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Janzenella, an Enigmatic New Genus of Scelionid Wasp from Costa Rica (Hymenoptera: Platygastroidea, Scelionidae)

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ABSTRACT

Janzenella, new genus, is described from the Neotropics (type species: *J. innupta*, new species). The position of the genus within the superfamily is unclear. *Janzenella* is characterized by the strongly depressed body, relatively dorsal position of the foramen magnum of the head, and the loosely articulated metasomatic segments with broad laterotergites and no laterosternites.

INTRODUCTION

During an intensive field survey in the Santa Rosa National Park (Guanacaste Province, Costa Rica) conducted in the mid 1980s by D.H. Janzen and I.D. Gauld, a long series of a remarkable new genus of scelionid wasp was collected by Malaise trapping. The habitus of this wasp is unusual for a scelionid and strongly reminiscent of a small bethylid (Hymenoptera: Chrysidoidea, Bethylidae). Its placement within the Platygastroidea is supported by the possession of paired, multiporous basiconic sensilla on the underside of the female antennal clava. Within the superfamily there are but two families, Scelionidae and Platygastridae. The latter is defined by the reduced number of antennomeres and the lack of cerci. In contrast, there are no synapomorphies for the Scelionidae (Austin et al., 2005). Because the new genus lacks the autapomorphies of platygastrids—the antennae are 11-segmented and the cerci well developed—we classify it as a scelionid, but it does not fit

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within any currently recognized tribe within the family. Because of the multitude of very strong autapomorphies of this new genus its higher classification within Scelionidae remains a painfully open question.

MATERIALS

This work is based upon specimens in the following collections:

AMNH: J.M. Carpenter: American Museum of Natural History, New York
ANIC: J. LaSalle: CSIRO Entomology, Canberra, Australia
AMNZ: J. Early: Auckland War Memorial Museum, Auckland, New Zealand
BMNH: M. Fitton: The Natural History Museum, London, England
CASC: W. Pulawski: California Academy of Sciences, San Francisco
CNCI: A. Bennett: Canadian National Collection of Insects, Ottawa, Canada
HNHM: S. Csősz: Hungarian National Museum of Natural History, Budapest
IEPA: F. Bin: Istituto di Entomologi Agraria dell'Università, Perugia, Italy
INBIO: M.Z. Arrieta: Instituto Nacional de Biodiversidad, Santo Domingo, Costa Rica
MIZA: J.L. García: Museo del Instituto de Zoología Agrícola Francisco Fernández Yépez, Universidad Central de Venezuela, Maracay, Venezuela
OSUC: N.F. Johnson: The Ohio State University Insect Collection, Columbus
TAMU: J. Oswald: Department of Entomology, Texas A&M University, College Station
UASK: S.V. Kononova: Institute of Zoology, Ukrainian Academy of Sciences, Kiev
UCDC: S. Heydon: Bohart Museum of Entomology, University of California, Davis
UCRC: S. Triapitsyn: UCR Entomological Teaching and Research Collection, University of California, Riverside
ZLMU: K. Yamagishi: Meijô University, Nagoya, Japan
ZMAS: S. A. Belokobylskij: Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia

Abbreviations and terms used in text: A1, A2, …, A11: antennomeres 1, 2, …, 11; claval formula: distribution of the large, multiporous basiconic sensilla on the underside of apical antennomeres of the female, with the segment interval specified followed by the number of sensilla per segment (Bin, 1981); S1, S2, …, S6: metasomatic sterna 1, 2, …, 6; T1, T2, …, T7: metasomatic terga 1, 2, …, 7. Morphological terminology follows Masner (1980). Figures 1–6 were made using AutoMontage software.

Janzenella innupta Masner and Johnson, new genus and species
figures 1–7

DESCRIPTION: Holotype female: small, elongate (figs. 1, 2), length 1.3 mm; body strongly depressed (figs. 1, 3), with relatively short legs, antenna; head and body dark brown, above base of mandibles with small whitish spot; radicle, A1, underside of A2–A7 yellow, antenna otherwise brown; legs including all coxa generally yellow, hind femur brownish yellow medially; macropterous.

Head transverse in dorsal view, width 1.5 times length, strongly narrowed medially; hyperoccipital carina absent (fig. 4); occipital carina absent; vertex with fine coriaceous microsculpture; lateral ocellus separated from inner orbit by more than one ocellar diameter; compound eye relatively small, with numerous short setae; head in frontal view (fig. 5) wider than high, height 0.8 times width; frons largely flat to weakly convex, smooth, nearly glabrous medially; interantennal process absent, torulus large, opening forward, lower rim of torulus nearly reaching oral cavity; submedian carina absent; orbital carina absent; lower frons strongly reflexed ventrally, without fanlike striae; interorbital space broad, 1.5 times eye height; inner orbits rounded, diverging dorsally and ventrally; clypeus very small, triangular, not differentiated into postclypeus, anteclypeus; malar space very long, 0.8 times eye height; malar sulcus absent; gena short, dropping off abruptly to posterior surface of head; labrum not visible externally; mandible short, robust, tridentate, teeth subequal in size, arrayed vertically; maxillary palpus 2-segmented, all segments cylindrical; labial palpus 1-segmented; hypostomal bridge on head without median longitudinal line of fusion (fig. 6), completely flat; antenna 11-merous; radicle inserted apically into A1, nearly parallel to longitudinal axis of A1; A1

Figs. 1–6. *Janzenella innupta*, n. gen. et sp., paratype female. (OSUC 167372); **1,** Lateral habitus. **2,** Dorsal habitus. **3**, Head and mesosoma, lateral view. **4**, Head and mesosoma, dorsal view. **5**, Head, frontal view. **6**, Head, posterior view. Scale bars in millimeters.

short, strongly widened in apical half, apex excavate for reception of flagellum; A3 distinctly shorter than A2; A3–A5 globular; apical 4 antennomeres expanded into semi-abrupt clava in female; gustatory sensilla on female antenna arranged in longitudinal pairs on apical antennomeres; claval formula A8–A11 2-2-2-1.

Mesosoma strongly depressed (figs. 1, 3), in dorsal view longer than wide (fig. 4), in lateral

view distinctly longer than high; pronotum in dorsal view narrowed laterally, subparallel to outline of mesoscutum, anterolateral corners rounded, anterior face extended forward into necklike elongation, finely coriaceous; transverse pronotal carina absent; vertical epomial carina absent; horizontal epomial carina present; lateral face of pronotum largely flat to weakly concave, without scrobe for reception of foreleg, surface shallowly reticulate, anterior margin very finely foveolate; netrion absent; anterior margin of mesoscutum meeting pronotum dorsally; mesoscutum (fig. 4) semioval in outline, longer than wide; admedian lines absent; parapsidal lines absent; notauli absent; skaphion absent; transscutal articulation well developed, simple; scutellum wider than long, unarmed, nearly flat; axilla reduced to lateral pit; metanotum extremely narrow, striplike, dorsellum not differentiated; dorsal surface of propodeum glabrous; keels, plicae of propodeum not developed; propodeum medially with irregular longitudinal line of punctures, punctures continuing along posterior margin around propodeal orifice and along lateral margins; mesopleural depression absent; mesopleural carina absent; sternaulus absent; mesopleural pit present, shallow; acetabular carina fine, anterior margin of ventral portion of mesepisternum straight, not projecting between fore coxae; posterior margin of mesopleuron with complete line of foveolae extending from base of forewing to mid coxa; episternal foveae absent; dorsal corner of mesepimeron angulate; anteroventral portion of metapleuron rounded, not separated from lateral face by carina, glabrous; metapleural pit not apparent; posterior margin of metapleuron rounded; metapleuron above hind coxa reticulate, otherwise smooth; metapleuron separated from propodeum dorsally by deep longitudinal groove; lateral propodeum without longitudinal carinae, relatively coarsely reticulate, glabrous posterolateral corner not at all produced posteriorly, posterior margin broadly rounded; legs relatively short, slender, only hind femur somewhat enlarged; posterior surface of hind coxa smooth; trochantellus present on hindleg; outer surface of fore-, mid tibia without spines; tibial spur formula 1-1-2; tarsal formula 5-5-5; tarsomeres tapering in width apically; pretarsal claws simple; forewing (fig. 7) extending to apex of metasoma, hyaline; R fairly straight, extending through basal 0.4 of length of forewing, bifurcating apically, R extending to costal margin, with 4 fine bristles arising along its length; bulla absent; R_1 absent or extremely short, therefore without postmarginal vein; r-rs (stigmal vein) extremely short, only slightly longer than length of R beyond bifurcation, reflexed basally; no other tracheate veins in forewing; no nebulous veins indicated; hindwing with R very short; no strong dark bristles on R; 2–3 hamuli present; marginal cilia about half width of wing.

Metasoma (fig. 2) weakly sclerotized, loosely articulated, depressed; T1–T3 subequal in length; 7 terga, 6 sterna visible externally; laterotergites extremely wide, no submarginal ridge present; laterosternites absent; no spiracles visible; anterior margin of segment 1 without anterior carina, T1 and S1 rounded and prolonged anteriorly into short neck that inserts into propodeal orifice; sutures between all segments simple, terga and sterna broadly overlapping; T7 without median raised field of microsetae or secretion, with short lateral apodemes arising from base; anterior margin of S2 straight; narrow sublateral felt fields absent; S7 deeply emarginate apically, with paired lateroventral apodemes; cercus peglike.

DIAGNOSIS: Similar in habitus and in the possession of wide laterotergites to the genera *Aradophagus* Ashmead and *Eumicrosoma* Gahan (Scelionidae). *Janzenella* may be distinguished from these by the very short marginal vein, the near absence of venation in the hindwing, the lack of a malar sulcus, the absence of a median longitudinal line of fusion on the postgenal bridge, 1-1-2 tibial spur formula, and the lack of a basal carina on T1. Additionally, all species of *Aradophagus* have 12-segmented antennae; species of *Eumicrosoma* have well-developed longitudinal plicae on the dorsal surface of the propodeum, and T2 is very distinctly the longest tergite.

TYPE SPECIES: *Janzenella innupta*, new species.

ETYMOLOGY: Named in honor of Dr. D. Janzen for his pioneering work in environmental biology and research in tropical countries, and who also collected many of

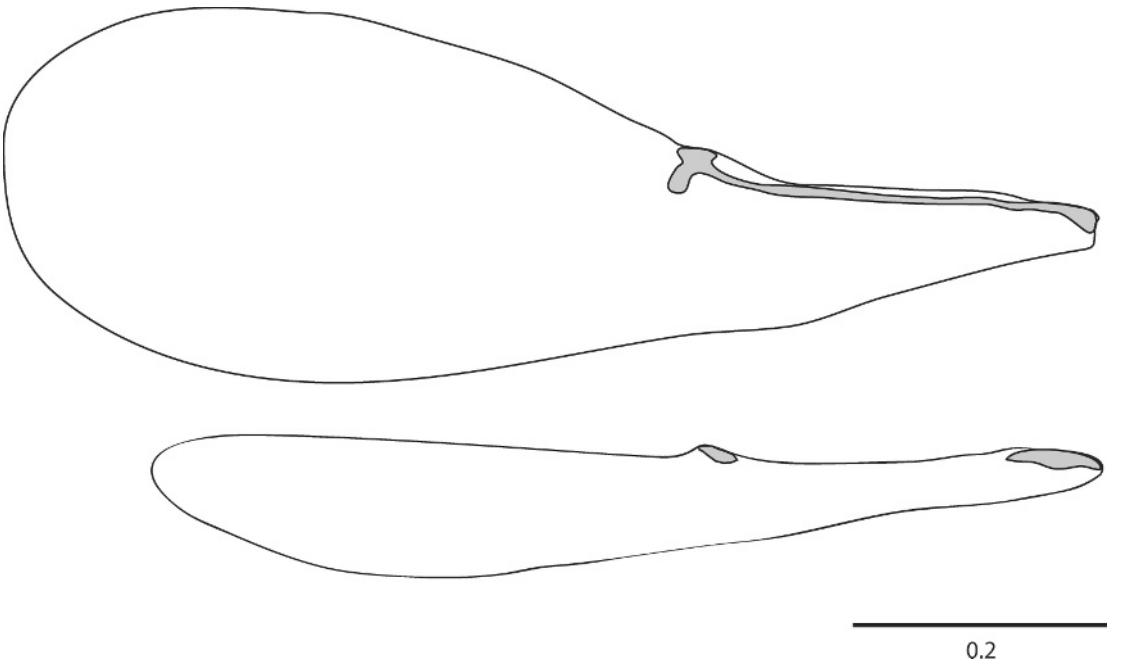

Fig. 7. *Janzenella innupta* n. gen. et sp. Wings. Scale bar in millimeters.

the specimens. The specific epithet, *innupta*, from the Latin meaning virgin, refers to the absence of males among the hundreds of specimens collected in Santa Rosa National Park.

Geographic Distribution: One specimen in Dominican amber; Costa Rica. No other individuals of *J. innupta* have yet been found in literally thousands of samples we have examined from the Neotropics, including many other parts of Costa Rica.

Material Examined: Holotype female. "COSTA RICA: Guan., Santa Rosa N.P., 1–21.II.1987, I. Gauld, MT, SE-5-O"; OSUC 167297. Deposited in CNCI. Paratypes: **COSTA RICA**: Guanacaste, Santa Rosa National Park, 20.xii.1986–10.i.1987, 10–21.i.1987, 10–31.i.1987, 31.i–21.ii.1987, 1–21.ii.1987, 21.ii–14.iii.1987, 1–10.iii.1990, 17–27.iv.1985, 27.iv–11.v.9815, 11.v–1.vi.1985, 14.vi.1986, D. Janzen, I. Gauld, Malaise trap. Guanacaste, 3 km NE Playa Naranjo, 1–5.iii.1990, J. Noyes, Malaise trap. 337 females. One female in CNCI in block of Dominican amber without further collecting data.

Comments: In all keys to scelionids, such as Masner (1976) or Kozlov (1978), *Janzenella* immediately is placed as a member of the subfamily Telenominae by virtue of the 11-segmented antenna and the wide laterotergites on the metasoma. Currently, there are two competing concepts of the scope of this subfamily. In one, the subfamily contains three tribes, the Telenomini, Aradophagini, and Tiphodytini (e.g., Kozlov, 1970; Kozlov and Kononova, 1983; Kononova and Kozlov, 2001); the second concept includes only the Telenomini, relegating the other tribes to the Scelioninae (e.g., Masner, 1976, 1995). Whatever the relative merits of these two hypotheses, *Janzenella* is not a telenomine. The loosely articulated metasomatic segments, the absence of a transverse carina on the base of the first metasomatic segment, the lack of a malar sulcus, the complete fusion of the postgenal bridge, the reduction in R in the hindwing, paired spurs on the hind tibia, and the lateroventral apodemes on S6 all distinguish it from any telenomine. Most of these features, in fact, seem to align this genus with the

putatively more plesiomorphic taxa within the Scelionidae and even with the Platygastridae.

The ovipositor of *Janzenella* is of the plesiomorphic *Ceratobaeus*-type (Austin and Field, 1997). The paired lateroventral apodemes at the base of the apical sternite and the short paired lateral apodemes at the base of the apical tergite are found in *Sparasion, Sceliomorpha*, and a number of genera of Platygastridae. However, the 1-1-2 tibial spur formula is unique within the Platygastroidea. We attach no particular significance to the reduced number of antennomeres, palpal segments, and the claval formula in view of the small body size of these animals.

The structure of the metasoma is very different from that of most platygastroids. There is no basal carinate edge to either T1 or S1; this feature is shared only with the genus *Mantibaria* Kirby, the only genus in the tribe Mantibariini (Scelioninae) and a phoretic parasite and egg parasitoid of the eggs of mantids (Masner, 1976). Dissection of the metasoma of *Janzenella* revealed that the short narrowed portion of the metasoma that articulates with the propodeum has both a tergal and sternal component. This is consistent with the structure of the metasoma in other platygastroids.

From these characters, it seems that *Janzenella* is not closely related to the major radiations within the Scelionidae or Platygastridae. It may be a rather basal element, but the small size of the individuals, with the concomitant reduction in the expression of many characters, makes it difficult to recognize the taxa to which it may be most closely related.

The specimens were collected from Malaise traps set in dry deciduous forest or in a disturbed area near human habitation. The traps in the forest were either under the canopy or open to the sky; both sets of traps captured specimens of *Janzenella*. Nearly 40% of the specimens were collected in the disturbed area. The range of collecting dates is restricted to the dry season in Guanacaste. The complete absence of males from the trap catch has at least two possible explanations. First, the species may be thelytokous, a condition unusual for platygastroids but not unknown (e.g., Hokyo and Kiritani, 1963; Hokyo et al., 1966; Tadić, 1965). Alternatively, males may not be effectively sampled using Malaise traps, perhaps because they remain close by the egg mass from which they emerged, because host eggs are in cryptic habitats (suggested by the strongly depressed body of the female), or the males are functionally flightless. Elucidation of the biology of *Janzenella innupta*, given its abundance, appears to be a tractable problem, and the resolution of that question may have important implications for understanding the evolution of host relationships within the Platygastroidea.

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