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Description and taxonomic position of a new genus and species of southern African pollen beetle (Coleoptera: Nitidulidae: Meligethinae)

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Abstract

The pollen beetle *Restiopria biondii* **gen. nov.**, **sp. nov.**, from Western Cape, South Africa, is described. The taxonomic position of *Restiopria* is discussed. The new genus is not noticeably related to any other known Meligethine, although it exhibits a few shared characters with *Pria* Stephens 1830. Larval host plants of the single known species are male flowers of two species of the monocot family Restionaceae.

Key words: *Restiopria biondii* **gen. nov.**, **sp. nov.**, South Africa, host-plants, Restionaceae

Introduction

A preliminary reexamination of the genus–level taxonomy of the subfamily Meligethinae (Audisio *et al.* 2009) was recently published. Subsequently, the partially unsorted material of Meligethinae collected some years ago in South Africa by the senior author, and tentatively referred to *Pria* Stephens, 1830 and related African genera, included a distinct new genus.

This paper describes this new southern African genus and species and discusses the phylogenetic position of the new taxon within the subfamily Meligethinae, as inferred from morphological evidence and ecological data. The present paper forms part of an upcoming revision of the Southern African species of the subfamily Meligethinae as a whole (P. Audisio *et al.* unpublished).

Material and methods

The new species described herein was collected during recent fieldtrips to South Africa (1994, 2005) organized by the senior author and our colleague Prof. Maurizio Biondi, Dept. of Environmental Sciences of the L'Aquila University, Italy. The studied material is preserved in P. Audisio's collection, Rome (CAR), in the Transvaal Museum, Pretoria (TMSA), in the National Museum (Natural History), Prague, Czech Republic (NMPC), and in A.R. Cline's Collection, currently housed at the California State Collection of Arthropods USA (CSCA). Other comparative material has been borrowed for study from several South African institutions, including the National Collection of Insects, Plant Protection Institute, Pretoria (SANC), the Iziko Museum, Cape Town (SAMC), and the National Museum, Bloemfontein (BMSA). Other undetermined material and type material of previously described species of African Meligethinae were made available for study by the Muséum National d'Histoire Naturelle, Paris (MNHN), the Zoological Museum, Lund University, Lund, Sweden (MZLU), the Zoologische Staatssammlung, München, Germany (ZSM) and by the Natural History Museum, London, England (BMNH). Terminology follows Audisio (1993) and Audisio *et al.* (2009).

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Taxonomy

Restiopria Audisio, Jelínek & Cline, gen. nov.

(Figs 1–20)

Type species: *Restiopria biondii* Audisio, Jelínek & Cline, **sp. nov.**

Generic diagnosis. *Restiopria* Audisio, Jelínek & Cline, **gen. nov., sp. nov.**, is easily differentiated from any other known Meligethine (Audisio 1993; Audisio *et al.* 2009) by the peculiarly shaped protibiae (possessing no teeth, but with elongate dark spicules along the outer edge, a condition unknown in all other known Meligethinae taxa), and by the peculiarly shaped male genitalia, with asymmetrically denticulate distal margin of the parameres (again, a condition absent in all other known Meligethinae). The following characters also are diagnostic: a simple *Pria*–like hypopygydium, lacking arcuate lateral impressions; a small, but elongate and narrow antennal club without sexual dimorphism; a wide axillary space on the first abdominal ventrite; and a strongly reduced and scarcely visible dorsal pubescence.

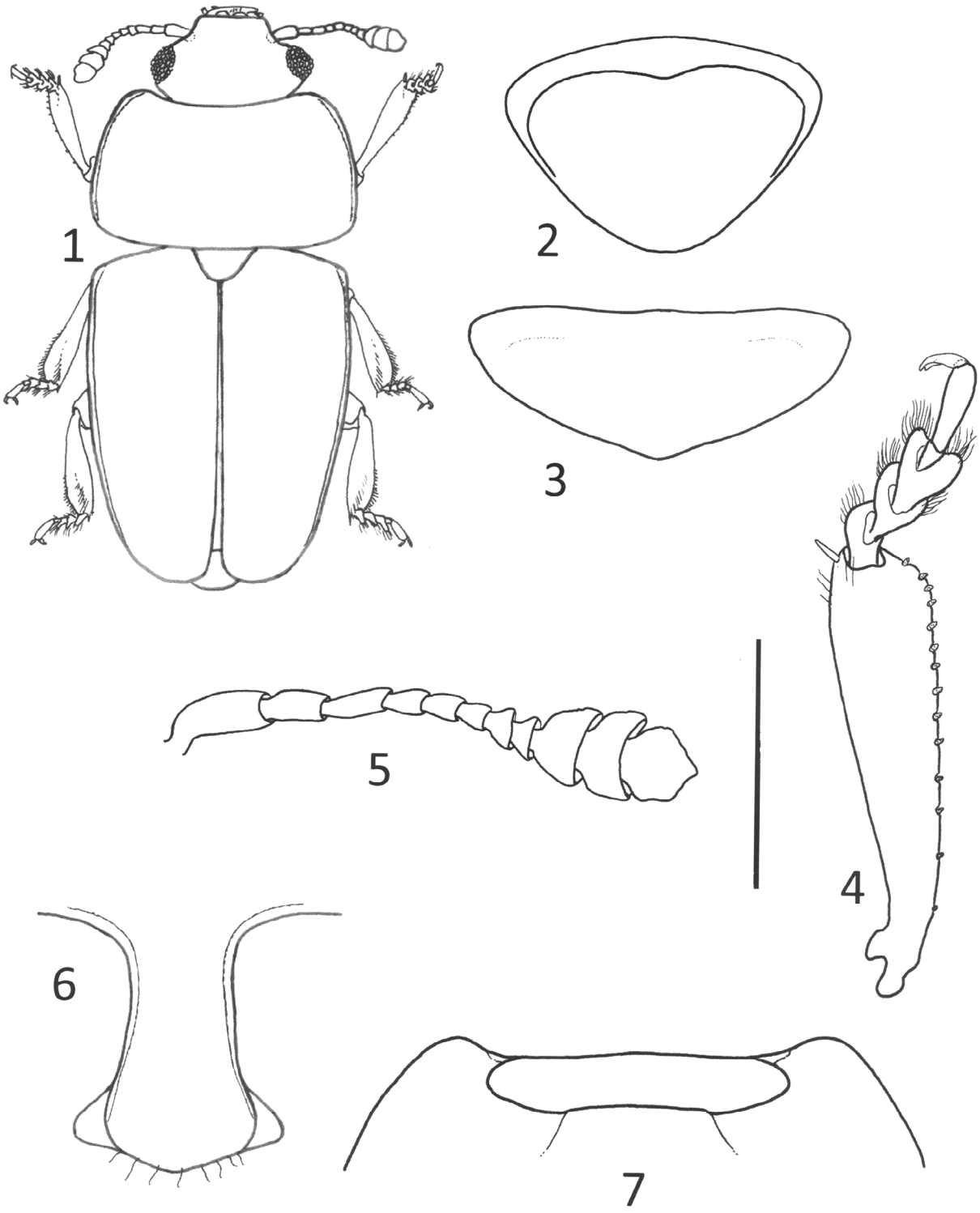
Generic description. The single inclusive species varies moderately in size (2.0–2.3 mm length), and exhibits the following combination of characters.

Body color and pubescence: dorsal body surface (Fig. 15) usually unicolored dark yellow to orange–brown, rather shining, and apparently nearly glabrous; pubescence golden to silvery-whitish, extremely short and fine dorsally, recumbent and indistinct (each seta nearly as long as the longitudinal diameter of each discal pronotal puncture), never obscuring the dorsal body surface; pronotal and elytral sides narrowly flattened, typically same color as disc; lateral margin of pronotum and elytra with a series of faintly distinct short setae, each seta 0.5–0.7X as long as those on elytral disc; posterior margin of pronotum with peculiarly small, short, distally bifid subtruncate microsetae (Fig. 17), sparsely and irregularly distributed medially, just anterior to scutellum. Ventral pubescence golden, recumbent, fine, but nearly 2X longer than dorsal setae.

Dorsal habitus: body slightly convex, slender and oval (Figs. 1, 15); anterior margin of clypeus truncate anteriorly, not bordered, without any medial bulge, and with moderately blunt outer angles (Fig. 20); circum-ocular furrows on dorsal side of head absent (Fig. 20); dorsal punctures on discal portion of pronotum nearly as large as eye facets, distinctly and densely impressed; pronotum with almost completely rounded posterior angles (Fig. 1); scutellum regularly but shallowly punctured on most of exposed portion; elytra with simple punctures, not transversely strigose; elytral humeral angle moderately distinct, blunt, not protruding laterally; elytral humeral striae absent; elytral pre-sutural striae hardly distinct anteriorly and in posterior half, terminating at elytral apex, and delimiting posteriorly, on each elytron, a barely distinct, flat, narrow unraised sutural border, nearly as wide as proximal width of 3rd antennomere; elytral apices truncately rounded in both sexes (Figs. 1, 15); pygidium partially exposed, moderately convex, apically rounded in both sexes (Fig. 2); proximal portion of pygidium (concealed under elytral apices) in both sexes with inner apices of basal arched impressions fused medially, forming a short blunt bulge (Fig. 2).

Ventral habitus: labrum wide with anterior margin widely and deeply incised medially (Fig. 9); antennal furrows shallow, moderately convergent posteriorly, ending in a C–shaped shallow and ill-defined impression (Fig. 16); mentum short and strongly transverse, subpentagonal (Fig. 16); prosternal antennal furrows on anterior margin of prosternum distinct, scarcely raised, short, and markedly divergent posteriorly (Figs. 7, 16); prosternal process relatively narrow, subapical portion dilated 1.8–2.0X as wide as maximum width of 1st antennomere, apex bluntly rounded (Figs. 6, 16); lateral borders of prosternal process delimiting shallowly impressed and barely distinct furrows, distally terminating over predistal lateral expansions, approximating prosternal posterior margin; posterior margin of mesoventrite simple, not medially incised; male impressions on metaventrite faint; first two visible abdominal ventrites simple in both sexes, without tufts of setae; caudal marginal lines of metacoxal cavities simple, parallel and narrowly contiguous to posterior margin of metacoxal cavities, with moderately distinct arched impressions of outer 'axillary' line curving posterolaterally (Fig. 18); 'axillary' space on first abdominal ventrite widely developed, 'axillary' angle broadly obtuse (Fig. 18); basal portion of last visible abdominal ventrite simple, without distinct traces of impressed arched impressions (Fig. 3).

Appendages: in both sexes 1st antennomere 0.9–1.0X as long as maximum width of protibiae (Figs 1, 5); 3rd antennomere in both sexes slender, ~3.0X as long as wide, 1.2–1.3X as long as but distinctly thinner than 2nd antennomere (Fig. 5); 4th and 5th antennomeres in both sexes subequal, moderately slender, distinctly longer than



FIGURES 1–7. *Restiopria biondii* **gen. nov., sp. nov.** (♂ holotype and ♀♀ paratypes from South Africa, Cape Town, Table Mountain. **1.** Body outline of male holotype. **2.** Female pygidium (dorsal view). **3.** Female hypopygidium (ventral view). **4.** Right female protibia and protarsus. **5.** Female right antenna. **6.** Female prosternal process (ventral view). **7.** Female anterior portion of prothorax (ventral view), with anterior portion of prosternum. Scale bar = 1.0 mm (Fig.1); = 0.20 mm (Figs 4–6); = 0.45 mm (Figs 2, 3, 7).

wide; antennal club long and narrow but compact, mid–sized, simple, comprising last 3 antennomeres in both sexes (8th antennomere scarcely widened, 0.4X as wide as 9th antennomere), slightly narrower than width of protibiae, sexual dimorphism absent; labial palpi moderately long in both sexes, terminal segment ~2.1X as long as wide (Figs. 11, 16); maxillary palpi long and slender in both sexes, terminal segment ~2.3X as long as wide (Figs. 10,

16); mandible mid-sized, apex acuminate, retinaculum moderately prominent on inner side (Fig. 8), no sexual dimorphism; tarsal claws simple, never toothed at base; tarsi of normal size and shape, 0.5–0.6X as long as corresponding tibiae (Figs 1, 4); protibiae lacking teeth along lateral margin, instead only large, dark and conspicuous spicules are present (Figs. 4, 19); meso- and metatibiae along lateral margin bearing a single even row of fine, long pegs, without U-shaped sinuosity at distal third; meso- and metatibiae long, slender and narrow, never subtrapezoidal or securiform (Fig. 1); sexual dimorphism not expressed in metatibiae; tarsal plates of prolegs slightly wider in males; posterior margin of metafemora simple in both sexes, without tubercles or projections.

Male genitalia: processes along inner side of parameres absent (Fig. 12), with deeply and narrowly incised distal margin, and without deep median longitudinal desclerotization from proximal portion of tegmen extending to medial distal V-shaped excision; apex of paramera with peculiarly shaped and asymmetrycal denticulations (Fig. 12); median lobe of aedeagus relatively short and parallel–sided, narrowly spatulate distally, without distal excision or emargination (Fig. 13).

Female genitalia (*ovipositor*): relatively large and slender; styli long, symmetrical and cylindrical, (Fig. 14), inserted close to apex of contiguous gonostyloids; each gonostyloid more sclerotized and pigmented distally, with a simple, never indentate outer portion of basicoxites, and a single, small and narrow, faintly pigmented and sclerotized arcuate area along outer subdistal portion of gonostyloids. 'Central point' of ovipositor located slightly proximad of midlength, without spicule directed proximad.

Geographic distribution. *Restiopria* **gen. nov.** currently includes only the type species from southwestern South Africa described below.

Etymology. This new genus is so named from the related genus *Pria* Stephens 1829, and from the stem of the plant family name Restionaceae, including both known host–plants of the type species (see below). Gender feminine.

Restiopria biondii Audisio, Jelínek & Cline, sp. nov.

(Figs 1–20)

Description. In addition to generic description above:

Small size (length 2.05–2.25 mm; width 1.04–1.10 mm). Body moderately shining, unicolorous yellowish–orange (rarely with head and pronutum reddish, slightly contrasting to brownish elytra); legs yellowish (Fig. 15).

Head with moderately deep punctures nearly as large as eye facets, separated by half to one diameter, surface between partly microreticulated but moderately shining; frons without tentorial impressions. Antennae medium-sized, club small and narrow, 2X longer than wide (Fig. 5), with short pubescence; 3rd antennal segment elongate, as long as but thinner than 2nd.

Pronotum moderately convex, 1.70X as wide as long, moderately rounded at sides, more strongly narrowed anteriorly than posteriorly, broadest in middle or at posterior third (Figs. 1, 15), with posterior angles almost completely rounded; sides narrowly bordered. Posterior margin straight on either side of scutellum; discal punctures as on head or slightly larger and deeper, surface between them partially microreticulate but shining.

Elytra ~1.20–1.25X longer than wide (combined width at humeri), scarcely arcuate at sides, distinctly and arcuately narrowed towards apex, broadest in middle or at basal two fifths, nearly as wide as pronotum (Figs. 1, 15). Punctures and spaces between punctures as on pronotum.

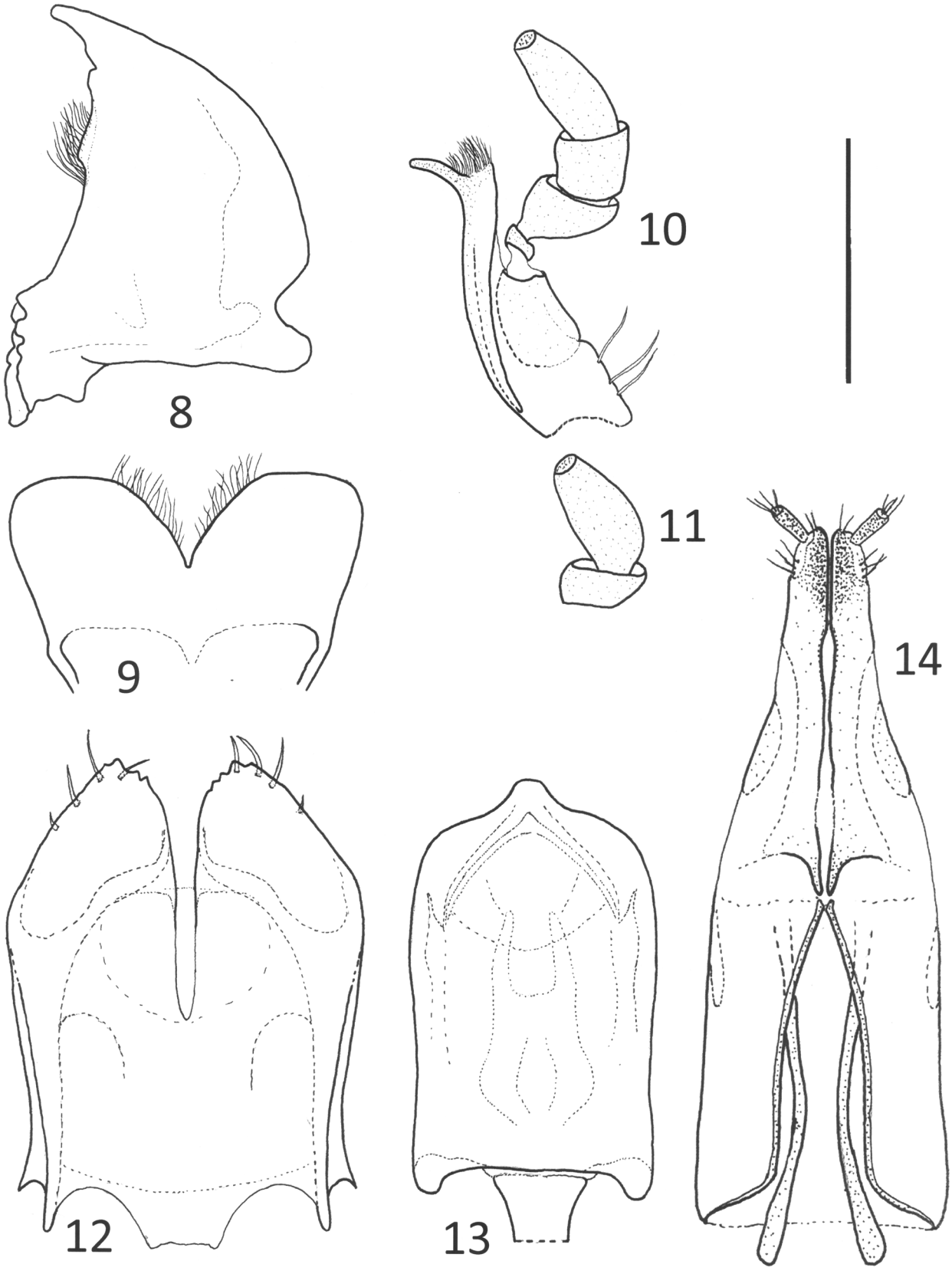
Tegmen (Fig. 12) relatively large, not elongate, with few moderately long setae at apex, and a short, linear median excision; median lobe of aedeagus moderately long (Fig. 13), shortly spatulate distally.

Ovipositor as figured (Fig. 14), yellowish, darker towards apex, relatively large and long, with large and long symmetrical styli; outer subdivision of coxites short and arcuate; 'central point' placed at proximal four ninths, without ventral spicule.

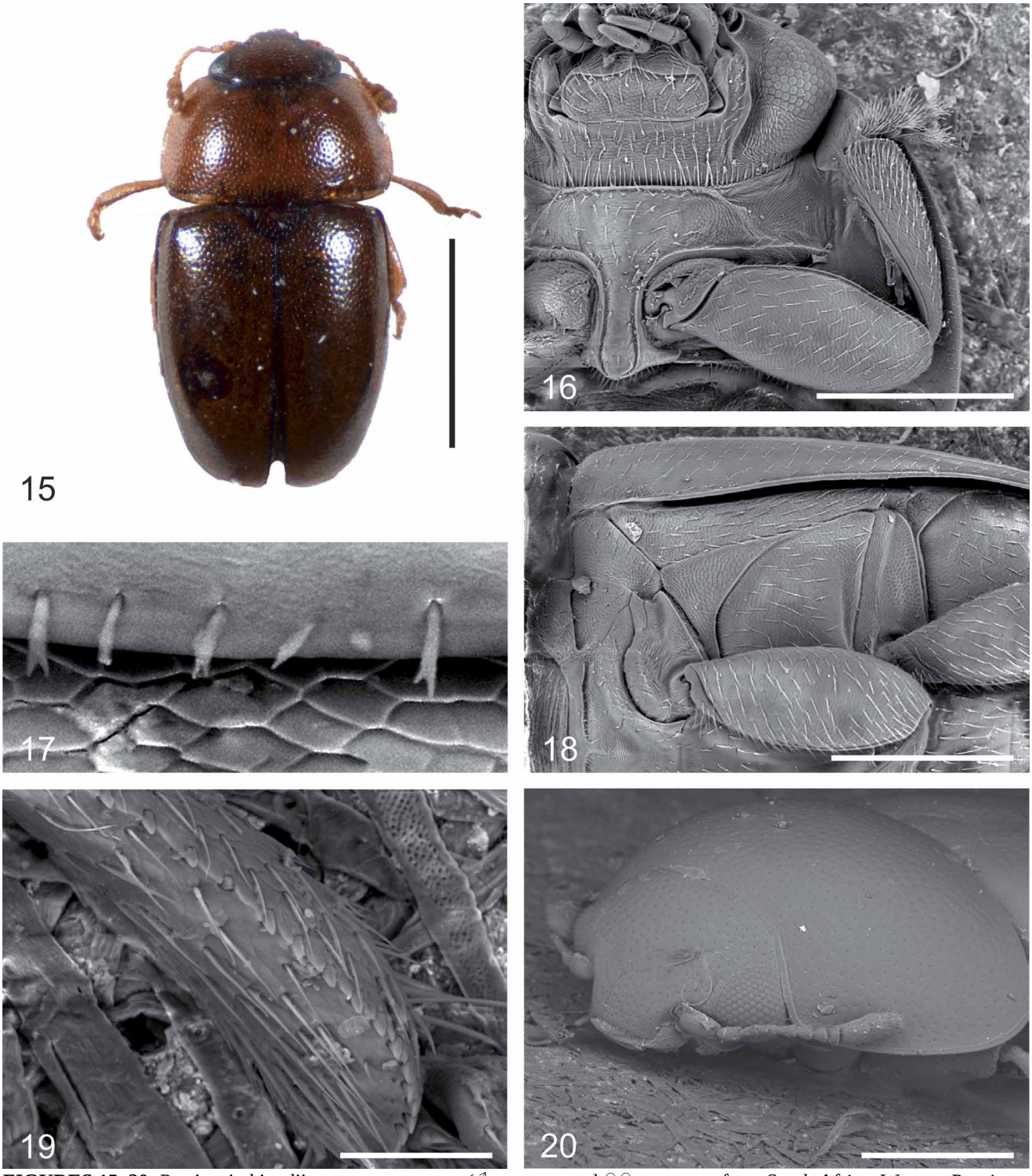
Female. Differs from male by possessing slightly narrower protarsi.

Variation. A couple of paratypes shows elytra brown, darker than head and pronotum.

Type material. Holotype, male, REPUBLIC OF SOUTH AFRICA, Western Cape, Cape Peninsula, Cape Town, Table Mountain, Tafelberg road, 400 m a.s.l., 21.IX.1994, on unidentified flowering stolones of Restionaceae close to a small waterfall, P. Audisio & M. Biondi leg. (TMSA). Paratypes: 11 females, same data as holotype (CAR, NMP, CAS, SAMC); 1 male, 8 females: REPUBLIC OF SOUTH AFRICA, Western Cape, 5 Km N of



FIGURES 8–14. *Restiopria biondii* **gen. nov., sp. nov.** (♂ holotype and ♀♀ paratypes from South Africa, Cape Town, Table Mountain. **8.** Right mandible (female paratype). **9.** Labrum (female paratype). **10.** Right maxilla and maxillary palpus (female paratype). **11.** Rigth labial palpus (female paratype). **12–13.** Tegmen and median lobe of aedeagus (male holotype). **14.** Ovipositor (female paratype). Scale bar = 0.13 mm (Figs 8–11); = 0.20 mm (Figs 12–14).



FIGURES 15–20. *Restiopria biondii* **gen. nov., sp. nov.** (♂ paratype and ♀♀ paratypes from South Africa, Western Province, Concordia indigenous forest, east of Knysna. **15.** Habitus (male paratype). **16.** SEM image of ventral view of head with antennal furrows and prosternum (female paratype). **17.** SEM image of microsetae on posterior edge of pronotum (female paratype); **18.** SEM image of ventral view of outer left portion of metaventrite and first abdominal ventrite, with axillary line and axillary space of left metacoxal cavity (female paratype); **19.** SEM image of outer edge of right protibia in lateral view (female paratype); **20.** SEM image of lateral-frontal view of head (female paratype). Scale bar = 1 mm (Fig. 15); = 40 µ (Figs 17).

Concordia, E of Knysna, 34.00.58 S, 23.06.25 E, 200 m a.s.l., 12.X.2005, on long and prostrate flowering stolones of unidentified Restionaceae (Fig. 19), in a wet place in subtropical indigenous forest, P. Audisio & M. Biondi leg. (CAR, NMP, CAS, TMSA).

Biological notes. The type specimens of the new species were collected in Spring (late September to early October) by sweeping from inflorescences on long stoloniform stems of two Restionaceae plants belonging to a

genus so far not identified with certainty (Fig. 21), but likely related to *Antochortus* Nees or allied genera. The host plants were localized at low altitudes (200–400 m), in wet places, i.e. along the sides of a small waterfall near Cape Town and around the edges of a small dumping area in a subtropical indigenous forest near Knysna.

Geographic distribution. The species is only known from the two mentioned type localities in Western Cape Province (Fig. 22).

Etymology. This species is named for our friend and colleague, Maurizio Biondi (L'Aquila, Italy), who contributed to the collection of the new species at the type locality near Cape Town in 1994 and later near Knysna in 2005.

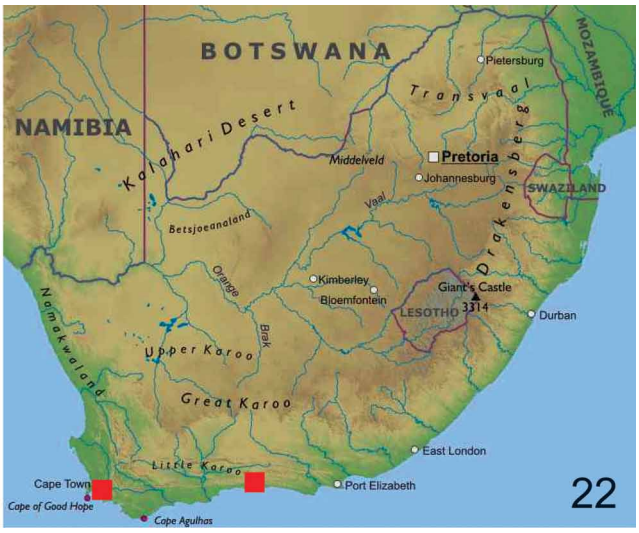


FIGURE 21. Distal portion of the elongate stoloniform stems (with inflorescence) of the the host–plant of *Restiopria biondii* **gen. nov.**, **sp. nov.** at the Concordia indigenous forest east of Knysna (Restionaceae, unidentified species; herbarium specimen). Scale bar = 1 cm.

FIGURE 22. Map of known geographic distribution of *Restiopria biondii* **gen. nov.**, **sp. nov.** in South Africa (red squares).

Taxonomic and systematic position

The systematic position of *Restiopria* Audisio, Jelínek & Cline, **gen. nov., sp. nov.**, is highly problematic due to the presence of some peculiar characters unknown in all other Meligethinae genera, as reported in the generic diagnosis above. However, the new genus exhibits all other relevant characters (Figs. 1–2, 8–11, 16–18) shared by known members of this subfamily (Jelínek 1975; Audisio *et al.* 2009). The simple hypopygydium, lacking arcuate lateral impressions, is a shared character with *Pria* Stephens; however, members of this large genus strongly differ by always possessing at least minutely toothed outer edges of protibiae, a never denticulate distal paramere margin, never completely rounded posterior angles of pronotum, small "axillary space" on first abdominal ventrite delimited by more acute "axillary" angle, and always completely absent prosternal antennal furrows on the prosternal anterior margin. Excluding the latter, the same characters also separate *Restiopria* **gen. nov.** from the other known Meligethinae genera sharing a simple hypopygydium, e.g. *Cryptarchopria* Jelínek 1975, *Horakia* Jelínek 2000, *Palmopria* S. Endrödy–Younga 1978, and related genera (see Audisio et al. 2009). Close relationships to any other Meligethinae are obscure; however, a cladistic morphological analysis on the entire subfamily, including this new genus, is underway.

Due to the vaguely *Epuraea*-like (Epuraeinae) body shape of the new genus (Figs 1, 15), the type specimen of *Epuraea singularis* Grouvelle, 1899 from South Africa, Cape Town, was also re-examined. In fact, this taxon was subsequently moved to the Meligethinae genus *Pria* Stephens by Jelínek (1979). Indeed, the type specimen (MNHN) is actually a true member of *Pria*, with dense and distinct yellowish pubescence, and no demonstrated close relationship to *Restiopria* **gen. nov.**, **sp. nov.**

Ecological data also suggest a strongly isolated position of *Restiopria* within Meligethinae. The only other known Meligethinae associated with monocots are *Meligethinus* Grouvelle 1906 associated with male inflorescences of Arecaceae; members of the *Microporum* generic complex associated with male inflorescences of Are-

caceae and Pandanaceae (Audisio *et al.* 2009); and a single isolated African species of the *Meligethes* generic complex, i.e. "*Meligethes*" *heteropus* Gerstaecker 1871, that remains in an undefined taxonomic position and is associated with Poaceae (Kirk–Spriggs 1985).

Molecular characterization of *R. biondii* will be undertaken to provide multiple gene sequences (COI, PEPCK, and ITS2) for phylogenetic analysis. The authors are confident that the results of these molecular analyses, combined with a robust morphological dataset and prior published phylogenetic work (Audisio *et al.* 2009; Trizzino *et al.* 2009), will provide sufficient data to validate the true phylogenetic position of *Restiopria*.

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