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Autor: Germann, Christoph

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On the identity of *Otiorhynchus (Nihus) subcostatus* STIERLIN, 1866, description of *Otiorhynchus muffi* sp. nov., and an illustrated key to the species of *Nihus* REITTER, 1912 with taxonomic comments on both the subgenera *Nihus* and *Eunihus* REITTER, 1912 (Coleoptera, Curculionidae)

Christoph Germann

ABSTRACT

Contrib. Nat. Hist. 25: 45–69

Within the examination of large series of *Otiorhynchus subcostatus* STIERLIN, 1866 from museum collections, and specific field collecting, specimens from Switzerland (Grisons), north-eastern Italy and Slovenia differed from the typical appearance of the species. The comparison with the hereby selected lectotype of *O. subcostatus* showed that these specimens belong to a new species described here as *Otiorhynchus muffi* sp. nov. Both species live syntopically in the overlapping area in Grisons and Trentino. A thorough examination of the subgenus *Nihus* REITTER, 1912 revealed, furthermore, the need to change *O. spaethi* REITTER, 1913 from *Eunihus* REITTER, 1912 to *Nihus*, REITTER, 1912. An illustrated key to the species of *Nihus* is given, and the misinterpretations of *O. azaleae* PENECKE, 1894 and *O. gredleri* DANIEL & DANIEL, 1898 are corrected. Furthermore, based on the examination of a specimen of *O. levasseuri* ROUDIER, 1961, this species is transferred from *Metopiorrhynchus* REITTER, 1912 to *Eunihus*.

Keywords: Entiminae, *Otiorhynchus*, *Eunihus*, *Nihus*, new species, taxonomy, Italy, Slovenia, Switzerland

Introduction

The subgenus *Nihus* REITTER, 1912 at present counts 9 species, including the new species, and *Otiorhynchus (Nihus) spaethi* which due to its characteristics also belongs to *Nihus* instead of *Eunihus* REITTER, 1912 where it is placed at present (Magnano & Alonso-Zarazaga 2013).

In general species of *Nihus* are difficult to determine; partly because both amphigonic and parthenogenetic populations are known, where the two forms differ in their external morphology (and partly even in their genital structures) rather considerably from each other. Furthermore, polyploidy was proven at least in *O. carinatopunctatus* (RETZIUS, 1783), resulting in a bigger, more massive appearance (Suomalainen 1969). Thus in all collections examined, many wrongly determined specimens were encountered, which implies that faunistic literature references should be treated with special care. In this paper I give an overview on the members of *Nihus* and provide a new key to the species.

Up to now, one species of the subgenus, *Otiorhynchus subcostatus* sensu auctorum, seemed to be distributed from the French Massif Central and the Alpes Maritimes in the West – where male specimens are also known according to Hoffmann (1950) – to Switzerland (Germann 2010a), the Italian provinces Trentino-Alto Adige (Kahlen 2011) and Veneto (Abbazzi & Maggini 2009), Slovenia in the south-east, and Bavaria (Köhler & Klausnitzer 1998) in the north-east. The examination of apparently more elongate and more colourful specimens from Grisons, where records are rather numerous (e.g. Germann & Lüscher 2007), resulted in the discovery of a new species presently hidden under the similar *O. subcostatus*.

Material and Methods

The following abbreviations are used:

BNM	Bündner Naturmuseum, Chur
HNHM	Hungarian Natural History Museum, Budapest
MCSN	Museo Cantonale di Storia Naturale, Lugano
MHNG	Muséum d'histoire naturelle de la Ville de Genève
NMBA	Naturhistorisches Museum Basel
NMBE	Naturhistorisches Museum der Burgergemeinde Bern
NML	Natur-Museum Luzern
SDEI	Senckenberg Deutsches Entomologisches Institut, Müncheberg
TLMF	Tiroler Landesmuseum Ferdinandeum Innsbruck
ZSM	Zoologische Staatssammlung München
cAS	collection Alexander Szallies (Reutlingen, Germany)
cCB	collection Carlo Braunert (Mensdorf, Luxembourg)
cCG	collection Christoph Germann (Thun, Switzerland)
cHW	collection Herbert Winkelmann (Berlin, Germany)
cJK	collection Jiří Krátký (Hradec Králové, Czech Republic)
cMG	collection Michael Geiser (London, United Kingdom)

Body size was measured laterally from the apex of the elytra to the anterior margin of the eye. The body, spiculum ventrale and spermatheca were photographed by a 5-megapixel digital camera (Leica DFC 420). Series of images were captured through a binocular (Leica MZ16) and processed by an Auto-Montage software (Imagic Image Access, Version 8).

The drawings by Olena Domschke were made using a camera lucida attached to a stereomicroscope (Olympus BH-2).

Label data of type material are reported literally, labels are separated by a double slash (/). Remarks on the data on the labels are set within rectangular brackets. Data of examined specimens is given in chronological order within the regions/cantons.

Results

It was Stierlin who described *Otiorhynchus subcostatus* in 1866, highlighting mainly the much less elevated striae on the elytra and the smaller size in comparison with *O. carinatopunctatus* (RETZIUS, 1783). As type localities he indicated very generally, as was usual at that time (Stierlin 1866): "Im Engadin, am Monte Rosa und auch in den französischen Alpen" [In the Engadine, near Mount Rosa (Italy) and also in the French Alps]. Five years before, Stierlin (1861: 154) already included the new species as one of his varieties ("Var. β . multo minor, rostro brevior, costis elytrorum parum elevatis") of *O. carinatopunctatus* – at that time under its junior synonym *O. septemtrionis* HERBST, 1795. The examination of the collections in the SDEI revealed a female syntype specimen from Stierlin's collection with the following indications in full agreement with Stierlin's description: Engadin [handwritten] // *O. subcostatus* [handwritten] m. [mihi] // coll. Stierlin // Syntypus [red paper] // coll. DEI Müncheberg. Other syntypes traceable after Stierlin's description (1866) consist of both, *O. subcostatus* sensu auctorum and *O. muffi* sp. nov., and therefore represent a mixed syntype series. To stabilize nomenclature and to definitely fix the name to a single name bearer, I select the before mentioned specimen from the Engadine (Fig. 5) as **lectotype** of *O. subcostatus*.

Description

***Otiorhynchus (Nihus) muffi* sp. nov.** (Figs 1, 4, 16–18, 29, 31)

Holotype ♀: 200_13.2 [collecting number] Switzerland, GR, S-charl, 1800 m, Hochstauden entlang Clemgia, 5.7.2013, leg. C. Germann (NMBE).

Paratypes: (39 in total), all from **Switzerland**: 2 ♀ [GR], Bernina, coll. L. v. Heyden (SDEI). 1 ♀ [GR], St. Mtz. [St. Moritz, most likely collected 1862 after von Heyden (1863)], coll. L. v. Heyden (SDEI). 2 ♀ GR, Miralago, 18.7.1970, leg. P. Scherler (NMBE). 1 ♀ GR, Alp Grüm, 21.7.1970, leg. P. Scherler (NMBE). 1 ♀ GR, Val dal Fain, 23.7.1979, Mousses sol [sifted], leg. P. Scherler (NMBE). 1 ♀ GR, E Alp Trupchun, Kurzrasen, 22.6.–16.7.2000, 2100 m, 802.480/163.680 [barber traps], leg. B. Lüscher (NMBE). 1 ♀ GR, Alp Chaschauna, 2200 m, 800.380/161.760, 14.7.–4.8.2000 [barber traps], leg. B. Lüscher (NMBE). 1 ♀ GR, Alp Trupchun, Vegetationsmosaik, Seggen, Kurzweide, 2060 m, 802.360/163.920, 16.7.–5.8.2000 [barber traps], leg. B. Lüscher (NMBE). 2 ♀ GR, W Alp Trupchun, Vegetationsmosaik, Eisenhut/Seggen/Kurzweide, 2020 m, 802.040/164.100, 5.8.–1.9.2000 [barber traps], leg. B. Lüscher (NMBE). 2 ♀ GR, W Alp Trupchun, Vegetationsmosaik Eisenhut, Seggen, Kurzweide, 2020 m, 802.040/164.100, 31.8.–28.9.2000 [barber traps], leg. B. Lüscher (cCG, NMBE). 4 ♀ GR, W Alp Chaschauna, Vegetation mosaikartig, feucht, 2200 m, 800.280/162.030, 21.10.2000–19.6.2001 [barber traps], leg. B. Lüscher (NMBE). 1 ♀ GR, Sur, Alp Flix, 2145 m, 770.700/154.500, Gesiebe *Rhododendron*, Polsterpflanzen, Moos und unter Stein, 20.6.2002, leg. C. Germann (NMBE). 1 ♀ GR, Valle Poschiavo, Garbela, 2 km NW Brusio, 1000 m, 28.8.2004, leg. C. Germann (NMBE). 3 ♀ GR, Alp Flix, Salategnas, 1960 m, 24.7.–21.8.2005, leg. P. Muff (BNM, NMBE). 1 ♀ 021_06.1 & 2 [collecting number] GR, Ftan, 812.730/186.400, 1900 m, Gesiebe Moos, S-Hang, 9.11.2006, leg. C. Germann (NMBE). 1 ♀ GR, Ardez, Chanoua, 811.850/184.850, 1600 m, 30.6.2007, Käscherfang, leg. M. Geiser (cMG). 4 ♀ GR, 4 km SW Zernez, Prazet, 1650 m, 46°40'12"N, 10°02'51"E, leg. C. Braunert (cCB). 1 ♀ GR, Ftan, Piz Clünas, 814.100/188.854, S-exp. Hang, 2560 m, Gesiebe Felssimse Flechten & Polsterpflanzen, 12.8.2011, leg. C. Germann (NMBE). 1 ♀ 199_13.5 [collecting number] GR, Val Mora, Döss Radond, 823.289/161.728, 2230 m, 28.6.2013, leg. C. Germann (NMBE). 1 ♀ 199_13.1 [collecting number] GR, Valchava, Val Vau, Spi da Vau, 826/164, 1700–1800 m, 28.6.2013, leg. C. Germann (NML). 7 ♀ 200_13.2 [collecting number] GR, S-charl, 1800 m, Hochstauden entlang Clemgia, 5.7.2013, leg. C. Germann (cCG, cHW, NMBE).

Further specimens examined:

Italy: 1 ♀ Südtirol, oberhalb Trafoi, 1700 m, 10.8.1973, in Schlag abends gestreift, leg. M. Kahlen (TLMF). 1 ♀ [Trentino] Val Camonica, [locality handwritten, illegible, without date], leg. G. Krüger, coll. O. Leonhard (SDEI). 1 ♀ [Trentino] Mt. Pari, Judicaria [without date], coll. Reiss (TLMF). 1 ♀ [Trentino] P. Fugazza [Vallarsa], 24.6.1897, coll. Knabl (TLMF). 2 ♀ [Trentino] Piano della Fugazza, 30.7.09, Vallarsa Südtirol, Gesiebt aus Laub, leg. Stöcklein (NMBA). 1 ♀ Trentino, Rollepäss, 1950 m, 4.6.1977, unter Stein, leg. M. Kahlen (TLMF). 1 ♀ Trentino, Cma. Pari, 1950–1990 m, 15.6.1979,

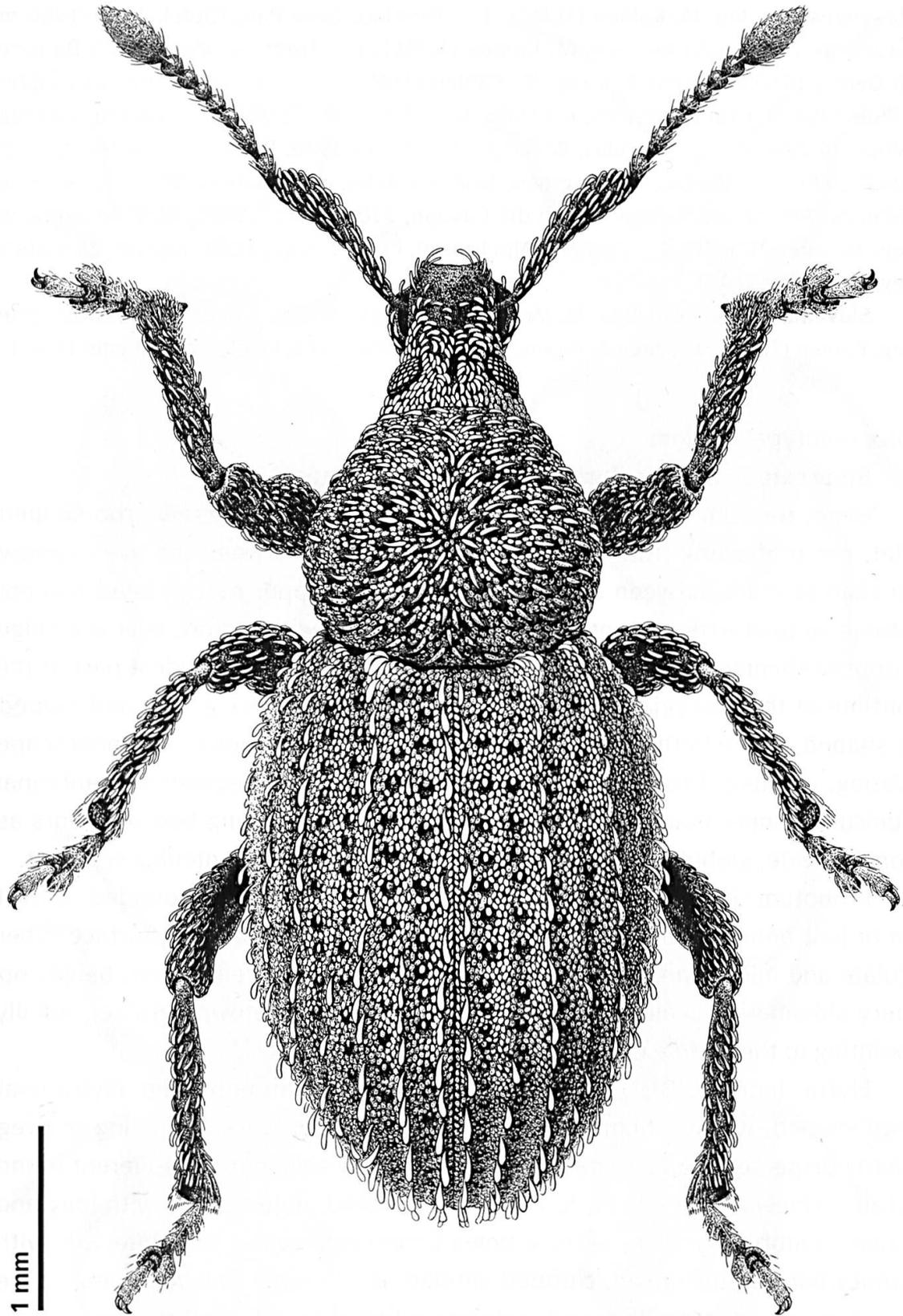


Fig. 1. Habitus of *Otiorhynchus muffi* sp. nov. Illustration by Olena Domschke.

Rasengesiebe, leg. M. Kahlen (TLMF). 1 ♀ Trentino, Cima Pari, Gipfel, 1950–1980 m, Grünerlenstreu, 6.7.1986, leg. M. Kahlen (TLMF). 1 ♀ Trentino, Monte Pari, Baitone di Gelos, 1450 m, 14.6.1984, leg. M. Kahlen (TLMF). 2 ♀ Trentino, Cima Pari, Gipfel, 1950–1990 m, Grünerlenstreu, 6.7.1986, leg. M. Kahlen (TLMF). 1 ♀ [Veneto] Vicenza, Altipiano d'Asiago, Cma. Undici, W-Hang, 2100 m, 9.8.1978, Rasengesiebe, leg. M. Kahlen (TLMF). 1 ♀ [Veneto] Campogrosso [without date], coll. Knabl (TLMF). 1 ♀ [Veneto] Vicenza, Altipiano d'Asiago, Dosso del Cuvolin, 2100 m, 30.5.1980, Alpenrosenmulm, leg. M. Kahlen (TLMF). 1 ♀ [Veneto] Alpi Lessini, Cima Carega, 2100–2200 m, 25.6.2007, leg. A. Szallies (cAS).

Slovenia: 1 ♀ Julijske Alpe, M. Mojstrovka, N-Kar, 1800 m, 3.6.1980, *Rhododendron*, leg. Kahlen (TLMF). 1 ♀ Steiner Alpen, Logarska Dolina, 27.6.1988, leg. M. Egger (SDEI).

Size holotype: 4.6 mm

Body colour: Auburn, head and rostrum dark brown.

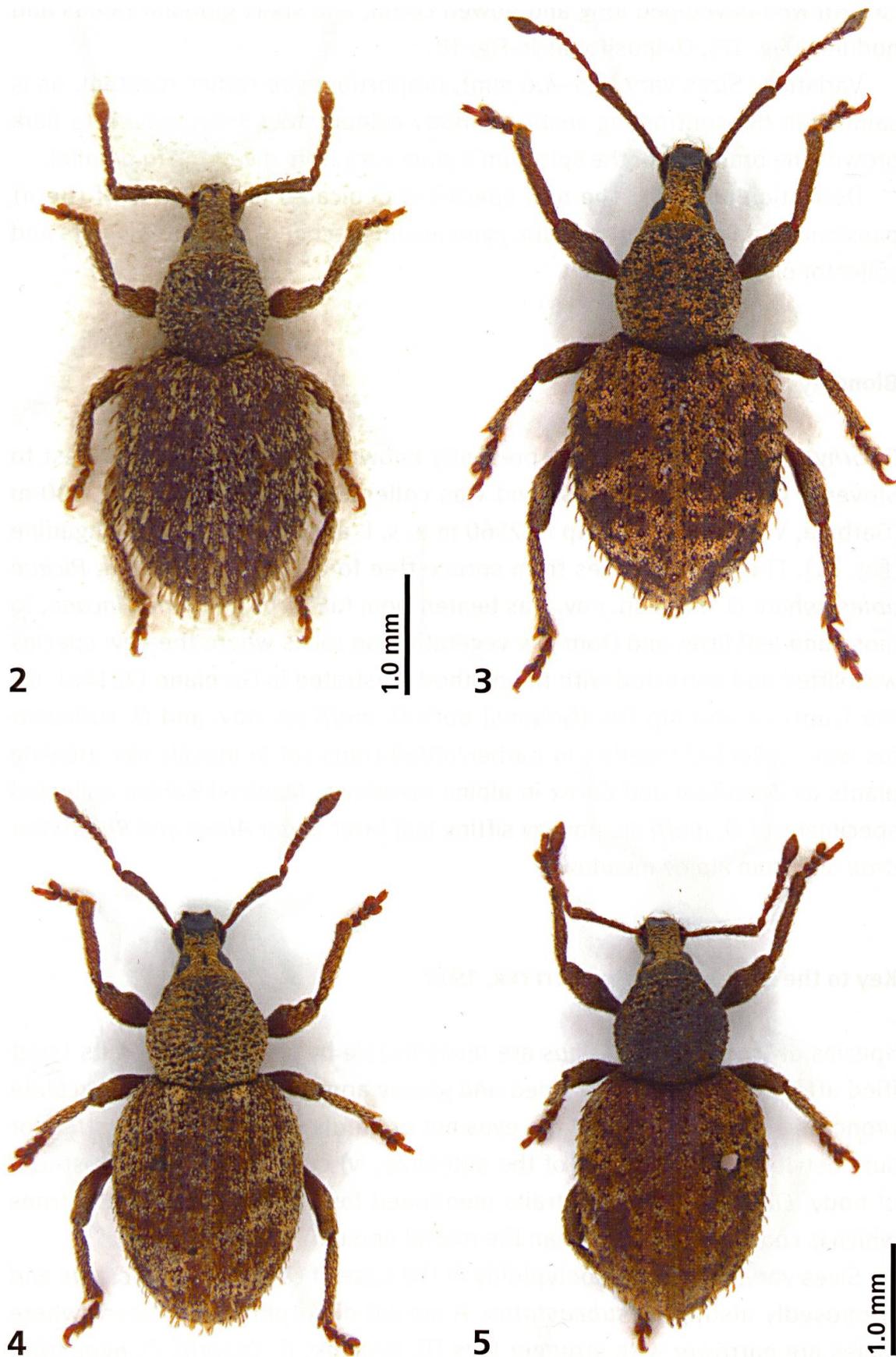
Head, rostrum and antennae: Head globular, eyes inversely drop-shaped, flat, not protruding from the heads outline. Frons between the eyes narrower than rostrum between the antennal insertion. Upper part of head and epistome up to insertion of antennae densely covered with narrow, oval and beige coppery shimmering scales. Rostrum a little longer than its widest part at the outline of the pterygia. Pterygia prominent, rostral apex glossy and sloped, V-shaped, where both tips are prolonged in form of little horns. Antennal scape strong, clubbed, thickest after its last third. First two segments of antennal funiculus longer than wide (L/B 1st and 2nd: 2.3), following five segments as long as wide, globular, club fusiform, twice as wide as last antennal segment.

Pronotum: Index (L/B): 0.9. Transverse, laterally strongly rounded, widest in or just behind middle, constricted at front and hind margin. Surface tuberculate and microgranulate. Vestiture consisting of adherent round, beige coppery shimmering scales and raised, narrow and dark brown setulae, radially pointing to the middle of the pronotum.

Elytra: Index (L/B): 1.3. Base slightly broader than pronotum, elytra oval, egg shaped, without humeral callus (apterous). Vestiture consisting of irregularly dispersed, beige to darker brown, coppery shimmering, adherent round scales. Uneven intervals (3, 5, 7) weakly elevated, regularly set with long and raised, clubbed setulae, up to 4 times longer than wide. Even intervals with somewhat shorter raised, clubbed setulae, best visible towards apex. Striae regularly punctuate with round scales inserting at their frontal margin.

Legs: strong, femora unarmed, three visible tarsal segments (fourth minute), first twice as long as second, third twice the width of second, claw segment as long as second and third combined, claws simple.

Spiculum ventrale, spermatheca and ovipositor: branches of the spiculum at base of plate angular and slightly diverging towards apex (Fig. 16). Spermathe-



Figs 2–5. Habitus of female specimens of 2. *Otiorynchus uncinatus* (Sagno), 3. *O. carinatopunctatus* (Tarasp), 4. *O. muffi* sp. nov. (holotype, S-charl), 5. *O. subcostatus* (lectotype, Engadine).

ca with well-developed long and bowed cornu, and short globular ramus and nodulus (Fig. 17). Ovipositor as in Fig. 18.

Variation: Sizes vary (3.5–4.6 mm), proportions are rather constant, as is same with the contrasting vestiture. Body colour varies from auburn to dark brown. The branches of the spiculum's plate vary from diverging to parallel.

Derivation of name: The new species is dedicated to Patrick Muff (Bern), passionate biologist, enthusiastic gymnasium teacher of future biologists and collector of the new species.

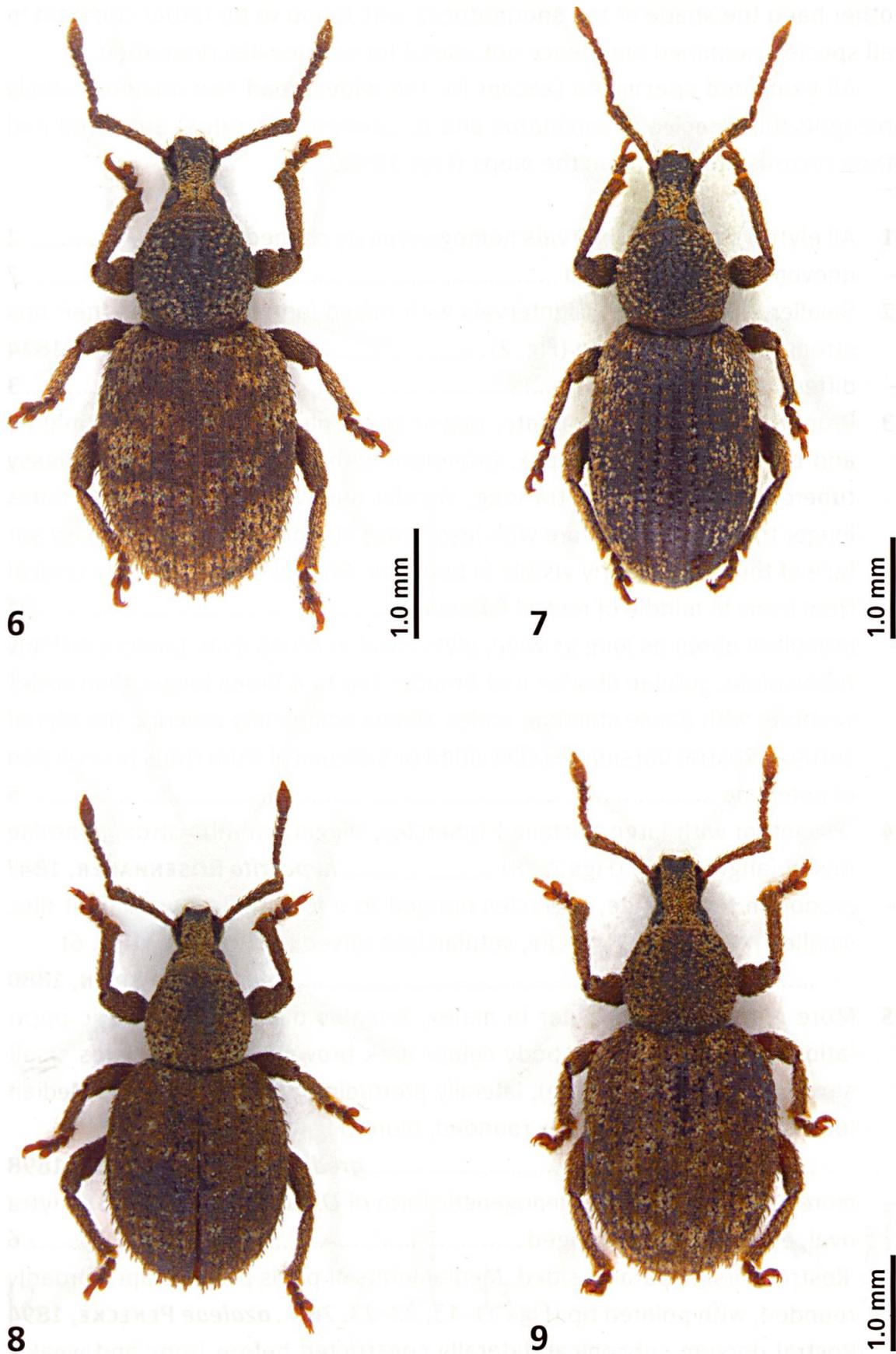
Bionomy

Otiorhynchus muffi sp. nov. is presently known from Grisons in the West to Slovenia in the East (Fig. 29) and was collected at altitudes from 1000 m (Garbela, Valle Poschiavo) up to 2560 m a. s. l. at Piz Clünas, lower Engadine (Fig. 31). The habitat varies from spruce tree forests (*Larix decidua*, *Picea abies*) where *O. muffi* sp. nov. was beaten from tall forbs and *Alnus incana*, to moss and leaf litter and from low vegetation on rocks where the new species was sifted and extracted with the method illustrated in Germann (2014a). On Alp Trupchun and Alp Flix (Grisons) both *O. muffi* sp. nov. and *O. subcostatus* were collected together in barber/pitfall-traps set in mosaic like growing plants as *Aconitum* and *Carex* in alpine meadows. Manfred Kahlen collected specimens of *O. muffi* sp. nov. by sifting leaf litter under *Alnus* and *Rhododendron* and from alpine meadows.

Key to the species of *Nihus* REITTER, 1912

Species of the subgenus *Nihus* are recognisable by the following traits (modified after Reitter 1913): i) sloped and glossy apex of rostrum, ii) tuberculate pronotum, iii) frons between the eyes not or hardly wider than the rostral dorsum between the insertions of the antennae, iv) comparably dense vestiture of body. *Eunihus* shares the traits mentioned for *Nihus*, except for the frons which is considerably wider than the rostral dorsum.

Sizes vary, also due to polyploidy in the case of *O. carinatopunctatus* and supposedly also in *O. subcostatus*. A sexual dimorphism is present where males are narrower with stronger legs (*O. azaleae*, *O. spaethi*, *O. hypocrita*) or males are stouter and more globular (*O. gredleri*). Also genital structures vary to a certain extent, see as an example the form of the plate of the spiculum in the case of *O. spaethi* (Figs 20–21) or *O. azaleae* (Figs 22–23). On the

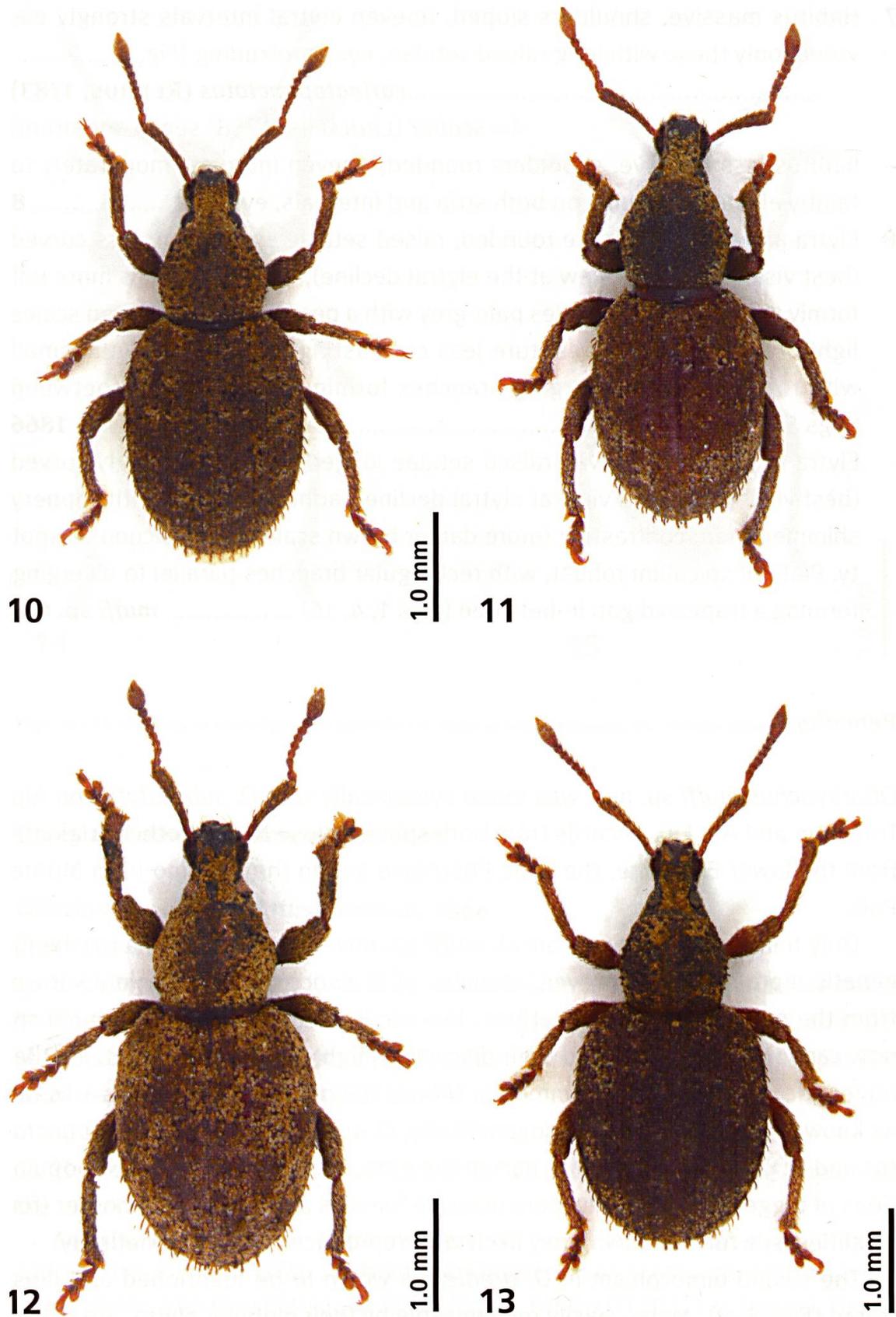


Figs 6–9. Habitus of 6. *Otiorynchus venustus* (female from Valmasque), 7. *O. hypocrita* (female from Pragelato). 8. *O. gredleri* (male from Monte Baldo), 9. Ditto female from an amphigonic population, same locality.

other hand the shape of the spermatheca was found to be rather constant in all species examined and hence not useful for species discrimination.

All examined specimens (except for the widespread and unambiguously recognisable species *O. uncinatus* and *O. carinatopunctatus*) are listed and their records are shown on the maps (Figs 29–30).

- 1 All elytral striae and intervals homogeneously shaped 2
- uneven intervals elevated 7
- 2 Smaller, less massive, all intervals with raised long and towards their tips strongly clubbed setulae (Fig. 2)..... ***uncinatus* GERMAR, 1824**
- different 3
- 3 Pronotum and elytra elongate, egg-shaped, parallel sided in the middle and broadly rounded at apex, pronotum with large, flattened and glossy tubercles, setulae on elytra long, slender and raised (more than 5 times longer than wide), vestiture with less dense standing scales, the glossy surface of the elytra clearly visible in between. Rostral dorsum weakly conical from frons to middle of rostral dorsum 4
- pronotum about as long as wide, elytra oval to broad oval, pronotum finely tuberculate, setulae shorter and broader (up to 4 times longer than wide), vestiture with dense standing scales almost completely covering the elytral surface. Rostral dorsum parallel sided or subconical from frons to insertion of antennae 5
- 4 Pronotum with large flattened tubercles, bigger, habitus strong, setulae raised (angle > 45°) (Figs 7, 28)***hypocrita* ROSENHAUER, 1847**
- pronotum tuberculate, tubercles merged to a longitudinal wrinkle at disc, smaller, habitus more gracile, setulae less raised (angle < 30°) (Fig. 6)***venustus* STIERLIN, 1880**
- 5 More massive (or globular in males, females of parthenogenetic populations long broad oval), body colour dark brown to blackish, eyes small, strongly bulged (button-like), laterally protruding from head outline. Medianlobus of penis parallel, apex rounded, blunt (Figs 8–10, 28)***gredleri* DANIEL & DANIEL, 1898**
- more gracile (except parthenogenetic form of *O. azaleae* Figs 11–13), elytra oval, eyes larger, less bulged 6
- 6 Rostral dorsum parallel sided. Medianlobus of penis parallel, apex broadly rounded, with pointed tip (Figs 11–13, 22–23, 26) ... ***azaleae* PENECKE, 1894**
- Rostral dorsum subconical, laterally constricted before frons and weakly broadened towards antennal insertion. Medianlobus of penis rounded, apex continuously pointed (Figs 14–15, 20–21, 27)***spaethi* REITTER, 1913**



Figs 10–13. Habitus of 10. *Otiorhynchus gredleri* (female from a parthenogenetic population, Piz Clünas), 11. *O. azaleae* (male from Koralpe), 12. Ditto (female from an amphigonic population, Wöllaner Nock), 13. Ditto (female from a parthenogenetic population, Monte Sernio).

- 7 Habitus massive, shoulders sloped, uneven elytral intervals strongly elevated, only these with long raised setulae, eyes protruding (Fig. 3).....
**carinatopunctatus (RETZIUS, 1783)**
 (= *scaber* (LINNAEUS, 1758) sensu auctorum)
- habitus less massive, shoulders rounded, uneven intervals moderately to faintly elevated, setulae on both stria and intervals, eyes flat.....**8**
- 8** Elytra and pronotum more rounded, raised setulae shorter and less curved (best visible in lateral view at the elytral decline), adherent scales more uniformly coloured, bright scales pale-grey with a pearly shimmer, brown scales lighter dark, therefore vestiture less contrasting. Plate of spiculum small with rounded and converging branches forming an oval gap in-between (Figs 5, 19)**subcostatus STIERLIN, 1866**
- Elytra more elongate oval, raised setulae longer and more strongly curved (best visible in lateral view at elytral decline), adherent scales with coppery shimmer, more contrasting (more darker brown scales), conspicuously spotty. Plate of spiculum robust, with rectangular branches parallel to diverging, forming a trapezoid gap in-between (Figs 1, 4, 16) **muffi sp. nov.**

Remarks

Otiorhynchus muffi sp. nov. was found syntopically with *O. subcostatus* on Alp Trupchun and Alp Flix, records from both species close to each other originate from the lower Engadine, the Valle Poschiavo and in the Trentino from Monte Pari.

Only females are known from *O. muffi* sp. nov. which indicates a parthenogenetic reproduction. However, as males of *O. subcostatus* are solely known from the most western populations, the occurrence of males in *O. muffi* sp. nov. cannot be excluded, and their discovery might be a future target. Parthenogenetic reproduction is common in *Nihus*; *O. uncinatus* reproduces – as far as known – exclusively parthenogenetically, *O. subcostatus*, *O. carinatopunctatus* and *O. gredleri* in the major part of the area. In *O. azaleae* recorded populations of bigger and generally more massive females at the southern border (for localities, see further down) may likely also reproduce parthenogenetically.

The sexual dimorphism in *O. gredleri* is worth to be mentioned and illustrated (Figs 8–9). Males, easily recognisable by their globular elytra, are solely known from around Lake Garda, whereas the wider distributed parthenogenetic form almost reaches Bavaria in the North (Fig. 30).



Figs 14–15. Habitus of *Otiorhynchus spaethi* 14. male (Campogrosso), 15. female (Carega).

Types and other specimens examined

Otiorhynchus subcostatus STIERLIN, 1866

Type locality: Engadin

Lectotype ♀: [Switzerland, GR], Engadin [handwritten] // *O. subcostatus* [handwritten] m. [mihi] // coll. Stierlin // Syntypus [red paper] // coll. DEI Müncheberg. Red label: Lectotype *Otiorhynchus* (*Nihus*) *subcostatus* Stierlin, 1866 des. C. Germann 2014 (SDEI).

The following specimens were examined, and their records are shown on the map (Fig. 28):

Austria: 1 ♀ [North Tyrol] Brandenberg, Ht. Sonwendjoch, SW-Hang, 1800 m, 7.7.1984, leg. Kahlen (TLFM). 1 ♀ Nordtirol, Stubai Alpen, Sandestal, 1850 m, Zwergstrauchheide, *Vaccinium*-Streu, 7.6.2003, leg. M. Kahlen (TLMF). 1 ♀ Osttirol, Granatspitzgruppe, Steinertal, 2050 m, 21.5.1993, leg. M. Kahlen (TLMF). 1 ♀ Osttirol, Lienz Umgebung, Amlach, 16.7.1994, 1050 m, leg. A. Kofler (TLMF).

France: Alpes-Maritimes, Vacherie du Boréon, 1680 m, 28.6.2010, leg. M. Kahlen (TLMF). 2 ♀ Hautes Alpes, Dévoluy, Tête de Lapras, 1700 m, 7.5.1999, leg. M. Kahlen (TLMF). 3 ♀ 113_10.4 [collecting number] Haut Jura, Grand Crêt, 485.675/126.772,

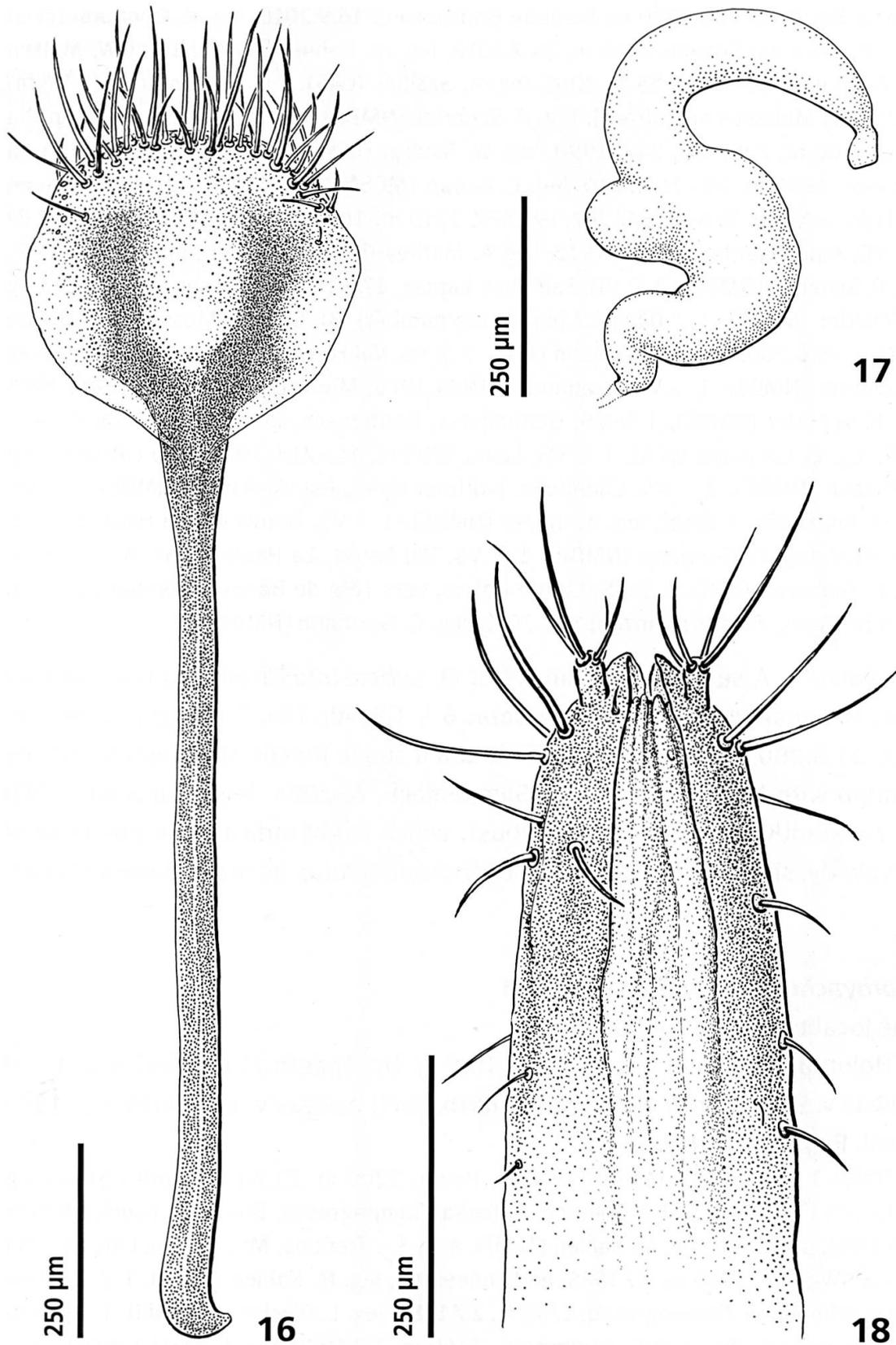
1630 m, 4.6.2010, leg. C. Germann (cCG). 1 ♀ Haute-Savoie, Samoens, Pte. de Ressache, 1830 m, Gesiebe alpiner Rasen, 20.5.2002, leg. C. Germann (NMBE). 1 ♀

Germany: 1 ♀ [Bavaria] Berchtesgaden, Kiefernwald, 1100 m (cHW). 1 ♀ Bayern, Wimbach, 2.8.1986, leg. H. Winkelmann (cHW). 1 ♀ 034_07.1 [collecting number] Bayern, Allgäuer Alpen, Oberstorf, 1490 m, 26.7.2007, leg. C. Germann (cCG). 1 ♀ Bayern, Oberbayern, Bayrischzell, 17.7.2012, leg. H. Mühle (NMBE).

Italy: 1 ♀ [Friuli] FVG, Sella Nevea, 1300–1400 m, 9.10.2001, leg. Bayer & Winkelmann (cHW). 1 ♀ [Lombardia] Brescia, Passo di Croce Domini, 2300 m, 6.7.1980, leg. M. Kahlen (TLMF). 1 ♀ [Lombardia] Brescia, Monte Guglielmo, Dosso Pedalta, 1950 m, 2.11.1989, leg. M. Kahlen (TLFM). 2 ♀ Lombardia, Grigna settentrionale, 1874 m, Gesiebe und geklopft *Rhododendron*, *Rhamnus*, *Salix*, 7.7.2002, leg. C. Germann (cCG, NMBE). 1 ♀ Lombardia, Macugnaga [without date] (NMBE). 1 ♀ [Lombardia] Bergamo, Alpi Orobie, Averara, Passo di Verobbio, 2030 m, 13.7.2010, leg. M. Kahlen (TLMF). 1 ♀ [Piemonte] Cuneo, Terme di Valdieri, S Vallone di Ciriegia, 2150 m, 24.6.2008, leg. M. Kahlen (TLMF). 1 ♀ Südtirol, Seiser Alpe, W-Seite unt. Weiden gesiebt, 19.5.1973, leg. M. Kahlen (TLMF). 1 ♀ Südtirol, oberhalb Trafoi, 1700 m, 10.8.1973, leg. M. Kahlen (TLMF). 1 ♀ Südtirol, Franzenshöhe, 2300 m, 14.8.1977, unt. Stein, leg. M. Kahlen (TLFM). 1 ♀ Trentino, Monte Baldo, Mt. Altissimo, S-Seite, 1900 m, Weidenlaub, 12.10.1997, leg. M. Kahlen (TLFM). 1 ♀ [Veneto] Verona, Mt. Baldo, Cma. Valdritta, Gipfel, 2200 m, 18.6.1983, nachts an Felsen, leg. M. Kahlen (TLFM). 1 ♀ [Veneto] Udine, Prealpi Giulie, Monte Matajur, N-Seite, 1630 m, 25.9.1998, leg. M. Kahlen (TLMF). 1 ♀ [Veneto] Treviso, Mt. Grappa, Val die Lebi, 1100 m, BF [Becherfalle] 15.5.–23.9.2006, leg. M. Kahlen (TLMF).

Slovenia: 1 ♀ Kamniske Alpe, Okreselj, 1400 m, 27.6.1988, leg. M. Kahlen (TLMF).

Switzerland: 1 ♀ BE, Gadmen, 6.8.1903, leg. A. Rätzer (NMBE). 1 ♀ BE, Gurnigel, 19.7.1959, leg. H. Schenk (NMBE). 1 ♀ BE, Bäderhorn, 16.9.1979, leg. P. Scherler (NMBE). 1 ♀ BE, Grischbachtal, 586/153, 1500 m, gekäschert, M.6.1996, leg. C. Germann (cCG). 1 ♀ BE, Sustenpass, 1700–2000 m, gesiebt aus Moos und Bodenstreu, 14.8.2001, leg. C. Germann (cCG). 1 ♀ BE, Kiental, Dreispitz, 2000 m, gesiebt aus Moos, 5.10.2001, leg. C. Germann (cCG). 1 ♀ BE, Wimmis, 613.970/168.800, 630 m, Auenwald, 17.5.2006, leg. C. Germann (cCG). 1 ♀ BE, Kandersteg, Sunnbüel, 1960 m, unter *Dryas*-Polster, 18.7.2012, leg. P. Sonderegger (NMBE). 1 ♀ FR, Plaffeien, Kaisereggpass, 2100 m, 6.–11.2010, Fallen, leg. A. Szallies (cAS). 1 ♀ GL, Linthal, Ochsenstein, 28.6.–11.7.2008, leg. P. Marti (NMBE). 1 ♀ GL, Linthal, Ochsenstein, 19.6.–28.6.2008, leg. D. Gloor (NMBE). 1 ♀ GR, Tantermozza, 12.8.1920, Moos, leg. E. Handschin (BNM). 2 ♀ GR, Val Sinestra, 21.7.1971, leg. P. Scherler (NMBE). 1 ♀ GR, E Alp Trupchun, Vegetationsmosaik Seggen/Kurzweide, 22.6.–13.7.2000, 2140 m, leg. B. Lüscher (NMBE). 1 ♀ GR, E Alp Trupchun, 2140 m, 802.700/163.450, Barberfalle, 16.6.–23.7.2001, leg. B. Lüscher (NMBE). 2 ♀ GR, Passo del Bernina, 2100–2300 m, 799/143, gesiebt aus Bodenstreu u. Moos, 24.8.2001, leg. C. Germann (cCG). 1 ♀ GR, E Alp Trupchun, Vegetationsmosaik, Seggen, Kurzweide, 2140 m, 802.700/163.450, 23.7.–17.8.2001 [barber traps], leg. B. Lüscher. 1 ♀ GR, Alp Flix, Malpass, 2422 m, 771.457/154.324, Kalk und Silikat, Gesiebe *Saxifraga caesia*, 20.6.2002, leg. C. Germann (cCG). 2 ♀ 019_06.8 [collecting number] GR, V. Poschiavo, Cavaione, Gesiebe Moos an Felsen im Wald (*Larix*), 1200 m, 6.10.2006, leg. C. Germann (cCG). 8 ♀ GR, Bergün, Preda oberhalb, 1830 m, Gesiebe Bodenstreu, Moos, 13.6.2008, leg. C. Germann (cCG, NMBE). 1 ♀ 124_10.1 [collecting number] GR, Passo del Bernina,



Figs 16–18. Genital structures of *O. mufi* sp. nov. 16. Spiculum ventrale, 17. Spermatheca, 18. Ovipositor. Illustrations by Olena Domschke.

Ospizio Bernina, Giuf, 2290 m, Gesiebe Bodenstreu, 16.9.2010, leg. C. Germann (cCG). 4 ♀ GR, Corn dal Solcun, 2300 m, 24.7.2012, leg. M. Kahlen (TLMF). 1 ♀ OW, Mettent, 2000 m, Blockhalde, 15.11.2005, leg. A. Szallies (cAS). 2 ♀ TI, Generoso (B-Vista), 21.7.1956, Mousses sol [sifted], leg. P. Scherler (NMBE). 1 ♀ TI, Val Calanca, Alp Pianasc, 2100 m, 728/142, 24.6.1990, leg. W. Marggi (NMBE). 1 ♀ TI, Quinto, Val Piora, Mottone, 1860 m, 19.–21.7.2010, leg. E. Knopp (MCSN). 2 ♀ 174_12.3 [collecting number] UR, Isenthal, Brisen, 677.262/194.577, 2210 m, 14.6.2012, leg. C. Germann (cCG). 1 ♀ VD, Alpes vaudoises, 27.7.1912, leg. A. Mathey (NMBE). 1 ♀ VD, Jaman, 14.7.1955, leg. P. Scherler (NMBE). 2 ♀ VD, Famelon, Lapiaz, 17.8.1985, Mousses sol [sifted], leg. P. Scherler (NMBE). 1 ♀ 032_07.2 [collecting number] VD, Col des Mosses, Lac Lioson, 1800 m, 29.6.2007, leg. C. Germann (cCG). 2 ♀ VS, Val Ferret, Ban Darray, 9.8.1957, leg. P. Scherler (NMBE). 1 ♀ VS, Grammont, 19.11.1978, Mousses sol [sifted], 19.11.1978, leg. P. Scherler (NMBE). 1 ♀ VS, Gemmipass, Daubensee, unter Stein, 2206 m, A. 7. 1997, leg. C. Germann (cCG). 1 ♀ VS, Leuk, 1700 m, 14.–21.6.2005 [trap catches], leg. A. Pasche (NMBE). 2 ♀ VS, Chandolin, [without date], leg. A. Rätzer (NMBE). 1 ♀ VS, Val Ferret, [without date], leg. A. Rätzer (NMBE). 1 ♀ VS, Branche d'en Haut, 1400 m, 16.7.2007, leg. C. Germann (NMBE). 1 ♀ VS, Val Ferret, La Peule, 2460 m, 17.7.2007, leg. C. Germann (cCG). 1 ♀ VS, Col de Balme, vers Tête de Balme, Kalkstein, 2300 m, Gesiebe Moos, Polsterpflanzen, 17.7.2012, leg. C. Germann (NMBE).

Remarks: A series of specimens of *O. subcostatus* from Alp Flix (Switzerland, Grisons) with the following data: 6 ♀ GR, Alp Flix, Salategnas, 1960 m, 24.7.–21.8.2005, leg. P. Muff (NMBE), and a single female specimen from Italy, Trentino with the data: Trentino, Gampenjoch, 6. 2004, leg. Grunwald (SDEI) are constantly bigger and more robust, which might indicate the presence of polyploidy, shown in the case of *O. carinatopunctatus* by Suomalainen (1969).

***Otiorrhynchus spaethi* REITTER, 1913**

Type locality: Monte Pasubio

Holotype ♀: [Italy] Pasubio Süd-Tirol // Dr. Spaeth // Gredleri Spaethi // azaleae v. Spaethi m // Holotypus Otiorrh. (sic!) azaleae v. spaethi Reitter 1913 // coll. Reitter (HNHM).

Italy: 1 ♀ Trentino, Monte Pasubio, Palon, 2200 m, 23.7.1977, unter Stein, leg. M. Kahlen (TLMF). 1 ♂, 2 ♀ Trentino, Vallarsa, Campogrosso, Boale die Fondi, 1500 m, 26.6.1983, unt. Stein, leg. M. Kahlen (TLMF). 4 ♂, 3 ♀ Trentino, Mti. Lessini, Carega, Cma. Mosca SW-Seite, 1950 m, 7.7.1985, an Schneerand, leg. M. Kahlen (TLMF). 1 ♀ Trentino, Lessinische Alpen, Campogrosso, 1250 m, 2.7.1986, leg. L. Dieckmann (SDEI). 1 ♀ [Trentino] Mte. Lessini, Passo di Campogrosso, 1460 m, 1.8.1994, leg. L. Zerche (SDEI). 4 ♀ Trentino, Monti Lessini, Cima Carega, Gipfel, 2250–2259 m, 31.5.2003, *Dryas*-Rasen, leg. M. Kahlen (TLMF). 1 ♂ Trentino, Monti Lessini, Cima Carega, NO Gipfel, 2200 m, *Rhododendron*-Streu, N45°43'29" E 11°07'01", 31.5.2003, leg. L. Zerche (SDEI). 1 ♀ [Trentino/Veneto] Lessini, Cima Posta, 15.8.1972, leg. G. Osella (SDEI). 2 ♀ [Veneto] Aviano, Monte Cavallo, Tremoi, 1850 m, N46°06'55.2" E12°29'24.4", 10.8.2013, leg. J. Kratky (cJK).

Figs 19–24. Spiculum ventrale of selected *Otiorhynchus* (*Nihus*)
19. *O. subcostatus* (lectotype, Engadine),
20. *O. spaethi* (Campogrosso),
21. *O. spaethi* (Monte Cavallo),
22. *O. azaleae* (Koralpe),
23. *O. azaleae* (Monte Sernio),
24. *O. gredleri* (Cima Tombea).



***Otiorhynchus azaleae* PENECKE, 1894**

Type locality: Koralpe

Amphigonic form:

Austria: 1 ♀ Kärnten, Nockberge, Wöllaner Nock, E-Seite, 2100 m, Rasenstreu an Schneerand, 11.6.1998, leg. M. Kahlen (TLMF). 1 ♀ [Styria] Koralpe [without date], leg. E. Klimsch (MHNG). 1 ♂ Styria, Koralpe [without date], leg. V. Gspan (MHNG). 1 ♀ [Styria] Koralpe [without date], leg. Schuster (TLMF). 1 ♀ Koralpe [without date], leg. C. Mandl (TLMF). 2 ♂ Turnau, Styria sept. [without date and collector] (TLMF).

Parthenogenetic form:

Austria: 1 ♀ Osttirol, Lienz-Umgebung, Deutsch Lavant, 4.5.1990, leg. A. Kofler (TLMF).

Italy: 4 ♀ [Veneto] Udine, Mt. Sernio, Forc. Nuviernulis, S-Seite, 1700 m, 16.7.1988, Dryasrasen, leg. M. Kahlen (TLMF). 1 ♀ [Veneto] Udine, Mt. Sernio, Forcella Nuviernulis, 1732 m, 23.9.1998, unt. *Saxifraga caesia*, leg. M. Kahlen (TLMF).

***Otiorhynchus grederi* DANIEL & DANIEL, 1898**

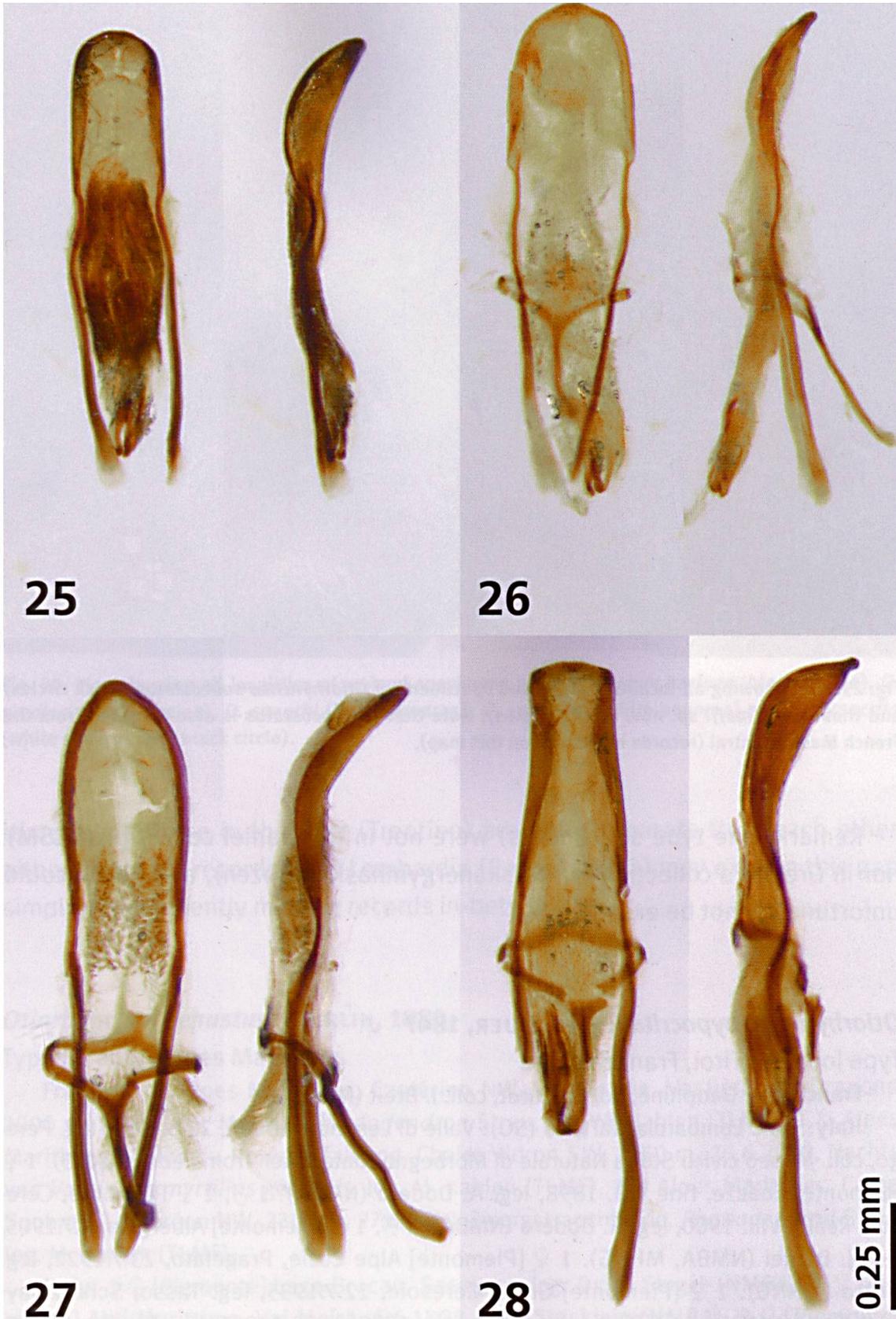
Type locality: Cima Tombea

Amphigonic form:

Italy: 1 ♂, 1 ♀ [Lombardia] Brescia, Cima Tombea, S-Hang, 1900–1950 m, 12.7.1978, unter Stein, leg. M. Kahlen (TLMF). 1 ♂, 2 ♀ Südtirol, Mte. Pari, 20.6.1936, Rasen, leg. Pechlaner (TLFM). 1 ♀ [Trentino] Val Scaglia, Ledrosee [without date], coll. Reiss (TLFM). 2 ♂ Trentino, Cima Pari, Gipfel, 15.7.1978, Rasengesiebe, leg. M. Kahlen (TLMF). 1 ♀ [Trentino] Verona, Monte Baldo, Cima Telegrafo, 2000–2150 m, 13.7.1979, u. Stein, leg. M. Kahlen (TLMF). 1 ♂ [Trentino] Verona, Monte Baldo, Cima Valdritta, Gipfel, 2200 m, Nachts am Felsen, 18.6.1983, leg. M. Kahlen (TLMF). 1 ♀ Trentino, Judikarien, Mt. Tombea, unter *Dryas*-Polster, 1900 m, 4.7.1986, leg. L. Dieckmann (SDEI).

Parthenogenetic form:

Switzerland: 3 ♀ GR, Ofenpass, 20.8.1969, leg. P. Scherler (NMBE). 3 ♀ GR, Ofenpass, 19.7.1973, Mousses sol [sifted] leg. P. Scherler (NMBE). 2 ♀ GR, Munt La Schera, 23.7.1977, leg. Dethier, coll. P. Scherler (NMBE). 2 ♀ GR, Munt La Schera, 17.9.1978, leg. P. Scherler (NMBE). 1 ♀ GR, E Alp Trupchun, Vegetationsmosaik, Seggen/Kurzweide, 2140 m, 16.6.–23.7.2001 [pitfall-traps], leg. B. Lüscher (cCG). 4 ♀ 038_07.6 [collecting number] GR, Valbella, W Funtana da S-charl, Kalk, u. Steinen, 821.122/170.777, 2450 m, 14.9.2007, leg. C. Germann (cCG). 2 ♀ 149_11.4 GR, Ftan, Piz Clünas, S-exp. Hang, 2500–2700 m, GS Pflanzenstreu Felsbänder, 10.8.2011, leg. C. Germann (cCG). 11 ♀ GR, Ftan, Piz Clünas, 814.100/188.854, S-exp. Hang, 2560 m, Gesiebe Felssimse Flechten & Polsterpflanzen, 12.8.2011, leg. C. Germann (cCG). 8 ♀ 199_13.7 (collecting number) GR, Val Mora, unterh. Piz dal Döss Radond, 823.323/162.634, 2500 m, GS Moos, Polsterpflanzen, Kalkstein, 29.6.2013, leg. C. Germann (cCG, NML).



Figs 25–28. Penis ventral and lateral of 25. *O. gredleri* (Monte Baldo), 26. *O. azaleae* (Koralpe), 27. *O. spaethi* (Campogrosso), 28. *O. hypocrita* (Albergian).

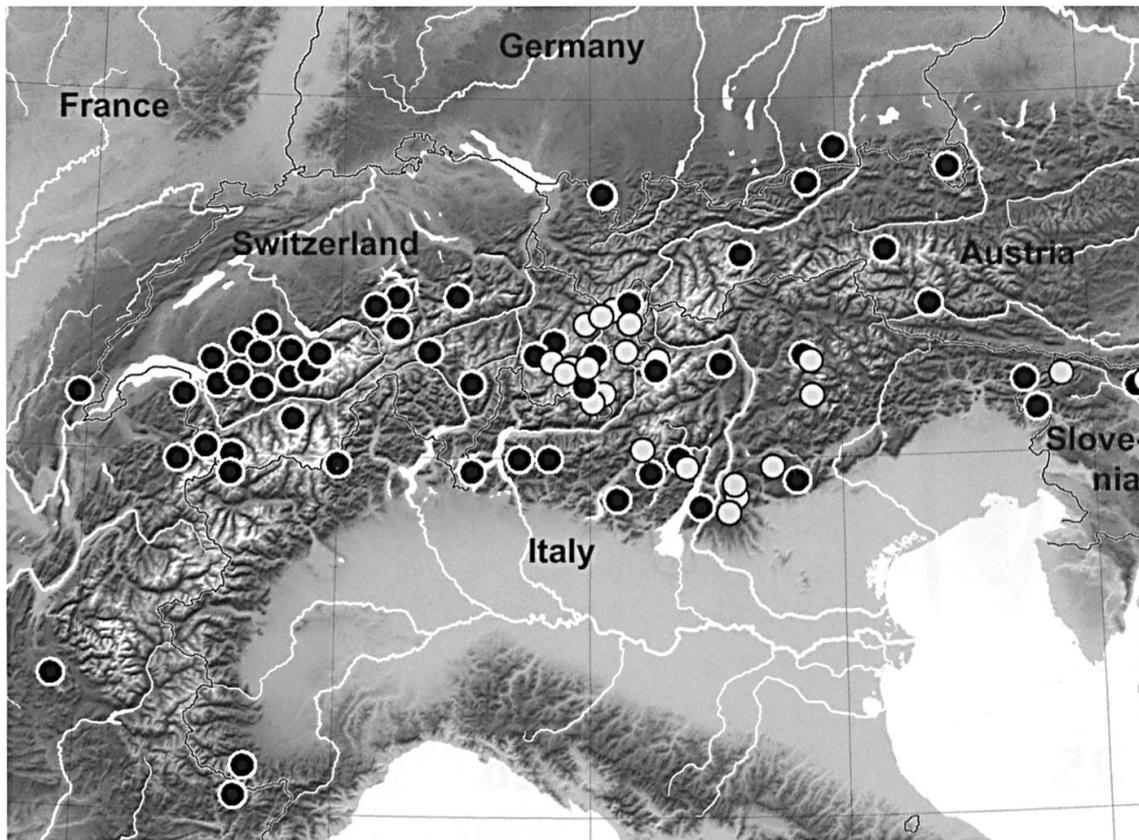


Fig. 29. Map showing all localities of revised specimens of *Otiorhynchus subcostatus* (black circles) and those of *O. muffi* sp. nov. (white circles). Note that *O. subcostatus* is also recorded from the French Massif Central (records not shown on this map).

Remark: The type specimen(s) were not in the Daniel collections (ZSM), nor in Gredler's collection (Franziskanergymnasium Bozen), and hence could unfortunately not be examined.

***Otiorhynchus hypocrita* ROSENHAUER, 1847**

Type locality: Tirol, Franzenshöhe

France: 1 ♀ Dauphiné, Col Lautaret, coll. J. Breit (NMBA).

Italy: 1 ex. Lombardia, Tartano (SO): Valle di Lemma, 2100 m, 28.6.1993, leg. Perego, coll. Museo civico Storia Naturale di Morbegno (data taken from Pedroni 2013). 1 ♀ Piemonte, Coazze, fine VIII. 1898, leg. A. Dodero (NMBA). 1 ♂, 1 ♀ Piemonte, Ceresole Reale, VIII. 1900, leg. A. Dodero (NMBA). 1 ♂, 1 ♀ [Piemonte] Albergian, 8.7.1905, leg. J. Daniel (NMBA, MHNG). 1 ♀ [Piemonte] Alpe Cozie, Prigelato, 23.7.1922, leg. Botto (MHNG). 1 ♀ [Piemonte] Graje, Ceresole, 22.7.1935, leg. Tasso, Schatzmayer & Koch (NMBA). 1 ♀ [Piemonte] M. Cenisio, 1700 m, 25.7.1935, leg. Schatzmayer & Koch (NMBA). 2 ♀ [Piemonte] Cuneo, Monte Viso, oberhalb Piano de Re, N44°41'35" E7°05'41", 2150 m, 9.7.2003, leg. C. Germann (cCG).

Remark: The type specimen(s) were not in Rosenhauer's collection in the ZSM and hence could not be examined. The localities in the West (Alpes Mar-

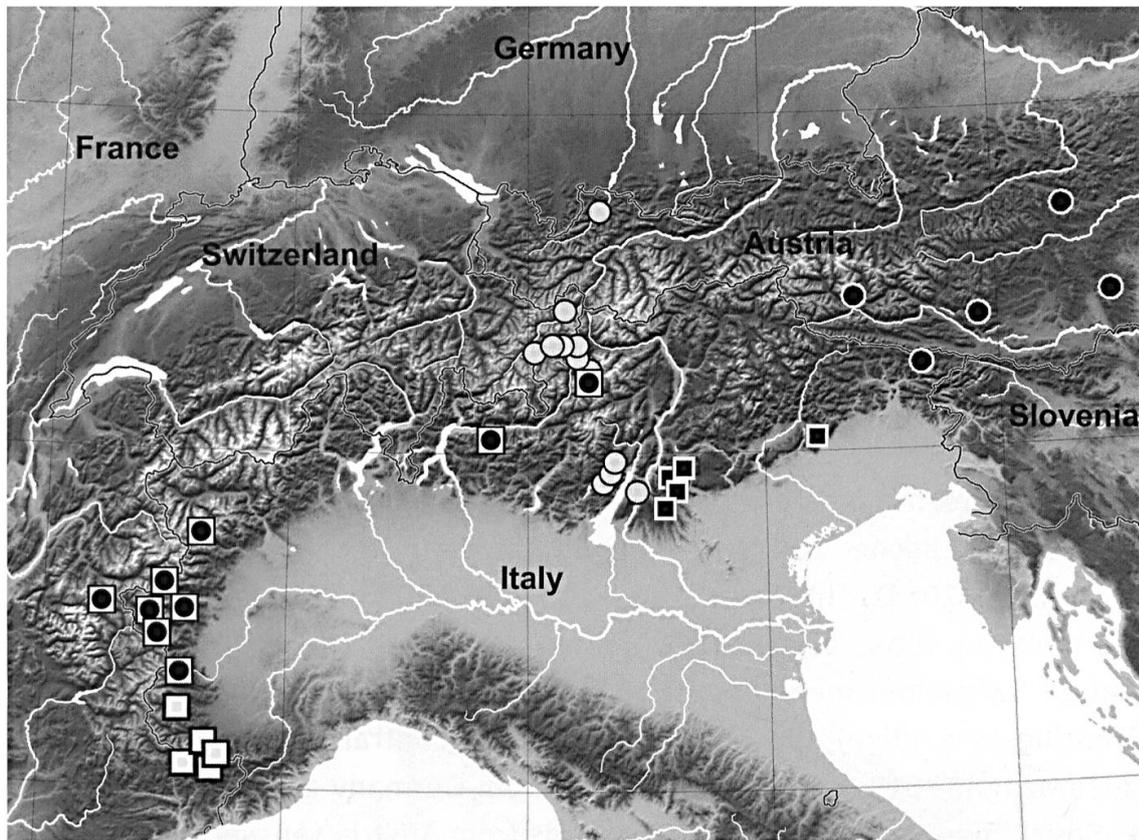


Fig. 30. Map showing all localities of revised specimens of *Otiorhynchus azaleae* (black circles), *O. gredleri* (white circles), *O. spaethi* (black squares), *O. venustus* (white squares) and *O. hypocrita* (white squares with black circle).

itimes) and those in the East (Trentino) are quite separate from each other, although recent records from Lombardia (Pedroni 2013) may explain this gap simply with presently missing records in-between.

***Otiorhynchus venustus* STIERLIN, 1880**

Type locality: Alpes Maritimes

France: 1 ♀ Alpes Maritimes, Castérino NW, Valmasque, Vastière des Dragons, 2000 m, 23.6.2009, Moos u. *Rhododendron*-Streu, leg. M. Kahlen (TLMF). 1 ♀ Alpes Maritimes, Vallée du Boréon, Talhang, Chalet Vidron SW, 1760 m, 26.6.2010, Nachts von *Vaccinium myrtillus* gestreift, leg. M. Kahlen (TLMF). 2 ♀ Alpes Maritimes, Camp Soubran, Le Boréon NW, 2300 m, 27.6.2010, Zwergstrauchheide, *Rhododendron*-Streu, leg. M. Kahlen (TLMF).

Italy: 1 ♀ [Piemonte] Lago Brocan, Seealpen, leg. Dr. K. Singer (NMBA). 1 ♀ [Piemonte] Alpi Marittime, Val Meira, 1.6.1898, coll. Stöcklein (NMBA). 2 ♀ [Piemonte] Cuneo, Entraque SW, Piano del Praiet, 1800 m, 4.6.2009, *Vaccinium*- und *Rhododendron*-Streu, leg. M. Kahlen (TLMF).

Remarks on *Otiorhynchus azaleae* sensu auctorum

Based on the key by Reitter (1913) and subsequently the one by Frieser (1981) to the taxa of *Nihus*, both *O. azaleae* and *O. gredleri* were mostly misinterpreted. One important detail, the shape of the eyes which is initially characterized by Daniel & Daniel (1898) in their description as "...stark gewölbte Augen", followed by Reitter (1913) as "...selten sehr schwach vortretend v. Gredleri Dan." and finally termed by Frieser (1981) as "... Augen wie bei *azaleae*..." (Whereas nothing is stated concerning the eyes in the case of *azaleae*...). This may have led to the repeated quotation of *O. azaleae* for Switzerland, initiated by the first record by Linder (1968) and followed by all subsequent authors (Germann & Lüscher 2007, Germann 2010a, 2012, 2014b, Magnano & Alonso-Zarazaga 2013). The present investigations, with a new key to this subgenus replacing those proposed by Reitter (1913) and Frieser (1981), showed that all Swiss specimens belong to *O. gredleri*, presently known from Italy (Trentino-Alto Adige) and Austria (Nordtirol). Contrary to Magnano & Alonso-Zarazaga (2013) no reliable records from Germany are presently known (P. Sprick, pers. comm.), although records from Austria (Ausserfern) are very close to Bavaria.

Remark on *Eunihus* REITTER, 1912

A specimen of *Otiorhynchus* (*Metopiorrhynchus*) *levasseuri* ROUDIER, 1961 with the following data was examined: 24.06.2001 NE Spain N Meranges E Pyrenees Mts. leg. P. Białooki. Thereby it could be stated that *O. levasseuri* is close to *O. rhilensis* STIERLIN, 1888 and *O. grischunensis* GERMANN, 2010, and hence belongs to the *O. rhilensis* species group (see Germann 2010b). As the species was placed in the subgenus *Metopiorrhynchus* REITTER, 1912 by Magnano & Alonso-Zarazaga (2013), the following transfer from *Metopiorrhynchus* to *Eunihus* is necessary:

Otiorhynchus (*Eunihus*) *levasseuri* ROUDIER, 1961.

It was Roudier (1961) himself who already mentioned that his new species belongs to *Nihus* – by some authors regarded as synonym to *Eunihus* in the past. The type locality of *O. levasseuri*, Glacier du Canigou, is situated about 60 km E of the before mentioned locality.



Fig. 31. Habitat of *Otiorhynchus muffi* sp. nov. on Piz Clüinas at 2500 m in the lower Engadine.

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Adressen des Autors:

Dr. Christoph Germann
Naturhistorisches Museum der Burgergemeinde Bern
Bernastrasse 15
CH–3005 Bern

Natur-Museum Luzern
Kasernenplatz 6
CH–6003 Luzern
E-mail: germann.christoph@gmail.com

