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*Dolychorhynchotious machadoi* sp. n., a new weevil from Morocco  
(Coleoptera, Curculionidae: Otiorhynchini)

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*Dolychorhynchotious machadoi* sp. n. is described. This second species from the recently described genus by L. Magnano (Poggibonsi, I) is well characterized by its external morphological characters and by the male and female genitalia. These are shown and compared with those of the closely related type species of the genus, *D. spinipennis* Magnano, 2003. The new species was discovered in a humid valley in the western Anti-Atlas mountains in Morocco. The finding locality is considered to be a refuge area for the new species. The evolutionary background is considered to be the steady expansion of the Sahara desert.

Keywords: Coleoptera, Curculionidae, Otiorhynchini, *Dolychorhynchotious machadoi* sp. n., Morocco, Anti-Atlas mountains, desertification, refuge, endemism, taxonomy

## INTRODUCTION

The genus *Dolychorhynchotious* was recently described by the estimated colleague Luigi Magnano. The only species known so far is the type-species of this genus, *Dolychorhynchotious spinipennis* Magnano, 2003. During an excursion to the western foothills of the Anti-Atlas mountains on 16<sup>th</sup> of April 2003, A. Machado (Tenerife, E) found six specimens of a new species of *Dolychorhynchotious* (tribus Otiorhynchini) by beating the vegetation. Although P. Stüben (Mönchengladbach, D) and myself collected at the same location in the years 2001 and 2002, we could not find this species at that time. So, the season and the collecting method obviously played an important role. Machado collected in April with the beating tray whereas the excursions of Stüben and myself took place from December to January and the collecting method was to sieve the soil litter.

## MATERIAL AND METHODS

Body size was measured laterally from the apex of the elytra to the anterior eye margin. The aedeagus, the spiculum ventrale and the spermatheca were examined in glycerol and figured. The genital structures of all the type material were sectioned and glued beside the beetles. The holotype is deposited in the Natural History Museum Bern (NMBE). Paratypes are deposited in the following collections: Luigi Magnano, Italy: Poggibonsi (LM), Antonio Machado, Spain: Tenerife (AM), Enzo Colonnelli, Italy: Rome (EC), Museo Civico di Zoologia di Roma (MCZR), Roman Borovec, Czech republic: Nechanice (RB) and Christoph Germann, Switzerland: Bern (CG).

## DESCRIPTION

***Dolychorhynchotious machadoi* sp. n. (Figs 1a–1d)**

**Holotype:** 1 ♂: Marruecos-Tiznit, Et-Tnine: Tasgrlt, 500m, 16. 4. 2003, Ceratonia y en Whitania, leg. A. Machado. Red label: HOLOTYPE, *Dolychorhynchotious machadoi* des. Ch. Germann 2004 (NMBE).

**Paratypes:** 14 ex. (8 ♀; 6 ♂): Red label: PARATYPE, *Dolychorhynchotious machadoi* des. Ch. Germann 2004; same indications as the holotype. (1 ♀ NMBE, 1 ♀ LM, 1 ♀ AM und 2 ♀ CG); – “MAGHREB-will. Tiznit Tasgrlt-Jebel Imzi-m 650 29°45'08"N 9°15'28"W 1. 5. 2000-E. Colonnelli” (1 ♂, 1 ♀ EC, 1 ♂, 1 ♀ MCZR, 2 ♂, 1 ♀ LM, 1 ♂ CG); – “Morocco, Djebel Imzi, Addar NE Anezi, 650m, 29°45'01"N, 09°15'28"W 1. 5. 2000, R. Borovec leg.” Additional label: “collection Ing. Roman Borovec Nechanice” (1 ♂ RB).

**Locus typicus:** Marokko, Tiznit, Et Tnine, Tasgrlt, N 29°44'34"/W 09°15'20"

The original labels of the specimens collected by E. Colonnelli indicate falsely «20°45'08"N». This false indication is here corrected to «29°45'08"N».

**Size:** 6.0–7.8 mm (♂ 6.0–7.6 mm, ♀ 6.4–7.8 mm). **Body colour:** Reddish-brown. **Head and rostrum:** Front of the head and back of the rostrum covered with pale-grey pearly shimmering oval shaped scales and longer, strongly bowed hair-setae. A U-shaped, anteriorly opened bulge shortly in front of the insertions of the antennae, enclosing the rostral apex. Rostral apex glossy and very slightly punctuated. Ends of the rostral apex above the mandibles prolonged in form of little horns in ♂. Back of the rostrum at its narrowest point more or less as broad as the front between the eyes. Eyes on the upper side of the head. Seen from above, head outline laterally not interrupted by the eyes.

**Pronotum:** About as long as wide (index: 0.93–0.98), widest before the middle, laterally strongly rounded. Tubercles sharp and slightly granulated; because of this, pronotum seemingly dull. Tips of tubercles smooth and glossy. Each tubercle with a setula originating laterally just beneath the tip. Setulae directed towards centre of pronotum. Pronotum covered with discrete pale-grey oval scales, especially along disc.

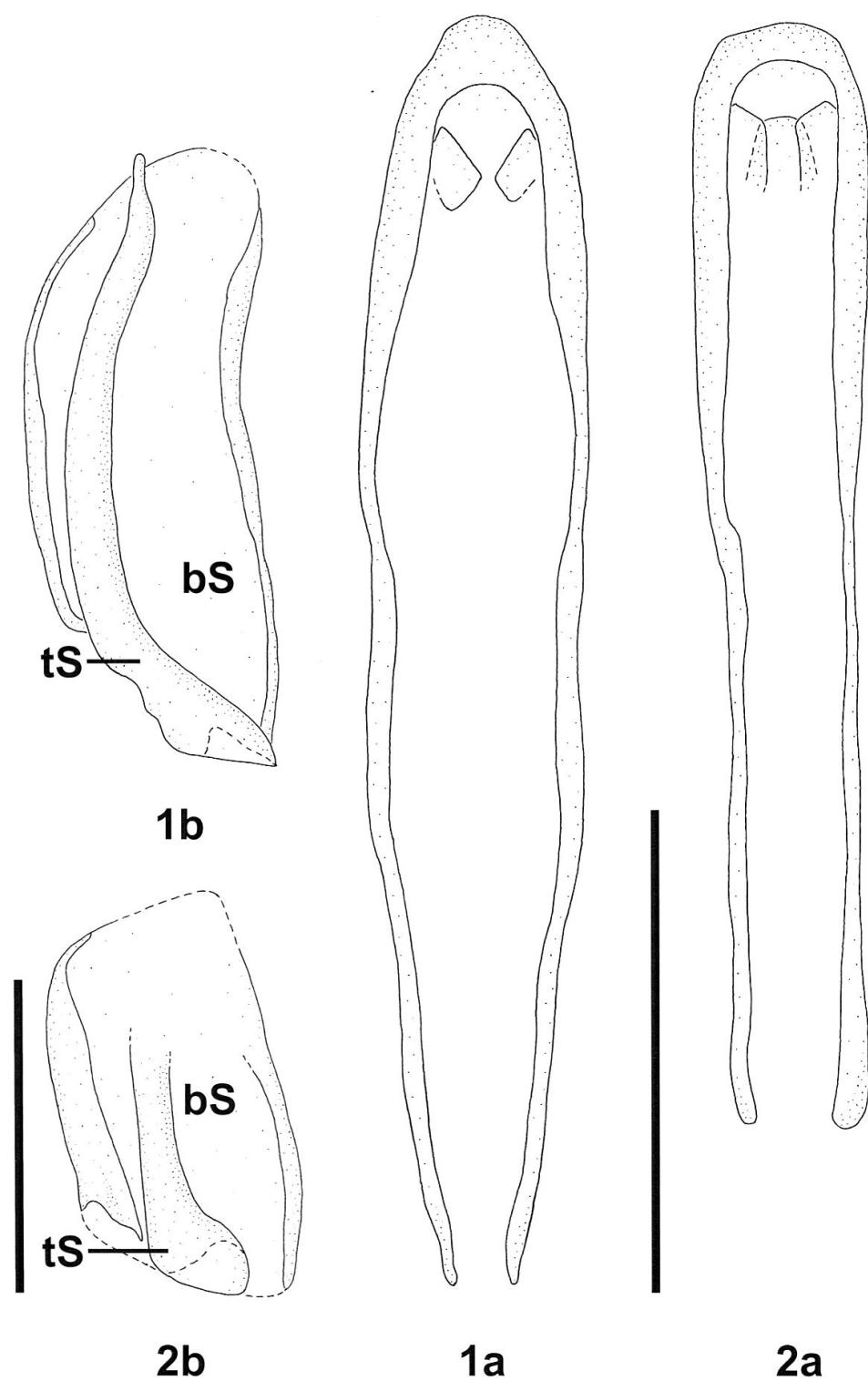
**Elytra:** Strongly prolonged, converging not before last third. Upper side flattened. Just at the beginning of the decline of the elytra, a bulge is visible in the range of the first three interspaces before the apex, so that a preapical elytral spine is formed (best visible from the side). Male with longer spines, reaching beyond the elytral apex, than female. Elytral rows of dots as wide as interspaces. Dots with a strongly curved setula on their frontal margin. Interspaces with rows of granula from which a procumbent setula arises. Elytra with bigger, loosely dispersed and round scales. Around elytral suture these scales are smaller and oval shaped. Scales are pale-grey with a pearly shimmer, setulae are brownish.

**Legs:** Femur without spines; in ♂ slightly thicker than in ♀. Ventral side of each tibia denticulated. End of each tibia spiked with lutescent stiff spines.

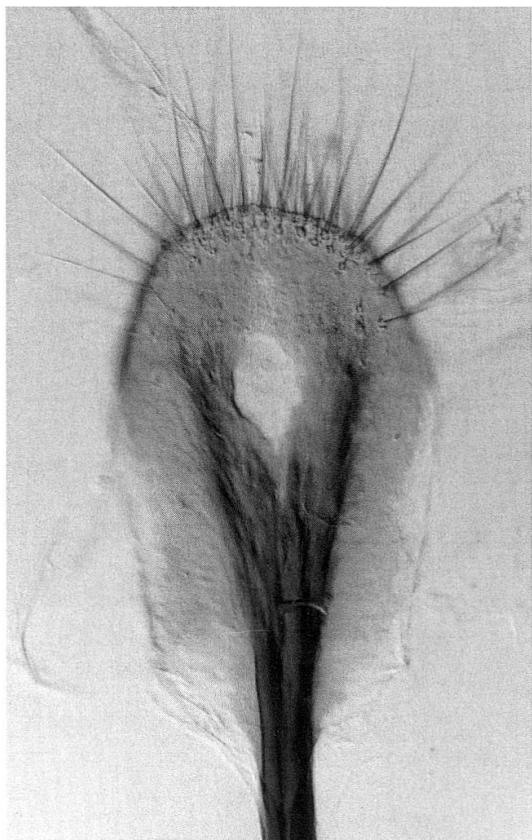
**Aedoeagus** (Fig. 1a): Asymmetrically pointed and just before the apex laterally slightly narrowed. Internal sac (Fig. 1b) consisting of two sclerites. A dorsally situated bowl-shaped sclerite (bS) enfolds an internally situated tube-shaped sclerite (tS), that is slightly bent and tapering apically.

**Spiculum ventrale** (Fig. 1c): Base fan-shaped, strongly rounded, densely fringed with long hairs. Basal branches strongly sclerotized, converging in a sharp angle.

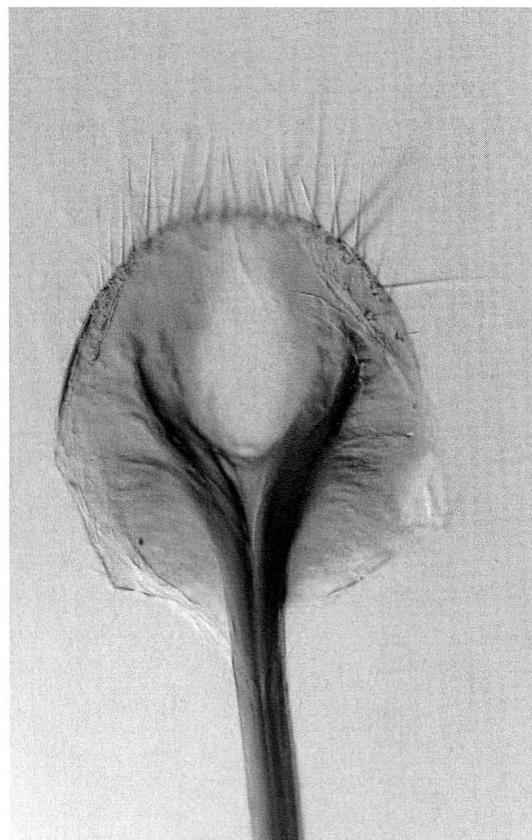
**Spermatheca** (Fig. 1d): Varying in form, long, s-shaped bent, the steadily tapering apex only weakly bent to the broad dilated base.



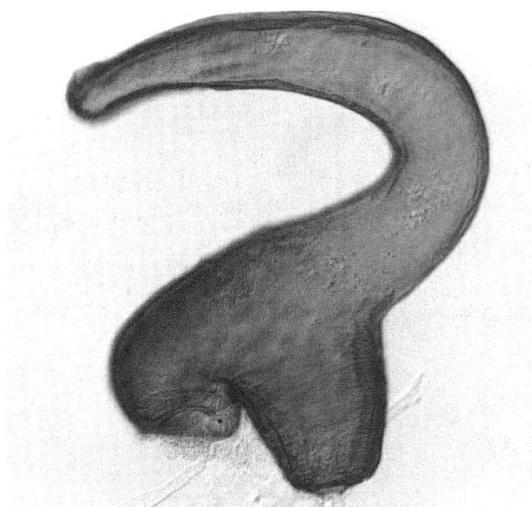
Figs 1a–b, 2 a–b. Aedeagus and internal sac. Fig 1. *Dolychorhynchotious machadoi* sp. n. Aedeagus (1a); internal sac (1b). Fig 2. *Dolychorhynchotious spinipennis* Magnano. Aedeagus (2a); internal sac (2b). All structures are shown in dorsal view. Aedeagi simplified, soft tissue, internal sacs and parameres omitted. Scale lines: Figs 1b, 2b 0.25 mm; figs 1a, 2a 1mm.



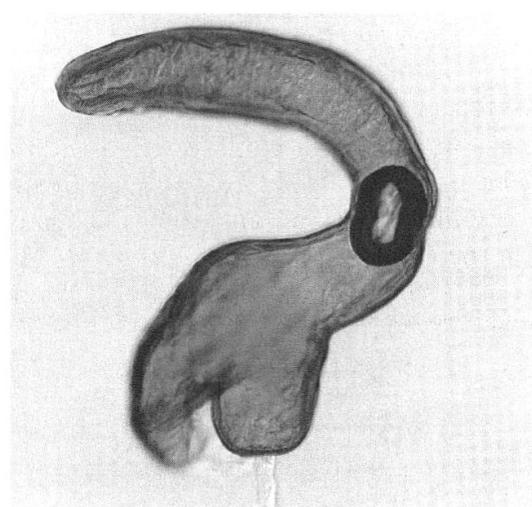
1c



2c



1d



2d

Figs 1c-d, 2c-d. Spiculum ventrale and spermatheca. Fig 1. *Dolychorhynchotious machadoi* sp. n., Spiculum ventrale (1c); spermatheca (1d). Fig 2. *Dolychorhynchotious spinipennis* Magnano. Spiculum ventrale (2c); spermatheca (2d). Scale lines: Figs 1c, 2c 0.5mm; figs 1d, 2d 0.25mm.

**Differential diagnosis:** The most conspicuous traits of the genus *Dolychorhynchotious* are the glossy nasal plate, the strongly prolonged elytra, the preapical elytral spines (difference to the close standing subgenus (*Otiorhynchus*) *Araniulus* Reitter, 1912) and the fore tibiae that are not dilated outwards distally (difference to *Rhynchotious* Magnano, 1998). *Dolychorhynchotious machadoi* sp. n. differs from *D. spinipennis* in the

- interocular distance, that corresponds to the width of the rostrum at its narrowest point (*D. spinipennis*: interocular distance clearly wider than the rostrum at its narrowest point);
- strongly reduced preapical spines of the elytra, especially in ♂ (*D. spinipennis*: long strong preapical spines of the ♂ elytra [name!]); also longer and stronger in ♀).
- rounded shoulders in ♂ (*D. spinipennis*: angular shaped shoulders in ♂).
- subtle granulated, dull appearing tubercles of the pronotum (*D. spinipennis*: glossy umbilicated tubercles of the pronotum).
- asymmetrically pointed aedeagus that is widest in the first third of the median lobus and converges from there to the apex (Fig 1a) (*D. spinipennis*: asymmetrically shortened, slightly diverging aedeagus, Fig 2a).
- long dorsal bS and the internally situated long and slender tS of the internal sac (Fig 1b) (*D. spinipennis*: short and wide bS and smaller and thicker tS of the internal sac, Fig 2b).
- spiculum ventrale that is strongly rounded at the base. The basal branches converge in a sharp angle, the enclosed faintly sclerotized area is small (Fig 1c) (*D. spinipennis*: spiculum ventrale weakly rounded at the base. The basal branches converge in a less sharp angle, the enclosed faintly sclerotized area is bigger, Fig 2c).
- spermatheca, with a steadily tapering apex. The base is broad (Fig 1d). (*D. spinipennis*: spermatheca converging immediately before the apex. The basis is only slightly dilated, Fig 2b).

**Bionomy:** A. Machado found the new species on *Ceratonia siliqua* L. (Caesalpiniaceae) and *Whitania* sp. (Solanaceae). Probably – as typical in the tribe *Otiorhynchini* – larvae of *D. machadoi* sp. n. are ectophagous on roots in the soil. The imagines could be polyphagous i.e. on the reported plants. Furthermore, it is very likely that the imagines are nocturnal. This was reported by P. Stüben and me on the occasion of the discovery of *D. spinipennis* (Magnano 2003).

**Derivatio nominis:** The new species is dedicated to the discoverer, estimated colleague and renowned entomologist Dr. Antonio Machado.

## DISCUSSION

The best differentiating character between *D. machadoi* sp. n. and *D. spinipennis* is the shape of the aedeagus. Female genitalia provide more difficulties because of the high variability of the spermatheca of all *Otiorhynchini* and Curculionoidea in general. So, this structure is a less suitable differentiating trait and should only be used in combination with other and more reliable traits like the spiculum ventrale and the dull pronotum.

The locus typicus of the new species is situated in a peculiar environment. The valley near Tasgrlt in the Anti-Atlas mountains is a humid refuge area surrounded by very xeric landscapes. *D. machadoi* sp. n. is with certainty endemic to this valley. A certain amount of moisture and humidity is ensured by permanently streaming water provided by a river in this valley. This causes a comparatively rich veg-

etation cover. The influence of the trade wind ("Passat") provides additional moisture. Similar conditions were observed at the locus typicus of the compared species *D. spinipennis*. This species was discovered by P. Stüben and myself in the year 2002 in a humid valley with a creek near to Imouzzer de Ida-Outanane in the western foothills of the Haut-Atlas mountains, only 90 kilometres north of the valley near Tasgrlt. *D. spinipennis* was also assumed to be endemic in this valley (Magnano 2003). Both species prefer permanent humidity and are distributed in a very restricted area.

I assume that the ancestor species of *D. machadoi* sp. n. and *D. spinipennis* had been distributed wider in an unknown period of time ago, when the environmental conditions were more favourable. Later, the increasing desertification in the Sahara region limited suitable habitats to a few humid valleys where the ancestor of these hygrophilic species could survive and inhibited gene flow between the populations. It can be strongly assumed that the geographic isolation resulted in formation of these two species.

#### ACKNOWLEDGEMENTS

Special thanks go to Antonio Machado and to Luigi Magnano who sent me the weevils for description. Furthermore, I am grateful to Dr. Charles Huber (Natural History Museum Bern, CH) for providing technical equipment and a working place.

#### ZUSAMMENFASSUNG

*Dolychorhynchotious machadoi* sp. nov. wird beschrieben. Diese zweite Art der erst im Jahr 2003 von L. Magnano (Poggibonsi, I) beschriebenen Gattung ist gut durch äussere morphologische Merkmale und durch die männlichen wie auch die weiblichen Geschlechtsorgane ausgezeichnet. Diese werden abgebildet und mit *D. spinipennis* Magnano, 2003 verglichen. Die neue Art wurde in einer feuchten Schlucht im Westen des Anti-Atlas Gebirges Marokkos entdeckt. Es wird vermutet, dass es sich bei dieser Schlucht um ein Refugium der neuen Art handelt. Die Artbildung wird mit der geographischen Isolation in Folge der Ausweitung der Sahara erklärt.

#### REFERENCES

Magnano, L. 2003. Un nuovo genere e una nuova specie di Otiorhynchini del Marocco. — In: CURCULIO-Institut (ed), Snudebiller 4: Studies on taxonomy, biology and ecology of Curculionidae, pp. 225–227. Mönchengladbach.

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