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Harpagonopus confluentus Loomis, a Pacific Coast milliped of the United States and Mexico (Polydesmida: Trichopolydesmoidea)

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ABSTRACT

The monotypic milliped genus *Harpagonopus* and its sole component species, *H. confluentus* Loomis, occur along the Pacific Coast from the vicinity of Santa Barbara, California, to Colonet, Baja California Norte, Mexico, a distance of some 620 km (386 mi). The range extends about 72 km (45 mi) inland in San Diego County, but most specimens have been taken within a few miles of the ocean, particularly in coastal canyons. *Harpagonopus* is assigned to the polydesmoid superfamily Trichopolydesmoidea, but its family position is uncertain; there are no detectable synapomorphies with representatives of the Nearctodesmidae in the Pacific Northwest. Past taxonomic accounts are reviewed, and gonopod drawings and a distribution map are presented.

NARRATIVE

The diplopod fauna of southern California, with its deserts and otherwise generally arid environments, lacks many of the faunal elements found north of Big Sur. Excepting the family Parajulidae (order Julida), which has been poorly studied throughout its range and whose composition there is unknown, the most diverse southern California group is the order Spirobolida, represented by 2 families, 8 genera, and around 15 nominal species: Spirobolidae, *Hiltonius* (about 3 species) and *Tylobolus* (2 species) (Keeton 1960, 1966); and Atopetholidae, *Arinolus* (1 species), *Atopetholus* (about 3 species), *Onychelus* (1 species), *Orthichelus* (1 species), *Tidolus* (1 species), and

Watichelus (about 3 species) (Hoffman & Orcutt 1960). The callipodoid family Schizopetalidae, with 3 genera and around 5 species — *Colactis* (1 species), *Diactis* (3 species), and *Heptium* (1 species) — is also relatively diverse (Loomis 1937, plus unreported material I have examined), but other groups common to northern California are absent or only minor components in the region adjoining Mexico. Cambaloids and platydesmoids are rarely encountered, and the order Chordeumatida is represented only by an occasional striariid and one caseyid, *Caseya similis* Causey (Gardner & Shelley 1989, plus unreported material I have examined). In the Polydesmida, the Polydesmidae and Nearctodesmidae, abundant north of San Francisco Bay, are absent from southern California, and the western faunal region of the Xystodesmidae reaches its southern periphery there with *Motyxia dissecta* (Wood) occurring in the Santa Monica Mountains and at Riverside (Causey & Tiemann 1969, plus unreported material I have examined).

Despite the fauna's impoverished status in comparison with that to the north, southern California also harbors southern forms that range northward from Mexico and Central/South America, and are absent or poorly represented elsewhere in the state. The order Siphonophorida, for example, extends northward from the vicinity of the Amazon River to the type locality of *Illacme plenipes* Cook & Loomis in San Benito County (Cook & Loomis 1928, Chamberlin & Hoffman 1958, Buckett 1964), and the Atopetholidae ranges from central Mexico into Monterey County (Hoffman & Orcutt 1960). Another milliped that extends northward into southern California is *Harpagonopus confluentus* Loomis, a representative of the polydesmoid superfamily Trichopolydesmoidea (family uncertain). The only component of its genus, *H. confluentus* is roughly equivalent in body dimensions to species of *Scytonotus*, the common representative of the Polydesmidae north of San Francisco Bay, and superficially resembles the latter in having a setose, tuberculate dorsum. As characterized by Loomis (1960), however, the setae of *H. confluentus* are strong and clavate, and impart a different appearance to its dorsum than do the finer, denser setae to species of *Scytonotus.* Adult females of *H. confluentus* also have normal paranota on all segments, in contrast to females of *Scytonotus* spp., where the structures are reduced on segments 5-9; furthermore, the gonopods of males conform to an entirely different pattern. Thus, despite their similar appearances, *Harpagonopus* and *Scytonotus* are not closely related.

Harpagonopus confluentus is of particular interest because its narrow distribution hugs the Pacific coastline for some 620 km (386 mi), from the vicinity of Colonet, Baja California Norte, Mexico, to near Santa Barbara, Santa Barbara County. Previous records are from San Diego County and 22.4–30 km (14–20 mi) north of Ensenada, Mexico (Loomis 1960, 1968; Buckett 1964), but the new material expands the distribution by some 247.5 km (154 mi) to the north and 141 km (88 mi) to the south. The milliped ranges up to 72 km (45 mi) inland into interior mountains of San Diego County

(Loomis 1960), but most samples have been taken within a few kilometers of the Pacific Ocean. Hence, *H. confluentus* may be relatively common in the moist lower reaches of coastal canyons. While examining material for a revision of western forms of *Scytonotus,* I discovered samples of *H. confluentus* that were either mislabeled as this genus or grouped with it because of their similar dorsal appearances, and female only samples of tuberculate polydesmoids from southern California coastal locales probably also refer to this species. The new specimens show little anatomical variation, conforming closely to the illustrations and diagnoses of Loomis (1960), but the magnitude of the range expansion justifies publication to benefit naturalists studying the fauna of this large urban area. This contribution therefore recaps the descriptive information on *H. confluentus* presented by Loomis (1960) and provides a verbal account of the gonopods and complete details on its distribution. Gonopod illustrations and a range map are provided. Acronyms of sources of preserved study material are as follows:

AMNH - American Museum of Natural History, New York, NY.
CIS - California Insect Survey, University of California at Berkeley.
LACMNH - Los Angeles County Museum of Natural History, Los Angeles, CA.
NCSM - North Carolina State Museum of Natural Sciences, Raleigh.
NMNH - National Museum of Natural History, Smithsonian Institution, Washington, DC.
SDMNH - San Diego Museum of Natural History, San Diego, CA.
VMNH - Virginia Museum of Natural History, Martinsville.

SYSTEMATICS

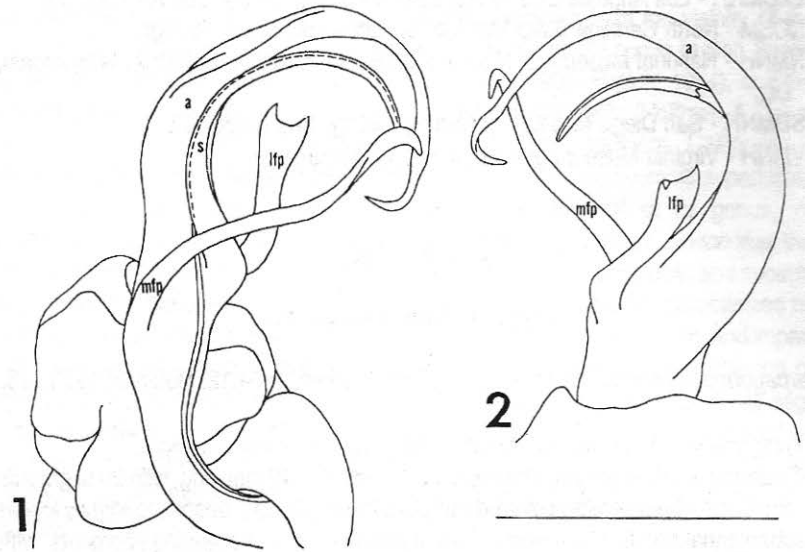
Genus Harpagonopus Loomis

Harpagonopus Loomis, 1960:58-59; 1968:54. Buckett, 1964:12. Hoffman, 1979:178.

Type species. H. confluentus Loomis, 1960, by original designation.

Diagnosis. Moderately large trichopolydesmoids, 15–19 mm long, with 20 segments in both sexes. Head densely covered with parallel-sided setae, becoming slightly longer in subantennal and frontal regions. Collum narrower than succeeding segments, with about 6 rows of lowly rounded, setose tubercles; remaining tergites generally with 3 rows of lowly rounded, setose tubercles, rounded to ovoid or elongate in dorsal profile, setae generally slightly clavate, arising from center of tubercles, latter becoming more discreet caudal to segment 5. Paranota distinct on all segments in both sexes, not reduced; margins generally smooth, with slight suggestions of minute teeth primarily on anterior segments, caudolateral corners slightly produced on caudal segments,

ozopores located caudolaterad. Sterna with strong transverse depressions originating between leg pairs. Podomeres without modifications. Gonopodal aperture relatively large, extending well into prozonum. Gonopod *in situ* with 3 slender projections arising from caudal surface of stem of telopodite (femoral region) at or distal to outer margin of coxa, curving broadly or directed caudad. Acropodite located anteriad to projections, broad basally, tapering slightly then expanding into narrow medial flange at midlength, tapering thereafter to subacuminate tip, distal extremity recurved anteriad. Solenomerite curving parallel to and closely appressed to acropodite for ⅓ of length, diverging near midlength and tapering smoothly and continuously to blunt tip, considerably shorter than acropodite. Medial femoral process long and slender, angling across medial face of telopodite and curving bisinuately to blunt tip, distal extremity overhanging both acropodite and solenomerite. Lateral femoral process directed generally ventrad with only slight basal curve, expanding distal to midlength into short, subacuminate, broadly segregated terminations on both anterior and caudal edges.



Figs. 1–2, *Harpagonopus confluentus*. 1, telopodite of left gonopod of male from Ramona, San Diego County, medial view. 2, the same lateral view. a, acropodite; lfp, lateral femoral process; mfp, medial femoral process; s, solenomerite. Scale line = 1 mm for both figs.

Distribution. Along the Pacific Coast from the vicinity of Santa Barbara, Santa Barbara Co., CA, to that of Colonet, Baja California Norte, Mexico, ca. 240 km (150 mi) S of the International Border, a total distance of about 620 km (386 mi), extending some 72 km (45 mi) inland in San Diego County.

Species. One. From the intensity of field collecting in coastal California north of Big Sur, it is doubtful that undiscovered species exist to the north, as the only poorly sampled area lies in San Luis Obispo County and the northern half of Santa Barbara County. However, practically no collecting has taken place to the south of the known range, so other species may await discovery in coastal environments farther south in the Baja California peninsula.

Remarks. Hoffman (1979) considered *Harpagonopus* as one of five trichopolydesmoid genera of uncertain family position, but he also suggested that some may be referrable to the Nearctodesmidae. I therefore directly compared the gonopod of *H. confluentus* to those of representatives of the nearctodesmid genera *Nearctodesmus, Kepolydesmus,* and *Ergodesmus* without finding any meaningful similarities. The gonopods of species of the last three genera clearly conform to a basic pattern, leaving no doubt that the differences between them warrant only generic-level distinction. The gonopods of *H. confluentus,* however, are so thoroughly dissimilar — the branches are of different proportions, curve in different directions, and the structure exhibits a totally different pattern — as to leave no doubt that a separate family is involved. I have not investigated the other Nearctic trichopolydesmoid genera of uncertain family, some of which may be referrable to the Nearctodesmidae, but *Harpagonopus* clearly has little affinity with this family.

Harpagonopus confluentus Loomis

Figs. 1-3

Harpagonopus confluentus Loomis, 1960:59-60; 1968:54. Buckett, 1964:12.

Type specimens. Male holotype and one male, five female, and two juvenile paratypes (NMNH) collected by O. F. Cook, 22 January 1921, along Cottonwood Cr., 72 km (45 mi) E San Diego, San Diego Co., CA.

Diagnosis. With the characters of the genus.

Variation. The gonopods of the available males exhibit only minor differences in the relative lengths and curvatures of the projections and are clearly conspecific.

Ecology. The vial labels lack habitat information, and I personally have not collected *H. confluentus.* However, having visited several known localities and other coastal sites in its range, I would expect to find it under litter or debris near water sources in canyon

bottoms, as opposed to the drier, chaparral vegetation on the canyon walls.

Distribution. Same as that of the genus. Specimens were examined as follows:

USA. CALIFORNIA: *Santa Barbara Co.,* Cold Spring Cr. above Montecito, Los Padres Nat. For., F, 24 Jan. 1985, R. W. Baumann and C. R. Nelson (NCSM). *Ventura Co.,* ca. 24 km (15 mi) N Ojai, along Bear Cr. nr. jct. CA hwy. 33 in Wheeler Gorge, Los Padres Nat. For., F, 23 Jan. 1985, R. W. Baumann and C. R. Nelson (NCSM); Ojai, F, 29 Aug. 1930, H. Brandt (NMNH); Ventura, M, F, 1 April 1960, W. J. Gertsch

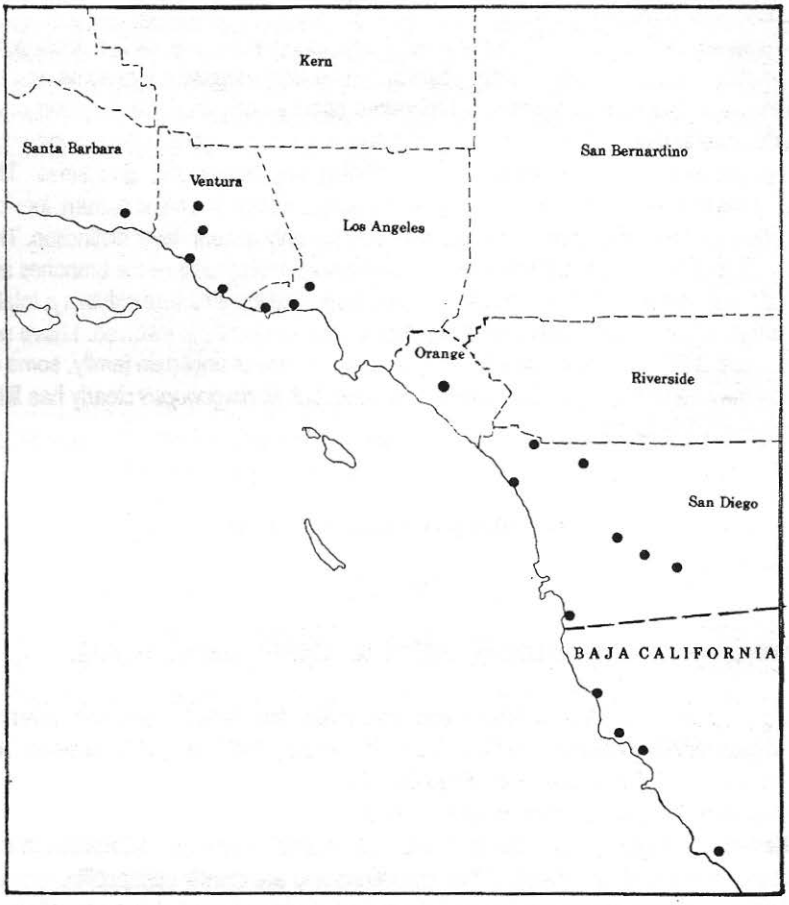


Fig. 3. Distribution of *Harpagonopus* and *H. confluentus* in California and Mexico.

and W. Ivie (NMNH); and Pt. Mugu St. Pk., La Jolla Cyn., M, 6 Feb. 1981, B. Hebert (LACMNH). *Los Angeles Co.,* 24 km (15 mi) NW Santa Monica, M, FF, 20 March 1941, W. Ivie (NMNH); along Topanga Cyn. Blvd. (CA hwy. 27) just above jct. CA hwy. 1, 2F, 18 March 1941, W. Ivie (NMNH); and Los Angeles, Beverly Glen Cyn., Santa Monica Mts., M, F, March 1953, collector unknown (NMNH). *Orange Co.*, Irvine, 2F, 13 July 1931, R. V. Chamberlin (NMNH). *San Diego Co.,* Oceanside, M, 11 July 1931, R. V. Chamberlin (NMNH); Mt. Palomar, F, 5 July 1941, R. V. Chamberlin (NMNH); Fallbrook, 3F, 3 April 1929, O. F. Cook (VMNH); Ramona, along the Golden Eagle R., MM, FF, 5 March 1977, D. K. Faulkner (SDMNH); 72 km (45 mi) E San Diego, along Cottonwood Cr., Cleveland Nat. For., 2M, 5F, 2 juvs., 22 Jan. 1921, O. F. Cook (NMNH) TYPE LOCALITY; Otay Mtn., exact location unknown, F, 18 March 1978, D. K. Faulkner (SDMNH); Hodges Dam, exact location unknown, 2M, F, juvs., 4 December 1927, O. F. Cook (VMNH); along the San Diego R., exact location unknown, 3F, 2 juvs., 12 July 1931, R. V. Chamberlin (NMNH); Old Mission Dam, exact location unknown, juv. 12 April 1976, R. G. Scudder (SDMNH); Mission Gorge, exact location unknown, M, 3F, 14 Feb. 1968, P. Opler (CIS); Bankhead Spgs., exact location unknown, juv., 24 March 1979, D. K. Faulkner (SDMNH); and Cleveland Nat. For., streamside, exact location unknown, M, 16 Feb. 1958, I. Newell (AMNH) (this site could also be in other sections of the Cleveland National Forest in Orange or Riverside counties, but because most of this forest is located in San Diego County, the record is listed here).

MEXICO: BAJA CALIFORNIA NORTE: *Ensenada vic.,* 22.4–32.0 km (14–20 mi) N, M, 5F, 6–7 January 1925, O. F. Cook (VMNH); *La Mission,* along Rio San Miguel, 2F, 27 February 1982, D. K. Faulkner (SDMNH). *8.0 km (5.0 mi) S. Colonet,* F, 4 February 1947, I. LaRivers (CIS).

Fallbrook is in northwestern San Diego County, not Riverside County as reported by Loomis (1960), approximately 11.2 km (7 mi) southwest of Temecula, which is in the latter county. Buckett's reference (1964) to its occurrence at Temecula was probably drawn from Loomis' record, but I have not seen any specimens from Riverside County. In California, *H. confluentus* is known only from counties bordering the Pacific Ocean, but western Riverside County, including the vicinity of Temecula, is a plausible area for the species.

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LITERATURE CITED

Buckett, J. S. 1964. Annotated list of the Diplopoda of California. Simmons Publishing Co., Davis, CA, 34 pp.

Causey, N. B. & D. L. Tiemann. 1969. A revision of the bioluminescent millipeds of the genus *Motyxia* (Xystodesmidae, Polydesmida). Proc. Amer. Philos. Soc., 113: 14–33.

Chamberlin, R. V. & R. L. Hoffman. 1958. Checklist of the millipeds of North America. Bull. No. 212, U.S. Natl. Mus., 236 pp.

Cook, O. F. & H. F. Loomis. 1928. Millipeds of the order Colobognatha, with descriptions of six new genera and type species, from Arizona and California. Proc. U.S. Natl. Mus., 72:1–26.

Gardner, M. R. & R. M. Shelley. 1989. New records, species, and genera of caseyid millipeds from the Pacific Coast of North America (Diplopoda: Chordeumatida: Caseyidae). Pan-Pacific Entomol., 65:177–268.

Hoffman, R. L. 1980 ("1979"). Classification of the Diplopoda. Museum d'Histoire Naturelle, Geneva, Switzerland, 237 pp.

_____ & B. S. Orcutt. 1960. A synopsis of the Atopetholidae, a family of spiroboloid millipeds. Proc. U.S. Natl. Mus., 111:96–166.

Keeton, W. T. 1960. A taxonomic study of the milliped family Spirobolidae (Diplopoda: Spirobolida). Mem. Amer. Entomol. Soc., no. 17, 146 pp.

_____. 1966. The species of the milliped genus *Tylobolus* (Diplopoda; Spirobolida). A re-examination. Trans. Amer. Entomol. Soc., 92:17–28.

Loomis, H. F. 1937. Crested millipeds of the family Lysiopetalidae in North America, with descriptions of new genera and species. Proc. U.S. Natl. Mus., 84:97–135.

_____. 1960. Millipeds of the order Polydesmida from the western states and Baja

California. J. Kansas Entomol. Soc., 33:57–68.
_____. 1968. A checklist of the millipeds of Mexico and Central America. Bull. No. 266, U.S. Natl. Mus., 137 pp.

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