

A new *Trachyscelis* Latreille, 1809 from Cape Verde Islands (Coleoptera Tenebrionidae)

Pietro Lo Cascio¹ & Piero Leo²

¹Associazione Nesos, Via Vittorio Emanuele 24, 98055 Lipari (Messina), Italy; e-mail: plocascio@nesos.org

²Via Tola 21, 09128 Cagliari, Italy; e-mail: piero.leo@tiscali.it

ABSTRACT

A new species of *Trachyscelis* Latreille, 1809 (Coleoptera Tenebrionidae) endemic to some islands of the Cape Verde archipelago is described. It differs from the widely distributed *T. aphodioides* Latreille, 1809 for the testaceous teguments, the incomplete set of elytral striae where only 1–3 are entirely visible, the smaller eyes with 50 ommatidia and the reduced wings.

KEY WORDS

Tenebrionidae; *Trachyscelis*; island endemics; Cape Verde Islands; new species.

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INTRODUCTION

The genus *Trachyscelis* Latreille, 1809 (Coleoptera Tenebrionidae) belongs to the tribe Trachyscelini Blanchard, 1845 and includes small fossorial darkling beetles characterized by a typical scarab-like habitus, compact form and flattened protibiae, that usually are living in coastal sand dunes.

Currently, this genus includes 17 species (Nabozhenko & Purchart, 2017), 8 of which (*T. aphodioides* Latreille, 1809, *T. esquiveli* Koch, 1953, *T. kochi* Nabozhenko et Purchart, 2017, *T. leoi* Lo Cascio & Grita, 2011, *T. litoralis* Soldati, 2009, *T. shokini* Nabozhenko et Purchart, 2017, *T. subcoecus* Koch, 1960 and *T. tenuestriatus* Fairmaire, 1886) are known for the Palearctic, Saharo-Arabian and Afrotropical (including Madagascan) regions (sensu Holt et al., 2013). Some of them have been described only during the last two decades (Soldati, 2009; Lo Cascio & Grita, 2011; Nabozhenko & Purchart, 2017).

The most widely distributed is *T. aphodioides*, type-species of the genus, which occurs in the Mediterranean and Macaronesian areas but is also established with localized populations in the Gulf

of Guinea and, as well, it was passively introduced in some areas of North, Central and South America (Steiner, 2004; Nardi, 2010; Nabozhenko & Purchart, 2017). It has also been cited for the Cape Verde archipelago, where it was firstly recorded by Gridelli (1955) from specimens collected by H. Lindberg in the early 1950s on the islands of São Vicente and Sal (see also Español & Lindberg, 1963); other records for the islands of Santo Antão, Boa Vista and Maio were given by Oromí et al. (2005).

However, the examination of recently collected material from this archipelago revealed the occurrence of a species distinct from *T. aphodioides*, whose description is presented below (Figs. 1–4). This suggests that specimens previously referred to the latter species could have been misidentified and therefore that *T. aphodioides* is not actually present in Cape Verde.

MATERIAL AND METHODS

The studied specimens were mounted on glue boards or preserved in alcohol, and successively examined by using Optika SZM-2 and Wild M3C

stereo-binocular microscopes, both equipped with a micrometer eyepiece.

Pictures were made with a Canon 550D camera mounted on a monocular optical microscope with a Lomo 3.7X objective; images were subsequently processed with Zerene Stacker software.

ABBREVIATIONS AND ACRONYMS. DS, Daniele Sechi (Cagliari, Italy); ex, specimen/s; JV, Jaroslav Větrovec, (Hradec Králové, Czech Republic); LB, Lorenzo Bonometto (Venice, Italy); PG, Paolo Garagnani, (Bagnacavallo, Italy); PL, Piero Leo (Cagliari, Italy); PLC, Pietro Lo Cascio (Lipari, Italy); ML, Martin Lillig (Saarbrücken, Germany); MSNG, Civic Museum of Natural History (Genoa, Italy); MSNT, Civic Museum of Natural History (Trieste, Italy); MSNV, Civic Museum of Natural History (Venice, Italy); MZUF, Natural History Museum of Florence University (Italy); NMP, National Museum of Prague (Czech Republic).

MATERIAL EXAMINED FOR COMPARISON. *Trachyscelis aphodioides*. SPAIN • 4 ex; Tenerife Island (Canarias), El Medano; 10 Mar. 2004; L. Bonometto legit; LB • 53 ex; Fuerteventura (Canarias), Sotavento de Jandia; 6 Mar. 2007; L. Bonometto legit; LB • 4 ex; Fuerteventura Island (Canarias), Corralejo, Caleta del Marraio; 2 Feb. 2022; R. Papi legit; PL • 9 ex; Fuerteventura Island (Canarias), Tarajalejo; 9 Mar. 2007; L. Bonometto legit; LB • 2 ex; Fuerteventura Island (Canarias), Playa de los Matos; 21 Mar. 2004; L. Bonometto legit; LB • 4 ex; Valencia, La Oliva; 3 Apr. 1972; P. Leo legit; PL • MOROCCO • 1 ex; Kenitra, mouth Oued Sebou; 16 May 1994; P. Leo legit; PL • TUNISIA • 7 ex; Mahdia; 12–16 Jun. 2013; G. Salvato legit; PL • 4 ex; Tabarka; 24 Apr. 1984; E. Migliaccio legit; PL • LIBYA • 6 ex; Cirenaica, Bengasi, Apr. 1935; MSNT • FRANCE • 7 ex; Île Rousse (Corsica), Plage de la Botre; 23 Jun. 2007; L. Bonometto legit; LB • 1 ex; Désert des Agriates (Corsica), foce Ostriconi; 1 Aug. 1991; L. Bonometto legit; LB • 4 ex; same locality as previous; 26 Jun. 2005; L. Bonometto legit; LB • 1 ex; Désert des Agriates (Corsica), Anse de Peraiola; 18 Jun. 2007; L. Bonometto legit; LB • ITALY • 4 ex; Venezia, Ca' Roman; 6 May 2007; L. Bonometto legit; LB • 11 ex; Venezia, San Nicolò; 7 Oct. 2004; L. Bonometto legit; LB • 3 ex; Venezia, Caorle, Brussa; 26 Apr. 2013; G. Scaglioni & S. Ferro legit; PL • 2 ex; Ansedonia (Tuscany); 2 Nov. 1973;

G. Benedetti legit; PL • 7 ex; Grosseto (Tuscany), Marina di Alberese; 6 Sep. 1969; S. Rocchi legit; PL • 2 ex; same locality as previous; 6 Sep. 1988; R. Lisa legit; PL • 4 ex; Roma (Latium), Ostia Lido; 4 May 1974; P. Maltzeff legit; PL • 12 ex; Gargano (Apulia), Isola di Varano; 8 Apr. 1979; G. Sama legit; PL • 1 ex; Lecce (Apulia), Punta Prosciutto; 26 Aug. 2013; P. Cornacchia legit; PL • 1 ex; Messina (Sicily), Mortelle; 7 May 1975; B. Massa legit; PL • 2 ex; foce Belice (Sicily); 21 Oct. 1973; B. Massa legit; PL • 11 ex; Gela (Sicily); 1 Nov. 1975; G. Sabatinelli legit; PL • 9 ex; Lampedusa Island, Spiaggia dei Conigli; 16–23 May 2009; R. Lisa legit; PL • 1 ex; Vulcano Island, spiaggia Ponente; 17 Apr. 1996; P. Lo Cascio legit; PLC • 3 ex; Panarea Island, Cala Zimmari; 24 Feb. 2021; P. Lo Cascio & L. La Fauci legit; PLC • 1 ex; Stromboli Island, Rina Grande; 2 Dec. 1999; P. Lo Cascio legit; PLC • 3 ex; Cagliari (Sardinia), Giurgino; 8 Mar. 1977; P. Leo legit; PL • 2 ex; Villasimius (Sardinia), Costa Rei; 14 May 1967; F. Cassola legit; PL • 5 ex; Muravera (Sardinia), spiaggia di S. Giovanni; 11 May 1985; C. Meloni legit; PL • 5 ex; same locality as previous; 23 Apr. 1986; P. Leo legit; PL • 2 ex; Gonnesa (Sardinia), Fontanamare; 24 Apr. 1985; C. Meloni legit; PL • 4 ex; same locality as previous; 4 Apr. 1991; C. Meloni legit; PL • 21 ex; same locality as previous; 16 Mar. 2017; P. Leo legit; PL • 8 ex; San Pietro Island (Sardinia), La Caletta; 5–7 Apr. 1977; P. Leo legit; PL • 5 ex; San Pietro Island, Giunco; 5–7 Apr. 1977; P. Leo legit; PL • 3 ex; same locality as previous; C. Meloni legit; PL • 1 ex; San Pietro Island, Bobba; 19 Mar. 2015; G. Ruzzante legit; PL • 5 ex; Sant'Antioco Island (Sardinia), Coaquadus; 10–12 Nov. 1978; P. Leo legit; PL • 3 ex; Santa Margherita di Pula (Sardinia); Oct. 1975; P. Leo legit; PL • 10 ex; Teulada (Sardinia), Porto Tramatzu; 10 Jun. 2005; L. Bonometto legit; LB • 158 ex; S. Giovanni di Sinis (Sardinia); 4 Apr. 1978; G. Sama legit; PL • 12 ex; Narbolia (Sardinia), Is Arenas; 23 Mar. 2017; P. Leo legit; PL • 4 ex; Tresnuraghes (Sardinia), Porto Alabe; 26 Mar. 1983; P. Leo legit; PL • ALBANIA • 1 ex; Durazzo, Ravasini-Lona; MSNT • GREECE • 1 ex; Halkidiki, Kassandria; 4–5 May 1983; M. Berra legit; PL • 1 ex; Kavala; Aug. 1982; PL • 1 ex; Lesbos Island, Andissa, Kambos dunes; 23 Mar. 2014; G. Ruzzante legit; PL • 10 ex; Andros Island, Chalkolimionas; 3 Apr. 2015; G. Ruzzante legit;

PL • 6 ex; Tinos Island, Aghios Sostis; 8 Apr. 2015; G. Ruzzante legit; PL • 1 ex; Kriti, Palekastro; 8 Aug. 1985; G. Zappi legit; PL.

Trachyscelis tenuestriatus. EGYPT • 2 ex; Sinai, Tor; 26 Feb. 1935; W. Wittmer legit; LB; 1 ex; Sinai, Nabq; 12 Mar. 2008; L. Bonometto legit; LB • 1 ex; Sinai, beach 3 km N of Nuweiba; 3 Dec. 1992; S. Lillig, M. Lillig & T. Pavliček legit; ML • OMAN • 1 ex; Dh-Qurm beach; 18 Feb. 1995; A. Rihane legit; ML • YEMEN • 1 ex; Red Sea Coast near Hodeida; 14 Mar. 1938; “B.M. Exp. to S.W. Arabia, H. Scott, E.B. Britton, B.M. 1938–246”; MSNT.

Trachyscelis subcoecus. SOMALIA • 1 ex (paratype); Mudugh, El Cabobe; Aug. 1958; C. Koch legit; MSNT • 2 ex; Sar Uanle; 9 Jun. 1973; MZUF • YEMEN • 10 ex; Socotra Island, Noked Plain; 5–6 Dec. 2003; D. Král legit; NMP • 2 ex; same locality of previous; 5–6 Dec. 2003; D. Král legit; PLC • 2 ex; Socotra Island, Ba’a village; 5 Dec. 2003; D. Král legit; NMP.

Trachyscelis esquiveli. KENYA • 1 ex; Mombasa; Aug. 1974; Pighini legit; PL • 9 ex; Malindi, beach; 1 Oct. 1992; L. Bartolozzi legit; MZUF • SOMALIA • 6 ex; Sar Uanle; 24–28 Oct. 1971; MZUF.

RESULTS

Systematics

Ordo COLEOPTERA Linnaeus, 1758
 Familia TENEBRIONIDAE Latreille, 1802
 Subfamilia DIAPERINAE Latreille, 1802
 Tribus TRACHYSCELINI Blanchard, 1845
 Genus *Trachyscelis* Latreille, 1809

Trachyscelis bonomettoi n. sp. (Figs. 1, 3)
<https://www.zoobank.org/6C37BAE4-C5ED-4E7C-8A5C-D698355474EB>

DIAGNOSIS. A *Trachyscelis* related to *T. aphodioides* Latreille, 1809, but with testaceous teguments, only 1–3 elytrae striae complete with less deep punctuation and the others less visible or absent, smaller eyes (50 ommatidia) and reduced wings.

TYPE MATERIAL. Holotype. CAPE VERDE • sex not determined; Boa Vista Island, Costa de

Boa Esperança; 24 Mar. 2005; L. Bonometto legit; MSNV.

Paratypes. CAPE VERDE • 10 ex; Boa Vista Island, Praia da Chave (Fabrica); 23 Mar. 2005; L. Bonometto legit; (3 LB, 3 PL, 2 PLC, 2 MSNV) • 1 ex; same locality as previous; 8 Mar. 2009; L. Bonometto legit; PLC • 4 ex; same locality as previous; Mar. 2010; L. Bonometto legit; (preserved in alcohol MSNV) • 46 ex; Boa Vista Island, Ervatão; 22 Mar. 2005; L. Bonometto legit; (2 DS, 15 LB, 15 PL, 10 PLC, 4 MSNV) • 5 ex; Boa Vista Island, Figueiras, Praia Cruz do Morto; 16 Mar. 2010; L. Bonometto legit; (1 PL, 4 in alcohol MSNV) • 12 ex; Boa Vista Island, Praia de Cruz; 7–12 May 2015; G. Salvato legit; (10 PL, 2 MSNG) • 2 ex; Boa Vista Island, Costa de Boa Esperança; 24 Mar. 2005; L. Bonometto legit; PLC • 1 ex; Sal Island, Santa Maria; 20 Mar. 2005; L. Bonometto legit; LB • 15 ex; same locality as previous; 11 Dec. 2013; P. Garagnani legit; PG • 33 ex; same locality as previous; 18 Dec. 2013; P. Garagnani legit; (4 LB, 15 PG, 10 PL, 4 PLC) • 13 ex; Sal Island, Santa Maria, beach plants; 16°35'27.9"N, 22°55'06.3"W; 3 m a.s.l.; 19 Aug. 2022; J. Větrovec legit; JV • 9 ex; São Vicente Island, Praia Grande de Calhau; 16 Mar. 2005; L. Bonometto legit; (3 LB, 4 PL, 2 PLC) • 1 ex; São Vicente Island, “Mindelo; 10–11 Jan. 1954; Lindberg / *Trachyscelis aphodioides* Latreille, 1809; Harald Lindberg determinit”; MSNT.

DESCRIPTION. Body small (holotype size: 3.80 x 2.13 mm; length of paratypes ranges from 2.95 to 4.08 mm), globose, entirely testaceous except the eyes, the apical portion of mandibles and the scutellum which are darker; dorsal side shiny, with visible punctuation only in the striae.

Head shiny, widest at genal level, laterally with long setae above eyes. Eyes normal-sized, with about 50 ommatidia, slightly protruding from the lateral margins of the head. Labrum straight, with short and erected spine-shaped setae on the anterior margin. Clypeus extended sideways beyond the fore margin of eyes; clypeal margin with two epistomal processes over the antennal insertions; surface of fronto-clypeus shiny and glossy, without punctuation; central portion of clypeus slightly globose, less on the margin, with two weak lateral impressions. Epistomal sulcus clearly visible and well impressed. Frons with very fine and sparse punctuation. Vertex trans-

versely convex, smooth, with feeble and irregular impressions on the middle. Antennae 10-segmented, with five-jointed flattened club and five distinct basal antennomeres (the first much smaller than the other), with sporadic setae; antennomeres 6–10 with circular marginal line of long bent setae.

Pronotum entirely shiny and smooth, globose, carinate along the edge, strongly transverse (2.1 times as wide as long), with maximum width just behind the base; lateral margins of pronotum moderately rounded, with hind and fore angles broadly rounded, the latter slightly more salient; anterior margin weakly curved, feebly ciliated by short setae not always visible; the edge behind the head is spotted by very small longitudinal dark streaks, barely visible. Scutellum darker, about three times wider than long, with a very dense and fine punctuation on the surface. Elytrae 1.2 longer than wide, globose, wider at the rear just forward of the base; surface shiny and smooth; elytral striae 1–3 complete, the 4th sometimes still visible, the 5th barely hinted at in the middle with feeble punctuation, other striae absent; interstriae smooth, flat or at least slightly convex on the apex. Pseudopleurae separated by elytra by a furrow, with dense pubescence of both long and short setae, not visible from above; from a lateral view, extended over the whole length and narrowed towards the apex, ciliate, with a strigate surface. Wings strongly reduced and non-functional.

Prosternal apophysis with long hair tuff. Mesosternum shiny and smooth. Metasternum rugulose, sparsely punctuated and densely covered by setae tuffs. Sternites with rugose surface and long backward hairs. Inner margin of the protibiae with long setae disposed forward and two well visible apical spurs; on the outer margin two rows of small spines; surface of the lower part of the protibial lobe slightly granulose, with four transverse rows of erect calcaria of unequal length, becoming two in the narrower basal part. Mesotibiae with monomorphic strong apical spines. Metatibiae with long erected setae and dense monomorphic strong spines; spines longer and acute in basal half and shorter and obtuse in apical part, but often abraded. Tarsal formula 5–5–4.

ETYMOLOGY. The new species is named in honour of the entomologist Lorenzo Bonometto, who kindly provided us with most of the examined spec-

imens, and already assumed that they belonged to a new taxon.

DISTRIBUTION AND BIOLOGY. *Trachyscelis bonomettoi* n. sp. is probably endemic of the Cape Verde archipelago and is currently known from the islands of Boa Vista, São Vicente and Sal, all belonging to the northern group (Ilhas do Barlavento); *T. bonomettoi* n. sp. seems to be the only species of the genus found on these three islands and previous records of *T. aphodioides* (Gridelli, 1955; Español & Lindberg, 1963; Oromí et al., 2005) should be referred to the new species. The same likely concerns the specimens from the islands of Santo Antão and Maio reported by Oromí et al. (2005). Finally, it is possible that the new species can also be found on other islands of the archipelago.

Thanks to field observations done by J. Větrovec and especially by L. Bonometto (pers. comm.), we are able to outline some ecological aspects of the new species. Specimens from São Vicente were collected in the coastal dunes under bushes of *Zygophyllum* sp., in association with the halo-psammobius tenebrionid beetle *Ammidium ciliatum* Erichson, 1843 s.l., as well as those from Sal, which were found in a typical sandy dune habitat (Fig. 5). At Boa Vista, it was relatively common under logs, stone blocks or madrepores, often at considerable depth in the sandy soil; in the same island, it was also found in the embryonic dunes of Praia Cruz do Morto under the carcasses of sea turtles, together with other beetles such as *Necrobia* sp. and *Pentatemeus* sp.

The depigmentation, reduced sclerification of the tegument and reduced eyes suggest that the species has fossorial habits, probably related to the search for more humid conditions in the soil.

REMARKS. *Trachyscelis bonomettoi* n. sp. is related to *T. aphodioides* Latreille, 1809 (Figs. 2, 4), but in this latter the elytral striae are deep, all clearly visible, and with coarser punctuation; the surface of the frons is rough and sometimes irregularly tuberculate; the pronotum more convex, with the anterior margin more curved and the hind angles almost right. Furthermore, the colouration is darkish, eyes are more prominent and with more than 60 ommatidia, and wings are not reduced.

Also *T. tenuistriatus* Fairmaire, 1886 from eastern Africa and Middle East, has the eyes with more than 60 ommatidia, while it lacks the clipeo-frontal

carina that is instead occurring in *T. bonomettoi* and *T. aphodioides*.

Finally, the new species is clearly distinct from the recently described *T. shokini* Nabozhenko et Purchart, 2017 from Morocco, which possess a different tarsal formula (1–4–3) and is eyeless.

DISCUSSION AND CONCLUSIONS

Cape Verde archipelago lies 600–900 km west of mainland Africa, between 14° and 18° latitude North, and stands at a crossroads between sub-tropical Macaronesia and the dry Sahel region (Floren-



Figures 1, 3. *Trachyscelis bonomettoi* n. sp. from Sao Vicente Island. Fig. 1: dorsal view (length 3.90 mm). Fig. 3: same specimen, lateral view. Figures 2, 4. *Trachyscelis aphodioides* Latreille, 1809 from Porto Alabe (Sardinia, Italy). Fig. 2: dorsal view (length 3.74 mm). Fig. 4: same specimen, lateral view. Photo by D. Sechi.

cio et al., 2021). It consists of nine inhabited large islands and several islets for 4,033 km² of total land area, and all have volcanic origin. Volcanism started from 26 million of years ago on the north-eastern islands Sal, Boa Vista and Maio, with most activity in the Miocene and Pliocene, while the south- and north-western ones developed mainly during the Pliocene (Holm et al., 2008; Ramalho et al., 2010). The islands' bioclimate ranges from tropical hyperdesertic to pluviseasonal, upper infra to low supratropical, and upper ultrahyperarid to upper dry. Annual precipitation ranges from 80–300 mm to 1200–1600 mm (depending from topographic factors) and is mainly concentrated in the wet season (July–October) (Neto et al., 2020).

This oceanic archipelago has high levels of endemism, estimated at around 35% for beetles (Triantis et al., 2010), with extensive speciation phenomena and interesting examples of evolutive radiation (for instance, within the tenebrionid genus *Oxycara* Solier, 1835: see Aistleitner & Geisthardt, 2009).

Despite the first extensive inventory of beetles was published more than 150 years ago (Wollaston, 1867), the finding of a new species is not surprising, considering that some coleopteran families have been just recently added to the islands' fauna (see Batelka & Straka, 2011; Král & Hružová, 2018).

Moreover, the genus *Trachyscelis* includes several island endemics: *T. suturalis* Kulzer, 1957 from the Micronesian archipelagos of Gilbert (Kiribati) and Caroline (Palau); *T. howensis* Lea, 1929, from the tiny and remote Lord Howe Island (Australia); *T. chinensis* Champion, 1894, described for Nan'ao Island (China) and successively recorded for the Ryukyu archipelago (Japan); *T. leoi* Lo Cascio & Grita, 2011 and *T. kochi* Nabozhenko & Purchart, 2017, from the Socotra archipelago (Yemen) (see Lo Cascio & Grita, 2011; Nabozhenko & Purchart, 2017 and references therein).

As suggested by several morphological similarities, the new species seems closely related to the



Figure 5. Habitat of *T. bonomettoi* on Sal Island. Photo by J. Větrovec.

widely distributed *T. aphodioides*, from which it may have originated through an allopatric speciation process.

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