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Caldarinus gwarrie, a new genus and species of edaphic weevil from South Africa with notes on some genera of Oosomini (Coleoptera: Curculionidae: Entiminae)

Riassunto: *Caldarinus gwarrie*, nuovo genere e nuova specie di curculionide edafico del Sud Africa, con note su alcuni generi di Oosomini (Coleoptera: Curculionidae: Entiminae).

Caldarinus gwarrie gen. n., sp. n., nuovo genere e nuova specie di Entiminae edafici, sono descritti dal Sud Africa: Western Cape. La sua collocazione tra le tribù della sottofamiglia è discussa e i caratteri tassonomici più importanti sono illustrati. Il genere *Rhysoderes* Marshall, 1955 (Entiminae: Oosomini) viene proposto come nuovo sinonimo di *Cladeyterus* Schoenherr, 1842 e *Rhysoderes atrobriunus* Marshall, 1958 è proposto come nuovo sinonimo di *Cladeyterus lepidopterus* Boheman, 1842. Le restanti nove specie di *Rhysoderes* sono trasferite al genere *Cladeyterus*.

Abstract: The new genus and species of edaphic Entiminae *Caldarinus gwarrie* gen. n., sp. n., is described from South Africa: Western Cape province. Its tribal placement in the subfamily is discussed and the most important taxonomic characters are illustrated. The genus *Rhysoderes* Marshall, 1955 (Entiminae: Oosomini) is proposed as a new junior synonym of *Cladeyterus* Schoenherr, 1842 and *Rhysoderes atrobriunus* Marshall, 1958 is proposed as a new junior synonym of *Cladeyterus lepidopterus* Boheman, 1842. The remaining nine *Rhysoderes* species are transferred to the genus *Cladeyterus*.

Key words: Weevils, Taxonomy, New genus, New species, Afrotropical region, Species discovery.

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INTRODUCTION

In the last decade several papers by the authors have improved the knowledge of the previously poorly known entimine weevil fauna of Southwestern Africa (Borovec & Meregalli 2013; 2020; Borovec & Oberprieler 2013; Borovec & Skuhrovec 2013; Borovec *et al.* 2014; Meregalli *et al.* 2021, and more). In the present paper a new genus and species from the South African province of Western Cape is described.

MATERIAL AND METHODS

Body length of all specimens was measured in dorsal view from the anterior border of the eyes to the apex of the elytra, excluding the rostrum. Width/length ratio of the rostrum was measured at the maximum width at base versus maximum length to the base of

the mandibles. Width/length ratios of pronotum, elytra, antennal segments and tarsomeres were taken at the maximum width and length of the respective parts in dorsal view; length of onychium was taken as the part projecting from the outline of tarsal segment 3. Dissected male and female genitalia were studied in glycerine. Female genitalia were subsequently embedded in Solakryl BMX (Medika, Prague); male genitalia were mounted dry on the same card as the respective specimen, with tegmen and sternite IX embedded in Solakryl BMX. Photographs were taken using a Nikon P 6000 digital camera mounted on a Leica 6SE stereomicroscope, combining image stacks with Zerene Stacker. All images were cleaned and enhanced as necessary with Adobe Photoshop CS3 and Topaz Denoise AI. The terminology of the rostrum and the terminalia follows Oberprieler *et al.* (2014).

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The material is deposited in the following collections:

BMNH: Natural History Museum, London, United Kingdom;

CMNC: Canadian Museum of Nature Collection, Ottawa, Canada;

NMPC: Národní Museum Prague, Czech Republic;

RBSC: Roman Borovec collection, Sloupno, Czech Republic;

MMTI: Massimo Meregalli collection, Torino, Italy;

SANC: National Collection of Insects, Pretoria, South Africa;

TMSA: Ditsong National Museum of Natural History (formerly Transvaal Museum), Pretoria, South Africa.

TAXONOMY

Caldarinus Meregalli & Borovec gen. n. (Figs. 1 and 2)

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D9548719-8838-4604-83CD-6A477DF423C1

Type species, by present designation: *Caldarinus gwarrie* Meregalli & Borovec sp. n.

The gender is masculine.

Diagnosis. Wingless Entiminae of small size; rostrum approximately as long as wide, with rounded sides, basally separated from head by a transverse furrow; frons densely squamose; epifrons narrow; scrobes in profile furrow-shaped, directed towards eye; mandibles trisetose; protibiae robust, apically armed with spines; metatibiae with apex densely squamose with slender setose bevel; claws free; abdominal segment 1 in middle twice as long as segments 2–4 together, segment 2 in middle as long as segment 3 or 4; suture between segments 1 and 2 deeply arched; metaventral process wide, obtuse, slightly wider than transverse diameter of metacoxa; tegmen with short parameres; female sternite VIII with plate semi-circular with apodeme terminating inside it.

Description. Body of small size, including antennae and legs compact and robust.

Rostrum approximately as long as wide, constricted at base, with distinctly rounded sides, at base separated from head by distinct, moderately deep transverse furrow with ill-defined margins. Epistome

V-shaped, extremely slender. Frons densely squamose. Epifrons narrow, at base distinctly narrower than distance between inner margins of eyes. Scrobe subdorsal, in dorsal view visible in anterior part of rostrum as slender furrows, in profile narrow, furrow-shaped, dorsal margin directed against dorsal margin of eye and ventral margin directed against ventral margin of eye, vanishing at about half distance between antennal insertion and anterior margin of eye. Eyes small, dorsally not prominent from dorsal outline of head, with less than 30 ommatidia. Head behind eye not striated, temple between eye and apex of pronotum as wide as diameter of eye. Mandibles robust, asquamose, trisetose. Prementum with 2 setae. Entire ventral side of rostrum and head densely squamose.

Antennae short, scape straight, funicle 7-segmented, club small, only slightly wider than last funicle segments, with segment 1 longest, occupying majority of length of club.

Pronotum distinctly wider than long, apically constricted, surface regularly domed, without ridges or furrows, anterolateral margins without ocular lobe or fringe of fine setae. Anterior margin of prosternum curved, surface densely squamose, with a narrow furrow at midlength between anterior margin and procoxae. Procoxal cavities circular, medially contiguous, placed at midlength of prosternum. Mesocoxal cavities circular, separated by 0.25× their width. Mesepimeron narrow, curved, extended posteriad between metanepisternum and metasternum; mesanepisternum broad, subrectangular, slightly broadened posteriad.

Elytra distinctly longer than wide, subparallel-sided, apically broadly rounded, without laterally prominent humeral or subhumeral calli, with 10 complete striae, apex not visible in dorsal view, hidden by slope overhanging it. Metanepisternum crescent-shaped, narrow; metepimeron barely visible between margin of elytron and metanepisternum. Scutellar shield dorsally concealed. Wingless.

Coxae lacking erect setae, trochanters obliquely truncate with one erect, subspatulate seta directed laterally. Femora adentate. Tibiae short, robust, mucronate, without spurs; protibiae slightly enlarged inwards and outwards, apically armed with spines, meso- and metatibiae with apex densely squamose, metatibiae with slender setose bevel. Tarsi with claws free, slightly divergent.

Ventrites about as long as wide, subtriangular. Segment 1 in middle twice as long as segments 2–4 together, behind metacoxa as long as segment 2;

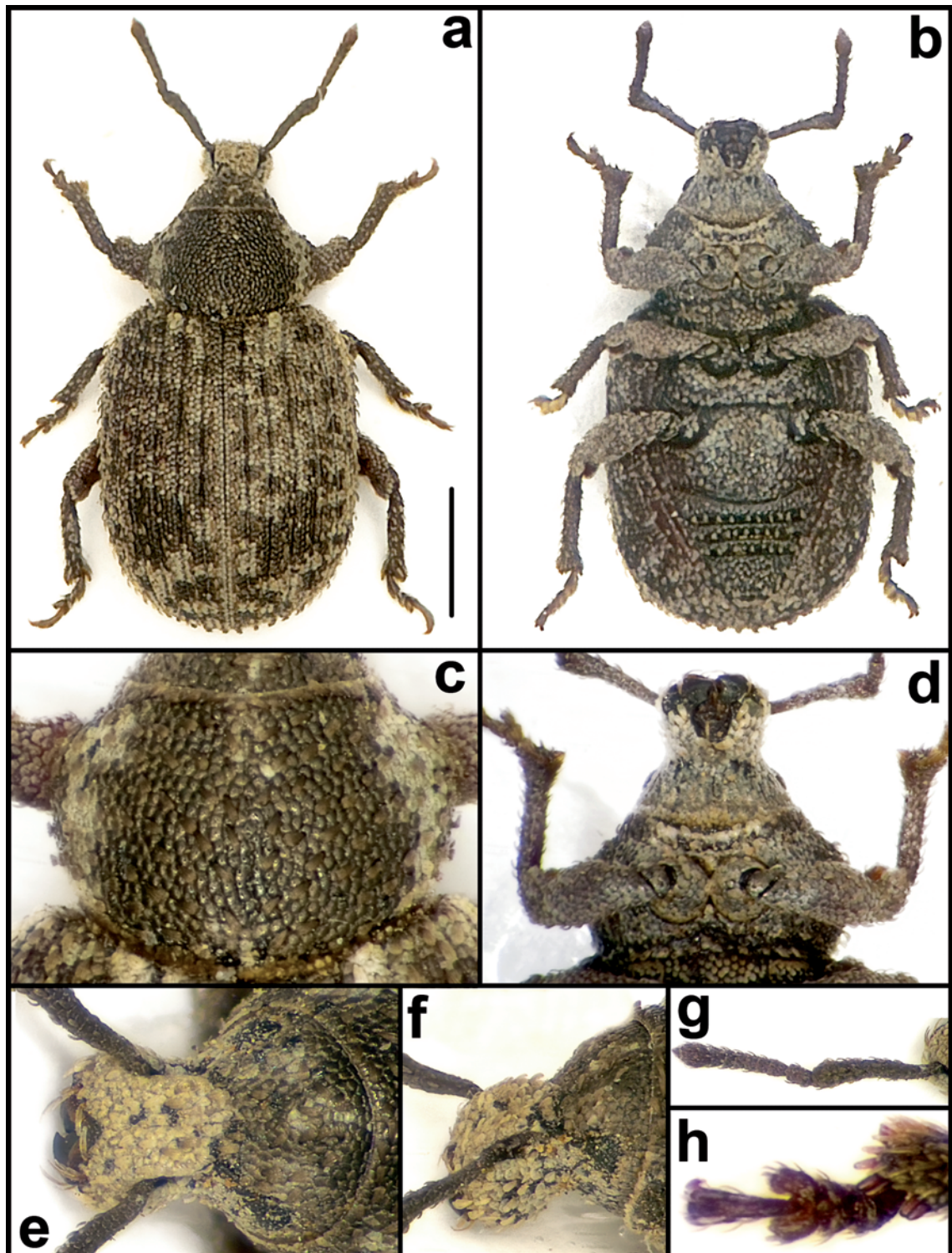


Fig. 1. *Caldarinus gwarrie*, paratypus. Body, dorsal view (a), ventral view (b); pronotum (c); head (underside) and prosternum (d); rostrum, dorsal view (e), dorso-lateral view (f); antenna (g); protarsus (h). Bar: 1 mm. Figures not to scale.

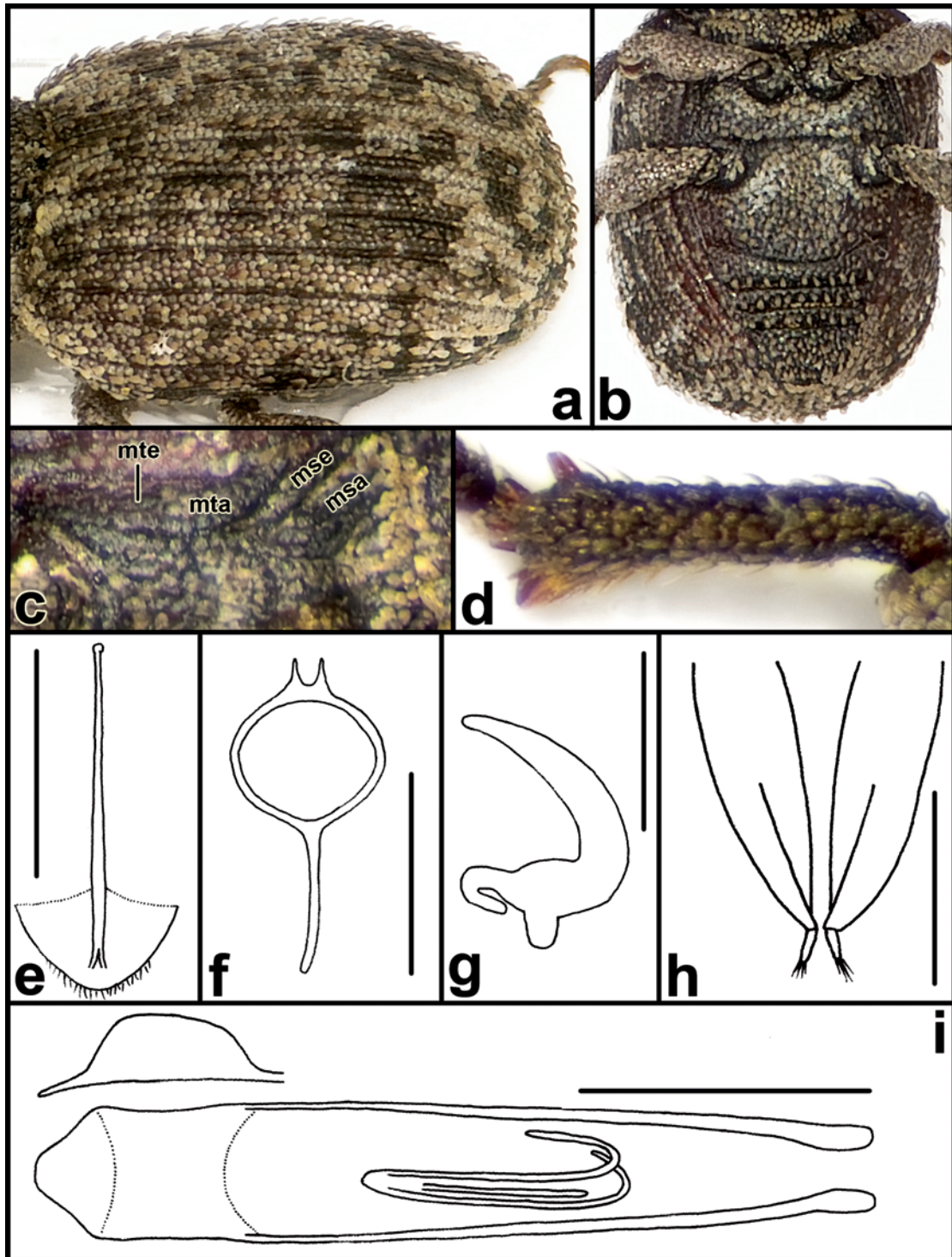


Fig. 2. *Caldarinus gwarrie*, paratypus. Elytra, dorso-lateral view (a); meso- and metasternum, ventrites (b); mesepimeron (mse), mesanepisternum (msa), metepimeron (mte), metanepisternum (mta) (c); protibia (d); female sternum VIII (e); tegmen (f); spermatheca (g); gonocoxites (h); penis and temones (i). Bars: e, f, i: 500 μ m; g, h: 250 μ m.

segment 2 in middle as long as segment 3 or 4; segments 3 and 4 short, equally long; segment 5 in males shorter, apically obtuse, in females longer, apically narrowly rounded. Suture between segments 1 and 2 deeply arched, fine, suture between remaining segments straight. Metaventral process wide, obtuse, slightly wider than transverse diameter of metacoxa. Male terminalia. Aedeagus with body of penis short, testes 2.6–2.8× longer; tegmen with short, almost translucent parameres, connected at base, manubrium only slightly longer than diameter of ring; sternite VIII with slender and slightly curved hemisternites, sternite IX with basal plate divided and apical part distinctly curved, somewhat flattened.

Female terminalia. Sternite VIII with plate semicircular, translucent, with posterior margin V-shaped, fringed with short and fine setae, anterior margin ill-defined, apodeme slender, originating at a short distance from posterior margin of plate, slightly more than twice as long as plate. Ovipositor short, weakly sclerotised; distal gonocoxites subtriangular with slender and short apical styli, bearing fine setae. Spermatheca sclerotised, U-shaped, with distinct ramus and collum.

Derivation of the name. The new genus is named after our colleague and good friend Dr Roberto Caldara (Milano, Italy), who provided important contributions to the knowledge of South African weevils.

Comments. The new genus belongs to the subfamily Entiminae, as defined by Marvaldi *et al.* (2014). The composition of the subfamily, with particular regard to the tropical African taxa, is still uncertain. Morphology can be misleading or uninformative, due to the high amount of homoplastic adaptive characters shared by these edaphic taxa, determined by parallelism or convergence. Combined evaluation of morphological characters and molecular sequences is desirable, and this method was implemented to define the tribe Namaini (Meregalli *et al.* 2021). According to its morphology, the new genus shares similarities with the tribes Oosomini Lacordaire, 1863 and Namaini Borovec & Meregalli, 2021, because of its free claws, trisetose mandibles, dorsally placed scrobes, lack of ocular lobes and vibrissae, and lack of a protruding humeral callus and metatibial corbels, but in the Bayesian inference of the CoxI sequences of several taxa of South African Entiminae, the type species was neither associated with species of the genus *Oosomus* Schoenherr, 1823, nor

with those of the tribe Namaini. However, it clustered nearer to the Namaini (see Fig. 1 in Meregalli *et al.* 2021, species #583), even though without any statistical support. Also in morphology, *Caldarinus* recalls the Namaini in several character states: frons densely squamose, eyes small, scape short and robust and metaventral process very wide, characters states that are not typical of the Oosomini (see Meregalli *et al.* 2021 for the differences between the Namaini and the Oosomini); a deeply arched suture between abdominal ventrite 1 and 2 is also a trait rather widespread in the Namaini, even though not always present. *Caldarinus* differs from *Nama* Borovec & Meregalli, 2013, type genus of the tribe Namaini, by the following characters: ***Caldarinus* gen. n.:** Rostrum posteriorly separated from head by a deep transverse sulcus; antennal scrobe in profile furrow-shaped, with dorsal margin directed towards dorsal margin of eye; epifrons at base narrow, not reaching inner margin of eye; epifrons narrow, occupying about half of rostral width, with slender simple longitudinal stria; head between eye and margin of pronotum shorter than diameter of eye; metatibia with setose bevel; gonocoxites with long styli.

Nama: Rostrum posteriorly continuous with head; antennal scrobe in profile subtriangular, with dorsal margin parallel to dorsal margin of rostrum, directed above eye; epifrons at base reaching inner margins of eye; epifrons wide, occupying majority of rostral width, with U-shaped stria; head between eye and margin of pronotum distinctly longer than diameter of eye; metatibia lacking bevel; gonocoxites with short styli.

Since the study of the large amount of edaphic Entiminae collected in South Africa is far from being completed, and following the results of the Bayesian inference, we prefer to avoid assigning the new genus to any of the tribes as presently defined, which are already marred by uncertainty and polyphyly, or to create a new tribe for it, which would not have sufficient support at the present state of our knowledge.

Caldarinus gwarrie Meregalli & Borovec sp. n.
urn:lsid:zoobank.org:act:
A7B37267-9FE1-4C2E-A0AB-1D74B9267C70

Type material. Species #583 in Meregalli *et al.* 2021. Holotype, ♂: RSA, Western Cape, 6 km W R62, 27 km NE Barrydale, Warmwaterberg, 33.761567°S,

20.875233°E, 15.xi.2018, 523 m, sifting below *Euclea undulata*, R. Borovec & M. Meregalli leg. (BMNH). Paratypes: 18 spec., same data as holotype (7 spec. MMTI, 7 spec. RBSC, 1 spec. CMNC, 1 spec. NMPC, 1 spec. SANC, 1 spec. TMSA). GenBank Cox1 sequence accession: OL415086

Description. Body length 2.72–3.47 mm, holotype 3.34 mm. Integument dark brownish to blackish, tarsi slightly paler, body and appendages densely covered with appressed, greyish and brownish scales and sparse, inconspicuous, short, semi-appressed spatulate setae. Scales regularly rounded, completely hiding integument, finely striate, on elytra 4–5 across width across each interstria. Setae on elytra short and spatulate, about twice as long as diameter of one appressed scale, forming 1–2 irregular rows on each interstria, on pronotum and head with rostrum setae slightly shorter, irregularly scattered, mainly visible in lateral view; scales and setae on rostrum directed towards vertex. Ventricle 1 with dense coating of scales, 2 with scales limited to basal part, posterior part lacking setae and with a series of spaced suberect spatulate setae, 3 and 4 almost lacking scales, with a series of spaced suberect setae, 5 with spaced small scales. General appearance in dorsal view greyish with large dark brownish spot on elytral disc and pronotum, or with scattered small brownish spots on majority of dorsal part.

Rostrum 1.02–1.07× wider than long, in basal third with distinctly concave sides, in apical two thirds with rounded sides; in profile regularly vaulted, distinctly separate from head. Frons densely squamose, with 3 pairs of stout setae, epistome narrowly carinate. Epifrons narrowest at base, evenly broadened apicad with straight sides, dorsally longitudinally flattened with narrow longitudinal median stria. Head wide and short, vertex distinctly wider than epifrons, regularly domed, head below eyes finely longitudinally striate. Eye round, with about 30 ommatidia.

Scape evenly enlarged apicad, 1.2× longer than funicle, at apex 1.2–1.3× wider than club. Funicle antennomer 1 1.5–1.7× longer than wide and 1.3× longer than second antennomer, this 1.4–1.5× longer than wide; antennomers 3 and 4 1.1–1.2× wider than long; antennomers 5 and 6 1.3–1.4× wider than long; antennomer 7 1.5× wider than long; club 1.6–1.7× longer than wide, closely connected to last funicle segment, club antennomer 1 less setose, shinier than others. Pronotum 1.46–1.61× wider than long, widest at mi-

dlength with slightly rounded sides, anterior margin narrower than posterior one, base arched; integument invisible, completely hidden by vestiture; pronotum in profile weakly vaulted.

Elytra 1.26–1.30× longer than wide, with base arched and shoulders regularly rounded, sides almost parallel. Striae narrow, well visible, not distinctly punctured; interstriae flat and wide; elytra in profile slightly vaulted. Femora inflated at midlength. Protibia 5.5–5.6× longer than wide at midlength, with straight lateral and slightly sinuate inner edge, apically rounded with 2–3 tightly adjacent lateral spines and 6–8 spines in middle lobe, from which 3–4 lateral are also tightly placed; middle lobe separated from lateral spines by short and shallow indentation; spines brownish; mucro reddish brown, hidden by a brush of yellowish fine setae. Apical parts of meso- and metatibia fringed by brownish stout spines. Tarsi with segment 2 1.4–1.5× wider than long; moderately small segment 3 1.5× wider than long and 1.2–1.3× wider than segment 2; onychium 2.0–2.2× longer than segment 3.

Penis short and wide, subparallel-sided with slightly concave sides, tip broadly rounded with distinct short concavities before; in profile wide, with ventral side straight and dorsal side convex, tip distinctly elongate, slender. Endophallus with 3 internal sclerites, one extremely long, base U-shaped, the other two almost straight, shorter.

Spermatheca with cornu long and slender, regularly curved; ramus short, as long as wide; collum very long and slender, tube-shaped, rising upwards and behind midlength U-shaped curved back.

Derivation of name. A noun in apposition. The species takes its name from Gwarrie (Ghwarrie, Gwarri, Guarri), Afrikaans, original Hottentot name of the shrub under which all specimens were collected.

Biology. All the specimens were sifted from litter, leaves and branches with thin layer of soil under a group of shrubs of *Euclea undulata* Thunb. (Ebenaceae), in fynbos vegetation.

Cladetyerus Schoenherr, 1842 and *Rhysoderes* Marshall, 1955

Cladetyerus Schoenherr, 1842: 157 (original description); Lacordaire, 1863: 216 (note); Lona, 1937: 509

(catalogue); Alonso-Zarazaga & Lyal, 1999: 166 (catalogue).

Rhysoderes Marshall, 1955: 1 (original description, type species: *Rhysoderes fractilineis* Marshall, 1955); Marshall, 1957: 833 (species descriptions); Marshall, 1958: 737 (species description); Marshall, 1959: 389 (species description); Alonso-Zarazaga & Lyal, 1999: 167 (catalogue).

The second author (R.B.) examined the type specimen of *Cladeyterus lepidopterus* Boheman, 1842, type species of the monotypic genus *Cladeyterus* (Entiminae: Oosomini), conserved at the Naturhistoriska Riksmuseet, Stockholm, and the type specimen of *Rhysoderes*, *R. fractilineis* Marshall, 1955, conserved at the Natural History Museum, London, and noticed that the two species are congeneric. The following synonymy is here proposed:

Rhysoderes Marshall, 1955 = *Cladeyterus* Schoenherr, 1842 new synonymy.

Moreover, *Cladeyterus lepidopterus* is conspecific with *Rhysoderes atrobruneus* Marshall, 1958. Hence the following synonymy is here proposed:

Rhysoderes atrobruneus Marshall, 1958 =

Cladeyterus lepidopterus Boheman, 1842 new synonymy.

All the species originally described in the genus *Rhysoderes* by Marshall belong to the genus *Cladeyterus*, hence the following new combinations are here proposed:

Cladeyterus collaris (Marshall, 1957), *C. divisus* (Marshall, 1955), *C. elandius* (Marshall, 1957), *C. fractilineis* (Marshall, 1955), *C. jouberti* (Marshall, 1958), *C. longicornis* (Marshall, 1957), *C. planicollis* (Marshall, 1959), *C. puncticollis* (Marshall, 1955), and *C. quinquevirgatus* (Marshall, 1957), all comb. nov. from *Rhysoderes*.

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