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Description of *Dociostaurus biskrensis* sp. nov. and male allotypes of four species: *Pamphagulus bodenheimeri dumonti*, *P. uvarovi*, *Sphingonotus ebneri* and *Notopleura pygmaea* (Orthoptera: Acridoidea) in the region of Biskra, Algeria

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Abstract

The new species *Dociostaurus biskrensis* Moussi & Petit 2013 was collected in the region of Biskra, at the arido-Saharan limit of Eastern Algerian. We also describe the males of four species for which only females were known: *Pamphagulus bodenheimeri dumonti*, *P. uvarovi*, *Notopleura pygmaea* and *Sphingonotus ebneri*. The key to the genus *Dociostaurus* in North Africa is given. The species *P. uvarovi* and *Notopleura pygmaea* are new for the Algeria. The diets and life cycles of *D. biskrensis* and of the two species of *Pamphagulus* are defined.

Key words: *Dociostaurus*, *Pamphagulus*, *Notopleura*, *Sphingonotus*, diet, Biskra

Résumé

La nouvelle espèce de *Dociostaurus biskrensis* Moussi & Petit 2013 de la région de Biskra, de la limite arido-saharienne de l'est Algérien est décrite et illustrée. Nous décrivons également les mâles de quatre espèces pour lesquelles seules les femelles étaient connues : *Pamphagulus bodenheimeri dumonti*, *P. uvarovi*, *Notopleura pygmaea* et *Sphingonotus ebneri*. Une clé pour le genre *Dociostaurus* en Afrique du Nord est donnée. Les espèces *P. uvarovi* et *Notopleura pygmaea* sont des nouvelles signalisations pour l'Algérie. Les régimes alimentaires et cycles de *D. biskrensis* et des deux espèces de *Pamphagulus* sont définis.

Mots clés: *Dociostaurus*, *Pamphagulus*, *Notopleura*, *Sphingonotus*, Régime alimentaire, Biskra

Introduction

In a previous study, we described the grasshopper fauna in the east Algerian wilaya of Biskra (Moussi & Harrat 2007), composed of 21 species, and found that the Oedipodinae represented the largest subfamily. Subsequently, monthly samplings during 3 years in 5 oases and 2 steppes allowed identifying 45 species in the same wilaya (Moussi *et al.*, 2011). In the present study, we propose to describe a species new to science and 4 species for which only females were known. We also describe the male epiphallus of a species only recorded from Morocco, *Notopleura rhelbanensis*.

Dociostaurus maroccanus (Moroccan Locust) (Acrididae, Gomphocerinae) was discovered for the first time in 1815 by Thunberg in the foothills of the Atlas Mountain in Morocco, and described under the latin name *Gryllus maroccanus*. In 1853, Fieber created the genus *Dociostaurus* and the Moroccan Locust became the type species. To date, 21 species of the genus have been identified, among which four are known in North Africa (Eades *et al.*, 2012): *D. maroccanus* (Fieber, 1853), *D. dantini* (Bolivar 1914), *D. jagoi* (Soltani 1978), and *D. hammadae* (Ingrisch, 1983).

Notopleura pygmaea

Allotype male 7/XI/09 Bir Naam, MNHN Paris. MNHN-EO-CAELIF999

Description. Sandy brown, spotted by dark dots and white tubercles regularly aligned.

The front head bears little elongated foveolae with clear edges. The pronotum has two white tubercles above and others distributed on the sides. The tegmina exceed the abdomen and are regularly adorned by white dots on the length. There are small white tubercles on the median nerve. The tibiae are slightly bluish with 5 internal and 3 external spines, with an apical spine on the inner face. The internal spurs are longer than the external ones and reach the medium metatarsal. The wings are transparent. The hind femurs show two dark spots on the external side, but are clear inside.

Bio-Ecology. There are two generations a year, in spring and autumn with a stop of embryonic development in winter. This species lives in scrublands of sandy steppe (Moussi *et al.*, 2011).

Following the analysis of three faeces, it appears the presence of only Dicotyledone remains, suggesting that this species could be forbivore. Of course this observation should be tested by further investigations.

Conclusion

During the course of our surveys in the area of Biskra, we could find and describe some aspects of morphology, biology and ecology of 4 rare species only known by a few number of females: *Notopleura pygmaea*, *Pamphagulus uvarovi uvarovi*, *Pamphagulus bodenheimeri dumonti* and *Sphingonotus ebneri*. Moreover, one species is new for science: *Dociostaurus biskrensis*. We also describe the male epiphallus of a species new to Algeria, *Notopleura rhelbanensis*. These species appear to be typical to sub-Saharan environment, or steppes but *P. bodenheimeri dumonti* seems to be pledged to oases. The largest part of the country remaining poorly explored, and especially in steppe environments, we can expect to discover yet new species of grasshoppers for Algeria.

The significance of the diets of the grasshoppers studied here has to be assessed. From an adaptive point of view, the polyphagy of the species *D. biskrensis* (forbivore), *D. jagoi jagoi* (ambivore), and *N. pygmaea* (forbivore) could reflect a response to arid areas where the availability of food lasts only a short time. Indeed, the pest species *Dociostaurus maroccanus* (Ben Halima *et al.*, 1984) has been found to enlarge the spectrum of plant consumed, as the first instars feed on Poaceae and later stages on Poaceae and various Dicotyledones, correlatively to the increasing draught of its habitat. A parallel could be drawn with the example of Pamphagidae which feed on a diversified source of plants in semi-arid plateaus of Algeria (Benkenana *et al.*, 2011, 2012).

In an evolutionary approach, deciphering the diet changes in the different groups of Acridomorpha is a challenge, but there are too weaknesses in our knowledge to have a reliable vision. ElGhadraoui *et al.* (2001) proposed that graminivory could be fundamental in Gomphocerinae and maybe Oedipodinae. In this respect, the determination of phyletic position of Eremogryllinae, the subfamily including *Notopleura* should be useful.

The affinity of *Pamphagulus* to halophilic vegetation is retrieved in *Dericorys millierei* (Moussi *et al.*, 2011), a genus belonging to the same taxonomic group. It should be interesting to test if the genera allied to *Pamphagulus* and *Dericorys* also share this affinity and consume Salsolaceae species, as diet specialization is scarcely distributed among Acridomorpha. In Paleotemperate Region, we can cite *Chorthippus binotatus binotatus* on *Ulex* bushes (Picaud *et al.*, 2002, 2003) and *Tropidopola cylindrica* on *Phragmites australis* (Benkenana, 2006).

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