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Agadirius trojani gen. et sp. nov.: a new owlfly (Neuroptera: Ascalaphidae) from Morocco

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Abstract

A new owlfly, *Agadirius trojani* gen. *et* sp. nov., (Ascalaphidae: Ascalaphinae), is described from the Anti–Atlas Mountains, Morocco. The habitus is unmistakable and differs from all other owlflies, but shares some superficial features with the genus *Puer* Lefèbvre, 1842. *Agadirius* gen. nov., belongs to the subfamily Ascalaphinae (split eyed owlflies) and has genitalia consistent with the tribe Ascalaphini as defined by Tjeder and Hansson (1992).

Key words: Myrmeleontiformia, Ascalaphinae, Palaearctic, North Africa

Introduction

The lacewing family Ascalaphidae comprise less than five hundred medium to large-sized species world-wide. Closely allied with Myrmeleontidae, adults are very strong fliers and aerial predators with diurnal, crepuscular or nocturnal activity. Some diurnal species are colorful, very abundant and easily recognizable among the flying-insect fauna of grasslands, meadows and glades in the Euro–Mediterranean region (e.g. *Libelloides* Schäffer, 1763). Due to their large dimensions and striking appearance, these colorful species are noticeable even by occasional observers and considered very common. On the contrary, many species are extremely elusive, difficult to collect, linked to peculiar habitats and rarely found in collections. Emblematic cases include the West–Palearctic species *Puer maculatus* (Olivier, 1789), rediscovered in Europe a century and a half after its last reported capture (U. Aspöck & H. Aspöck 1987) and the still undetermined species of the genus *Ascalaphus* Fabricius, 1775 recently found in south Sardinia (Pantaleoni *et al*. 2011).

It is not surprising that a single, apparently diurnal and distinctive new owlfly was collected in the Anti–Atlas Mountains, Morocco; an area where other new interesting species of Myrmeleontiformia have been recently discovered (H. Aspöck & U. Aspöck 2009; Ábrahám 2009, 2010). Due to its small dimensions, dark body color and wing markings, it shows a superficial resemblance to the genus *Puer* Lefèbvre, 1842.

Material and methods

Morphological observations were performed using a Leica MZ9.5 stereomicroscope. A Leica MZ16 stereomicroscope equipped with a Leica DFC320 digital camera was used both for morphological measurements and photographs, which were subsequently elaborated using LAS (Leica Application Suite) applied software Version 2.5.0 R1. The software Adobe Photoshop CS5 Extended Version 12.0 was utilized for post-shoot image processing.

The length of the specimen was measured from the vertex of the head to the tip of the abdomen. The length of the wings was measured from the base to the apex, and the width was taken as the maximum width perpendicular to the length measurement line.

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The male genitalia were prepared by macerating them in 10% KOH (potassium hydroxide) in cold water for several hours and stained in a saturated solution of Chlorazol Black in 95% ethanol. After examination they were washed in acetic acid and subsequently in ethanol.

The terminology regarding genitalia follows Tjeder (1954, 1970, 1977, 1992). Tjeder's terminology is also adopted for venation (1992) although it is slightly simplified, neglecting (but not rejecting) the bifurcation of the media and the fusion of its second branch (M2) with the first branch of the cubitus (Cu1) in the forewing. In particular his interpretation of the cubital area in the hind wing appears convincing.

Agadirius gen. nov.

Type species: *Agadirius trojani* sp. nov.

Diagnosis. Relatively small, blackish, hairy with predominantly black marked hind wings (Fig. 1); wings oval in shape with sparse venation; pterostigmata short; apical area with two rows of cells; anal area normally developed; ectoproct without projections.

Description. Head broader than the thorax; genae hairless; vertex narrower than one eye in dorsal view; eyes large, divided by a transverse furrow; antennae hairless, a little shorter than the forewing. Wings with relatively sparse venation; forewing elongated, narrow, noticeably longer than the hind wing; pterostigma distinct, divided by a single cross vein; apical area beyond the vein Sc+R with few, large cells, disposed in two rows; sector of the radius with few cross veins (5) between the latter and the radius; Cu2+1A reaching Cu1a origin from Cu1; hind wing oval, heavily marked, Cu2 and 1A long, reaching Rs origin from R; anal area normally extended (Fig. 4A). Thorax hairy; legs short and slender. Abdomen hairy, shorter than wing (albeit only slightly shorter than the hind wing). Male ectoproct simple, without projections (Fig. 2); sternite IX cuneiform (Fig. 3D); gonarcus thin and curved; paramere elongated, tubular; pelta present; pulvini small, slightly protruding, with short gonosetae (Figs. 3A, B).

Female unknown.

Etymology. The new genus is named in honor of the Moroccan city of Agadir, capital of the region of Souss–Massa–Draâ where the species was collected. Gender is masculine.

Comments. The new genus belongs to the subfamily Ascalaphinae (split eyed owlflies); the scale-like ectoproct and the shape of the genitalia is consistent with the tribe Ascalaphini as defined by Tjeder and Hansson (1992). This tribe is not well delimited because it is based both on plesiomorphic characteristics, as also underlined by the same authors, and on a study of only Afrotropical taxa. Tjeder and Hansson (1992) considered the tribe equivalent to the tribe Suhpalacsini van der Weele, 1909. The situation is even more complicated by the homonymy between Ascalaphini *sensu* Tjeder and Hansson, 1992 and Ascalaphini Lefèbvre 1842 *sensu* van der Weele (1909).

Puer Lefèbvre, 1842 is the only genus superficially similar to *Agadirius* gen. nov. and is traditionally, but erroneously, included in the tribe Ascalaphini Lefèbvre *sensu* van der Weele (1909), as also stated by U. Aspöck and H. Aspöck (1987). In fact, both its external and internal genitalia are similar to those of the genus *Ascalaphus*. It is evident that a tribal revision of Ascalaphidae is needed.

The genitalia of the genera *Agadirius* gen. nov. and *Puer* show a plesiomorphic, simplified configuration, characterized by the absence of valuable diagnostic features. However, the difference in wing shape and venation are remarkable and comparable to that observed at genus level throughout the family Ascalaphidae. The forewing of *Agadirius* gen. nov. is characterized by sparse venation, the cross veins are relatively few and sparse and the cells are large; four branches originating from Rs; Cu2+1A just reach Cu1a origin from Cu1. The hind wing of *Agadirius* is oval in shape, reaching its maximum depth at the same height of the origin of Rs from R; the costal area is straight with 13 cross veins between C and Sc; 1A runs far from the edge of the wing, is slightly curved towards it and has long, curved anal cross veins (Fig. 4A). In *Puer* the forewing appears relatively narrow due to the almost straight posterior edge with a slightly pronounced axillary lobe; much denser venation; five branches originating from Rs; Cu2+1A well exceeding Cu1a origin from Cu1. The hind wing of the latter genus is a peculiar shape, reaching its maximum depth after the origin of Rs from R; the costal area is sinuous, narrower in the middle, with less than 10 cross veins; 1A is very close to the wing margin, runs parallel to it and to Cu2 for much of its

length and has very short anal cross veins (Fig. 4B). Moreover the pterostigma of *A. trojani* is divided by a single cross vein while in *Puer* it is divided by two or three cross veins The wings of *Puer* appear to be highly distinctive with the posterior straight margin of the forewing corresponds well with the sinuous shape of the costa of the hind wings; this may be linked to flight dynamics. On the other hand, *Agadirius* is characterized by a much more typical wing shape and venation, despite some modifications due to small dimensions.

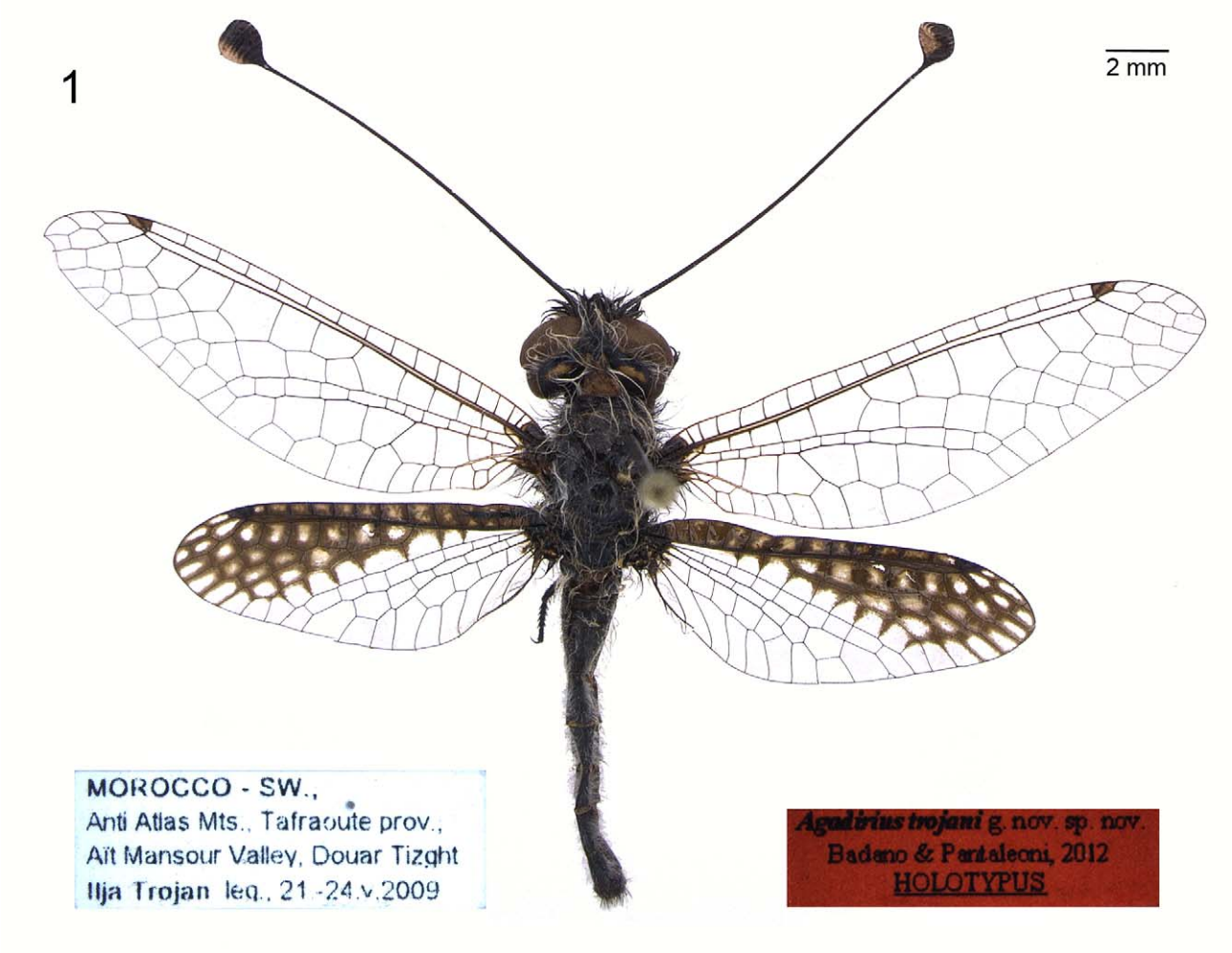


FIGURE 1. *Agadirius trojani* gen. *et* sp. nov., habitus of the male holotypus.

Agadirius trojani sp. nov.

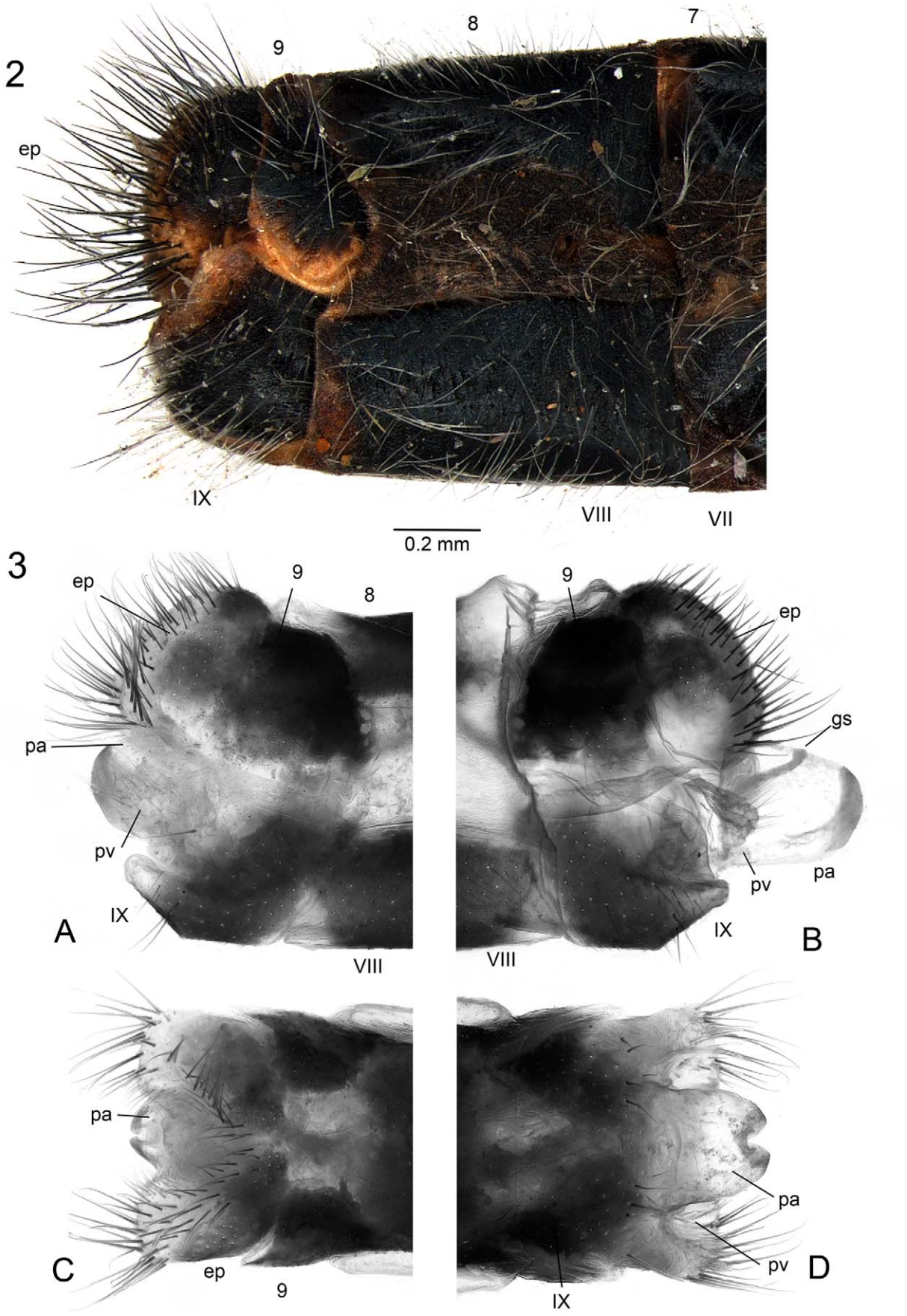
Diagnosis. Very small and dark ascalaphid; body almost totally black with many long white setae; forewing hyaline, hind wing with the costal and radial areas blackish (Fig. 1).

Description. Size. Body length 18.2 mm; forewing length 16.8 mm, ratio length–width 3.13; hind wing length 12.2 mm, ratio length–width 2.72; antenna length 13.3 mm; abdomen length 10.5 mm.

Head. Vertex and occiput black, thickly covered by long white and grey setae; frons black, almost hidden by a thick covering of white and grey setae; clypeus black with a paler edge; labrum dark brown with a paler edge; genae hairless; mandible dark brown, maxillary palpi dark brown, labial palpi almost black; antennae almost as long as the distance between the forewing base and the pterostigma; scape black; flagellum black, hairless; external half of the club black, internal half white.

Thorax. Pronotum short, black, covered by long white setae; mesonotum and metanotum black with longer setae on the side, shorter dorsally.

Legs. Black except some brown rings at the articulation between the femur and the tibia and again near the middle of the tibia, those rings are more evident in the first two legs; spurs and claws black.



FIGURES 2 & 3. 2. *Agadirius trojani* gen. *et* sp. nov., male abdomen *in situ*, lateral view. **3**. *Agadirius trojani* gen. *et* sp. nov., A, male genitalia, lateral view; B, male genitalia everted, lateral view; C, male genitalia, dorsal view; D, male genitalia, ventral view. Ectoproct (ep), parameres (pa), gonarcus (gs), pulvini (pv).

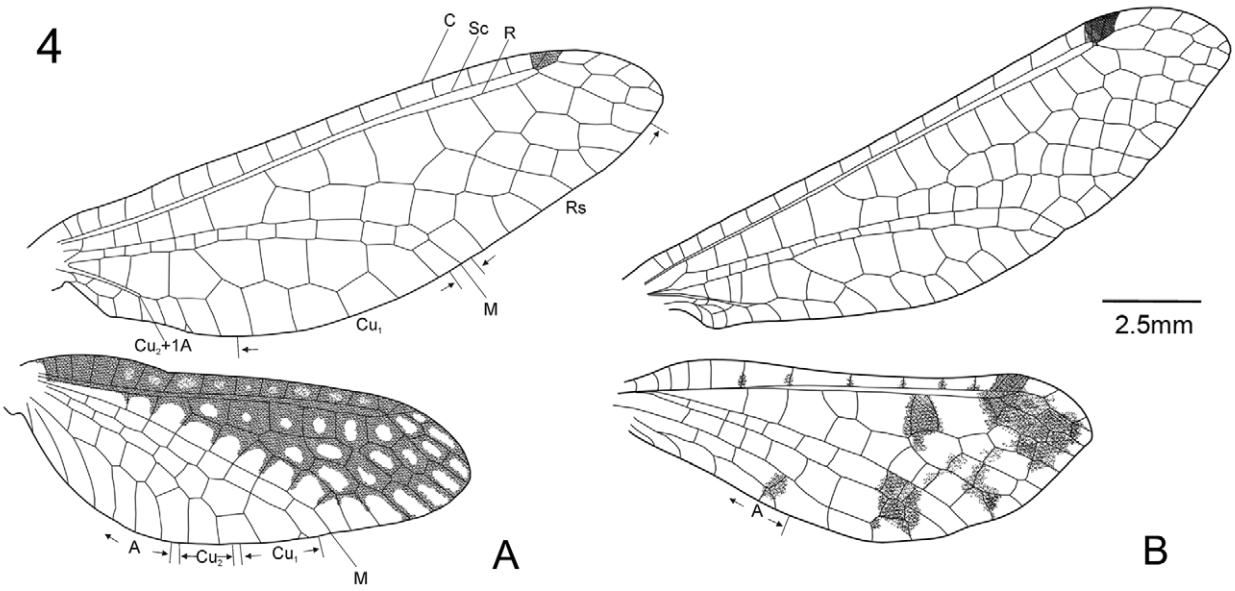


FIGURE 4. Wings: A, *Agadirius trojani* gen. *et* sp. nov., male holotypus; B, *P. maculatus* (Olivier, 1789), male; Hérault, France; D. Badano collection. Costa (C), Sub costa (Sc), Radius (R), Radius sector (Rs), Media (M), Cubitus 1st branch (Cu1), Cubitus 2nd branch (Cu2), 1st Anal (1A).

Wings. Forewing noticeably longer than the hind wing; venation black or dark brown; pterostigma dark brown, similar in shape in both wings; forewing membrane completely hyaline except a small dark area at the base hind wing heavily marked with brown along the area of the costa, subcosta, radius and radius sector (the anterior/distal half of the wing obliquely subdivided), the dark pigmentation of the membrane extends from the longitudinal and transverse veins giving it a reticulated appearance more evident toward the apex; the median, cubital and anal areas totally hyaline, except at the base; dark base of both wings with long, black setae (Figs. 1, 4A).

Abdomen. Black, extensively covered by fine white setae, longer along the pleural area; tergites and sternites black; tergites 3–7 with a small brown spot at the posterior edge.

Male genitalia. Ninth tergite black with a light brown inferior edge; ectoproct not forcipate, oval in shape, dark in color except a light brown area at the inferior margin, covered by long robust dark setae (Fig. 2); ninth sternite with a round ventral apex (Fig. 3D), totally black except a light brown area at the superior edge; gonarcus arch-like, surrounding the dorsal surface of the paramere (Fig. 3B); paramere tubular, smooth, their caudal portion sclerotized with an irregular surface pattern (Fig. 3); pelta distinct; pulvini small, slightly protruding, covered by sparse, short gonosetae (Fig. 3B).

Type material. Holotype 1 ♂ pinned, genitalia preserved in glycerol, labeled: MOROCCO–SW., \ Anti–Atlas Mts., Tafraoute prov., \ Aït Mansour Valley, Douar Tizght \ Ilja Trojan leg. 21–24.v.2009. \\ *Agadirius trojani* g. nov. sp. nov. \ Badano & Pantaleoni 2012 \ HOLOTYPUS (Fig. 1)

Type depository. Museo civico di Storia naturale "Giacomo Doria", via Brigata Liguria 9, I–16121 Genova GE, Italy.

Etymology. The new species is dedicated to Ilja Trojan, Czech entomologist, who collected the only known specimen.

Type locality with ecological remarks. The type locality (29°32'54.83"N 8°52'49.33"O), situated near Aït Mansour in the Anti–Atlas Mountains, is a small, deep valley where a small clear stream flows surrounded by date palms (Fig. 5). The slopes of the valley are bare and rocky, with sparse vegetation constituted by low scrub and herbs. The specimen was observed on the slope of the valley flying very fast, hardly noticeable, around midday in very hot weather (Trojan pers. comm.).

FIGURE 5. Aït Mansour Valley, Douar Tizght (Morocco), locus typicus of *Agadirius trojani* (photo I. Trojan).

Discussion

Although the genitalia do not provide good differential characteristics due to their plesiomorphic and simplified appearance, this taxon does not belong to any known genus; the peculiarities in venation are distinctive enough to discriminate it from all other Ascalaphinae genera. The only similar ascalaphids are the members of the sympatric genus *Puer.* This genus comprises two species: *P. maculatus* (Olivier, 1789), described from Southern France and reported also from Spain and Israel, and *P. algericus* van der Weele (1909) from Algeria and Morocco (unpublished data: Museum of Madrid, Navàs det., Michel, comm. pers.), however the status of the latter taxon is questionable (H. Aspöck *et al.* 1980; U. Aspöck & H. Aspöck 1987; H. Aspöck *et al.* 2001). The two genera share small dimensions and a dark habitus with dark marked hind wings; unusual and striking characteristics among owlflies but still of superficial value. They are well differentiated by the above-mentioned venational characteristics though the species can be immediately recognized with ease by their very different coloration (Figs 4A, 4B).

The comparison between the genera *Agadirius* and *Puer* in this paper is purely pragmatic, with the aim of distinguish the two taxa, not based on phylogenetic considerations. The current knowledge about the phylogenetic relationships among the genera of Ascalaphidae is very poor. No comprehensive arrangement of the family into tribes and subfamilies was attempted after the masterly work of van der Weele (1909), excluding the partial revisions of Navás (1912), Penny (1981), New (1984) and Tjeder (1992).

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References

Ábrahám, L. (2009) A new *Bankisus* Navás, 1912 species from Morocco (Neuroptera: Myrmeleontidae). *Acta Phytopathologica et Entomologica Hungarica*, 44(2), 423–429.

Ábrahám, L. (2010) Ascalaphid studies VIII. A new *Cirrops* Tjeder, 1980 species from Morocco (Neuroptera: Ascalaphidae). *Acta Phytopathologica et Entomologica Hungarica*, 45(2), 359–366.

Aspöck, H. & Aspöck, U. (2009) Wiederentdeckung des mysteriösen Genus *Pseudimares* Kimmins, 1933, und Beschreibung einer neuen Art aus Marokko, *Pseudimares aphrodite* n. sp. (Neuroptera, Myrmeleontidae). *Entomologische Nachrichten und Berichte*, 53, 41–46.

Aspöck, H., Aspöck, U. & Hölzel, H. (1980) *Die Neuropteren Europas. Eine zusammenfassende Darstellung der Systematik, Ökologie und Chorologie der Neuropteroidea (Megaloptera, Raphidioptera, Planipennia) Europas*, Goecke & Evers, Krefeld, Germany, pp. 495+355.

Aspöck, H., Hölzel, H. & Aspöck, U. (2001) Kommentierter Katalog der Neuropterida (Insecta: Raphidioptera, Megaloptera, Neuroptera) der Westpaläarktis. *Denisia*, 2, 1–606.

Aspöck, U. & Aspöck, H. (1987) Wiederentdeckung von *Puer maculatus* (Olivier) in Europa (Neuropteroidea: Planipennia: Ascalaphidae). *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen*, 39, 5–11.

Navás, L. (1912) Sinopsis de los Ascálafidos (Ins. Neur.). *Arxius de l'Institut de Ciences*, 1, 45–143.

New, T. R. (1984) Revision of the Australian Ascalaphidae. *Australian Journal of Zoology, supplementary series*, 100, 1–86.

Penny, N. D. (1981) Review of the generic level classification of the New World Ascalaphidae (Neuroptera). *Acta Amazonica*, 11, 391–406.

Pantaleoni, R.A., Badano, D., Aspöck, U. & Aspöck, H. (2011) *Ascalaphus* cf. *festivus* (Rambur, 1842) in Sardinia, a new genus of Ascalaphidae for Europe. *Book of Abstracts, XIth International Symposium on Neuropterology*, Ponta Delgada, Açores, Portugal, 12-15 June 2011, 3.

Tjeder, B. (1954) Genital structures and terminology in the order Neuroptera. *Entomologiske Meddelelser*, 27, 23–40.

Tjeder, B. (1970) Neuroptera. *In* Tuxen, S. L., *Taxonomist's glossary of genitalia in insects*, 2nd edition. Munksgaard, Copenhagen, pp. 89–99.

Tjeder, B. (1977) Distal abdominal segments and sclerotized parts of genitalia in Ascalaphidae (Neuroptera). *Annales Entomologici Fennici*, 43, 61–65.

Tjeder, B. (1992) The Ascalaphidae of the Afrotropical Region (Neuroptera). 1. External morphology and bionomics of the family Ascalaphidae, and taxonomy of the subfamily Haplogleniinae including the tribes Proctolyrini n. tribe, Melambrotini n. tribe, Campylophlebini n. tribe, Tmesibasini n. tribe, Allocormodini n. tribe, and Ululomyiini n. tribe of Ascalaphidae. *Entomologica Scandinavica*, *Supplement*, 41, 3–169.

Tjeder, B. & Hansson, C. (1992) The Ascalaphidae of the Afrotropical Region (Neuroptera). 2. Revision of the tribe Ascalaphini (subfam. Ascalaphinae) excluding the genus *Ascalaphus* Fabricius. *Entomologica Scandinavica*, *Supplement*, 41, 171–237.

van der Weele, H.W. (1909) Ascalaphiden, monographisch bearbeitet. *Collections Zoologiques du Baron Edm. de Sélys Longchamps, Catalogue Systématique et Descriptif*, fasc. VIII, 1908, 1–326. [date of distr.: 5.I.1909 cf. Cowley, J. (1937) The dates of distribution of the fascicles of the "Catalogue des collections de Selys Longchamps. *Journal of the Society for the Bibliography of Natural History*, 1, 31–32.]