Nasekomych Evrospeiskoi Tsasti SSSR 3, Peredpontdatokrylye 4, pp. 150–180. Opr. Faune SSSR.' 145:1–501. pp. 150–180.

Wharton, R. A. 2006. The species of *Sternaulopius* Fischer (Hymenoptera: Braconidae, Opiinae) and the braconid sternaulus. Journal of Hymenoptera Research 15:317–347.

Williams, R. N., M. J. Weiss, M. Kehat, and D. Blumberg. 1984. The hymenopterous parasites of Nitidulidae. Phytoparasitica 12(1):53–64.
Yu, D. S., C. van Achterberg, and K. Horstmann. 2005. World Ichneumonoidea 2004. Taxonomy, biology, morphology and distribution. Taxapad 2005. CD/DVD. Taxapad, Vancouver.