A new Triassic insect fauna from Cerro Bayo, Potrerillos (Mendoza Province, Argentina) with descriptions of new taxa (Insecta: Blattoptera and Coleoptera)

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This contribution describes new fossil insect taxa from the early Late Triassic Potrerillos Formation (lower section), at quebrada del puente, Cerro Bayo, Mendoza Province, Argentina. A new family, three new genera, and four new species of Blattoptera are described: *Anablatta compacta* gen. et sp. nov., *Potrerilloblatta stipanicici* gen. et sp. nov. (Subioblattidae Schneider), *Delpuenteblatta dangeloi* gen. et sp. nov. and *Lariojablatta neiffi* sp. nov. (Delpuenteblattidae fam. nov.); and a new coleopteran species, *Delpuentesyne menendezi* sp. nov. (Permosynidae Tillyard). These findings extend the stratigraphic distribution of the typical Triassic coleopteran taxa. The new assemblage shares the genus *Lariojablatta* with the Los Rastros fauna. The Blattoptera and Coleoptera genera differ from those typical of the Australian and South African Triassic biota (*Ademosyne* for Coleoptera and *Triassoblatta* and *Samaroblatta* for Blattoptera) and appear to be endemic to Argentina (*Delpuentesyne*, *Potrerilloblatta* and *Delpuenteblatta*).

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TRIASSIC INSECTS from Gondwana have been elucidated via the pioneering works of Etheridge & Olliff (1890), Tillyard (1916, 1926), Tillyard & Dunstan (1924), Wieland (1925, 1926), Cabrera (1928), Zeuner (1939, 1959), Pinto (1956), Pinto & Ornellas (1974), Pinto & Purper (1978), Riek (1955, 1962, 1974, 1976), Carpenter (1960) and Marquat (1991) from Australian, South African and South American Triassic basins. Triassic insects from southern South America have been described by Gallego (1997), Gallego & Martins-Neto (1999), Martins-Neto & Gallego (1999, 2001, 2006) Martins-Neto *et al*. (2003, 2005, 2006a, 2006b) and Gallego *et al*. (2005). These insects mainly came from the Ischichuca and Los Rastros formations (Bermejo Basin, Argentina), Potrerillos and Cacheuta formations (Cuyana Basin, Argentina), Santa Maria Formation (Brazil) and Santa Juana Formation (Chile).

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Knowledge of the Triassic insect fauna from southern South America has increased noticeably in recent years through the work of our research team. This permits better characterization of the real insect diversity and the probable relationships to other Gondwanan Triassic insect faunas. In this serial contribution, we describe new Blattoptera (cockroaches) and Coleoptera (beetles) from the Potrerillos Formation at a new insect locality, the 'quebrada del puente', Cerro Bayo near Potrerillos, Mendoza Province, Argentina (Fig. 1).

Only five records of fossil insects have been documented from the Potrerillos Formation in the Cuyana Basin, Argentina (Cabrera 1928, Carpenter 1960, Pinto & Purper 1978, Marquat 1991, Martins-Neto & Gallego 1999). These insects included representatives of the orders Ensifera (*Notopamphagopsis bolivari* Cabrera, 1928 and *Notopamphagopsis* sp.), Odonatoptera (*Triassothemis mendozensis* Carpenter, 1960), Plecoptera (*Gondwanoperlidium argentinarum* Pinto & Purper, 1978 and *G. mendozensis* Pinto & Purper, 1978) and Palaeomanteidae (=Miomoptera) [*Triasseuryptilon acostai* (Marquat, 1991) Storozhenko, 1997]. All these insect remains came from the upper section of the Potrerillos Formation at the classic locality, named Cacheuta or 'Minas de Petroleo', from southern Cerro Cacheuta, Mendoza Province, Argentina.

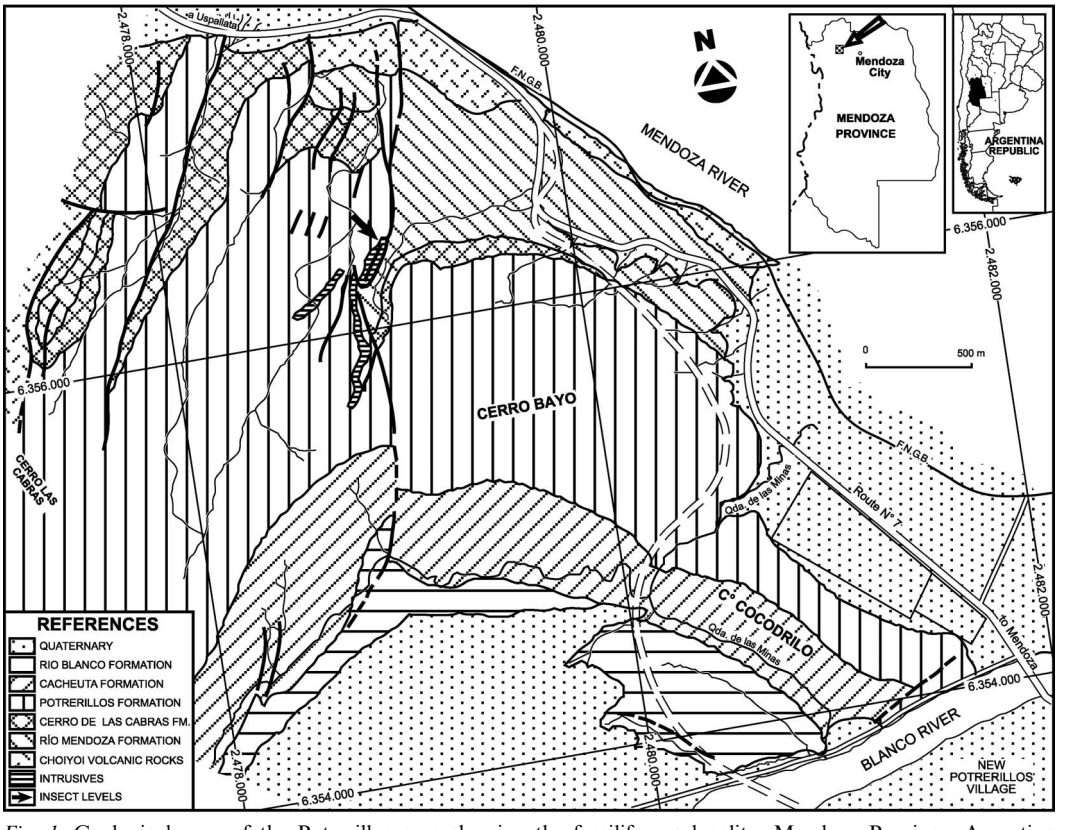


Fig. 1. Geological map of the Potrerillos area showing the fossiliferous locality, Mendoza Province, Argentina (modified from Días & Massabié 1974).

The materials were collected by two of the authors OFG and AMZ during two field trips in 1995 and 2005. The terminology adopted here is mainly that of Kukalova-Peck (1991) and Martins-Neto *et al*. (2005, 2006b). The abbreviations in Fig. 2F are as follows: **oMA**: distance from the tegmen base to **MA** origin; **aml**: anal margin length from the tegmen base to distal part of **CuP**; **amw**: anal margin width from **CuP** origin, at the tegmen base to the anal margin; **d**: anal area diagonal, from **CuP** origin at **CuP** distal extremity, at the anal margin; **f**: height from the main **CuP** curvature to **d**, in relation to the tegmen base; **lcm**: length from the wing base to the last distal **ScP** branch; **lrp**: length from the distal part of the first **RA** branch to the last **RP** branch; **lh**: humeral area length.

The repository and institutional abbreviations used here are: **MCNAM – PI** (Paleoinvertebrate Collection, Museo de Ciencias Naturales y Antropológicas 'Cornelio Moyano', Mendoza, Argentina) and **CTES-PZ** (Paleozoological Collection, Facultad de Ciencias Exactas y Naturales y Agrimensura, Universidad Nacional del Nordeste, Corrientes, Argentina).

Geological setting of Potrerillos

The Triassic strata of the Potrerillos area at the southwestern extreme of the Precordillera in Mendoza Province (32°56′S/69°12′W) represents the most complete exposed sequence of the Cuyana Basin. The whole succession, assigned to the Uspallata Group (Stipanicic 1979), is exposed mainly at the two hills called Cerro Bayo and Cerro Cocodrilo, near Potrerillos (Fig. 1). The Triassic sequence in this area represents a large fluvial-deltaic-lacustrine depositional system (Kokogian & Boggetti 1986, Kokogian & Mancilla 1989, Kokogian *et al*. 1993). It starts with coarse alluvial fan breccias and conglomerates (Río Mendoza Formation) and is followed concordantly by fine conglomerate and sandstone, mudstone, carbonate rocks, and tuffs representing ephemeral fluvial systems and lacustrine facies with a regular supply of volcanic ash (Cerro de Las Cabras Formation). An angular unconformity separates the Cerro de Las Cabras Formation from the overlying Potrerillos Formation (Rolleri & Criado Roqué 1968). The Potrerillos Formation is composed of thick, coarse conglomerates at its base and by thinner conglomerates, sandstones, bentonites, mudstones, and carbonaceous shales in the middle and upper part of the unit. It represents a mix of braided-river channels, floodplain deposits, and high-sinuosity meandering channels. The Potrerillos Formation passes upward into fine sandstones followed by well-bedded black and bituminous shales of the Cacheuta Formation, representing a widespread deltaic (interdistributary bay facies) system and lacustrine environments. Red beds of the Río Blanco Formation constitute the base of a second fluvial cycle.

A detailed stratigraphic study of the Triassic sequence around Potrerillos was undertaken by Días & Massabié (1974), among others. Frey & Rosenfeld (1992) provided a revised sedimentological and lithofacies analysis with interpretations of all sedimentary environments of the entire Potrerillos succession. The geological map and lithostratigraphic units of Días & Massabié (1974) are followed partially in this study (Fig. 1). These authors indicated that the region consisted of a series of fault blocks that had undergone differential movement associated with the Andean orogeny. The whole sequence, situated in the tectonically disturbed region in the western half of the Potrerillos area, was described originally (Borrello 1942) as the type locality of the Cerro de Las Cabras Formation

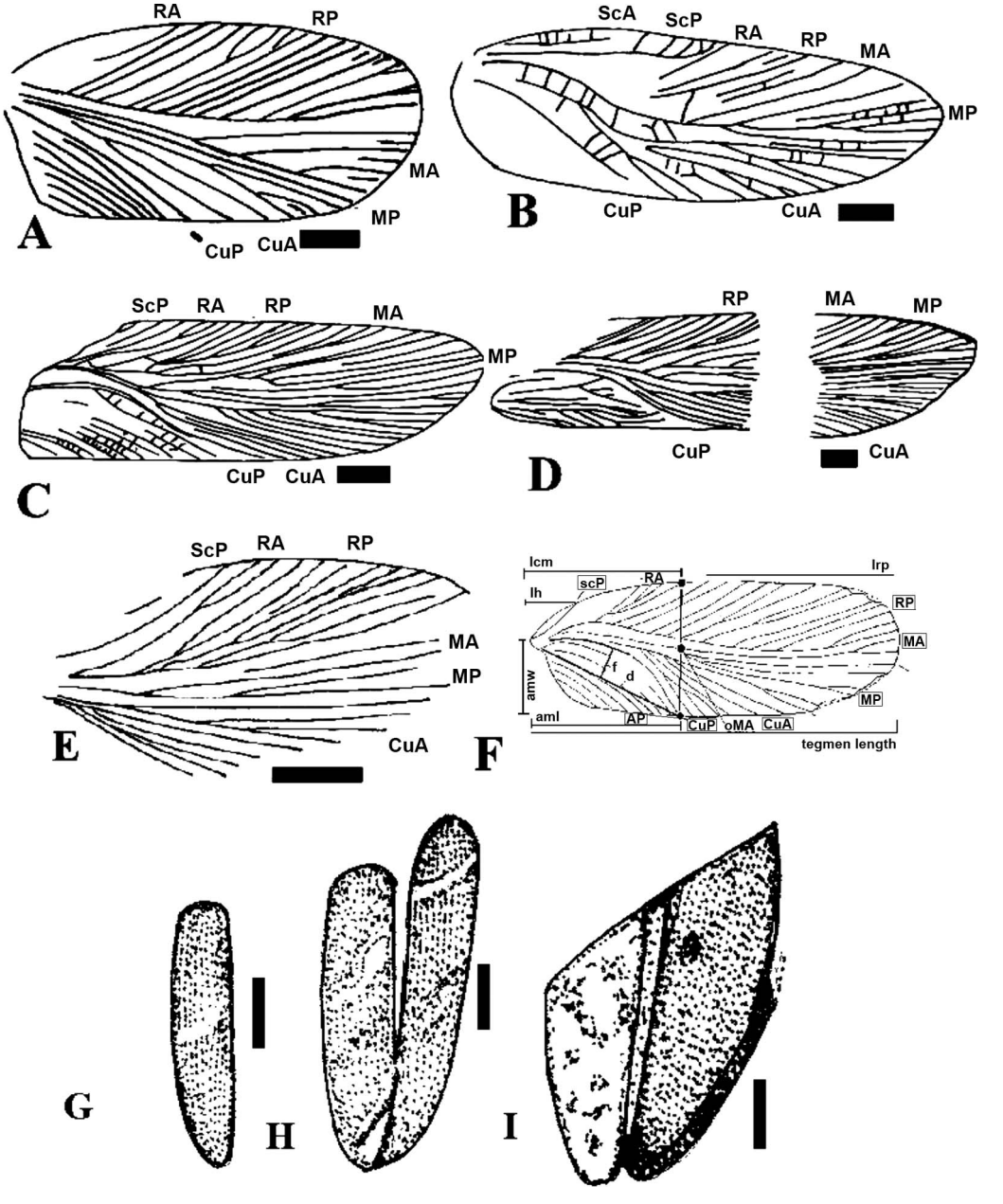


Fig. 2. **A**, *Anablatta compacta* Martins-Neto & Gallego sp. nov. drawn from the holotype MCNAM – PI 24294. **B**, *Potrerilloblatta stipanicici* Martins-Neto & Gallego sp. nov., drawn from the holotype MCNAM – PI 24263. **C – D,** *Delpuenteblatta delicata* Martins-Neto & Gallego sp. nov., drawn from the holotype MCNAM – PI 24265, counterpart (**C**) and MCNAM – PI 24264 part (**D**) of the same specimen. **E**, *Lariojablatta neiffi* Martins-Neto & Gallego sp. nov., drawn from the holotype MCNAM – PI 24260. **F**, Schematic drawing of the Blattoptera tegmen, showing the main diagnostic characters. The intersection points (black dots) are from the top to bottom, last **RA** branch extremity, **MA** origin and **CuP** distal extremity (from Martins-Neto *et al.* 2005). **G – I,** *Delpuentesyne menendezi* Martins-Neto & Gallego sp. nov., drawn from the holotype MCNAM – PI 24261 (**G**), drawn from the paratypes MCNAM – PI 24262a (**H**) and 24262b (**I**). Scale bar = 1 mm.

(see Stipanicic *et al.* 2002). Días & Massabié (1974) redefined the unit and recognized a more limited distribution in outcrop confined to the northwestern and western areas as shown in Fig. 1. Originally, Borrello (1942) described carbonaceous beds with plant remains in the upper part of this unit in the western region of Potrerillos as belonging to the 'Las Cabras strata'. However, Días & Massabié (1974) ascribed carbonaceous layers with abundant plant remains on the western side of Bayo Hill to the lower part of Potrerillos Formation. Importantly, the structural conditions on the studied western side of Bayo Hill do not permit exact stratigraphic placement and correlation of the finer-grained strata (see also Frey & Rosenfeld 1992).

Samples with insect remains were collected around 1460 m south of the 1101.7 km mark of National Route N° 7, in a long creek that runs southward to the northwestern flank of the Cerro Bayo (Fig. 1). We have called that creek 'quebrada del puente' because it begins almost at the railway bridge over the Mendoza River. The carbonaceous dark shale containing insect remains associated with scarce plant debris comes from a highly tectonically disturbed and intruded area of the Potrerillos Formation (32°56′28″S/69°13′48″W; Días & Massabié 1974). The organic-rich insect-bearing levels are finely laminated to massive shales, light grey when weathered and black when fresh. These bituminous layers are interbedded with fine conglomerate layers, tabular pebbly sandstones, and light-coloured tuffaceous sandstones that are almost vertically tilted owing to the local block faulting.

The Uspallata Group has a rich megaflora (Stipanicic 1983, Stipanicic *et al.* 1996, Spalletti *et al.* 1999, Stipanicic & Archangelsky 2002, Morel *et al.* 2003) and palynoflora (Zavattieri & Batten 1996) together with vertebrate (Báez *et al.* 1993) and invertebrate remains (Gallego 1992, 1997, 1999, 2005, Gallego & Melchor 2000, Gallego *et al.* 2004, Martins-Neto & Gallego 1999, 2001, Shen *et al.* 2001). The Uspallata Group is considered by Stipanicic & Zavattieri (2002) to range from the Middle Triassic to the latest Triassic. The age of the Potrerillos Formation based on its stratigraphic relationships and paleontological content has been discussed in detail by Morel *et al.* (2002, p. 222–223). These authors attributed an early Late Triassic (Carnian) age to most of the unit, although its lower part may be latest Middle Triassic.

Systematic palaeontology

Order BLATTOPTERA Brunner, 1882
Superfamily BLATTOIDEA *sensu* Handlirsch, 1906
Family BLATTULIDAE Vischnyakova, 1982

Anablatta Martins-Neto & Gallego gen. nov.

Type species. *Anablatta compacta* Martins-Neto & Gallego sp. nov., designated here.

Etymology. Ana, dedicated to the palynologist Ana María Zavattieri for her great contribution to protect the Triassic outcrops of Mendoza Province, and *blatta*, general suffix for blattoids.

Diagnosis. Tegmen twice as long as wide, with **RA** and **CuP** distal extremities perpendicular to the costal and anal margins; **MA** origin after this alignment (**lcm** = **aml** < **oMA** family characteristic, Fig. 2F; see Martins-Neto *et al.* 2005). **RP** slightly curved. Unbranched **MA**. Anal area triangular, 1/3 of tegmen length.

Discussion. *Anablatta* gen. nov. differs from all known Blattulidae (including *Pulchellablatta* Martins-Neto & Gallego 2005 and *Argentinoblattula* Martins-Neto & Gallego

2005 from the Los Rastros Formation (in Martins-Neto *et al*. 2005) by the short, wide tegmen. The *Anablatta* tegmen is at least three times as long as wide and is relatively broad for blattulids, but the costal area and anal areas are restricted to the proximal 1/3 of the tegmen, which is typical for this family. *Anablatta* also shares an overall reduction of **MP** and **CuA** secondary branches and unbranched **MA** with known blattulids. Another distinctive characteristic of this new genus is the slightly curved **RP** (notably sigmoid in all other blattulid genera).

Anablatta compacta Martins-Neto & Gallego sp. nov. (Figs 2A, 3A)

Holotype. MCNAM – PI 24294.

Type stratum, locality, and age. Lower part of Potrerillos Formation; Quebrada del Puente, Potrerillos, Mendoza Province, Argentina; early Late Triassic.

Etymology. Latin: *compacta,* small.

Diagnosis. As for the genus.

Description. Tegmen 5.8 mm long and 2.8 mm wide. Unbranched **ScP** (as preserved), reaching the costal margin around 1/3 of the tegmen base. Unbranched **RA**. **RP** long, slightly curved, with 10 long pectinate branches: **RP3**, **4**, **8**, and **9** with a small distal dichotomy. **MA** origin at tegmen mid-length, unbranched. Two-branched **MP**. Three-branched **CuA**: **CuA2** and **CuA3** polychotomous. **CuP** slightly curved, oblique to and reaching anal margin, around 1/3 of the tegmen base. Anal area triangular, small, restricted to the basal third of the tegmen. Nine unbranched anal secondary veins preserved. **RA** and **CuP** perpendicular to costal and anal margins, **MA** origin after this alignment (**lcm = aml < oMA**; see Martins-Neto *et al*. 2005).

Family SUBIOBLATTIDAE Schneider, 1983

Potrerilloblatta Martins-Neto & Gallego gen. nov.

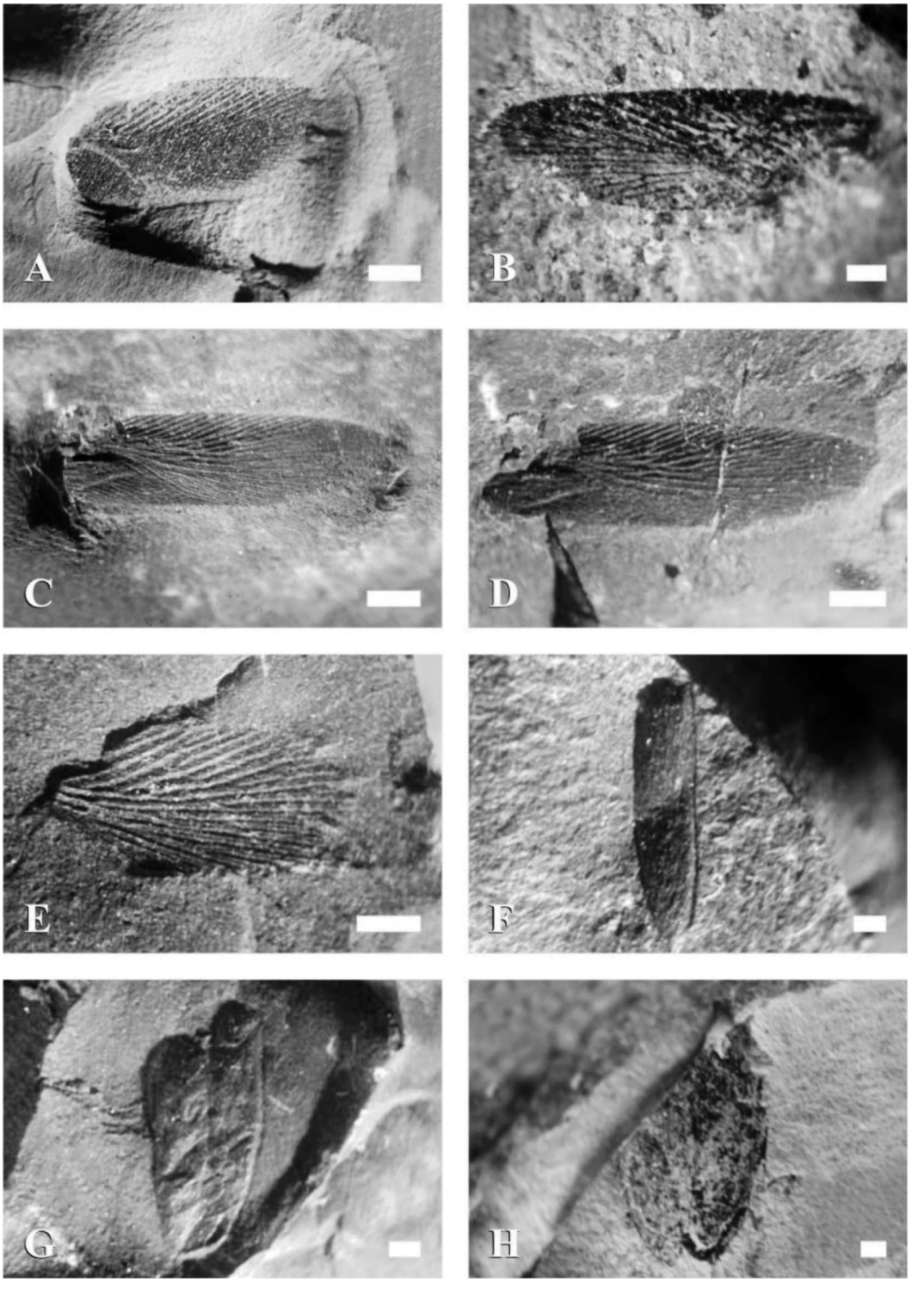
Type species. *Potrerilloblatta stipanicici* Martins-Neto and Gallego sp. nov., by present designation.

Etymology. From the Potrerillos Formation.

Diagnosis. Notably small tegmen with **ScP** reaching the costal margin after the mid-length of the tegmen and with at least five small secondary branches. **ScA** present. Massive presence of cross-veins between **M** and **Cu**. Intercalary veins present.

Discussion. Only two genera were previously assigned to this family: *Samaroblattella* Riek 1976 and *Subioblatta* Lin 1978, both reviewed by Papier *et al*. (1994). *Potrerilloblatta* gen. nov. is similar to *Samaroblattella* by having differing intercalary veins (absent in *Subioblatta*) but differs by having **ScP** with secondary branches (absent in *Samaroblattella*, present in *Subioblatta*). *Potrerilloblatta* gen. nov. differs from both established genera by having a notably small tegmen, presence of a massive number of cross-veins between **M** and **Cu,** and **Sc** branched in **ScA** and **ScP**.

Fig. 3. **A**, *Anablatta compacta* Martins-Neto & Gallego sp. nov., holotype MCNAM – PI 24294. **B**, *Potrerilloblatta stipanicici* Martins-Neto & Gallego sp. nov., holotype MCNAM – PI 24263. **C – D**, *Delpuenteblatta delicata* Martins-Neto & Gallego sp. nov., holotype MCNAM – PI 24265, counterpart (**C**) and MCNAM – PI 24264, part (**D**) of the same specimen. **E**, *Lariojablatta neiffi* Martins-Neto & Gallego sp. nov., holotype MCNAM – PI 24260. **F – H**, *Delpuentesyne menendezi* Martins-Neto & Gallego sp. nov., holotype MCNAM – PI 24261 (**F**), paratypes MCNAM – PI 24262a (**G**) and 24262b (**H**). Scale bar = 1 mm.



Potrerilloblatta stipanicici Martins-Neto & Gallego sp. nov. (Figs 2B, 3B)

Holotype. MCNAM – PI 24263.

Type stratum, locality and age. As for *Anablatta compacta* sp. nov.

Etymology. In honour of Pedro N. Stipanicic (Academia Nacional de Ciencias) for his great contributions to the Triassic geology and palaeontology of Argentina.

Diagnosis. As for the genus.

Description. Small ovoid tegmen, 5 mm long and 1.6 mm wide. **ScA** relatively long, parallel to the costal margin with at least five short, pectinate secondary branches. **ScA** length around one-quarter of the tegmen length. **ScP** long, more than half of the tegmen length, with at least five small pectinate secondary branches. Unbranched **RA**. **RP** three-branched, all branches undivided. **M** sigmoid. **MA** origin at the same level as extremity of **ScP**. **MA** is unbranched, reaching the costal margin around one-fifth of the distance to the apex. **MP** three-branched with **MP2** trichotomous. **CuA** sigmoid, parallel to **M**, three-branched; **CuA1** and **CuA2** trichotomous; **CuA3** dichotomous. **CuP** slightly curved, reaching the anal margin around one-third of the tegmen base. Anal area small, triangular. Intercalary veins very common. **m-cu** cross-veins very numerous.

Remarks. *Subioblatta* Lin 1978 is represented by *S. tongchuanensis* Lin 1978, *S. recta* (Lin) Papier, Grauvogel-Stamm & Nel 1994, both from the Chinese Triassic, and *S. undulata* Papier, Grauvogel-Stamm & Nel 1994, from the French Triassic. *Samaroblattella revelata* Riek 1976 is from the South African Triassic. *Potrerilloblatta stipanicici* is the smallest species of the family, having a 5-mm-long tegmen (more than 11 mm in all other known species).

Family DELPUENTEBLATTIDAE Martins-Neto & Gallego fam. nov.

Diagnosis. Tegmen slightly acuminate. **RP** four-branched, polychotomous; **RP4** reaching the costal margin around one-quarter distance to apex. **M** sigmoid: **MA** long, four-branched; **MA2** to **MA4** origin aligned to **RP** (apomorphic condition). **MA** secondary branches restricted to the acroscopic apical margin, and the **MP** ones, also restricted to the basiscopic apical margin. **CuP** sigmoid, long, reaching the anal margin around one-third of the distance to the apex (apomorphic condition). Anal area occupying about one-third of tegmen length and two-thirds of tegmen width.

Discussion. Similar to Subioblattidae Schneider, 1983 (as revised by Papier *et al.* 1994) by having a sigmoid **M** (synapomorphy), differing by having short **ScP**, restricted to the tegmen base (notably longer, with several short, pectinate secondary branches in Subioblattidae), **RP** slightly curved (notably sigmoid in Subioblattidae), and a very long and sigmoid **CuP** (relatively small and strongly curved in Subioblattidae).

Remarks. Material referable to this new family was first reported from the Los Rastros Formation (Martins-Neto *et al.* 2005) with the description of *Lariojablatta* Martins-Neto & Gallego (in Martins-Neto *et al.* 2005). The family is formally proposed here, based on more complete material.

Delpuenteblatta Martins-Neto & Gallego gen. nov.

Type species. *Delpuenteblatta dangeloi* Martins-Neto & Gallego sp. nov.

Etymology. From 'quebrada del puente', Mendoza, Argentina.

Diagnosis. Tegmen slightly acuminate, four times longer than wide. **MA** origin at half of the tegmen base, four-branched **ScP**, three-branched distally.

Delpuenteblatta dangeloi Martins-Neto & Gallego sp. nov. (Figs 2C – D, 3C-D)

Holotype. MCNAM – PI 24264 part, and MCNAM – PI 24265 counterpart.

Type stratum, locality and age. As for *Anablatta compacta* sp. nov.

Etymology. In honor of Alejandro D'angelo, who actively collaborates in the collection of Triassic invertebrates.

Diagnosis. Tegmen around 12 mm long and 3 mm wide. Anal area relatively wide with massive cross-veins between the anal branches.

Description. Tegmen 10 mm long, as preserved, and 3 mm wide, slightly acuminate. At least three distal secondary branches of **ScP** preserved. Unbranched **RA** with a small distal dichotomy. **RP** three-branched: **RP1** and **RP3** without distal dichotomy, **RP2** polychotomous (five distal secondary branches), and **RP4** with a small distal dichotomy reaching the costal margin circa one-quarter of the apex. **M** sigmoid, forking around one-third of the tegmen base; **MA** four-branched: **MA1** notably long, reaches the costal margin around one-eighth of the apex; **MA2** to **MA4** origin aligned with **RP**; **MP4** reaches the apical margin slightly above the apex. **MP** three-branched: **MP1** and **MP2** with a long distal dichotomy; **MP3** reaches the apical margin slightly below the apex. **CuA** two-branched: **CuA1** with six oblique and pectinated secondary branches, all of them restricted to the apical margin, below the apex; **CuA2** with two secondary branches. **CuP** long, sigmoid, reaches the anal margin circa one-third of the apex. Anal area relatively wide, occupying around half of the tegmen length and two-thirds of the width. Massive presence of small cross-veins between the anal branches.

Family DELPUENTEBLATTIDAE?

Lariojablatta Martins-Neto & Gallego (in Martins-Neto *et al*. 2005)

Type species. *Lariojablatta chanarensis* Martins-Neto & Gallego (in Martins-Neto *et al*. 2005), Los Chañares, La Rioja Province, Argentina (Los Rastros Formation).

Lariojablatta neiffi Martins-Neto & Gallego sp. nov. (Figs 2E, 3E)

Holotype. MCNAM – PI 24260.

Paratypes. MCNAM – PI 24302, CTES-PZ 7352.

Type locality, type stratum, and age. As for *Anablatta compacta* sp. nov.

Etymology. In honour of Juan José Neiff (CECOAL-CONICET, Corrientes, Argentina).

Diagnosis. Tegmen twice as long as it is wide (7 mm long and 3.5 mm wide), with **ScP** restricted to the tegmen base and **RP** four-branched, all of them dichotomous, restricted to the costal margin. **MA** origin at one-quarter of the tegmen base.

Description. Tegmen fragment 7 mm long and 3.5 mm wide. **ScP** at least two-branched. Unbranched **RA**, with a distal dichotomy. **RP** four-branched: **RP1** and **RP3** dichotomous; **RP2** trichotomous. **RP4** reaching the costal margin in the boundary of the apical

margin. **MA** origin at one-quarter of the tegmen base, at least two-branched. **CuA** origin close to the tegmen base with eight secondary pectinate branches.

Discussion. **RP** four-branched and both **RP** and **MA** secondary branches restricted to the costal margin are diagnostic characters for Delpuenteblattidae fam. nov. *Lariojablatta*, although very similar in general morphology to *Delpuenteblatta* gen. nov. (anal area not preserved for comparison), differs in the tegmen proportions: twice as long as it is wide in *Lariojablatta*, four times longer than wide in *Delpuenteblatta* gen. nov., and by having the **MA** origin at one-quarter of the tegmen base (one-half in *Delpuenteblatta* gen. nov.). *Lariojablatta neiffi* sp. nov. differs from *L. chanarensis* Martins-Neto & Gallego by having a notably small tegmen length (7 mm in *L. neiffi* sp. nov., 17 mm in *L. chanarensis*).

Order COLEOPTERA Linnaeus, 1758
Family PERMOSYNIDAE Tillyard, 1924 (includes Ademosynidae Ponomarenko, 1969)

Delpuentesyne Martins-Neto & Gallego gen. nov.

Type species. *Delpuentesyne menendezi* Martins-Neto & Gallego sp. nov., designated here.

Etymology. From 'quebrada del puente' locality, the source of the material, and *syne*, common suffix for Permosynidae.

Diagnosis. Elytron length 5–10 mm, width 1.2–1.8 mm. Length/width ratio 4.2–5.0. Elytron with 11 weakly marked costae and ornamentation consisting of homogenous granules.

Remarks. *Delpuentesyne* gen. nov. differs from *Argentinosyne* Martins-Neto & Gallego (in Martins-Neto *et al*., 2006b) from the Los Rastros Formation in that the elytron of the latter lacks costae and has ornamentation varying from granulate to rugose and in the high length/width ratio (1.4–4.2 in *Argentinosyne*). The new genus differs from *Ademosyne* Handlirsch, 1906 in the weakly marked costae (well-marked in *Ademosyne*) and in the high length/width ratio (1.4–3.6 in *Ademosyne*).

Delpuentesyne menendezi Martins-Neto & Gallego sp. nov. (Figs 2G, H, I; 3G, H, I)

Holotype. MCNAM–PI 24261.

Paratypes. MCNAM–PI 24262a, 24262b, 24306; CTES-PZ 7353, 7354.

Type locality, type stratum, and age. As for *Anablatta compacta* sp. nov.

Etymology. In honour of Augusto Menendez, a lawyer and amateur palaeontologist who has collected thousands of fossil specimens from Mendoza.

Diagnosis. As for the genus.

Description. Elytron (isolated) 5.3 mm long and 1.25 mm wide. Ratio of length/width 4.24. Eleven costae weakly marked, smooth. Ornamentation constituted by small granules homogeneously distributed over the whole elytron surface. The paratype (MCNAM–PI 24262a) with elytron (articulated) 8.75 mm long and 1.75 mm wide. Length/width ratio 5.0. Other paratype (MCNAM–PI 24306) with elytron 9.5 mm long and 1.8 mm wide; length/width ratio 5.27; other elytron features as above.

Discussion. This species is similar to *Argentinosyne frenguelli* Martins-Neto & Gallego (in Martins-Neto *et al*., 2006b) of the Los Rastros Formation in the general aspect of elytron (three and half times or longer

than wide). *Delpuentesyne menendezi* sp. nov. differs from *A. frenguelli* by being rather small (*Delpuentesyne menendezi* sp. nov.: 5.0–10.0 mm long; *A. frenguelli*: 14.0–18.0 mm long). Length/width ratio about 4.5 longer than wide (around 3.5 in *A. frenguelli*) and weak costae are present, whereas these are not well defined in *A. frenguelli*. The species is also similar to *Ademosyne elongatus* Martins-Neto & Gallego, 2006 (in Martins-Neto et al. 2006b) in the number of costae (although weakly marked in *D. menendezi*) and the finely granulate ornamentation.

Environmental conditions

The greatest diversity of the '*Dicroidium* flora' (Anderson & Anderson 1993a,b, Spalletti *et al.* 1999, Zamuner *et al.* 2001) occurred during the latest Middle Triassic to the early Late Triassic in southwestern Gondwana under a dry mesothermal and strongly seasonal climate of megamonsoonal characteristics (Spalletti *et al.* 2003, p. 129). Under these climatic conditions, a mosaic of mesothermal evergreen sclerophyllous and deciduous forests characterized the fluvial and lacustrine environments of the central western basins of Argentina. These climatic characteristics and ecosystems could have strongly suited the development of diverse insect communities at that time.

Both the *Dicroidium* flora and the climate are confirmed and supported by the known components of the insect fauna. Although the extremely abundant vegetation and seasonally humid climate ought to have supported a diverse range of insects, the known fauna is small in both abundance of specimens and diversity of taxa (only four genera and species of cockroaches are recorded). Strong taphonomic influences and the ease with which some insect remains can be overlooked may account for the scarcity of fossil insects presently known from this area. Nevertheless, the limited range of taxa available provide important information on the environmental conditions during deposition of the Potrerillos Formation. The 'lower' Potrerillos assemblage also includes a triassoblattomorph (Blattoptera-?*Triassoblatta*: MCNAM–PI 24303) and freshwater branchiopod crustaceans (Conchostraca).

Martins-Neto *et al.* (2005) mentioned the important ecological role of the blattopterans as leaf-litter consumers, and that they can be used as ecological indicators of leaf-litter communities beneath the rich *Dicroidium* forest and *Taeniopteris*/*Baiera* thickets (plant habitats interpreted by Anderson *et al.* 1998) adjoining the Potrerillos lake and river systems (see also Mancuso *et al.* 2005).

Despite the relatively low diversity and abundance, the coleopteran assemblage includes a member of the suborder Archostemata, a primitive group that includes the Permosynidae (extinct) and Cupedidae (with 27 extant species). Extant Australian cupedids live in different wooded habitats, such as: closed forest, open forest, rotting wood, and woodland. The structure of adult mouthparts suggests pollen-feeding habits, but all known larvae feed in dead wood, which may be firm and dry, but having been attacked by wood-rotting fungi. Humid climatic conditions (supporting standing water bodies) are also supported by the record of other insect orders (cited above) that have aquatic nymphal stages (stoneflies, dragonflies, and miomopterans). Each of these lives in water bodies as active predators of other components of the biota (see also Mancuso *et al.* in press).

Conclusions

The new locality for Argentinian Triassic insects considerably extends the stratigraphic range of Triassic Coleoptera-Permosynidae (now found in all known Argentinian localities). The small, low-diversity assemblage shares at least one

genus, *Lariojablatta* (represented by a new species), with the Los Rastros Formation. The Blattoptera and Coleoptera species and genera differ from those typical of Australian and South African Triassic faunas, such as *Ademosyne* (for Coleoptera) and triassoblattomorphs (as *Triassoblatta* Tillyard 1919 and *Samaroblatta* Tillyard 1919). The Argentinian faunas contain the endemic genera *Potrerilloblatta* and *Delpuenteblatta*. The new family Delpuenteblattidae is dominant in the Potrerillos Formation assemblage but rare in the Los Rastros Formation, (with a single specimen). Among South American deposits, the Subioblattidae is represented only at the new locality, although it is known from the French, Chinese, and African Triassic). The 'lower' Potrerillos palaeoentomofauna is constituted by rather small specimens, making it quite distinct from assemblages from the upper part of the Potrerillos and Los Rastros formations.

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