Calotheca leonardii, a new flea beetle species from southern Africa (Coleoptera: Chrysomelidae: Galerucinae: Alticini)

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Abstract - *Calotheca* is a widespread sub-Saharan flea beetle genus comprising 36 species already described. In this contribution, we describe a new species, *Calotheca leonardii* sp. nov., from the Republic of South Africa. It shows the most remarkable similarities with *Calotheca thunbergi*. In fact, based on external morphology, specimens of the new species were previously considered within the variability of *Calotheca thunbergi*. We highlight the main diagnostic characters of the two species and provide photographs of the habitus, median lobe of the aedeagus, and spermatheca. We also report information on their geographical distribution and host plants.

Key words: Afrotropical region, *Calotheca leonardii* sp. nov., flea beetles, leaf beetles, new species.

Riassunto - *Calotheca leonardii*, una nuova specie di Alticini dell'Africa meridionale (Coleoptera: Chrysomelidae: Galerucinae: Alticini).

Calotheca è un genere di Alticini molto diffuso nell'Africa sub-sahariana che comprende trentasei specie descritte. In questo contributo forniamo la descrizione di una nuova specie, *Calotheca leonardii* sp. nov., della Repubblica del Sud Africa. La nuova specie mostra le somiglianze più significative con *Calotheca thunbergi*. Infatti, sulla base della morfologia esterna, esemplari della nuova specie sono stati precedentemente considerati nell'ambito della variabilità di *Calotheca thunbergi*. Per entrambe le specie vengono evidenziati i principali caratteri diagnostici e presentate immagini dell'habitus, del lobo mediano dell'edeago e della spermateca. Vengono inoltre riportate informazioni sulla loro distribuzione geografica e sulle piante ospiti.

Parole chiave: Alticini, *Calotheca leonardii* sp. nov., crisomelidi, nuova specie, Regione afrotropicale.

INTRODUCTION

Calotheca Heyden 1887 is a sub-Saharan flea beetle genus (Chrysomelidae: Galerucinae: Alticini) with limited extensions into Israel and the Arabian Peninsula, particularly common in the eastern and southern parts of its range (Biondi *et al*., 2017; Iannella *et al*., 2021). The 36 species identified so far (D'Alessandro *et al*., 2020, 2021, 2022, 2023) are typically found in savannahs and forests (D'Alessandro *et al*., 2018). According to some reports, their major host plants are *Searsia* species (Anacardiaceae) (Koch, 1958; Furth & Young, 1988; E. Grobbelaar, personal data). The cooccurrence of the following characters can identify the genus: medium to large-size (approximately 3.50-9.00 mm); dorsal margin of middle and hind tibiae with a distinct ciliate emargination (Figs. 1A, 2A); sinuate and deeply impressed frontal grooves, which extend from the dorsal ocular margin to the interantennal space (fg: Figs. 1B, 2B); punctate lateral striae on the pronotum which extend from the anterior margin to the disc and are generally L- or C-shaped (pls: Figs. 1B, 2B). Short lateral longitudinal furrows or small dimples close to the pronotal base are sometimes present (bf: Figs. 1B, 2B). A shallow medial dimple is occasionally present (smd: Figs. 1B). It is generally possible to identify species groups based primarily on the morphology of the spermatheca and, to some extent, the median lobe of the aedeagus, and characters of the external anatomy (D'Alessandro *et al*., 2020, 2021, 2022).

In this contribution, we describe *Calotheca leonardii* sp. nov. from the Republic of South Africa (Eastern Cape and Western Cape Provinces) and provide some taxonomic remarks, diagnostic characters, and the updated distribution for *Calotheca thunbergi* Biondi & D'Alessandro 2017. The two species show some significant morphological similarities and similar distributions. In fact, based on external morphology, specimens of the new species were previously considered within the variability of *Calotheca thunbergi* (Biondi *et al*., 2017). To highlight the main diagnostic characters of the two species, photographs of the habitus, median lobe of the aedeagus, and spermatheca are provided.

MATERIALS AND METHODS

Material examined consists of dried pinned specimens preserved in the institutions listed in the "Abbreviations" section. Specimens were examined, measured, and dissected using a Leica M205C stereomicroscope. Photographs were taken using a Leica DMC5400 camera and

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compiled with the focus stacking technique using Zerene Stacker software, v. 1.04. Scanning electron micrographs were taken using a Hitachi TM-1000. Terminology follows D'Alessandro *et al*. (2016) for the median lobe of aedeagus, and Furth & Suzuki (1994) for the spermatheca. Geographic coordinates for the localities were reported in a degrees and minutes format using the WGS84 datum; information included in square brackets was added to the label data by the authors and using the Google Earth website for coordinates and geographic information. Abbreviations for the depositories follow the list on the website The Insect and Spider Collections of the World (Evenhuis, 2021). Chorotypes follow Biondi & D'Alessandro (2006).

Abbreviations

Collections and repositories - BAQ: Italy, University of L'Aquila, Collection of M. Biondi; MNHN: France, Paris, Muséum National d'Histoire Naturelle; NHMUK: United Kingdom, London, The Natural History Museum; NHRS: Sweden, Stockholm, Naturhistoriska Riksmuseet; SANC: South Africa, Pretoria, South African National Collection of Insects; UWCP: Poland, Wrocław, University of Wrocław.

Biometrics - LA: numerical sequence from base to apex of each antennomere, proportional to the length of the first antennomere; LAED: length of median lobe of the aedeagus; LAN: length of antennae; LB: total body length (from apical margin of head to apex of elytra); LE: length of elytra; LP: medial length of pronotum; LSP: maximum length of spermatheca, including ductus; WE: maximum width of elytra combined; WP: maximum width of pronotum.

TAXONOMY

***Calotheca leonardii* sp. nov.** (Figs. 1, 3)

Calotheca thunbergi Biondi & D'Alessandro: Biondi *et al*. (2017: 126, 155 partim)

Type material

Holotype ♂**:** Republic of South Africa, CP [Eastern Cape Province], Cintsa Mouth, 32°49'S 28°07'E, 26.xi.1988, E. Grobbelaar leg., collected by beating (SANC). ***Paratypes*:** Republic of South Africa: Eastern Cape Province: 2♂ and 5♀, same data as the holotype (SANC); 1♂ and 1♀, road R63, 4 km E Komga, 350 m, 32.34.67S 27.55.22E [32°34'43''S 27°54'28''E], 2.v.2005, E. Colonnelli leg. (BAQ); 1♀, Port St Johns - second plage, 31.38.66S 29.31.25E [31°38'39''S 29°31'15''E], 8-9.xi.2006, E. Colonnelli leg. (BAQ); 1♀, Port St. Johns, Silaka Nature Reserve, 31.39.45S, 29.30.14E [31°39'45''S 29°30'14''E], 10.xi.2006, E. Colonnelli leg. (BAQ); 1♀, 10 km South of Addo, 100 m, 35°46'S, 25°45'E [33°36'58''S, 25°42'41''E], 5.xi.1988, E. Colonnelli leg. (BAQ); 1♀, road Grahamstown to Alexandria, 350 m, 33 23.97S, 26 28.43E [33°23'58''S 26°28'26''E], 3.v.2005, P. Audisio & E. Colonnelli leg. (BAQ); 1♂ and 1♀, Mondhoek, 12 km NNE of Jeffreys Bay, 33°56.5'[33°56'30"] S 24°59'E, 02.i.1997, R. Ståls leg. (SANC); 2♂ and 1♀, Pirie Forest, K[ing] W[illiam]'s Town [32°53'44"S 27°25'02E], 21.iii.[19]65, A.L. Capener leg. (SANC); 1♀, Hogsback State Forest, Hogsback Pass (middle) c. 1100m, 32°36'S 26°56'E, 26.v.1998, Collected from *Rhus* sp. (Anacardiaceae), E. Grobbelaar, S. Neser, O. Neser leg. (SANC); 1♂, Van Staden's Riv[er] nr. Thornhill, 33°55'S 25°12'E, 06.xii.1988, B.[=E.] Grobbelaar leg. (SANC); 2♂ and 1♀, Colonie du Cap, East London [33°01'42"S 27°51'06"E], 1923, R. Ellenberger leg. (MNHN); 4♂, N2 Rd side 20 km N of Peddie, 175 m, -33.0659S/27.2098E [33°03'57"S 27°12'35"E], 18.xi.2013, karoo vegetation, M. Wanat leg. (UWCP); 1♂, Silaka Nat[ure] Res[erve], near Port St. Johns, 20-80 m, trail up chalet 11, -31.6532S/29.5068E [31°39'12"S 29°30'24"E], 13.xi.2013, beating, M. Wanat leg. (UWCP); 1♂ and 1♀, Alexandria Forest, 33°42'S 26°22'E, 27.xi.1988, B.[=E.] Grobbelaar leg. (SANC); 1♂, 5 Km N Allcedale, 300 m, 33°18'53"S 26°06'15"E, 12.xi.2005, E. Colonnelli leg. (SANC); 1♂, Port St. John[s], Pondoland, [31°37'55"S 29°32'11"E] 10-31.vii.1923 (NHMUK); Western Cape Province: 1♂, Kirstenbosch National Botanical Garden, near Cape town, 33°59'15"S 18°25'58"E, 23.i.2000, Feeding on *Rhigozum obovatum* (Bignoniaceae), C.N. Duckett leg. (SANC); 2♂ and 1♀, Bloukrans River Bridge, c. 10 km E of Nature's Valley, 33°57'S 23°09'E, 31.xii.1996, Beaten from flowering *Rhus* sp. (Anacardiaceae), R.Stals leg. (SANC).

Diagnosis

The colour pattern of *Calotheca leonardii* sp. nov. is very similar to *C. thunbergi*: dark yellow pronotum, elytra with irregular brown patches and blackish punctation (Figs. 1A, 2A). However, the new species is distinguishable by the longer elytra and, especially in male, the longer antennae (Figs. 1A, 2A): in *Calotheca leonardii* sp. nov. LE/LP = 3.59 ± 0.08 in ♂, 3.85 ± 0.11 in ♀; LAN/(LE+LP) = 0.48 ± 0.02 in ♂, 0.41 ± 0.02 in ♀; in *C. thunbergi* LE/LP = 3.31 ± 0.08 in ♂, 3.46 ± 0.14 in ♀; LAN/(LE+LP) = 0.39 ± 0.02 in ♂, 0.36 ± 0.02 in ♀. In addition, *C. leonardii* sp. nov. has a less convex pronotum, with rather irregular surface compared to *C. thunbergi*.

The median lobe of the aedeagus of *Calotheca leonardii* sp. nov. is distinguishable from that of *C. thunbergi* by the clearly sinuate apex, and a longer dorsal ligula (Figs. 1D, 2D). Spermatheca (Fig. 1C) is rather variable and does not have striking diagnostic value at the species level. Its basal part is approximately fusiform, distal part distinctly curved, about as long as half the length of the basal part, with evident appendix; ductus is thickset, rather short, uncoiled, roughly U-shaped, with insertion slightly dorsally oriented. It can be generally distinguished from *C. thunbergi* by the ductus more elongate (Figs. 1C, 2C).

Description of the holotype (♂)

Body elliptically-elongate in dorsal view, rather convex in lateral view; total length of body (LB) = 6.45 mm; maximum pronotal width near the base (WP = 3.00 mm); maximum width of elytra in the basal third (WE = 3.80 mm). Head, distal half of the antennae, and legs pale brown; pronotum and proximal half of the antennae dark yellow; elytra slightly paler than pronotum, with irregular brown patches and blackish punctation (Fig.

1A); scutellum dark yellow. Head surface (Fig. 1B) microreticulate and micropunctate, with setiferous punctures that are sparser on the frons; frontal grooves sinuate, deeply impressed, extending from the dorsal ocular margin to approximately the inter-antennal space; eyes elliptical, elongate; antennae shorter than half the body length (LAN = 3.15 mm; LAN/LB = 0.49); LA: 100:53:74:74:84:74:79:68:74:63:95. Pronotum (Fig. 1B) slightly convex, sub-trapezoidal, distinctly transverse (LP = 1.50 mm; WP/LP = 2.00), sides moderately rounded, lateral margins visible in dorsal view; surface microreticulate and micropunctate, with small, dense punctation, and very shallow, irregular depressions; punctate lateral striae moderately impressed, L-shaped; some sparse additional punctures along the pronotal margins; basal furrows very short and moderately incised; a small dimple medially, near the basal margin; anterior angles distinct, prominent and pointed, indistinctly swollen; posterior angles obtuse. Scutellum sub-triangular. Elytra (Fig. 1A) elongate (LE = 5.35 mm; WE/LE = 0.71; LE/LP = 3.57), moderately rounded laterally, jointly rounded apically; lateral margin narrow, barely visible in dorsal view; elytral punctation arranged in single regular rows formed by distinctly impressed punctures; interstriae on elytral disc flat, with finely microreticulate and sparsely micropunctate surface; humeral calli indistinctly raised. Macropterous. Basal pro- and meso-tarsomeres distinctly enlarged. Underside pale brown; apical abdominal ventrite without preapical sculptures or impressions. Median lobe of the aedeagus (Fig. 1D) (LAED = 2.80 mm; LE/LAED = 1.91) softly si-

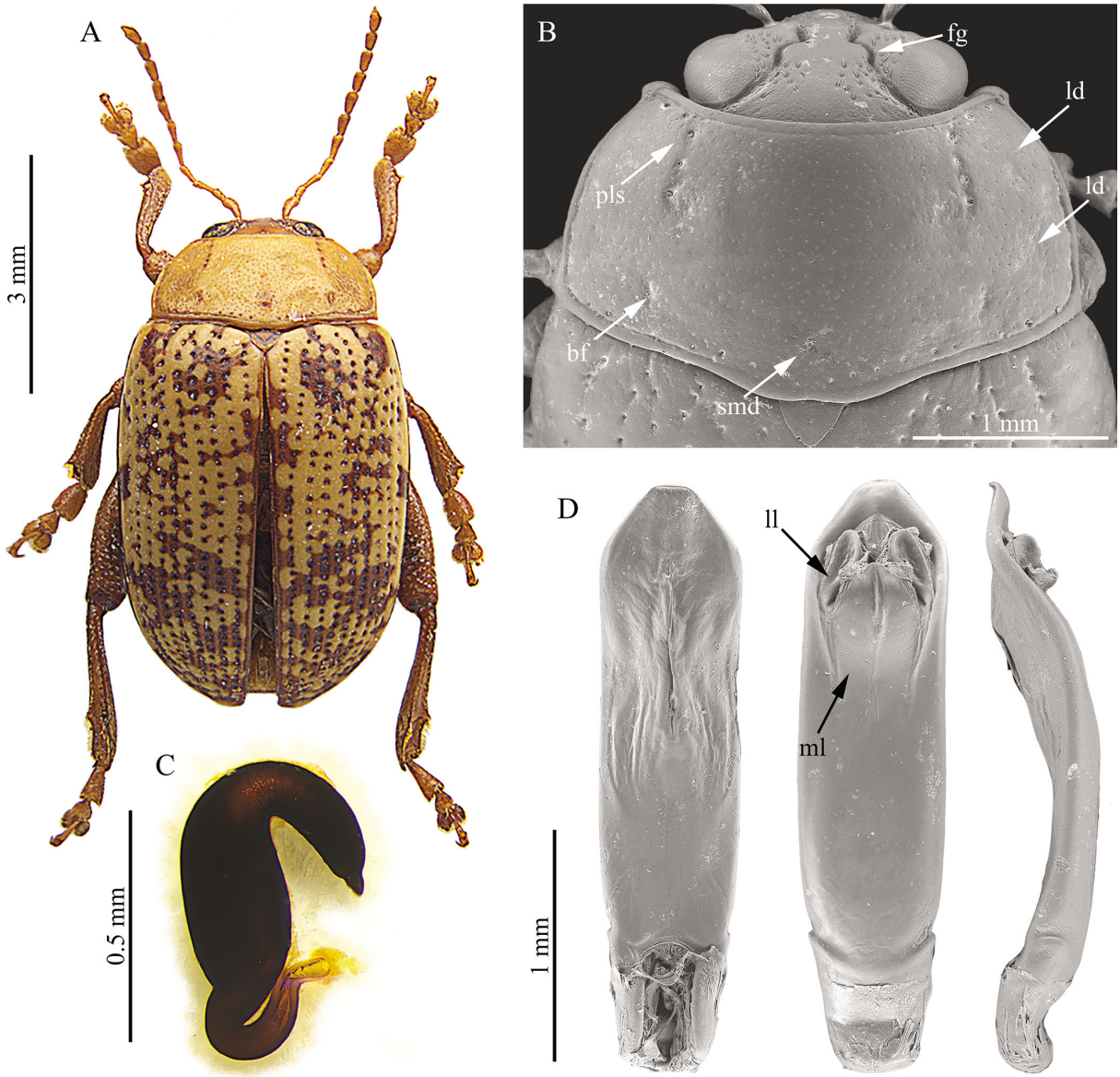

Fig. 1 - *Calotheca leonardii* sp. nov. A) habitus of the holotype; B) head and pronotum, male; C) spermatheca (Eastern Cape, 4 km E Komga); D) median lobe of the aedeagus, from left to right in ventral, dorsal and lateral view (Eastern Cape, 20 km N of Peddie). bf: basal furrow; fg: frontal grooves; ld: lateral depression; pls: punctate lateral stria; smd: shallow medial dimple. / A) habitus dell'olotipo; B) testa e pronoto, maschio; C) spermateca (Eastern Cape, 4 km a E di Komga); D) lobo mediano dell'edeago, da sinistra a destra in visione ventrale, dorsale e laterale (Eastern Cape, 20 km a N di Peddie). bf: solco basale; fg: docce frontali; ld: depressione laterale; pls: stria laterale di punti; smd: fossetta mediana superficiale.

nuate laterally in ventral view, subtriangular and truncate apically; ventral surface coarsely wrinkled and prominent from about the half-length to the subapical part, with a narrow median sulcus; median lobe moderately curved in lateral view, with sinuate apex; dorsal ligula moderately elongate, with a wide median lobe, subtriangular apically, and with two narrow and more elongate lateral lobes.

Variability

Males (n = 10; mean ± standard deviation, range): LE = 4.98 ± 0.23 mm (4.75 ≤ LE ≤ 5.35 mm); WE = 3.58 ± 0.14 mm (3.45 ≤ WE ≤ 3.80 mm); LP = 1.39 ± 0.06 mm (1.30 ≤ LP ≤ 1.50 mm); WP = 2.80 ± 0.11 mm (2.68 ≤ WP ≤ 3.00 mm); LAN = 3.04 ± 0.17 mm (2.80 ≤ LAN ≤ 3.35 mm); LAED = 2.65 ± 0.08 mm (2.58 ≤ LAED ≤ 2.80 mm); LB = 6.24 ± 0.23 mm (5.93 ≤ LB ≤ 6.65 mm); LE/LP = 3.59 ± 0.08 (3.39 ≤ LE/LP ≤ 3.69); WE/WP = 1.28 ± 0.02 (1.23 ≤ WE/WP ≤ 1.31); WP/LP = 2.02 ± 0.03 (1.96 ≤ WP/LP ≤ 2.06); WE/LE = 0.72 ± 0.01 (0.71 ≤ WE/LE ≤ 0.74); LAN/LB = 0.49 ± 0.02 (0.46 ≤ LAN/LB ≤ 0.53); LE/LAED = 1.88 ± 0.05 (1.78 ≤ LE/LAED ≤ 1.95). Females (n = 10; mean ± standard deviation; range): LE = 5.12 ± 0.38 mm (4.50 ≤ LE ≤ 5.78 mm); WE = 3.70 ± 0.26 mm (3.15 ≤ WE ≤ 4.10 mm); LP = 1.33 ± 0.09 mm (1.20 ≤ LP ≤ 1.45 mm); WP = 2.83 ± 0.21 mm (2.40 ≤ WP ≤ 3.15 mm); LAN = 2.66 ± 0.20 mm (2.25 ≤ LAN ≤ 3.05 mm); LSP = 0.70 ± 0.04 mm (0.65 ≤ LSP ≤ 0.75 mm); LB = 6.48 ± 0.46 mm (5.80 ≤ LB ≤ 7.50 mm); LE/LP = 3.85 ± 0.11 (3.70 ≤ LE/LP ≤ 4.04); WE/WP = 1.31 ± 0.01 (1.29 ≤ WE/WP ≤ 1.34); WP/LP = 2.13 ± 0.07 (2.00 ≤ WP/LP ≤ 2.23); WE/LE = 0.72 ± 0.01 (0.70 ≤ WE/LE ≤ 0.74); LAN/LB = 0.41 ± 0.02 (0.38 ≤ LAN/LB ≤ 0.42); LE/LSP = 7.32 ± 0.49 (6.57 ≤ LE/LSP ≤ 7.97). Paratypes are very similar in shape, sculpture, and co-

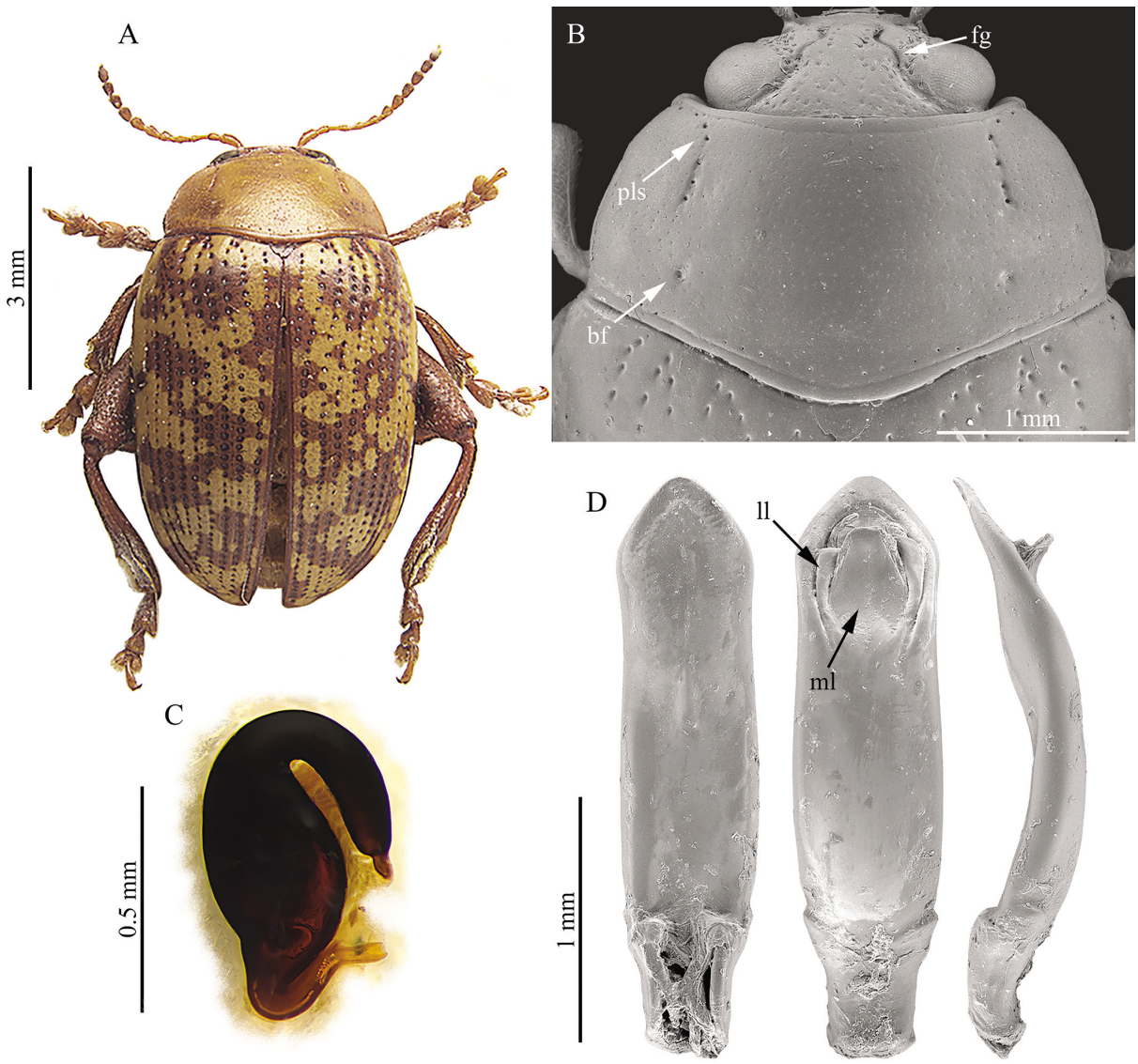

Fig. 2 - *Calotheca thunbergi* Biondi & D'Alessandro. A) habitus, male (Eastern Cape, Katberg); B) head and pronotum, male (Eastern Cape, Katberg); C) spermatheca (Eastern Cape, Katberg); D) median lobe of the aedeagus, from left to right in ventral, dorsal and lateral view (Eastern Cape, Katberg). bf: basal furrow; fg: frontal grooves; pls: punctate lateral stria. / A) habitus, maschio (Eastern Cape, Katberg); B) testa e pronoto, maschio (Eastern Cape, Katberg); C) spermateca (Eastern Cape, Katberg); D) lobo mediano dell'edeago, da sinistra a destra in visione ventrale, dorsale e laterale (Eastern Cape, Katberg). bf: solco basale; fg: docce frontali; pls: stria laterale di punti.

lour to the holotype. Some variability affects the pronotal surface, more regular in some specimens, and with the basal furrows moderately impressed to barely detectable. Female with basal pro- and mesotarsomeres less enlarged than in male. Spermatheca (Fig. 1C) rather variable but always roughly fusiform; distal part distinctly curved, about as long as half the length of the basal part, with a distinct appendix; ductus thickset, moderately elongate, uncoiled, roughly U-shaped; ductus insertion almost dorsally oriented.

Etymology

The specific epithet refers to our friend and colleague Carlo Leonardi (Museo di Storia Naturale di Milano, Italy), passionate and esteemed expert in flea beetles.

Distribution

Republic of South Africa, Eastern Cape and Western Cape Provinces (Fig. 3). Chorotype: Southern African (SAF).

Ecological notes

Based on the notes reported on the labels, adults were collected in January, March, May, July, November, and December, between 20-1100 m a.s.l., on karoo vegetation, *Rhus* sp. (Anacardiaceae) and *Rhigozum obovatum* (Bignoniaceae).

***Calotheca thunbergi* Biondi & D'Alessandro, 2017**
(Figs. 2, 3)

Calotheca thunbergi Biondi & D'Alessandro new name for *Blepharida stolida*: Biondi *et al*. (2017: 126, 155 partim)

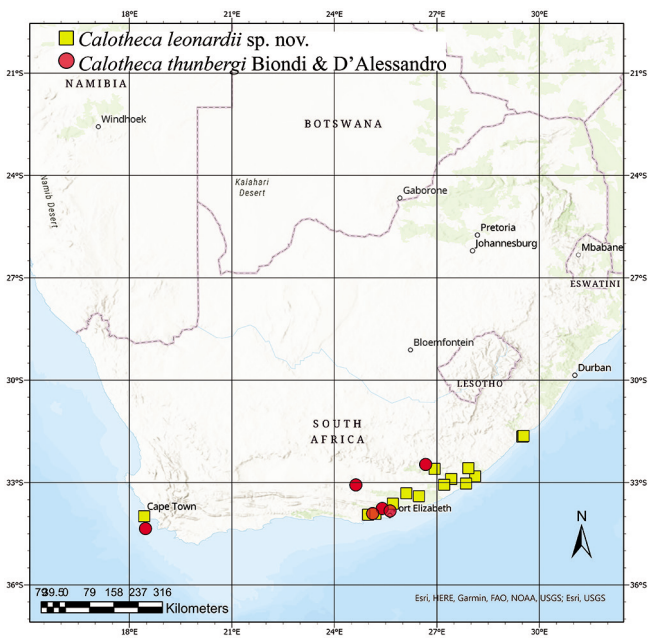

Fig. 3 - Locality occurrences of *Calotheca leonardii* sp. nov. and *C. thunbergi* Biondi & D'Alessandro. / Località di presenza di *Calotheca leonardii* sp. nov. e *C. thunbergi* Biondi & D'Alessandro.

= *Haltica stolida* Thunberg 1808: 300 (name preoccupied by *Blepharida stolida* (Fabricius 1775: 98) = *B. rhois* (Forster 1771: 21)): Biondi *et al*. (2017: 126, 155 partim)

Type material examined

Lectotype ♀: "Cap. B. Sp/Mus. Payk" [Republic of South Africa, Western Cape, Cape of Good Hope, 34°21′25"S, 18°28′25"E], M. Biondi des. 2017 (NHRS).

Additional material examined

REPUBLIC OF SOUTH AFRICA: Western Cape Province: 3 specimens, Cape Bona Spei [Cape of Good Hope, 34°21′24"S, 18°28′26"E], 1889, ex Musæo Allard (MNHN); Eastern Cape Province: 4 specimens, Katberg, 4000 ft [32°28′12"S, 26°40′12"E], xii.1932, R.E. Turner leg. (NHMUK); 1 specimen, ditto, 1-13.xii.1932 (NHMUK); 3 specimens, Zuurberg Nature Reserve, 900 m, 33°16'S 25°45'E, 28.xi.1988, Adults collected from *Rhus dentata* (Anacardiacee), E. Grobbelaar leg. (SANC); 1 specimen, Uitenhage [33°45'45"S 25°24'07"E], 30.x.1931, J. Ogilvie leg. (NHMUK); 4 specimens, Uitenhage [33°45'45"S 25°24'07"E], 30.xii.[19]70, M.W. Strydom leg. (SANC); 2 specimens, Port Elizabeth, Blue water bay (macchia riva mare [seashore shrub]), S33°51'12" E25°38'36", 6.xi.2006, G. Osella leg. (BAQ); 1 specimen, near Thornhill, 300 m, 33°54'27"S 25°07'03"E, 16.xi.2006, E. Colonnelli leg. (BAQ); 1 specimen, Dunbrody [Cacadu District Municipality, Western District, 33°04'13"S 24°37'34"E], 2.ix.1901 (NHMUK); 1 specimen, ditto, 06.ii.1901 (NHMUK).

Morphological remarks

Head, legs, and antennae dark yellow or pale brown; pronotum yellow or dark yellow; elytral yellow, generally slightly paler than pronotum, with pale brown irregular patches (Fig. 2A). Pronotum (Fig. 2B) convex, with margins barely visible in dorsal view; surface regular, without depressions, densely and finely punctate; punctate lateral stria (pls: Fig. 2B) moderately impressed basal furrows, when distinguishable, short, like a dimple (bf: Fig. 2B). Median lobe of the aedeagus (Fig. 2D) softly sinuate laterally in ventral view, subtriangular in the apical part; surface smooth, slightly raised from the middle to the subapical part; median lobe moderately curved in lateral view up to the apex; dorsal ligula short, with a wide, subtriangular, median lobe apically truncated, and with two narrow lateral lobes. Spermatheca (Fig. 2C) rather variable but always roughly fusiform; distal part distinctly curved, long at least half the length of the basal part, with evident appendix; ductus moderately thickset, short, uncoiled, roughly U-shaped.

Biometrics

Males (n = 10; mean ± standard deviation, range): LE = 4.71 ± 0.24 mm (4.35 ≤ LE ≤ 5.00 mm); WE = 3.57 ± 0.09 mm (3.45 ≤ WE ≤ 3.65 mm); LP = 1.42 ± 0.06 mm (1.35 ≤ LP ≤ 1.53 mm); WP = 2.90 ± 0.11 mm (2.75 ≤ WP ≤ 3.08 mm); LAN = 2.46 ± 0.10 mm (2.30 ≤ LAN ≤ 2.60 mm); LAED = 2.35 ± 0.08 mm (2.20 ≤ LAED ≤ 2.40 mm); LB = 5.93 ± 0.40 mm (5.50 ≤ LB ≤ 6.30 mm); LE/

LP = 3.31 ± 0.08 (3.22 ≤ LE/LP ≤ 3.43); WE/WP = 1.23 ± 0.03 (1.19 ≤ WE/WP ≤ 1.26); WP/LP = 2.04 ± 0.04 (2.00 ≤ WP/LP ≤ 2.11); WE/LE = 0.76 ± 0.02 (0.73 ≤ WE/LE ≤ 0.79); LAN/LB = 0.40 ± 0.02 (0.37 ≤ LAN/LB ≤ 0.44); LE/LAED = 2.00 ± 0.08 (1.89 ≤ LE/LAED ≤ 2.08). Females (n = 10; mean ± standard deviation; range): LE = 5.05 ± 0.27 mm (4.60 ≤ LE ≤ 5.30 mm); WE = 3.82 ± 0.22 mm (3.45 ≤ WE ≤ 4.05 mm); LP = 1.46 ± 0.04 mm (1.40 ≤ LP ≤ 1.50 mm); WP = 3.08 ± 0.15 mm (2.90 ≤ WP ≤ 3.25 mm); LAN = 2.36 ± 0.11 mm (2.15 ≤ LAN ≤ 2.50 mm); LSP = 0.68 ± 0.03 mm (0.65 ≤ LSP ≤ 0.73 mm); LB = 6.17 ± 0.26 mm (5.65 ≤ LB ≤ 6.35 mm); LE/LP = 3.46 ± 0.14 (3.23 ≤ LE/LP ≤ 3.60); WE/WP = 1.24 ± 0.03 (1.19 ≤ WE/WP ≤ 1.27); WP/LP = 2.11 ± 0.07 (2.04 ≤ WP/LP ≤ 2.21); WE/LE = 0.76 ± 0.02 (0.74 ≤ WE/LE ≤ 0.79); LAN/LB = 0.38 ± 0.01 (0.37 ≤ LAN/LB ≤ 0.40); LE/LSP = 7.49 ± 0.49 (6.81 ≤ LE/LSP ≤ 8.15).

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