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NOTES ON *TRICHOFERUS ARENBERGERI*
WITH DESCRIPTION OF MALE
(Coleoptera, Cerambycidae)

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Trichoferus arenbergeri Holzschuh, 1995 was described from Sardinia based upon three females collected in the following localities: “2 km westl, Siniscola [NU], Monte Albo” (locus typicus), “Siniscola (Nuoro)” and “Ozieri” [SS] (Holzschuh 1995: 15). The male of this taxon is still unknown, as well as its biology, ecology and preimaginal stages.

During several surveys carried out from 2002 to 2007 at different sites in southern Sardinia, several specimens (larvae, pupae and adults of both sexes) of this poorly known longhorn beetle were collected and observed. The aim of this paper is to describe the male morphology, the biology and the habitat of the species, with a discussion about its relationship to other congeneric species. Larval and pupal morphology will be treated in a further contribution (Biscaccianti & Di Giulio unpublished data).

Specimens examined are listed from North to South and from East to West; they are preserved in the collections listed below.

Measures of specimens are taken in the following way. Total length: from the forehead to the apex of elytra; elytral length: from humerus to elytral apex; elytral width: maximum width at humeri; tarsal joint length: from the base of joint (excluding articulation) to the apical margin, or to the midpoint of a line tangential to the apex of the lobes (for bilobed joints); tarsal joint width: maximum width.

Nomenclature of associated beetle-fauna follows Liberti (2007), plant nomenclature follows Conti et al. (2005).

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ABBREVIATIONS. AB = legit A.B. Biscaccianti; CA = Cagliari province; DS = legit D. Sechi; el = ex larvis (follows the host plant and the date of sampling, if known); LF = legit L. Fancello; NU = Nuoro province; SS = Sassari province; tl = collected with light trap.

ACRONYMS USED FOR THE COLLECTIONS. ABB = collection A.B. Biscaccianti, Roma (Italy); CMNH = Carnegie Museum of Natural History, Pittsburgh, Pennsylvania (USA); DSE = collection D. Sechi, Quartu Sant'Elena (Italy); LSA = collection L. Saltini, Modena (Italy); MZUR = Museum of Zoology of University of Rome "La Sapienza" (Italy).

Trichoferus arenbergeri Holzschuh, 1995

Trichoferus arenbergeri Holzschuh, 1995, FBVA Berichte, 84: 14-15, fig. 14.

MATERIAL EXAMINED. 1 ♀, Orgosolo (NU), Arcu Correboi, m 1240, 2.IV.2003 (el *Santolina corsica* Jord. & Fourr.), DS (DSE); 1 ♀, ibidem, 20.VI.2003 (el *S. corsica*), DS (DSE); 1 ♀, Villagrande Strisaili (NU), Cantoniera Pira 'e Onni, m 870, 27.VI.2002 (el *S. corsica*), DS (ABB); 1 ♀, Burcei (CA), Riu Ollastu, m 80, 39°22'51" N - 09°27'05" E, 17.VI.2007, (tl), DS (ABB); 1 ♀, Buggerru (CA), 20.VI.2003, LF (LSA); 1 ♂, Iglesias, Nebida (CA), 12.VI.2003 (el *Carlina corymbosa* L.), DS (ABB); 1 ♂, Iglesias, Nebida (CA), 19.VI.2004, LF (LSA); 11 larvae, Iglesias, Nebida (CA), Punta Mezzodi, m 180, 39°18'18" N - 08°27'16" E, 24.III.2006 (in *C. corymbosa*), AB (ABB); 2 ♂ ♂, ibidem, 12.VI.2006 (el *C. corymbosa*, 24.III.2006), DS (DSE); 1 ♂ (pupa), ibidem, 13.VI.2006 (el *C. corymbosa*, 24.III.2006), AB (ABB); 11 ♂ ♂ 19 ♀ ♀, ibidem, 12-28.VI.2006 (el *C. corymbosa*, 24.III.2006), DS (CMNH, DSE); 6 ♂ ♂ 8 ♀ ♀, ibidem, 27.VI-7.VII.2006 (el *C. corymbosa*, 24.III.2006), AB (ABB, MZUR); 1 larva, Sant'Anna Arresi surroundings (CA), state road 195, m 67, 39°59'81" N - 08°39'08" E, 24.III.2006 (in *C. corymbosa*), AB (ABB); 5 ♀ ♀, ibidem, 11-20.VI.2006 (el *C. corymbosa*, 24.III.2006), DS (DSE); 1 ♂ 2 ♀ ♀, ibidem, 2.VII.2006 (el *C. corymbosa*, 24.III.2006), AB (ABB); 1 larva, 3 km E of Teulada (CA), m 157, 38°57'03" N - 08°48'03" E, 24.III.2006 (in *C. corymbosa*), AB (ABB); 3 ♂ ♂ 2 ♀ ♀, ibidem, 2.VII.2006 (el *C. corymbosa*, 24.III.2006), AB (ABB).

DESCRIPTION OF MALE. Body elongate, integument entirely reddish-brown, but head and pronotum often more darkened; background pubescence relatively thick and short, thinner beneath, appressed, white to yellowish-white, but easily tending to become yellowish or golden in preserved specimens; habitus as in fig. 1.

Head coarsely punctate, pubescence of upper and lateral surfaces more or less hiding the integument; forehead feebly impressed between antennal sockets, with a median, slightly impressed longitudinal groove; eyes with sparse, short bristles between ommatidia, ocular lobes without a distinct margin on inner and upper edges. Antennae relatively short, extending to about midpoint of elytra or just beyond, the apex of joint 6 reaching elytral base; scape longer than all subsequent joints, all segments clothed with short, recumbent pubescence; joints 1 to 5-7 also with a few long, erect hairs beneath.



Fig. 1 – Male of *Trichoferus arenbergeri* just emerged from pupal cell (Photograph: A.B. Biscaccianti).

Pronotum somewhat variable in shape, usually slightly transverse, subglobose, as broad as, or slightly broader than base of elytra, rounded to parallel-sided medially, regularly convex in lateral view but abruptly sloped apically; apical margin straight, usually more or less concealed under pronotal convexity, hind margin slightly bisinuate; disk dull, very densely punctate except for a smooth impression behind the middle, only occasionally obliterated; small simple punctures intermixed with larger umbilicate ones; pubescence sparser than that of head, converging to the prebasal impression; erect setae absent.

Prosternum densely punctate, anterior margin markedly indicated; intercoxal process slightly expanded behind procoxae, rounded apically; mesosternum densely punctate as in prosternum; metasternum, mesothoracic epimera, meso- and metathoracic episterna more or less finely and densely punctate, interspaces between punctures very finely microreticulate; pubescence short, uniform, without erect hairs.

Scutellum broader than long, rounded, densely clothed with pubescence hiding the integument.

Elytra shining, moderately slender, on average 2.5 times as long as basal width, parallel-sided, narrowed from apical fifth and broadly

rounded at apex, deeply and confusedly punctate to just beyond the middle, punctuation becoming finer and sparser towards the apex; pubescence speckled with short, pale brownish, suberect bristles interspersed.

Legs short, usually clothed with sparser yellowish-white recumbent pubescence on femora, and denser golden suberect hairs on tibia; tarsi slender, all joints longer than broad except joint 2 of protarsi (fig. 2), which is slightly transverse, 0.71-0.88 as long as broad; last joint of all tarsi always longer than joints 2 and 3 together.

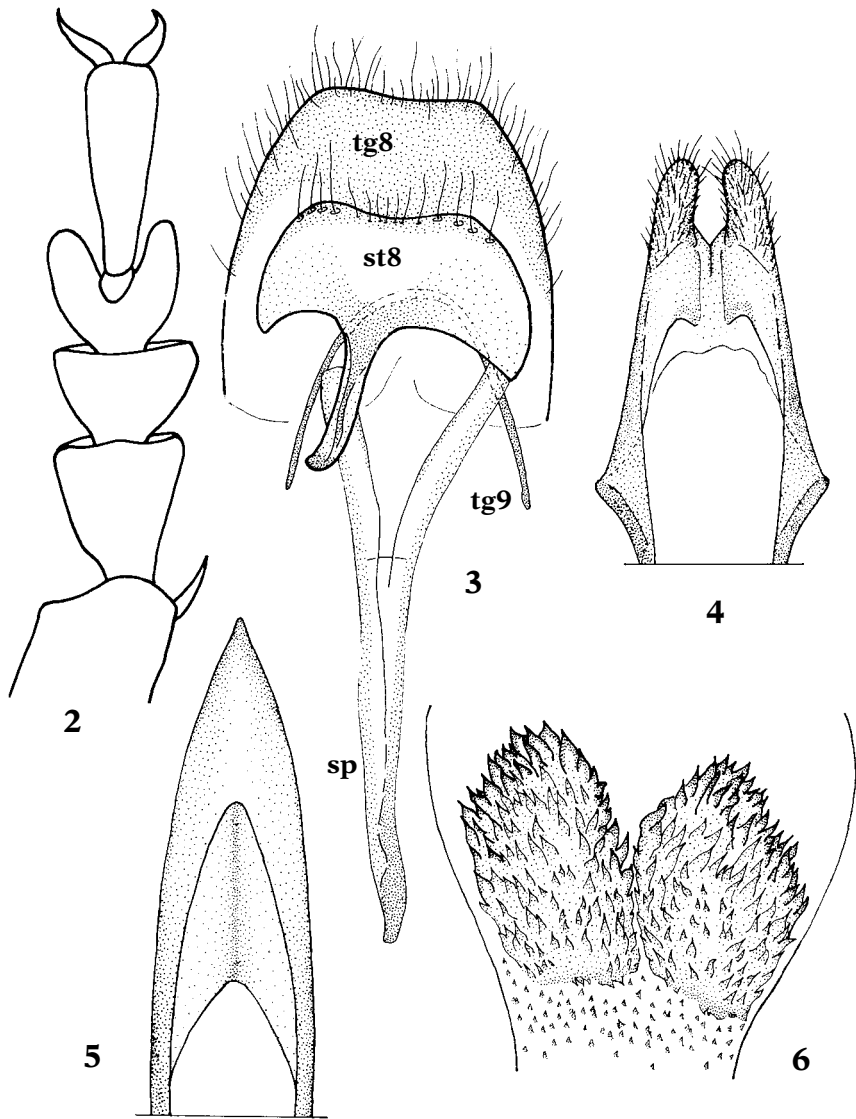
Abdomen densely pubescent, finely and rather densely punctate, interspaces between punctures very finely microreticulate; hind margin of first abdominal sternite with a poorly defined median area smooth and glabrous, vaguely triangular in shape. Hind margin of tergite 8 (fig. 3) feebly emarginate, although rather variable in shape; parameres as in fig. 4; median lobe of aedeagus as in fig. 5; median sclerites of endophallus (fig. 6) similar to *T. spartii* (Müller, 1948).

Length of males: mm 9-14.

SEXUAL DIMORPHISM. As in all species of *Trichoferus*, the female of *T. arenbergeri* has a stouter form, smaller pronotum and shorter antennae than the male. Additionally, the female differs from the male chiefly by the following features: pronotum shining with sparser, coarser, mostly umbilicate punctuation, punctures larger than those of male, prebasal elongated area slightly elevated, or at least not impressed, sides of pronotum with 2-4 long and thin erect setae near the base; all tarsal joints usually longer than broad, occasionally joint 2 of protarsi as long as broad; ventral background pubescence usually longer, with a few, long, suberect setae interspersed; integument of the whole body often darker than male.

Length of females: mm 10.6-17.2 [maximum length taken from Holzschuh (1995)].

BIOLOGY. *Trichoferus arenbergeri* develops on roots of herbaceous plants: *Carlina corymbosa* L. and *Santolina corsica* Jord. & Fourr. (Compositae). The authors' observations have been made upon *C. corymbosa*, since only three specimens were reared from *S. corsica*. Moreover, oviposition, eclosion and early stages of larval development have not yet been observed. Nevertheless, the authors are inclined to believe that oviposition takes place directly on the tap root



Figs 2-5

Fig. 6

Figs 2-6 – *Trichoferus arenbergeri*, male: left protarsus, dorsal view (schematic) (2), last abdominal segments, ventral view [sp, spiculum ventrale; st8, sternite 8; tg8, tergite 8; tg9, tergite 9] (3), parameres, ventral view (4), apex of median lobe of aedeagus, ventral view (5), median sclerites of endophallus (6). Scale bars = 0.5 mm (Drawings: A.B. Biscaccianti).

7



8



Figs 7-8 – Habitat of *Trichoferus arenbergeri*: mountain slopes (Orgosolo, Arcu Correboi) with *Santolina corsica* (7), stony ground with *Carlina corymbosa* (Nebida, Punta Mezzodi) (8) (Photograph: D. Sechi).

of the host plant or in the soil near it, as in *Plagionotus floralis* (Pallas, 1773) (Cherepanov 1990; Biscaccianti 2004), since no trace of the initial stages of larval activity has been observed in the stems or other exposed parts of the plant.



Fig. 9 – Distribution of *Trichoferus arenbergeri* (Sardinia).

During the first year, the young larva bores a descending gallery inside the tap root of the host plant, usually feeding out to near the tip, and fills it with powdery, compressed frass. This first period of larval activity does not cause the death of the plant. After hibernation, the larva starts to bore a new, ascending, broad feeding gallery filled with coarser frass intermixed with fibrous shreds and excrement, causing the death of the plant. Occasionally two or three larvae occur in the same plant: in these cases, short burrows bored in the lower region of stems have been observed as well. Once mature, usually in May, the larva enlarges the upper portion of the feeding gallery, making a large, elongated cell, where it pupates. According to the authors' observations, pupation requires 11-13 days.

This thesis of biennial development is supported by the findings, in March, of both young larvae near the root tip of living plants, and mature larvae occurring in the upper region of the roots of dead plants. Attempts to rear the former were unsuccessful, whereas only the latter completed their development.

Besides this species, no other insect was obtained from the rearings except two species of Dasytidae (Coleoptera), *Psilothrix viridicoerulea* (Geoffroy, 1758) and *Aplocnemus pectinatus* (Küster, 1849),

which were collected (from Nebida and Sant'Anna Arresi respectively) inside the feeding galleries of the larvae of *T. arenbergeri*. Larvae of different species of *Aplocnemus* Stephens, 1830 are known to be predators of Coleoptera and Lepidoptera (Russo 1938; Prota 1966; Liberti in litteris), but no trophic linkage should exist between *T. arenbergeri* and *P. viridicoerulea*, because of the non-predatory behavior of the larvae of the latter (Fiori 1972; Liberti in litteris). However, whether *A. pectinatus* is a predator of the larvae of *T. arenbergeri* or only a saprophytic opportunist, should be ascertained with further studies, since its biology is still unknown (Constantin 1990; Liberti 1995; Liberti in litteris).

Adults of *T. arenbergeri* emerge through a rounded exit hole made in the upper portion of the tap root of the host plant, usually from early to late June; they are nocturnal and sometimes attracted to light. Under laboratory conditions, adults lived 7-10 days and did not copulate.

According to field observations, *T. arenbergeri* is associated with xeric environments, chiefly Mediterranean maquis with scattered vegetation, garigues and xerothermophilous grasslands. This species colonizes only small open areas, preferring plants living in stony ground or poorly-consolidated stony slopes (figs 7-8). In different places of Sardinia this species is sympatric with *T. fasciculatus* (Faldermann, 1837).

REMARKS. In the original description, Holzschuh (1995) compared *T. arenbergeri* with the supposed closely related species *T. fasciculatus*, because of their very similar habitus and elytral pattern. However, a suitable systematic placement of *T. arenbergeri* within the genus *Trichoferus* Wollaston, 1854 has not been advanced up to now, the male being unknown.

In fact, whereas females of several species of *Trichoferus*, chiefly *T. fasciculatus*, *T. spartii* and their relatives, are almost identical to each other and often impossible to identify, some diagnostic characters of the males (such as shape and punctuation of pronotum, chaetotaxy, shape and position of sclerites of the endophallus, etc.) allow one to better distinguish the different taxa and to ascertain their affinities.

The structure of the sclerites of the endophallus places *T. arenbergeri* near the complex of species, apparently allopatric, close to *T. spartii*; other additional differential characters, such as the presence of short bristles between the ommatidia, also suggest a relatively distant relationship with *T. fasciculatus*. Both *T. fasciculatus* and *T. spar-*

tii differ from *T. arenbergeri* in having long and thin erect setae on the elytra, as well as on the pronotal disk of females, whereas *T. arenbergeri* only bears very short and thick half-recumbent setae on the elytra, indistinguishable or lacking on the pronotal disk of females.

In short, *T. arenbergeri* shares with *T. spartii* and other related species at least the peculiar endophallic structure and the pubescent eyes, but shows a different chaetotaxy and elytral pattern, the latter, instead, very similar to *T. fasciculatus* and related species. On the other hand, the complex of species related to *T. fasciculatus* is easily separated by the very different endophallic structure, chaetotaxy and other less remarkable features. Therefore *T. arenbergeri*, although relatively close to *T. spartii*, seems to be a rather isolated species within the genus; it is known only from Sardinia (fig. 9), where *T. spartii* does not occur (Biscaccianti 2003; Sama 2005). It should be noted that a combination of characters similar to *T. arenbergeri* (eyes pubescent, speckled elytral pubescence with short, suberect hairs interspersed, whitish pubescence of the whole body) is shared by *T. sbordonii* Sama, 1982 only, described from southern Turkey (Sama 1982). However, *T. sbordonii* is known only from the holotype female and its biology is completely unknown, so that it is not possible to draw any suitable conclusions about their relationships.

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SUMMARY

Trichoferus arenbergeri is a poorly known endemic species of Sardinia, described upon three females. Description of the male and the species' biology is given in this paper, together with short notes on its habitat. The relationships between this species, *T. fasciculatus* and *T. spartii* are also briefly discussed.

RIASSUNTO

Note su Trichoferus arenbergeri con descrizione del maschio (Coleoptera, Cerambycidae).

Trichoferus arenbergeri è una specie endemica di Sardegna di cui era sinora nota unicamente la femmina. In questo contributo viene fornita la descrizione del maschio e di alcuni aspetti della biologia ed ecologia della specie. Si riportano inoltre brevi considerazioni sulle affinità esistenti tra questa specie, *T. fasciculatus* e *T. spartii*.

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