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A second species of *Sebasthetops* JÄCH from South Africa (Coleoptera: Hydraenidae)

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Abstract

Sebasthetops altimontanus sp.n. is described from the Cederberg and Groote Winterhoek mountains in the Western Cape Province of South Africa, the second member of this phylogenetically isolated Afrotemperate hydraenid lineage. Like *S. omaliniformis* JÄCH, 1998, *S. altimontanus* appears to be a high altitude specialist of cold water, only known to date from above 1,000 m in two mountain stream sites. In light of this discovery, and the presence of female specimens of the genus from the Langeberg, it is suggested that additional species of *Sebasthetops* may remain undiscovered in high altitude areas of the Cape Fold Mountains.

Key words: Coleoptera, Hydraenidae, *Sebasthetops*, taxonomy, new species, South Africa.

Introduction

Of the seven genera of the hydraenid subfamily Prosthetopinae endemic to South Africa (PERKINS & BALFOUR-BROWNE 1994, PERKINS 2008), *Sebasthetops* JÄCH, 1998 is the only one which was currently regarded as monospecific. Long known from two females, *S. omaliniformis* JÄCH, 1998 was recently rediscovered at the type locality, apparently living exclusively in deep riffles at high altitude (BILTON 2013). In addition to being geographically restricted, and flightless, *S. omaliniformis* is phylogenetically isolated within the Afrotropical hydraenid genera, something which adds to its potential conservation interest (BILTON 2013). To date, *S. omaliniformis* has been recorded only from the Dutoitskop Mountains above Franschhoek, in the extreme southwest of the Western Cape Province. The fact that female specimens of *Sebasthetops* have long been known from the Langeberg, however (see BILTON 2013) hinted at the possibility of additional populations/taxa of these beetles in the Cape Fold Mountains. Here I report the discovery of a second species of *Sebasthetops*, revealed through the targeted sampling of high altitude streams in the Cederberg and Groote Winterhoek mountains of the Cape Fold system. Like *S. omaliniformis* this new species appears to be a scarce inhabitant of deep cold water at relatively high altitude.

Material and Methods

Beetles were sampled by manually turning stones and boulders in pools and riffles, and captured using a circular hand net with a 300 µm mesh.

Specimens were studied using Leica MZ8/M205C stereomicroscopes, with a Fluopac FP1 fluorescent illuminator. Habitus photographs were taken with a Canon EOS 500D camera fitted to a Leica Z6 Apo macroscope, fitted with a 2 × objective lens. Specimens were illuminated using a Leica LED5000 HDI dome illuminator to avoid shadow. Genitalia were mounted on glass slides in Kisser's glycerol gelatine (see RIEDEL 2005) and imaged using an Olympus CX31 microscope with the same camera. All image stacks were produced by hand, and combined using Zerene Stacker software (www.zerenesystems.com).

Exact label data are cited for specimens. A double slash (//) indicates new line in label text.

Abbreviations

CDTB	Collection D.T. Bilton, Plymouth, UK
NMW	Naturhistorisches Museum Wien, Vienna, Austria
SAM	Iziko South African Museum, Cape Town, South Africa
SANC	South African National Collection of Insects, Pretoria, South Africa
BL	Body length (front of labrum to elytral apices)
EL	Elytral length (outer angle of shoulder to apex
EW	Elytral width at widest point

Sebasthetops altimontanus sp.n.

TYPE LOCALITY: South Africa, Western Cape, Cederberg Mountains, Breëwaterkloof stream ca. 2 km SE of Uitkyk Pass, 1,050 m (Fig. 3a).

TYPE MATERIAL: **Holotype** ♂ (SAM): "23/ix/2014 South Africa WC // Cederberg – stream ca. 2 km SE of // Uitkyk Pass, 1,050 m, D T Bilton leg." (genitalia extracted and mounted on same card) and red holotype label. **Paratypes** (CDTB, NMW, SAM, SANC): 4 ♂♂, 1 ♀ same data as holotype; 1 ♂, 1 ♀ "11/ii/2015 South Africa WC // Groote Winterhoekberge stream below // Sneeugatpiek 1,300 m D T Bilton leg.". All with red paratype labels.

DIFFERENTIAL DIAGNOSIS: The new species can be distinguished from the only other known species of the genus, *S. omaliniformis* on both external and aedeagal characters. Externally the elytral apices of the two species differ in both sexes – being much more acuminate in *S. omaliniformis* (see Fig. 2c–f). In addition the glabrous longitudinal ridges of the abdominal ventrites are more extensive in the new species, being present on all of ventrites 1–2 and extending onto ventrite 3 in most specimens. Males can be distinguished by their aedeagi, that of *S. altimontanus* being much more slender with shorter setae, and having a narrower, shorter apical process and longer terminal piece than *S. omaliniformis* (see Fig. 1c–d). In females ventrite 6 is more strongly produced in *S. altimontanus*, this segment having a parallel-sided apical process in the new species, in contrast to the cone-like projection of *S. omaliniformis*. Finally specimens of *S. altimontanus* examined (1 ♂, 1 ♀) are fully winged, whereas individuals of *S. omaliniformis* studied to date are brachypterous. Whether this latter feature is fixed in the two species remains to be seen, however, as intraspecific wing length polymorphism has been observed in a number of aquatic beetles (see BILTON et al. 2001).

DESCRIPTION: Size: Holotype: BL 2.13 mm; EL 1.3 mm; EW 0.95 mm. Paratypes: ♂♂ BL 2.5–2.2 mm; EL 1.3–1.35 mm; EW 0.93–0.95 mm. ♀ BL 2.5 mm; EL 1.4 mm; EW 1 mm. Dorsum (Fig. 1a) – head, pronotum and elytra black. Legs black, tarsi brown to piceous; claws paler. Maxillary palpi light brown to piceous; paler towards apices of palpomeres. Venter dark brown to black, with hydrofuge vestiture, trochanters paler.

Head: Labrum slightly transverse, rounded apicolaterally, with deep broad apicomedian emargination extending over approx. 0.5 of length. Sides of apicomedian emargination strongly raised. Anterolateral margins of labrum weakly raised and finely crenulate. Upper surface of labrum shining, but densely punctate, each puncture bearing a long white decumbent seta. Similar setae also present on anterolateral margins of labrum. Clypeus strongly transverse, approx. 3 × as broad as long. Surface rugosely microreticulate, with scattered ridges between meshes and scattered fine punctures bearing stout white recumbent setae, shorter than those on labrum. Frontoclypeal suture indistinct. Frons and vertex rugosely microreticulate, with small tubercles and ridges, particularly in posterior half. Frons with sparse punctures bearing stout white recumbent setae, particularly in centre. Ocelli prominent, cone-like and protruding. Frons with shallow open paraocular furrows running from ocelli to anterolateral angle. Eyes rather small but prominent, occupying approx. 0.4 of lateral margin of head; approx. 14 facets in longest series.

Fig. 1: *Sebasthetops* species; a–c) *Sebasthetops altimontanus*, a) male paratype, habitus, b) female paratype, habitus (pale colouration due to slight tenerality), c) holotype aedeagus, ventral and lateral views; d) *S. omaliniformis*, aedeagus, ventral and lateral views. Scale bars a–b = 1 mm, c–d = 0.25 mm.

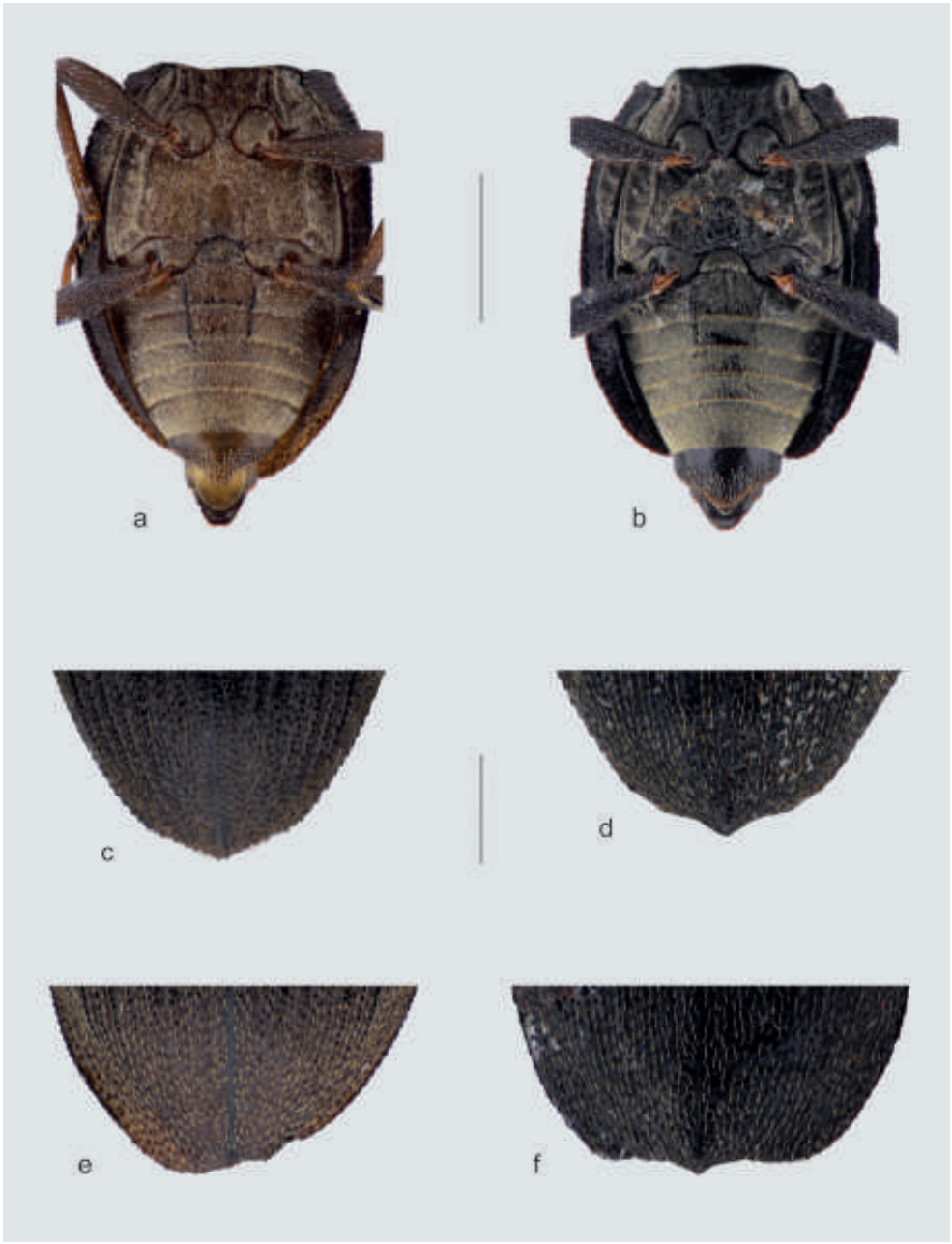

Fig. 2: *Sebasthetops* species, venters and elytral apices; a–b) ventral view of meso- and metathorax and abdomen of a) *Sebasthetops altimontanus* female paratype (pale colouration due to slight tenerality), b) *S. omaliniformis* female; c–f) elytral apices of c) *S. altimontanus* male paratype, d) *S. omaliniformis* male, e) *S. altimontanus* female paratype, f) *S. omaliniformis* female. Scale bars a–b = 0.5 mm, c–f = 0.25 mm.

Pronotum: Cordate, slightly transverse, widest at middle (Fig. 1). Anterior and posterior margins sinuate, lateral margins arcuate, narrowed to posterior angles. Anterior and posterior angles obtusely rounded. Lateral margins denticulate, each denticle bearing a stout, white posteriorly directed seta. Disc with shallow median longitudinal sulcus, somewhat deeper anteriorly and posteriorly, but not foveate. Anterior and posterior admedian fovea shallow, and connected by longitudinal sulcus. Adlateral anterior and posterior fovea shallow; broadly opening laterally, especially anterior fovea which opens onto broadly explanate front angles. Entire upper surface of pronotum dull, rugosely microreticulate and punctate; punctures bearing stout white-golden recumbent setae.

Elytra: Very wide, broadest at middle (Fig. 1). As wide as pronotum at shoulder, broadening to approx. 1.5 × width of pronotum at level of mesocoxae. Sides serrate, with posteriorly directed white recumbent setae. Subparallel to metacoxae, then narrowing to sutural angles; more strongly towards apex. Apices rounded, conjointly acuminate around suture (Fig. 2c). Elytra covering first seven tergites, leaving tergites VIII-X exposed. Each elytron with nine visible rows of serial punctures, bearing long, golden recumbent setae, extending posteriorly to next puncture in row. Serial punctures and intervals distinct over inner 0.75 of elytra, becoming similar in structure laterally. Elytral intervals with 1–3 irregular rows of shining, punctate, raised granules; granule punctures bearing setae as in serial puncture rows. Sutural interval and intervals 2, 4, 6 and 8 more strongly raised than alternate intervals, ridges disappearing in posterior 0.5; those on intervals 6 and 8 extending into posterior 0.3. Elytra rugosely microreticulate and dull between granules/punctures.

Wings: Fully developed. Staphyliniform wing venation pattern; sclerotized veins restricted to basal 0.3, comprising C, MP_{1+2} and CuA only. Hind margin with setal fringe.

Venter: Mentum shining, but with strong, rugose microreticulation with raised ridges between meshes, giving a coriaceous appearance. Cells of reticulation transverse close to central front margin; almost isodiametric elsewhere. Posterior 0.6 of mentum with shallow open depression occupying most of surface. Two smaller shallower depressions anterior to this, separated by a broad low ridge. Front margin of mentum with long fine hair-like setae. Submentum shining, sculptured as mentum, but meshes somewhat larger, producing a slightly shinier surface. Genae shining, microreticulate, with stronger ridges between meshes than on mentum and submentum. Reticulation becoming obsolete towards apex of genae, which appear coriaceous due to rough sculpture. Front of genae wrapping around cardo and base of stipes of maxillae; apicolateral angles sharp, protruding anterolaterally. Gula shining, weakly microreticulate; gular suture weak but visible. Prosternum with anterior margin thickened and somewhat raised, with well-marked narrow central longitudinal ridge and somewhat lower lateral longitudinal ridges running from front margin to between outer edge of procoxae and pronotal hypomeron. Prosternal surface rugosely sculptured, with dense hydrofuge vestiture. Pronotal hypomeron broad, shining, surface rough due to irregular, rugose microreticulation. Hypomeral antennal pocket shallow, with extensive patch of short closely-packed pocket setae visible posteriorly. Meso- and metaventrites rugose, with dense hydrofuge vestiture throughout (Fig. 2a). Mesoventral plaques distinct, forming seven ridges as follows: median longitudinal ridge running over anterior 0.5 of ventrite, connecting laterally with pair of admedian ridges running entire length of segment. Admedian ridges diverging anteriorly and posteriorly, posterior portion narrowing again to form ridge around posterior border of median projection of mesoventrite. Two pairs of longitudinal ridges present outside admedian ridges; outer ones connecting with adlateral longitudinal ridges of metaventrite. Metaventrite with deep, elongate central depression on posterior 0.6; depression deeper and broader posteriorly and separated from depression on intercoxal abdominal sternite by raised and thickened hind margin (Fig. 2a). Metaventrite with median longitudinal ridge in the shape of an inverted Y. Stem of Y occupying 0.5 of ventrite. Median ridge flanked by strong

admedian and adlateral ridges. Elytral pseudepipleurs broad, becoming abruptly narrower apically. Surface with corrugated microreticulation and small tubercles over inner 0.8; outer 0.2 smooth and more strongly shining. Epipleurs narrow, shining throughout. Pseudepipleurs and epipleurs with patch of hydrofuge vestiture in anterior section, centred at level of mesocoxae (Fig. 2a). Abdominal ventrites 1–5 with dense hydrofuge vestiture. Ventrites 2–4 with longer flattened decumbent setae along posterior margins. Ventrites 1–2 with a pair of shining glabrous longitudinal ridges running along entire length of ventrites and extending onto anterior 0.25 of ventrite 3 (Fig 2a). Ventrite 6 devoid of dense vestiture, with obsolete isodiametric microreticulation and dense stout recumbent golden setae which are also present on the posterior margin of the ventrite.

Legs: Moderately long and slender. All tibiae stouter in male than in female. Meso- and metatibia modified in male (Fig. 1a). Mesotibia thickened and angled inwards apically; inner face with approx. 14 stout setae arising from tubercles which become more strongly raised apically. Metatibia also angled and thickened apically; inner face smooth and flattened, flanked by a row of approx. 12–14 stout short setae ventrally.

Aedeagus (Fig. 1c): Elongate, parameres absent. Main piece with asymmetrical apex extending into a short elongate process, and two fields of setae, one ventral and one dorsal, the latter associated with the base of the terminal piece. Terminal piece long, slender and sinuate.

Female: Broader and flatter than males, particularly the elytra (see Fig. 1). Elytral apices more rounded than in male, subtruncate and broadly explanate laterally; suture not acuminate (Fig. 2e). Intriguingly, the elytral apices are similarly asymmetrical in the two females, which are from different localities. Whether this represents damage is unclear. Elytral pseudepipleurs broad almost to apex (Fig. 2a). Palpi slightly shorter than in male (Fig. 1b). Labrum shorter, apicomedian emargination shallower and narrower (Fig. 1b). Legs unmodified (see Fig. 1). Ventrite 6 strongly produced medially (Fig. 2a); shining with fine transverse slit-like punctures over anterior 0.6, weakly microreticulate and punctate in posterior 0.3, each puncture bearing a short stout recumbent seta. Similar setae also present along posterior margin of ventrite.

Variation: Paratypes vary in the degree to which the glabrous longitudinal ridges extend onto ventrite 3, sometimes these cover up to 0.5 of the ventrite, or they are scarcely visible beyond ventrite 2. The colouration of the paratypes also varies, many of those collected in September being pale (as in Figs. 1b, 2a, 2c, 2e), due to their teneral nature. In some cases the dorsal setae are less visible, having apparently been rubbed off. Some specimens with reddish, oxide-like coating (e.g. Fig. 1a).

ECOLOGY: In the Cederberg *S. altimontanus* was found under large sandstone boulders lying in a single deep riffle roughly 10 m in length, and partly overhung by proteoid shrubs (Fig. 3a). Approximately 2 km of stream was searched upstream of this area, without finding additional specimens of *Sebasthetops*. The boulders under which the species was found were large enough to remain in position during flash floods, and were in a section likely to retain water, at least interstitially, during low summer flows. *Sebasthetops altimontanus* was microsympatric with the elmids *Elpidelmis capensis* (GROUVELLE), *Ctenelmis* DELÈVE sp. and *Peloriolus* DELÈVE sp., as well as *Rapnus* GROUVELLE sp. and *Strina* REDTENBACHER spp. (Dryopidae) and numerous larval Simuliidae. Other beetles found in the same stream were *Canthyporus petulans* GUIGNOT (Dytiscidae), *Delevea bertrandi* REICHARDT (Torridincolidae), and the following hydraenids: *Mesoceration* sp. (undescribed), *M. dissonum* PERKINS & BALFOUR-BROWNE, *M. granulovestum* PERKINS, *M. jucundum* PERKINS & BALFOUR-BROWNE, *M. languidum* PERKINS & BALFOUR-BROWNE, *M. periscopum* PERKINS, *M. piceum* PERKINS, *M. rapidensis* PERKINS, *M. repandum* PERKINS, *Parasthetops nigritus* PERKINS & BALFOUR-BROWNE, *Prosthetops setosus* PERKINS & BALFOUR-BROWNE, *P. wolfbergensis* BILTON, *Pterosthetops coriaceus* BILTON and *P. impressus*

PERKINS & BALFOUR-BROWNE. In the Groote Winterhoek locality (Fig. 3b), the new species was collected from below stones in a pool in a small stream section which retained water in the height of summer (February), where it co-occurred with *Mesoceration apicalum* PERKINS & BALFOUR-BROWNE, and a number of elmid and dryopid species.

Fig. 3: *Sebasthetops altimontanus* localities; a) South Africa, Western Cape, Cederberg Mountains, Breëwaterkloof stream ca. 2 km SE of Uitkyk Pass, 1,050 m (photo D.T. Bilton); b) South Africa, Western Cape, Groote Winterhoek Mountains, stream at 1,300 m below Sneeugatpiek (photo N. Helme).

DISTRIBUTION: To date known only from Breëwaterkloof stream (Fig. 3a), a high-altitude east facing stream flowing through Cederberg Sandstone Fynbos (sensu MUCINIA & RUTHERFORD 2006), at the head of the Matjies River in the Cederberg Range, and a small stream in a heavily shaded valley at 1,300 m (Fig. 3b) in the Groote Winterhoek mountains north of Tulbagh. These two sites are at opposite ends of the north-south trending mountains of the Western Cape, indicating that *S. altimontanus* is likely to occur in suitable high altitude localities in between. Such a pattern of widespread distribution within these north-south orientated ranges is seen in other hydraenid genera such as *Pterosthetops* PERKINS (BILTON 2014).

ETYMOLOGY: Named in reference to the high altitude sites in which the species has been collected.

Discussion

Although status assessments are clearly problematic in the case of newly described taxa, the fact the *S. altimontanus* has evaded detection by previous workers, including the present author, point to it being a high altitude habitat specialist. Such observations, coupled with the phylogenetic isolation of *Sebasthetops* (BILTON 2013) suggest the new species is potentially of high conservation interest. The fact that *S. altimontanus* was discovered through targeted searches of high altitude streams in the north-south trending mountains of the Western Cape, and the presence of females which may represent another species from the distant Langeberg Range (BILTON 2013) suggest that other species of the genus may remain undetected elsewhere in the Cape Fold Mountains. Indeed *Sebasthetops* may represent an aquatic analogue of *Colophon* GRAY stag beetles, high altitude endemics whose radiation has apparently been driven by the onset of Mediterranean climatic conditions in the Cape during the Cenozoic (ENDRÖDY-YOUNGA 1988, SWALITKA et al. 2014).

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