

## ***Pujadella* Ros-Farré, a New Genus from the Oriental Region, with a Description of Two New Species (Hymenoptera: Figitidae: Aspicerinae)**

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**Palmira Ros-Farré (2007)** *Pujadella* Ros-Farré, a new genus from the oriental region, with a description of two new species (Hymenoptera: Figitidae: Aspicerinae). *Zoological Studies* 46(2): 168-175. The subfamily Aspicerinae (Hymenoptera: Cynipoidea: Figitidae) includes 7 genera (*Balna* Cameron, *Prosaspicera* Kieffer, *Aspicera* Dahlbom, *Paraspicera* Kieffer, *Anacharoides* Cameron, *Omalaspis* Giraud, and *Callaspidia* Dahlbom), morphologically characterized by a distinct saddle-shaped 3rd tergum and biologically by attacking immature stages of Cyclorrhapha Diptera. A new genus of Aspicerinae, *Pujadella* gen. nov., with 2 species of *Pujadella villari* sp. nov. from Taiwan and *P. lewisae* sp. nov. from China are described. Morphological differences between the species are given and illustrated. A key to all Aspicerinae genera is included. *Ceraspidia* Belizin belongs to the Figitinae, not to the Aspicerinae. <http://zoolstud.sinica.edu.tw/Journals/46.2/168.pdf>

**Key words:** Figitidae, Aspicerinae, *Pujadella* gen. nov., Taiwan, China.

The Figitidae, a cosmopolitan microcynipoid group, is composed of parasitoids of Diptera, Hymenoptera, and Neuroptera larvae. They form a monophyletic group by having a distinct point of weakness in the 9th tergum of the female at the base of the 3rd valvula, and Rs+M always being directed towards the posterior end of the basal vein (Ronquist 1995: fig. 11; Ronquist 1999). The last character is used to distinguish the Figitidae from the Cynipidae (Nieves-Aldrey 2001). Nevertheless, this character is absent from some members of the Figitidae: in some Aspicerinae, Rs+M projects to the middle of the basal vein, while in many Aylacini (Cynipidae) this vein projects into the posterior end of the basalis (Pujade-Villar 2002). In fact, it is often more difficult to separate the Figitidae from the Cynipidae than the figitid subfamilies themselves (Parnipinae, Thrasorinae, Charipinae, Figitinae, Anacharitinae, Emarginae, Pycnostigminae, Eucoilinae, and Aspicerinae). Characters that support the monophyly of Aspicerinae include: i) the facial impres-

sion, i.e., the lower face is distinctly impressed beneath the antennae, and the impression is marked laterally by distinct carinae (Ros-Farré et al. 2000: fig 4), and ii) the distinct saddle-shaped 3rd tergum (Ros-Farré et al. 2000: fig 19). These characters can easily be used to separate the Aspicerinae from all other Figitidae subfamilies, and the Aspicerinae is composed of parasitoids of Dipteran predators of aphids (Syrphidae) and Chamaemyiidae (Diptera: Cyclorrhapha) (Ronquist 1999).

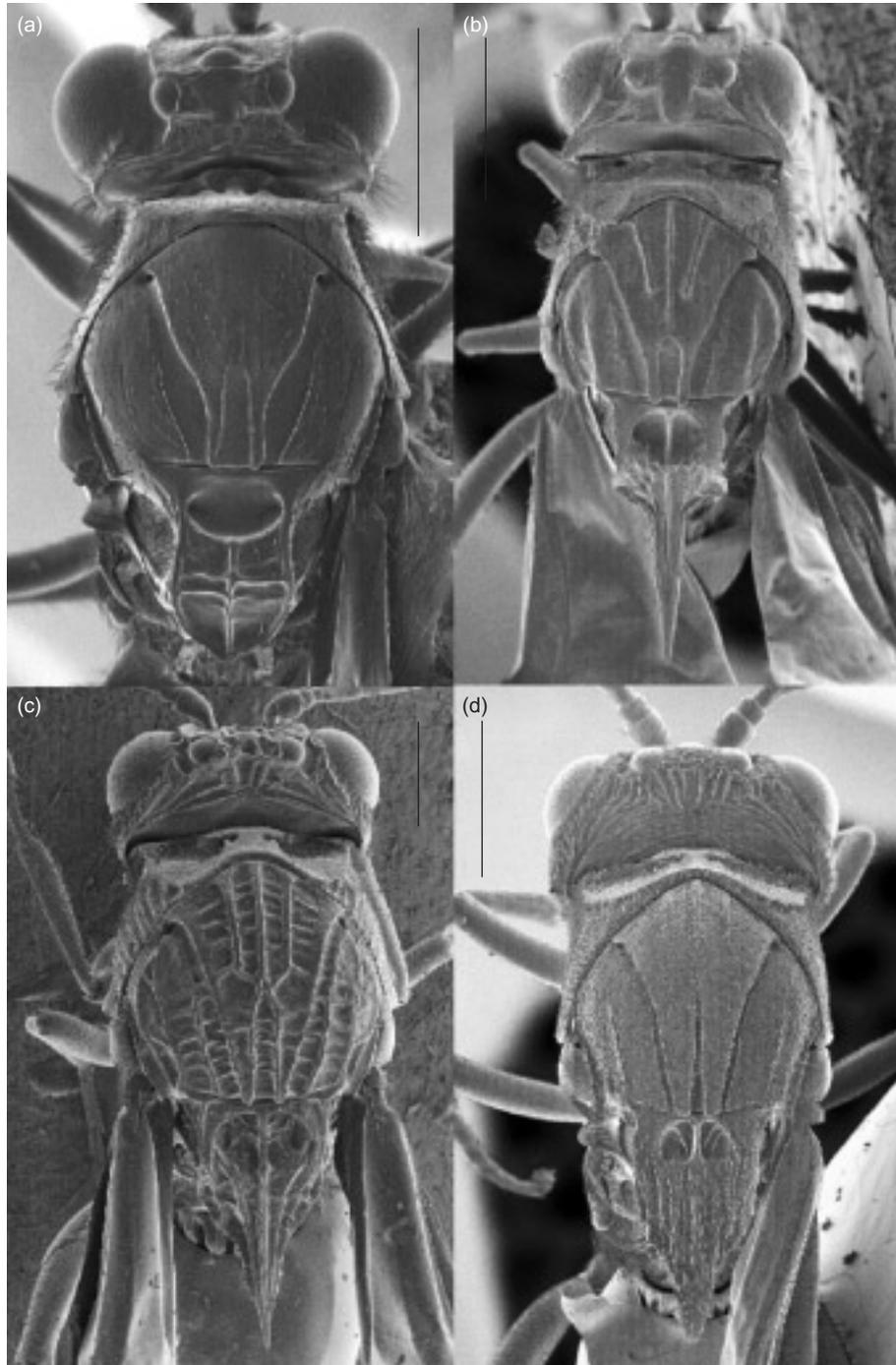
The last published key to Aspicerinae genera was given by Weld (1952); however, because of the high variability of some genera (e.g., *Paraspicera*, *Aspicera*, and *Prosaspicera*), the proposed key is not sufficient for precisely distinguishing genera. Moreover, some characters used in this key are now useless, after a revision of certain genera, e.g., *Paraspicera*, *Aspicera*, *Omalaspis*, and *Prosaspicera*, was made (Ros-Farré and Pujade-Villar in prep.).

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## MATERIALS AND METHODS

The type materials of all current Aspicerinae genera were studied. We were unable to study the type species of *Heteraspidia* (*H. foveata* Belizin, 1952), synonymized to *Prosaspicera* by Weld

(1961), but the holotype of *H. kerzhneri* Kovalev, 1974, was examined. Additionally, undescribed morphospecies of all genera were studied, which were obtained from several recently completed generic revisions (Ros-Farré and Pujade-Villar in prep.).



**Fig. 1.** Head and mesosoma in dorsal view of species of Aspicerinae with scutellar projection. (a) *Balna* sp., Cameron, 1883 (x77.5); (b) *Prosaspicera similis*, Ashmead, 1887 (x61.7); (c) *Aspicerca aculeata* (Dahlbom 1842) (x36.2); (d) *Paraspicera backeri*, Kieffer, 1907 (x51.6). Scale bar = 500  $\mu$ m.

The studied materials were loaned from the following institutions: The Natural History Museum (British Museum), London, UK (NHML, S. Lewis), Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (ZMAS, Dr. S. Belokobylskij), and Canadian National Collection of Insects, Ottawa, Canada (CNCI, Dr. G. Gibson). The studied materials are deposited in the NHML, ZMAS, CNCI, and Barcelona University (UB, Spain, Dr. J. Pujade-Villar).

Terms for skeletal structures follow Richards (1977) and Ronquist (1995). The terminology of morphological structures follows Gibson (1985) and Ronquist and Nordlander (1989). The abbreviation, F1-F12, indicates the 1st and subsequent flagellomeres. For the antennae, the length of each segment is indicated, and its width is given in parentheses.

SEM pictures were obtained at low voltages (700-850 V) without gold or carbon coating in order to preserve the specimens.

All characters used by other authors to differentiate Aspicerinae genera were examined herein.

## RESULTS

The type species of *Ceraspidia* (*C. japonica* Belizin, 1952) is not an Aspicerinae, as it was indicated by Ronquist (1999), because it lacks diagnostic characters of the subfamily: the facial impression and a distinctly saddle-shaped 3rd tergum. After examining *Ceraspidia japonica*, there was no doubt that it belongs to the Figitinae. Thus, the subfamily Figitinae includes 14 genera: *Ceraspidia* and those mentioned by Ronquist (1999:163).

As mentioned above, the type species of *Heteraspidia* (*H. foveata* Belizin) was unavailable for examination, so the holotype of *H. kerzhneri* Kovalev was examined, and it belongs to *Prosaspicera*. The same was mentioned by Weld (1961) for *H. foveata*.

Thus, the Aspicerinae includes 7 genera: *Balna*, *Prosaspicera*, *Aspicera*, *Paraspicera*, *Anacharoides*, *Omalaspis*, and *Callaspidia*. Weld's (1952) key is incomplete because some characters given for *Paraspicera*, *Aspicera*, *Omalaspis*, and *Prosaspicera* are erroneous or imprecise (Ros-Farré and Pujade-Villar in prep.). In this sense, *Balna* has weak anterior parallel and lateral ridges, and the scutellum ends in a slightly upturned or straight blunt point. In *Paraspicera*, the spine of the scutellum is not always in the

same plane as the disk and pits and is as long as or longer than the mesoscutum: its length widely varies. The posterior 1/2 of the scutellum of *Prosaspicera* does not always slope towards the basis of the scutellar spine; in many species it is straight. The length of the scutellar spine is also variable and does not reach at least the basal vein of the forewing in all species. F1 is not always unexcavated, but in fact, is usually excavated. In *Aspicera*, the scutellar spine does not reach back beyond the basal vein of the forewing, and the posterior 1/2 of the scutellum and spine being in almost the same plane as the pits is not true for all species. In addition, Fergusson (1986) corrected Weld (1952) when he mentioned that in *Omalaspis*, the scutellum is rounded posteriorly; however, it can be rounded, truncated, or emarginated (Weld 1952). Weld (1952) also mentioned that the scutellar disc is not transversely sculptured, but in some species of *Omalaspis*, it is so.

Later, Quinlan (1979) and Fergusson (1986) studied some Aspicerinae and gave some characters in their key to Aspicerinae genera which were not included in the earlier key (Weld 1952).

For all of these reasons, there is a need for a key to Aspicerinae genera. In the given key, the new genus, *Pujadella* gen. nov., is also included, and thus there are 8 Aspicerinae genera.

## Key to Aspicerinae Genera

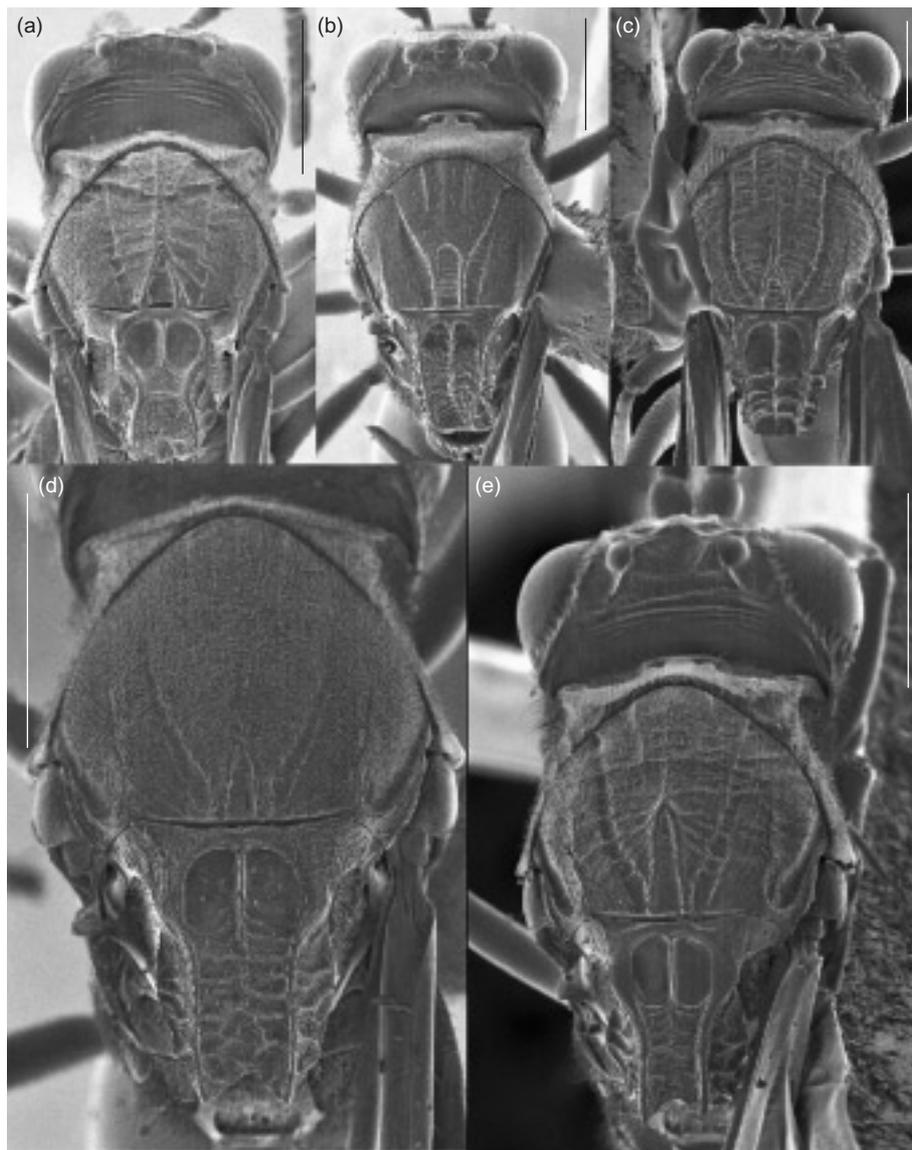
1. Scutellum ending in a spine (blunt or sharp) or in a blunt point. .... 2
- Scutellum different: truncate, emarginated, rounded, or ending in 2 sharp lateral points. .... 5
2. Scutellum ending in a blunt point; with 1 very deep scutellar fovea. Scutellar disc with a noticeable longitudinal carina and several transverse carinae, which separate broad depressed areas (Fig. 1A). Third tergum with a central patch of pubescence (similar to those shown in Figs. 3C, 4C). Dorsal margin of pronotal plate with a strong medial tooth ..... *Balna* Cameron
- Third tergum without such pubescence. With different combinations of characters. .... 3
3. Vertex with a median vertical groove (Fig. 1B), bounded by parallel ridges, that runs back from between the lateral ocelli to the occiput. Compound eyes bounded by a strong continuous carina (comprised of the frontal carina, occipital carina, and facial impression) (Fig. 3A). Ocelli raised. .... *Prosaspicera* Kieffer
- Vertex without median vertical groove (Fig. 1C, D). Compound eyes may be bounded by a carina but it is always interrupted near the malar space. Ocelli not or only slightly raised. .... 4
4. Scutellar spine slender and pointed (Fig. 1C). .... *Aspicera* Dahlbom
- Scutellar spine blunt and stout (Fig. 1D) ..... *Paraspicera* Kieffer
5. Scutellum ending in 2 lateral spines or points (Fig. 2D, E)

- and/or with a strong posterior depression (Fig. 2A). Dorsal surface and posterior margin of metatibia with several noticeable spurs (Fig. 3D). ..... 6
- End of scutellum rounded, emarginated or truncated (Fig. 2B, C). Dorsal surface of metatibia without spurs but its posterior margin with 2 spurs (Fig. 3E). ..... 7
6. Scutellum, in dorsal view, ending in a strong deep depression (Fig. 2A). ..... *Anacharoides* Cameron
- Scutellum, in dorsal view, without terminal depression, ending in a sharp point on each side; scutellar disc flat (Fig. 2D, E). ..... *Pujadella* Ros-Farré gen. nov.
7. Scutellar foveae less than 1/2 length of scutellum (Fig. 2B). Vein R1 present. Petiole broader than long; 3rd tergum with 2 patches of pubescence (Fig. 3B). Occiput more or less rugose, without transversal carinae (Fig. 2B).

- ..... *Omalaspis* Giraud
- Scutellar foveae about 1/2 as long as scutellum (Fig. 2C). Vein R1 absent. Petiole at least as long as broad; 3rd tergum with a central patch of pubescence (Fig. 3C). Occiput with strong transversal carinae (Fig. 2C). ..... *Callaspidia* Dahlbom

***Pujadella* Ros-Farré gen. nov.**  
(Figs. 2D, E, 3D, 4)

**Diagnosis:** This genus easily recognized by scutellum, with 2 sharp posterior points (Fig. 2D, E). Metatibia with several noticeable spurs on its dorsal surface and posterior margin (Fig. 3D), like



**Fig. 2.** Head and mesosoma in dorsal view of species of Aspicerinae without scutellar projection. (a) *Anacharoides* sp. Cameron, 1904 (x78.7); (b) *Omalaspis* sp. Giraud, 1860 (x59.6); (c) *Callaspidia dufouri* Giraud, 1860 (x51.9); (d) *Pujadella villari* Ros-Farré sp. nov. (x95.6); (e) *Pujadella lewisae* Ros-Farré sp. nov. (x72.5). Scale bar = 500  $\mu$ m.

in *Anacharoides*, but in the latter, scutellum ending in a strong depression (Fig. 2A), whereas in *Pujadella* gen. nov. scutellum is flat posteriorly (Figs. 2D, E).

**Description (Female):** Head entirely coriaceous, frons usually with wavy carinae; 2 strong oblique carinae behind central ocellus forming a distinct area sometimes smooth and sometimes coriaceous. Ocelli clearly projected, vertex incised. Genae marginated. Frontal ridges present. Lower face with typical impression that all *Aspicerinae* have. Occiput with or without transverse carinae. Antennae 13-segmented, long, filiform. Mesosoma with non-differentiated subpronotal plate. Mesoscutum coriaceous, with or without transverse carinae; antero-admedian lines and median ridge present. Notauli and median mesoscutal furrow present. Mesopleura smooth dorsally and posteriorly, sculptured, with transverse carinae on basal and anterior parts. Scutellar foveae reaching back almost to 1/3 of scutellum length. Scutellum coriaceous, with some transverse carinae; constricted behind scutellar foveae, margins raised and ending in a sharp tooth on each side. Central carina separat-

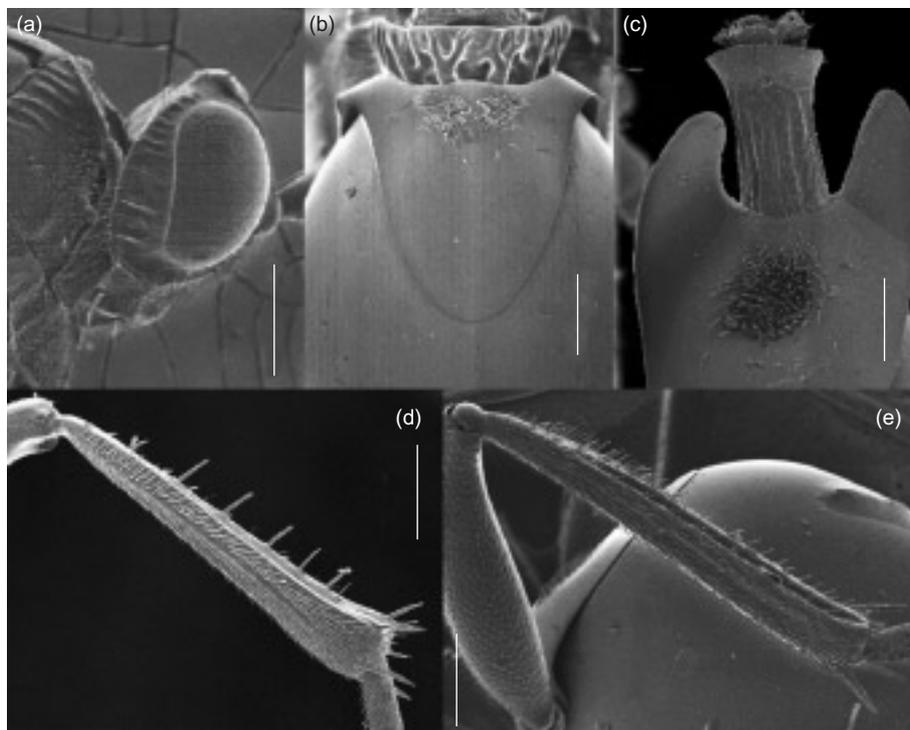
ing scutellar foveae running along scutellar disc. Lateral propodeal carinae strong and conspicuous. Forewing without areolet, radial cell completely opened along wing margin, R1 absent. Wing without or with moderate pubescence. Tarsal claw simple, sharp. Posterior margin of metatibia with 2 long spurs ventrally, with 4 or 5 shorter spurs laterally and dorsally. Metatibia with 2 longitudinal carinae on interior surface and with another weaker one on external surface. Dorsal surface of metatibia with strong spurs, variable in number. Metasomal petiole longitudinally striated and variable in length. Third abdominal tergum saddle-shaped and with a distinct median dorsal patch of setae in a depressed area. Fourth abdominal tergum with strong punctures on posterior 2/3.

Male unknown.

**Etymology:** Genus dedicated to my husband and eminent cynipidologist Dr. Juli Pujade-Villar, to whom I owe all I have learned.

**Species types:** *Pujadella villari* Ros-Farré sp. nov.

**Distribution:** Oriental region; known from Hainan I., China, and Taiwan.



**Fig. 3.** (a) Head in lateral view of *Prosaspicera* sp. Kieffer 1907 (x40.7); (b) 2nd metasomal segment in dorsal view of *Omalaspis cavroi* (Hedicke, 1914) (x133); (c) 2nd metasomal segment in dorsal view of *Callaspidia* sp. Dahlbom, 1842 (x143); (d) metatibia of *Pujadella villari* sp. nov. (x93.1); (e) metatibia of *Callaspidia* sp. Dahlbom, 1842 (x73.6). Scale bar = 250  $\mu$ m.

***Pujadella villari* Ros-Farré sp. nov.**

(Figs. 2D, 3D, 4A, C, E)

*Holotype* (♀): deposited in CNCI with the following labels: “Nantou Hsien E of Shan Kan, 2000-2200 m., on 28/V/1990 (Taiwan), J. Heraty leg. Decid/pine for. H90/076” (white label); “Holotype desig. by P. Ros-Farre-2005” (red label); “*Pujadella villari* n. sp. det P. Ros-Farré 2005” (white label).

*Paratypes* (4 ♀ ♀): with same label data as type (2 ♀ ♀ deposited in CNCI and 2 ♀ ♀ in UB).

*Diagnosis*: *Pujadella villari* sp. nov. characterized by having a slightly curved mesoscutum in lateral view, with conspicuously coriaceous sculpturing without transverse carina dorsally. Moreover, petiole long, approximately 2.0 times as long as broad and occiput coriaceous, without transverse carinae.

*Description*: Only females known.

*Length*: Females: 3.2-3.5 mm; male unknown.

*Color*: Head entirely black or very dark brown, except medium to light brown gena and area near antennal foramina. Antennae dark brown, last 4 or 5 antennomeres sometimes lighter ventrally. Mesoscutum and scutellum black, sometimes lateral margins of scutellar foveae medium brown. Mesopleura dark to light brown. Fore- and midlegs light to medium brown, hindlegs dark brown to black. Metanotum black.

*Head*: Frons strongly coriaceous, with a conspicuous median carina; upper 1/2 weakly rugose, area behind central ocellus coriaceous. Frontal carinae very strong, weakly curved, space between them and eye with small transverse carinae. Vertex coriaceous, incised, with 2 oblique carinae forming a keel. Gena coriaceous, with strong transverse carinae, angled behind upper 1/3 of eye in lateral view. Occiput coriaceous, without transverse carinae. Occipital carina present and strong, interrupted behind vertex.

*Antennae*: Long and filiform. F1/F2: 1.5. Antennal formula: 10(6): 5(5): 22(4): 14(4): 14.5(4): 14(4): 10(4): 10(4): 9(4): 8(4): 8(4): 8(4): 13(4). Placodeal sensilla uniformly distributed on ventral side of all flagellomeres; F1 without sensilla dorsally; F2 with 1 or 2; F3 with some near dorsal end, F4-F11 with uniformly distributed sensilla dorsally and ventrally.

*Mesosoma* (Figs. 2E, 4A, C, E): Pronotum strongly coriaceous, with distinct transverse carinae laterally. Pronotal plate slightly curved on dorsal margin. Mesoscutum conspicuously coriaceous, without transverse carinae. Parascutal sul-

cus coriaceous. Notauli strongly coriaceous, posteriorly narrower than medial mesoscutal sulcus and rather deep, becoming shallower and narrower towards anterior end. Median mesoscutal furrow granulated and short, 1.5-3.0 times as long as broad. Median ridge weak, antero-admedian lines weak, shiny, clearly visible. Scutum slightly curved in lateral view. Scutellar foveae 0.3 times length of scutellum, almost smooth, in some specimens slightly rugose, with some scattered small setae. Median carina of scutellum reaching back to 1/2 its length. Scutellar disc with transverse carinae on each side of median carina and with rugae on posterior 1/2. Mesoscutum 1.1-1.3 times as long as scutellum. Lateral propodeal carinae weakly curved and smooth, central propodeal area smooth and pubescent.

*Forewing*: Radial cell 2.3 times as long as broad; R2 nearly straight. Marginal cilia very long.

*Metasoma* (Fig. 4A, C): Petiole long, more than 2 times as long as broad.

*Distribution*: Presently known only from Taiwan.

*Biology*: Unknown.

*Etymology*: Species named after the maternal surname of Dr. Juli Pujade-Villar.

*Remarks*: *Pujadella villari* sp. nov. is related to *P. lewisae* sp. nov., but in *P. villari* sp. nov. the mesoscutum lacks a protuberance in lateral view (Fig. 4A) and a transverse carina dorsally (Fig. 2D); the petiole is long, approximately 2 times as long as broad (Fig. 4A, C); the occiput is coriaceous, without transverse carinae.

***Pujadella lewisae* Ros-Farré sp. nov.**

(Figs. 2E, 4B, D, F)

*Holotype* (♀) deposited in NHML with the following labels: “Hainan I. Tien Fong Mts., 17/V/1983, Boucek leg. (China)” (white label); “Holotype desig. by P. Ros-Farré-2005” (red label); “*Pujadella lewisae* n. sp. det P. Ros-Farré 2005” (white label).

*Diagnosis*: *Pujadella lewisi* sp. nov. is characterized by having a mesoscutum with a strong prominent protuberance at the end of the median mesoscutal sulcus in lateral view and with transversal carinae dorsally. Moreover, the petiole is short, as long as broad, and the occiput has several short transversal carinae.

*Description*: Only females known.

*Length*: Females: 3.0 mm, male unknown.

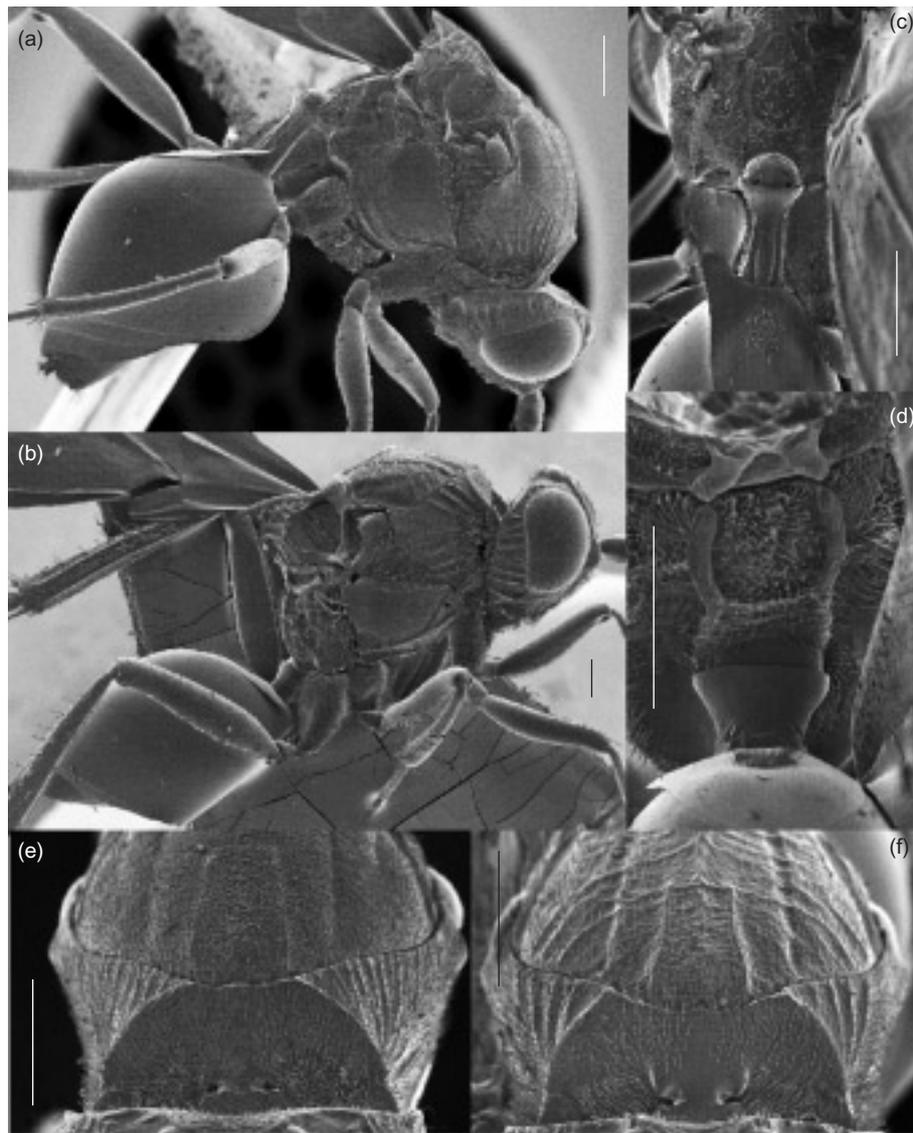
*Color*: Head black, except medium brown gena, area near antennal foramina, vertex, and

central area of occiput. Antennomeres medium brown, scape and pedicel dark brown dorsally and lighter ventrally. Pronotum mostly black, lateroventral 1/3 medium brown. Mesopleura medium brown. Mesoscutum black, except medium brown area along median mesoscutal furrow. Scutellum, metapleura, propodeum, and petiole medium brown (lateral carinae of scutellum black). Legs medium brown to black.

**Head (Fig. 2E):** Frons strongly coriaceous, with very strong median carina and rugae in upper 1/2. Area behind ocellus smooth. Frontal carinae distinct, nearly straight, space between them and eye with transverse carinae. Vertex coriaceous,

strongly incised, with 2 strong oblique carinae forming a keel. Gena weakly coriaceous, angled behind dorsal 1/3 of eye in lateral view, with strong transverse carinae. Occiput coriaceous, with few short transverse carinae centrally. Occipital carina strong, interrupted behind vertex.

**Antennae:** Long and filiform. F1/F2: 1.6. Antennal formula: 9(6): 4(4.5): 19(3): 12(3): 11(3.5): 10(3.5): 9(3.5): 9(4): 8(4): 8(4): 8(4): 7.5(4): 16(4). Placodeal sensilla uniformly distributed ventrally on all flagellomeres, except basal part of F1; F1 and F2 dorsally with sensilla on distal 2/3 only; F3-F11 with as many sensilla on dorsal face as on ventral face.



**Fig. 4.** Lateral view of (a) *Pujadella villari* Ros-Farré sp. nov. (x43.8) and (b) *Pujadella lewisae* Ros-Farré sp. nov. (x40.7); propodeum of (c) *Pujadella villari* Ros-Farré sp. nov. (x93.5) and (d) *Pujadella lewisae* Ros-Farré sp. nov. (x184); pronotum in frontal view of (e) *Pujadella villari* Ros-Farré sp. nov. (x134); and (f) *Pujadella lewisae* Ros-Farré sp. nov. (x140). Scale bar = 250  $\mu$ m.

*Mesosoma* (Figs. 2E, 4B, D, F): Pronotum coriaceous, with very strong transverse carinae laterally. Dorsal margin of pronotal plate with small tooth. Mesoscutum coriaceous, with weak transverse carinae. Parascutal sulcus shiny. Notauli posteriorly narrower than median mesoscutal furrow and rather deep; externally becoming weaker anteriorly but clearly impressed throughout length; internally coriaceous, with strong transverse carinae. Median mesoscutal furrow long, 4.3 times as long as broad, coriaceous, with small transverse carinae, median ridge weak, antero-admedian lines strongly impressed. Mesoscutum with a strong protuberance in lateral view where median mesoscutal furrow ends. Scutellar foveae 0.3 times length of scutellum, smooth, glabrous. Median carina of scutellum reaching 1/2 length of scutellum. Scutellar disc with strong transverse carinae near scutellar fovear and with weaker ones towards posterior margin. Mesoscutum 1.2 times as long as scutellum. Lateral propodeal carinae weakly curved and smooth, central propodeal area smooth and densely pubescent.

*Forewing*: Radial cell 2.14 times as long as broad; R2 curved basally. Marginal cilia very long.

*Metasoma* (Fig. 4B, D): Petiole short, approximately as long as broad.

*Distribution*: Presently known only from Hainan I., China.

*Biology*: Unknown.

*Etymology*: Species dedicated to the curator of the NHML, Ms. Suzanne Lewis, whose patience and help I highly appreciate.

*Remarks*: *Pujadella lewisi* sp. nov. is related to *P. villari* sp. nov., but in *P. lewisi* sp. nov., the mesoscutum has a strong prominent protuberance at the end of the median mesoscutal sulcus in lateral view (Fig. 4B) and transversal carinae dorsally (Fig. 2E); the petiole is shorter, as long as broad (Fig. 4B, D); and the occiput has several short transversal carinae (Fig. 2E).

**Acknowledgments**: I am very grateful to Dr. John Huber, Dr. Gary Gibson, Jennifer Read (Canadian National Collection of Insects, Ottawa, Canada), and Suzanne Lewis (Natural History Museum, British Museum, London, UK) for the loan of unde-

termined material included in this study; Dr. Sergej Belokobylskij (Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia) for the loan of the types of *Ceraspidia japonica* Belizin and *Heteraspidia kerzhneri* Kovalev; and Jordi Paretas Martínez for his comments on the manuscript.

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