Oribatids from Switzerland X (Acari: Oribatida: Carabodidae) (*Acarologica Genavensia* C)

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ABSTRACT Contrib. Nat. Hist. 12: 931–949.

In this contribution all published records and newly determined Swiss moss mites belonging to the family Carabodidae are listed, reconsidered or described. From the 13 named species in the literature 8 are confirmed after critical reconsideration. New identifications of 15 species are given: 2 of which (*Carabodes oenipontanus* sp. nov. and *Carabodes thaleri* sp. nov.) are new to science, 3 species are new for the Fauna of Switzerland and 4 are confirmations of doubtful species in the literature for the Swiss territory. As a synthesis, a preliminary list of 16 Carabodidae species belonging to 2 genera from Switzerland is given and an identification key for all Swiss species of the genus *Carabodes* is presented.

Keywords: Acari, Oribatida, Carabodidae, taxonomy, new species, identification key, Switzerland.

Introduction

The study of oribatid mites of Switzerland was outlined in several previous papers (e. g. Mahunka & Mahunka-Papp 2003). In continuation of this project we scrutinized the species belonging to the family of Carabodidae in the material that was placed at our disposal.

The distribution of the Carabodidae species in Switzerland has been discussed by several specialists: Schweizer (1922, 1948, 1956, 1957), Grandjean (1951), Bernini (1976), Mahunka (1987, 1996), Borcard (1991a, 1991b, 1991c, 1992) and Borcard, Geiger & Matthey (1995). So far, the presence of 13 species is recorded. The number of valid species is 8 belonging all to one genus. Our present investigations revealed 15 species belonging to two genera. Thus,

the present Swiss Fauna of Carabodidae comprises 16 species belonging to two genera. Here we describe two new species and we compiled an identification key for all Swiss species of the genus *Carabodes*.

Concerning the terminology in describing the new species we heavily relied upon the works of Bernini (1976), Mahunka (1986), Reeves (1992) and Reeves & Behan-Pelletier (1998).

Hitherto published species from Switzerland

The following list gives all recorded species in chronological order with the published names (in the original spelling without corrections) and (in bold type) the names currently considered as valid or, in the case of misidentifications, the correct species names.

Schweizer (1922)

pp. 62, 99:
Carabodes coriaceus C. L. Koch = ?
pp. 62, 99:
Carabodes elongatus (Mich.) = ?
pp. 62, 99:
Carabodes marginatus (Mich.) = ?
pp. 62, 99:
Carbodes labyrinthicus (Mich.) = ?

Schweizer (1948)

pp. 12, 19:
Carabodes femoralis (Nic.) = ?
p. 19:
Carabodes labyrinthicus (Mich.) = ?
pp. 5, 9, 12, 19:
Carabodes marginatus (Mich.) = ?
pp. 11, 12, 19:
Carabodes minusculus Berl. = ***Carabodes schatzi*** Bernini, 1976
pp. 7, 8, 9, 11, 19:
Carabodes areolatus Berl. = ?

Grandjean (1951)

pp. 262–263:
Carabodes rugosior (Berl., 1916)

Schweizer (1956)

pp. 293, 372:

Carabodes areolatus Berlese, 1916

pp. 294, 372:

Carabodes forsslundi Sellnick, 1953 = ***Carabodes ornatus*** Storkán, 1925

pp. 294–295, 372:

Carabodes labyrinthicus (Michael, 1855)

pp. 295, 372:

Carabodes intermedius Willmann, 1951

pp. 295–296, 372:

Carabodes minusculus Berlese = ***Carabodes schatzi*** Bernini, 1976

Schweizer (1957)

pp. 46, 50, 58, 98, tab. IX:

Carabodes areolatus

pp. 46, 48, 49, 49, 50, 98, tab. IX:

Carabodes labyrinthicus

pp. 48, 98, tab. IX:

Carabodes intermedius

pp. 48, 48, 98, tab. IX:

Carabodes minusculus = ***Carabodes schatzi*** Bernini, 1976

pp. 51, 98, tab. IX:

Carabodes forsslundi = ***Carabodes ornatus*** Storkán, 1925

Bernini (1976)

pp. 19–20:

Carabodes schatzi Bernini, 1976: pro *Carabodes minusculus* in Schweizer (1956)

Mahunka (1987)

p. 402:

Carabodes areolatus Berlese, 1916: in Schweizer (1956)

p. 403:

Carabodes intermedius Willmann, 1951: in Schweizer (1956)

p. 404:

Carabodes labyrynthicus (Michael, 1879): in Schweizer (1956)

Carabodes ornatus Storkán, 1925: pro *Carabodes forsslundi* in Schweizer (1956)

p. 405:
Carabodes schatzi BERNINI, 1976: pro *Carabodes minusculus* in Schweizer (1956)

Borcard (1991a)
p. 308:
Carabodes labyrinthicus (MICHAEL) 1879

Borcard (1991b)
p. 332:
Carabodes labyrinthicus (MICHAEL) 1879

Borcard (1991c)
p. 526:
Carabodes labyrinthicus (MICHAEL) 1879
Carabodes marginatus (MICHAEL) 1884
Carabodes rugosior (BERLESE) 1916

Borcard (1992)
pp. 242–243:
Carabodes areolatus BERLESE, 1916
pp. 242, 243:
Carabodes forsslundi SELLNICK, 1953 = ***Carabodes ornatus*** STORKÁN, 1925
pp. 242, 243:
Carabodes labyrinthicus (MICHAEL) 1879
pp. 242, 243–244:
Carabodes marginatus (MICHAEL) 1884
pp. 242, 244:
Carabodes rugosior (BERLESE) 1916

Borcard, Geiger & Matthey (1995)
p. 325:
Carabodes marginatus (MICHAEL, 1884)
Carabodes labyrinthicus (MICHAEL,1879)
Carabodes forsslundi SELLNICK, 1953 = ***Carabodes ornatus*** STORKÁN, 1925

Mahunka (1996)
pp. 128–129:
Carabodes wettsteini MAHUNKA, 1996

List of the published species accepted for the Swiss Fauna

Carabodes areolatus Berlese, 1916
Carabodes intermedius Willmann, 1951
Carabodes labyrinthicus (Michael, 1879)
Carabodes marginatus (Michael, 1884))
Carabodes ornatus Storkán, 1925
Carabodes rugosior (Berlese, 1916)
Carabodes schatzi Bernini, 1976
Carabodes wettsteini Mahunka, 1996

List of localities

AP-1: SWITZERLAND: Appenzell: Hoher Kasten, sifting, 1600–1700 m; 18. VIII. 1982; leg. C. Besuchet — (Bp-86).

FR-7: SWITZERLAND: Fribourg: Vaulruz, Derballys, decaying spruce stump, 900 m; 2. IX. 1980; leg. S. Vit — (Bp-172).

GE-6: SWITZERLAND: Geneva: Malval, mosses and lichens; 22. X. 1982; leg. C. Besuchet — (Bp-34).

GL-2: SWITZERLAND: Glarus: Hinterschwändi, peat-bog with *Sphagnum* sp., 1250 m; 6. X. 1994; leg. C. Besuchet — (Bp-87).

GR-1: SWITZERLAND: the Grisons: Gafia St. Antönien, mosses and grass roots; 20. IX. 1983; leg. C. Besuchet — (Bp-51).

GR-5: SWITZERLAND: the Grisons: Swiss National Park, Il Fuorn, under a pile of dead branches, 1800 m; 22. IX. 1995; leg. C. Besuchet — (Bp-104).

GR-8: SWITZERLAND: the Grisons: Samnaun, alpine meadows with *Rhododendron* sp., sifting, 2050 m; 26. VIII. 1968; leg. C. Besuchet — (Bp-26).

GR-9: SWITZERLAND: the Grisons: Santa Maria – Umbrail Pass, sifting, 2000 m; 5. VIII. 1974; leg. C. Besuchet — (Bp-37).

GR-11: SWITZERLAND: the Grisons: Untervaz near Chur, mosses; 29. IX. 1983; leg. C. Besuchet — (Bp-126).

GR-15: SWITZERLAND: the Grisons: Umbrail Pass, 2000 m; 25. VIII. 1968; leg. C. Besuchet — (Bp-149).

GR-16: SWITZERLAND: the Grisons: Val Bregaglia, Soglio, hollow chestnut stumps, 900 m; 10. IX. 1985; leg. C. Besuchet — (Bp-146).

GR-17: SWITZERLAND: the Grisons: Val Poschiavo, above Cavajone, at base of rocks and *Rhododendron* sp., 2050–2100 m; 27. VIII. 1983; leg. C. Besuchet — (Bp-151).

GR-18: SWITZERLAND: the Grisons: Val Poschiavo, above Cavajone, under reeds and willows, 2250 m; 17.–18. VII. 1984; leg. C. Besuchet — (Bp-145).

JU-2: SWITZERLAND: Jura: Boncourt, old tree stumps; 11. III. 1978; leg. C. Besuchet — (Bp-173).

LU-1: SWITZERLAND: Lucerne: Eigenthal, peat-bog Forenmoos near the village of Eigenthal, *Sphagnum* sp., 970 m; 2. VIII. 1996; leg. C. Besuchet — (Bp-108).

LU-2: SWITZERLAND: Lucerne: above Gettnau (between Zell and Willisau), old ant-hill of *Formica rufa* L.; 1. VIII. 1996; leg. C. Besuchet — (Bp-107).

LU-5: SWITZERLAND: Lucerne: Wohlhusen, old tree stumps; 17. III. 1979; leg. C. Besuchet — (Bp-176).

SO-1: SWITZERLAND: Solothurn: Ammansegg, mosses on floor of deciduous forest; 14. V. 1972; leg. S. Mahunka & L. Mahunka-Papp — (Bp-10).

SO-2: SWITZERLAND: Solothurn: Ammansegg, litter and dry leaves in mixed forest; 4. V. 1972; leg. S. Mahunka & L. Mahunka-Papp — (Bp-11).

SO-3: SWITZERLAND: Solothurn: Schnottwil, mosses; 27. IX. 1974; leg. S. Mahunka & L. Mahunka-Papp — (Bp-132).

SO-4: SWITZERLAND: Solothurn: Schnottwil, Bucheggberg, thick layer of mosses on floor of old pine forest; 27. IX. 1987; leg. S. Mahunka & L. Mahunka-Papp — (Bp-46).

SO-5: SWITZERLAND: Solothurn: Schnottwil, Bucheggberg, mosses on bark of a live deciduous tree; 27. IX. 1987; leg. S. Mahunka & L. Mahunka-Papp — (Bp-47).

SO-6: SWITZERLAND: Solothurn: Schnottwil, Bucheggberg, dry needles in pine (*Pinus* sp.) forest; 27. IX. 1987; leg. S. Mahunka & L. Mahunka-Papp — (Bp-48).

TG-3: SWITZERLAND: Thurgau: Hudelmoos near Hagenwil, peat-bog with *Sphagnum* sp., 600 m; 13. IX. 1993; leg. C. Besuchet — (Bp-88).

TG-7: SWITZERLAND: Thurgau: Müllheim, dry leaves in mixed forest; 13. IX. 1987; leg. S. Mahunka & L. Mahunka-Papp — (Bp-42).

TG-8: SWITZERLAND: Thurgau: Müllheim, rotten trunk with mosses; 13. IX. 1987, leg. S. Mahunka & L. Mahunka-Papp — (Bp-43).

TG-9: SWITZERLAND: Thurgau: between Bischofszell and Hauptwil, moss on forest floor with ferns; 11. VI. 1983; leg. T. & Z. Adamis — (Bp-21).

TG-10: SWITZERLAND: Thurgau: between Bischofszell and Hauptwil, moss on forest floor and dry needles in pine (*Pinus* sp.) forest; 11. VI. 1983; leg. T. & Z. Adamis — (Bp-22).

TI-3: SWITZERLAND: Ticino: Bordei at base of Mount Gridone ("massif de refuge"), old chestnut stumps in forest, sifting, 700 m; 24. IV. 1992; leg. C. Besuchet — (Bp-90).

TI-9: SWITZERLAND: Ticino: Nufenen Pass, dry leaves and rotten wood in larch forest; 15. VI. 1979; leg. S. Mahunka & L. Mahunka-Pap — (Bp-18).

TI-11: SWITZERLAND: Ticino: Rancate, chestnut forest, sifting; 7. IX. 1965; leg. C. Besuchet — (Bp-25).

TI-16: SWITZERLAND: Ticino: Serpiano, dead leaves in oak forest; 14. VI. 1979; leg. S. Mahunka & L. Mahunka-Papp — (Bp-16).

TI-17: SWITZERLAND: Ticino: Serpiano, mosses on floor of oak forest; 14. VI. 1979; leg. S. Mahunka & L. Mahunka-Papp — (Bp-17).

TI-22: SWITZERLAND: Ticino: Cortascio above Brissago, sifting in ravine, 1050 m; 22. IV. 1992; leg. C. Besuchet — (Bp-157).

TI-23: SWITZERLAND: Ticino: Alpe d' Arena above Vergeletto, at base of rocks, 1700 m; 22. VII. 1983; leg. C. Besuchet — (Bp-142).

TI-25: SWITZERLAND: Ticino: Centovalli, Moneto, dead leaves, 800 m; 23. VII. 1983; leg. C. Besuchet — (Bp-144).

TI-26: SWITZERLAND: Ticino: Valle Onsernone, Spruga, mosses and humus, 1000 m; 22. VII. 1983; leg. C. Besuchet — (Bp-141).

TI-37: SWITZERLAND: Ticino: Rancate, old tree stump, extraction by flotation of soil; 5. VI. 1969; leg. C. Besuchet & I. Löbl (Te-69/34) — (Bp-192).

TI-38: SWITZERLAND: Ticino: Ascona, Monte Verità, dead leaves and soil, 450 m; 5. XI. 1984; leg. C. Besuchet — (Bp-210).

TI-40: SWITZERLAND: Ticino: Brissago, dead leaves and old tree stump; 26. IV. 1985; leg. C. Besuchet & I. Löbl — (Bp-215).

TI-42: SWITZERLAND: Ticino: Cortascio above Brissago, sifting of mosses, 900 m; 20. V. 1998; leg. C. Besuchet — (Bp-229).

UR-1: SWITZERLAND: Uri: Klausen Pass, litter of *Rhododendron* sp., 2000 m; 23. VIII. 1983; leg. I. Löbl — (Bp-60).

VD-4: SWITZERLAND: Vaud: La Dôle, litter and dead leaves in alder forest, 1000 m; 7. V. 1972; leg. S. Mahunka & L. Mahunka-Papp — (Bp-8).

VS-4: SWITZERLAND: Valais: Daubensee, mosses and grass, 2200 m; 11. VIII. 1980; leg. C. Besuchet — (Bp-32).

VS-11: SWITZERLAND: Valais: Grammont, sifting of mosses, 2000 m; 30. VI. 1989; leg. C. Besuchet — (Bp-79).

VS-41: SWITZERLAND: Valais: Val d'Anniviers, mosses, 1100 m; 11. V. 1980; leg. S. Vit — (Bp-222).

VS-44: SWITZERLAND: Valais: Saas-Almagell, waterlogged mosses, 1650 m; 5. VII. 1997; leg. C. Besuchet — (Bp-225).

VS-45: SWITZERLAND: Valais: St. Maurice, dead leaves at base of rocks; 11. VII. 1980; leg. C. Besuchet — (Bp-226).

VS-46: SWITZERLAND: Valais: Val d'Anniviers, St. Jean, decaying wood, 1300 m; 11. V. 1980; leg. S. Vit — (Bp-227).

VS-47: SWITZERLAND: Valais: Val d'Anniviers, St. Jean, ash-tree and *Lasius* sp., 1400 m; 11 .V. 1980; leg. S. Vit — (Bp- 228).

VS-48: SWITZERLAND: Valais: Vouvry, layer of mosses from a rocky slope on the trail to the cave "Grotte de la Pierre à Perret", (B), 460 m; 10. VIII. 1989; leg. B. Hauser — (Bp-237).

VS-52: SWITZERLAND: Valais: above Haute-Nendaz, mosses, 1800 m; 2. VII. 1981; leg. C. Besuchet — (Bp-241).

VS-53: SWITZERLAND: Valais: Traquit; VIII. 1944; leg. E. Wettstein — (Bp-242).

VS-54: SWITZERLAND: Valais: Cr. de la Lex; 22. VIII. 1944; leg. E. Wettstein — (Bp-243).

List of newly determined Swiss species

Carabodes C. L. Koch, 1835

Carabodes areolatus Berlese, 1916

Carabodes areolatus Berlese 1916: 331.

Localities: GR-5, SO-5, TI-22, TI-23, TI-37, TI-38, TI-40, VS-47.

Distribution: Holarctic Region.

Carabodes coriaceus C. L. Koch, 1835

Carabodes coriaceus C. L. Koch 1835: 3, 15.

Localities: GE-6, GR-8, LU-2, SO-2, SO-6, TG-3, TI-17, TI-25, TI-42.

Distribution: Holarctic Region; **confirmation of the Swiss record.**

Carabodes femoralis (Nicolet, 1855)

Tegeocranus femoralis Nicolet 1855: 466, pl. 9: 1, 1a–f, 2.

Localities: LU-5, SO-1, TG-3, TG-8, TI-17, TI-22, TI-40, VS-4.

Distribution: Europe; **confirmation of the Swiss record.**

Carabodes intermedius Willmann, 1951

Carabodes intermedius Willmann 1951: 169, fig. 11.

Localities: VS-53, VS-54.

Distribution: Europe (Alps).

Remarks: The identified specimens are mounted on 2 slides: W. 1149 (VS-53) and W. 1150 (VS-54) and are part of the Wettstein collection, which is deposited in the Naturhistorisches Museum, Basel (see: Mahunka 1996, Pestalozzi 1962). Apart from the scant locality labels on the slides, no other documen-

tation on the provenance of this material exists. Thanks to the helpful information by Dr. Y. Gonseth (Neuchâtel)[1] we are sure that the specimens were collected in the canton of Valais. Concerning "Traquit": there exists a mountain hut called "Cabane Tracuit" (618/108), 3256 m, (= cabane de Traquit), a pass called "Col Tracuit" (618/108), 3250 m and also an alpine pasture "Alpage Tracuit" (616/108) 2600 m above Zinal. Concerning "Cr. de la Lex": there exists a "Croix de la Lé" (553/134) above Port Valais and a "Creux de la Lé" near the pass "Col du Sanetsch" (587/133) 2300 m.

Carabodes labyrinthicus (Michael, 1879)

Tegeocranus labyrinthicus Michael 1879: 249, pl. 11: 2–3.

Localities: AP-1, FR-7, GR-1, GR-5, GR-15, GR-17, GR-18, JU-2, LU-2, SO-1, SO-4, SO-6, TG-8, TG-9, TI-38, UR-1, VD-4, VS-4, VS-52.

Distribution: Holarctic Region.

Carabodes marginatus (Michael, 1884)

Tegeocranus marginatus Michael 1884: 322, pl. 21: 5, pl. 22: 1–2.

Localities: GR-5, GR-9, GR-11, GR-15, GR-17, LU-2, SO-3, TG-3, TI-9, TI-17, VS-44.

Distribution: Palaearctic Region.

Carabodes minusculus Berlese, 1923

Carabodes minusculus Berlese 1923: 257.

Localities: GR-15, GR-18, TI-3, TI-23, VS-11.

Distribution: Europe; **confirmation of the Swiss record.**

Carabodes oenipontanus sp. nov.

Locality: TI-37.

Description: see below.

Carabodes ornatus Storkán, 1925

Carabodes ornatus Storkán 1925: 21, fig. 4.

Localities: GR-5, GR-11, TG-7, TI-3, TI-25, TI-40, VS-41, VS-48.

Distribution: Palaearctic Region.

Carabodes reticulatus Berlese, 1913

Carabodes coriaceus Koch var. *reticulatus* Berlese 1913: 95, pl. 7: 74.

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[1] translation in English of the e-mail of 22. IX. 2006 to Dr. B. Hauser

Localities: TI-22, UR-1, VS-41, VS-47.
Distribution: Europe; **first record for Switzerland.**

Carabodes rugosior Berlese, 1916
Carabodes femoralis Nicolet var. *rugosior* Berlese 1916: 327.
Localities: FR-7, LU-1, SO-4, TG-3, TG-9, TI-23, TI-26, TI-42, VS-41.
Distribution: Holarctic Region.

Carabodes schatzi Bernini, 1976
Carabodes schatzi Bernini 1976: 16–20, figs. V: a–b.
Localitiy: GR-9, TI-38, TI-42.
Distribution: Europe (Alps); **first record for Switzerland.**

Carabodes tenuis Forsslund, 1953
Carabodes tenuis Forsslund 1953: 373–375, figs. 2–3.
Localities: GL-2, TI-9.
Distribution: N-Europe, Alps; **first record for Switzerland.**

Carabodes thaleri sp. nov.
Locality: VS-46.
Description: see below.

Odontocepheus Berlese, 1913

Odontocepheus elongatus (Michael, 1879)
Tegeocranus elongatus Michael 1879: 250, pl. 10: 7–10.
Localities: GR-16, LU-5, TG-10, TI-11, TI-16, TI-22, TI-37, TI-40, TI-42, VS-45.
Distribution: Palaearctic Region; **confirmation of the Swiss record.**

Description of new species

***Carabodes oenipontanus* sp. nov.** (Figs. 1–5)

Material examined: Switzerland: Holotype: Ticino: TI-37 (MHNG[2]).

Paratypes: 4 Ex. from the same sample. 2 paratypes: MHNG[2] and 2 paratypes (1661-P0-02): HNHM[3].

Diagnosis: Prodorsum foveolate anteriorly and rugose in basal part medially, with a stronger, crest-like structure transversally in front of the notogaster. Interlamellar and notogastral setae dilated, with median crest and spicules. Sensillus long (Fig. 4), its head spiculate and multiramose, with short branches. Circumgastric depression present, notogastral surface alveolate. Epimeral setal formula: 3-1-3-3. Anogenital setal formula: 4-1-2-3.

Measurements: Length of body: 396–445 µm, width of body: 198–220 µm.

Prodorsum: Rostrum, rostral part of prodorsum and whole surface of lamellae distinctly foveolate. Median surface of prodorsum, posterior to interlamellar setae, irregularly rugose, rugae running longitudinally (Fig. 5). The intermediate fields formed by confluent foveolae. This region bordering a strong discontinuous crest basally. Rostrum slightly elongate. Rostral setae long, curved inwards, slightly bacilliform with pointed apex (Fig. 1). Lamellae normal, well sculptured by foveolae, bearing the short, wide, lamellar setae. Interlamellar setae wide, arising on the prodorsal surface, nearly penicilliform. Sensillus long (Fig. 4), its head spiculate and multiramose, with short branches. Dorsosejugal depression hardly observable, only a narrow slit visible.

Notogaster: Anterior margin slightly undulate. Humeral process small, wide. Circumgastric depression present. Whole surface irregularly foveolate, border of the foveolae consisting of small arches, appearing flower-shaped (Fig. 3). Ten pairs of broad, clavate, distinctly barbed notogastral setae, with high median crest.

Ventral regions (Fig. 2): Mentum, epimeral surface with simple, normal foveolae, ventral plate with larger and irregular ones, genital and anal plates also foveolate, but with deeper and smaller foveolae. Coxisternal, genital and aggenital setae simple, spiniform. Anal setae and setae ad_3 setiform, setae ad_1 and ad_2 ciliate, spiculate.

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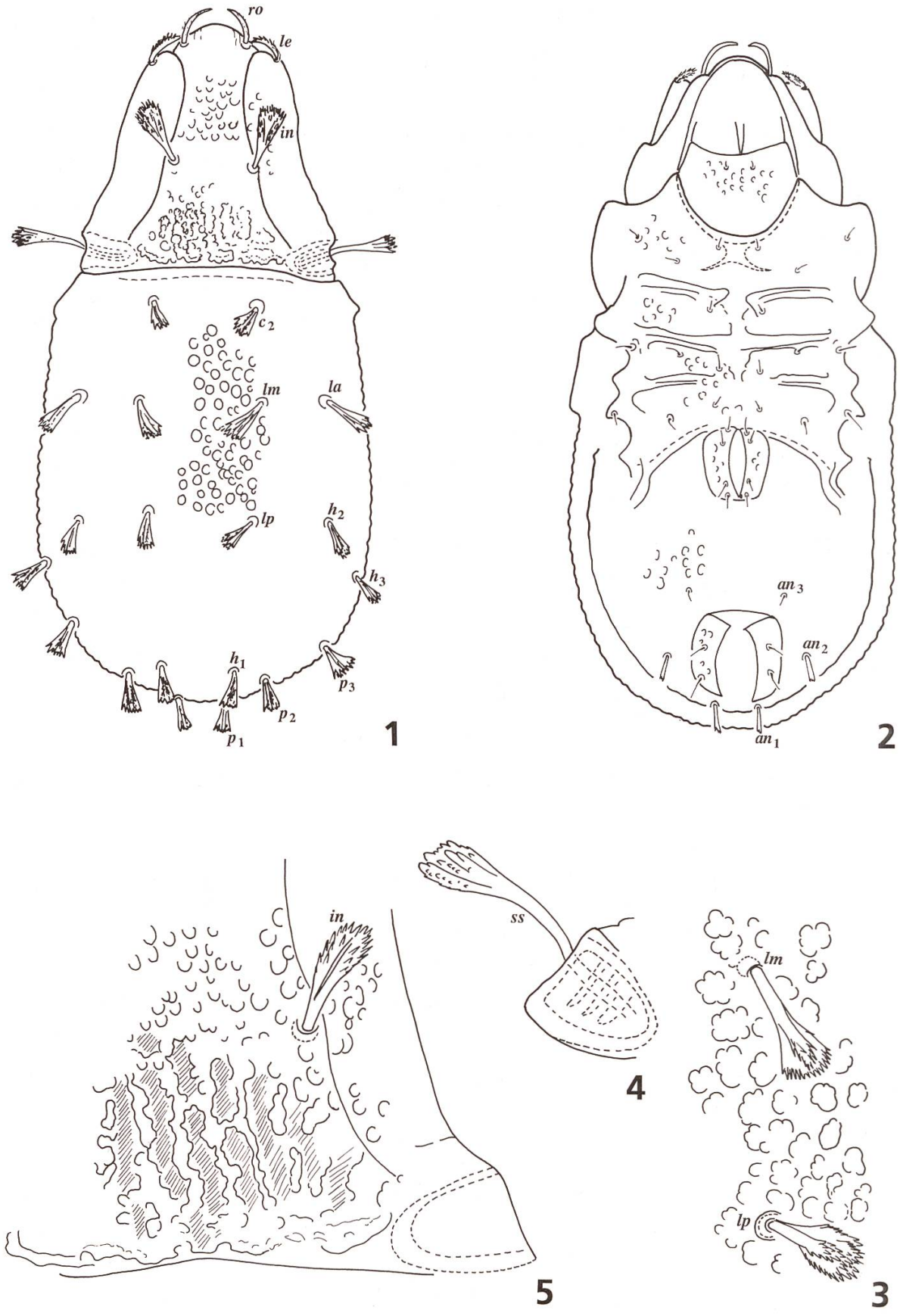
[2] MHNG = deposited in the Muséum d'Histoire naturelle, Geneva.

[3] HNHM = deposited in the Hungarian Natural History Museum, Budapest, with identification number of the specimens in the Collection of Arachnida.



Figs. 1–5. ***Carabodes oenipontanus*** **sp. nov. – 1: body in dorsal view; – 2: body in ventral view; – 3: notogastral surface with setae; – 4: trichobothrium; – 5: surface of the basal part of the prodorsum with interlamellar setae.**

Legs: Femur of legs I and II, trochanter and femur of legs III–IV foveolate. Setae *u* in all legs long, attenuate.

Remarks: The new species belongs to the "*minusculus*" group with a sensillus grooved at tip. It is more similar to *Carabodes granulatus* Banks, 1895, however it differs from that species by the median sculpture of prodorsum (no longitudinal ridges in *C. granulatus*), much larger notogastral setae and by the shape of notogastral setae (penicilliform in *C. granulatus*).

Derivatio nominis: We dedicate this species to the late Konrad Thaler (1940–2005) as an outstanding representant of the Innsbruck School of Alpine Zoology (*Oenipons* = Latin translation of Innsbruck).

Established in 1863 by Camillo Heller (1823–1917), the first holder of the professorial chair of modern Zoology at the Innsbruck University, the Tyrolian center of high altitude zoology (in German "Hochgebirgszoologie"), counts furthermore such famous naturalists as Karl Wilhelm von Dalla Torre (1850–1928), Otto Steinböck (1893–1969) and Heinz Janetschek (1913–1997) in its lineage (more details in: Janetschek, 1969, Thaler, 1997).

***Carabodes thaleri* sp. nov.** (Figs. 6–11)

Material examined: Switzerland: Holotype: Valais: VS–4 (MHNG).

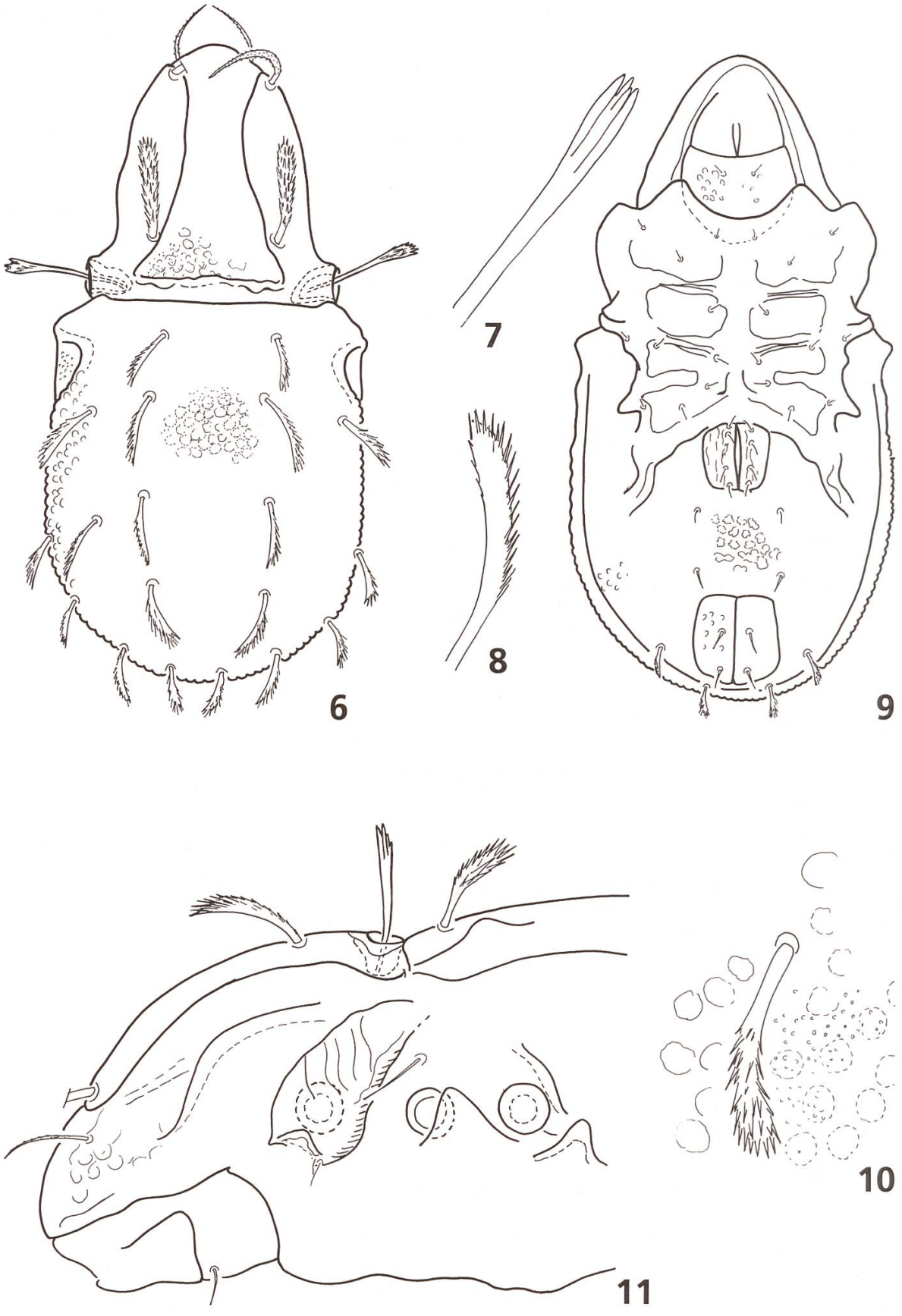
2 paratypes from the same sample. 1 paratype: MHNG and 1 paratype (1691-P0-05): HNHM.

Diagnosis: Prodorsum foveolate anteriorly and tuberculate in basal part medially, with a stronger, crest-like structure transversally in front of the notogaster. Interlamellar and notogastral setae dilated, with median crest and spicules. Sensillus long, straight, its narrow head divided. Notogastral surface tuberculate. Epimeral setal formula: 3-1-3-3. Anogenital setal formula: 4-1-2-3.

Measurements: Length of body: 433–472 µm, width of body: 220–248 µm.

Prodorsum: Rostral apex, a small part of prodorsum and surface of lamellae distinctly foveolate. Median and basal surface of prodorsum distinctly tuberculate. This region bordering a strong crest basally (Fig. 6). Rostral and lamellar setae long, roughened, curved inwards, slightly bacilliform with pointed apex. Lamellae normal, well sculptured by foveolae, bearing the lamellar and interlamellar setae (Fig. 8). The latter setae wide, nearly plumose. Sensillus long, straight, its narrow head divided (Fig. 7). Dorsosejugal depression narrow, distinct, as a narrow slit. Tutorum (Fig. 11) well developed.

Notogaster: Anterior margin straight. Humeral process small, but well observable. Whole surface except the humeral parts irregularly tuberculate,



Figs. 6–11. ***Carabodes thaleri*** **sp. nov. – 6: body in dorsal view; – 7: sensillus; – 8: interlamellar seta; – 9: body in ventral view; – 10: notogastral surface with seta *la*; – 11: body in lateral view.**

border of the tubercles indistinct. Above the tubercles a granulate layer present (Fig. 10). Ten pairs of broad, clavate, distinctly barbed notogastral setae, with median crest.

Ventral regions (Fig. 9): Infracapitulum rarely foveolate, epimeral surface nearly smooth, but the granulate layer also present. Ventral plate with larger and irregular tubercles, genital plates with longitudinal ribs, anal plates also foveolate. Coxisternal, genital and aggenital setae simple, spiniform. Anal setae and setae ad_3 setiform, setae ad_1 and ad_2 ciliate, spiculate.

Legs: Femur of legs I and II, trochanter and femur of legs III–IV foveolate. Setae *u* in all legs long, attenuate.

Remarks: The new species is well characterised by the dorsal and ventral sculpture, the shape of the interlamellar and notogastral setae and the shape of the sensilli. This combination of the features was unknown in the genus *Carabodes* until now.

Derivatio nominis: This species is dedicated to the memory of our friend and renowned arachnologist, the late Prof. Dr. Konrad Thaler (Innsbruck), who was the first who invited us in 1969 to collect mites in Central Europe (Obergurgl) on the other side of the iron curtain.

A preliminary list of Swiss Carabodidae

Carabodes areolatus Berlese, 1916
Carabodes coriaceus C. L. Koch, 1835
Carabodes femoralis (Nicolet, 1855)
Carabodes intermedius Willmann, 1951
Carabodes labyrinthicus (Michael, 1879)
Carabodes marginatus (Michael, 1884)
Carabodes minusculus Berlese, 1923
Carabodes oenipontanus sp. nov.
Carabodes ornatus Storkán, 1925
Carabodes reticulatus Berlese, 1913
Carabodes rugosior Berlese, 1916
Carabodes schatzi Bernini, 1976
Carabodes tenuis Forsslund, 1953
Carabodes thaleri sp. nov.
Carabodes wettsteini Mahunka, 1996
Odontocepheus elongatus (Michael, 1879)

1 (24) Setae c_2 originating medially, far from the shoulder, in the longitudinal line of setae *lm* and *lp*

2 (17) Entire inner surface of notogaster comprising convex elements: tubercles, pustules, granules or rugae, without areolae

3 (4) Entire inner surface of notogaster with rugulose sculpture, at places interrupted by narrow furrows. Setae c_2 of notogaster much longer than the other notogastral setae and clearly directed forwards ..... ***intermedius*** WILLMANN

4 (3) Inner surface of notogaster with more or less independent roundish or polygonate outgrowths. Setae c_2 of notogaster differing neither in length nor in direction from the other notogastral setae

5 (8) Dorsosejugal depression very narrow, slit-like, sometimes hardly discernible

6 (7) Notogastral setae erect. Setae c_2 not longer than the other notogastral setae ..... ***schatzi*** BERNINI

7 (6) Setae of notogaster adpressed on body surface. Setae c_2 much longer than the other notogastral setae..... ***minusculus*** BERLESE

8 (5) Dorsosejugal depression wide, well discernible

9 (14) Inner and marginal setae of notogaster approximately of the same length, or the marginal setae somewhat longer than the inner ones

10 (11) Inner surface of notogaster with clearly delimited tubercula forming clear polygonal sculpture ..... ***marginatus*** (MICHAEL)

11 (10) Sculpture of notogaster different, without clearly delimited tubercula forming a polygonal structure, sculpture comprising merely tubercula

12 (13) Interlamellar and notogastral setae narrow, simple. Sensillus curved ..... ***wettsteini*** MAHUNKA

13 (12) Interlamellar and notogastral setae plumose. Sensillus straight ..... ***thaleri*** sp. nov.

14 (9) Marginal setae only about half as long as length of inner ones

15 (16) Notogaster covered with tubercula arranged on twisting, broad rugae ..... ***coriaceus*** C. L. KOCH

16 (15) Notogastral tubercula small, forming an irregular, blurred polygonal sculpture ..... ***ornatus*** STORKÁN

17 (2) Entire inner surface of notogaster comprising areolae and hollows, at most they are framed by keels and polygonal tubercula

18 (19) All notogastral and interlamellar setae strongly broadened: phylliform ..... ***oenipontanus*** sp. nov.

19 (18) All notogastral and interlamellar setae setiform, stick- or spindle-

shaped, at most only some may be slightly broadened

20 (21) Size of notogastral alveoli identical, separated from each other, no polygonal sculpture visible around them ..... ***tenuis*** FORSSLUND

21 (20) Size of notogastral alveoli different, framed by polygonal sculpture

22 (23) Dorsosejugal depression wide, anterior margin arcuating anteriad. Anterior margin of notogaster with a large, median tuberculum. Interlamellar setae broadening anteriorly, straight..... ***reticulatus*** BERLESE

23 (22) Dorsosejugal depression narrow, anterior margin straight. Anterior margin of notogaster without a tuberculum..... ***areolatus*** BERLESE

24 (1) Setae c_2 originating laterally, near the shoulder, in the longitudinal line of setae *la* and h_2

25 (26) Notogastral and interlamellar setae longer than sensillus. Notogastral sculpture comprising regularly dispersed tubercula confluent into rugae ..... ***labyrinthicus*** (MICHAEL)

26 (25) Notogastral and interlamellar setae much shorter than sensillus. Notogaster with larger rugae and a medial outgrowth

27 (28) Surface of notogastral rugae with granules. Notogastral setae stick-shaped ..... ***rugosior*** BERLESE

28 (27) Notogastral rugae with tubercula. Notogastral setae broadened ..... ***femoralis*** (NICOLET)

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References

Bernini, F. (1976): Notulae Oribatologicae XIV. Revisione di *Carabodes minusculus* Berlese 1923 (*Acarida, Oribatei*). — Redia 54: 1–49.

Borcard, D. (1991a): Les Oribates des tourbières du Jura suisse (Acari, Oribatei): Écologie. I. Quelques aspects de la communauté d'Oribates des sphaignes de la tourbière du Cachot. — Revue Suisse de Zoologie 98(2): 303–317.

Borcard, D. (1991b): Les Oribates des tourbières du Jura suisse (Acari, Oribatei): Écologie. II. Les relations Oribates–environnement à la lumière du test de Mantel. — Revue d'Écologie et de Biologie du Sol 28(3): 323–339.

Borcard, D. (1991c): Les Oribates des tourbières du Jura suisse (Acari, Oribatei): Écologie. III. Comparaison a posteriori de nouvelles récoltes avec un ensemble de données de référence. — Revue Suisse de Zoologie 98(3): 521–533.

Borcard, D. (1992): Les Oribates des tourbières du Jura suisse (Acari, Oribatei). Faunistique IV. Caraboidea, Tectocepheoidea, Oppioidea (Oppiidae). — Mitteilungen der Schweizerischen Entomologischen Gesellschaft 65: 241–250.

Borcard, D., Geiger, W. & Matthey, W. 1995. Oribatid mite assemblages in a contact zone between a peat-bog and a meadow in the Swiss Jura (Acari, Oribatei): influence of landscape structures and historical processes. — Pedobiologia 39: 318–330.

Grandjean, F. (1951): Observations sur les Oribates (23^{e} série). — Bulletin du Muséum National d'Histoire Naturelle, Paris (2^{e} série) 23(3): 261–268.

Janetschek, H. (1969): Aus der Geschichte der Zoologie in Innsbruck. — Zoologischer Anzeiger 32. Supplementband. Verhandlungen der Deutschen Zoologischen Gesellschaft in Innsbruck 1968: 56–65.

Mahunka, S. (1986): A survey of the family Carabodidae C. L. Koch, 1836 (Acari: Oribatida). — Acta Zoologica Hungarica 32(1–2): 73–135.

Mahunka, S. (1987): A survey of the family Carabodidae C. L. Koch, 1836 (Acari: Oribatida), II. — Acta Zoologica Hungarica 33: 399–434.

Mahunka, S. (1996): Oribatids from Switzerland II (Acari: Oribatida) (Acarologica Genavensia XC). — Folia Entomologica Hungarica 57: 125–129.

Mahunka, S. & Mahunka-Papp, L. (2003): Oribatids from Switzerland VIII (Acari: Oribatida: Ptyctima). (Acarologica Genavensia CIII). — Revue Suisse de Zoologie 110(3): 453–481.

Pestalozzi, G. (1962): Prof. Dr. Ernst Wettstein 1878–1962. Kantonale Oberrealschule Zürich, Jahresbericht 1961/62: 50–51.

Reeves, R.M. (1992): *Carabodes* of the eastern United States and adjacent Canada (Acari: Oribatida: Carabodidae). — Canadian Journal of Zoology 70: 2042–2058.

Reeves, R.M. & Behan-Pelletier, V. (1998): The genus *Carabodes* (Acari: Oribatida: Carabodidae) of North America, with descriptions of new western species. — Canadian Journal of Zoology 76: 1898–1921.

Schweizer, J. (1922): Beitrag zur Kenntnis der terrestrischen Milbenfauna der Schweiz. — Verhandlungen der Naturforschenden Gesellschaft in Basel 33: 23–112 + pls. I–IV.

Schweizer, J. (1948): Landmilben aus der Umgebung des schweizerischen Nationalparks. — Ergebnisse der wissenschaftlichen Untersuchung des schweizerischen Nationalparks (N. F.) 2(20): 1–28.

Schweizer, J. (1956): Die Landmilben des schweizerischen Nationalparkes 3.Teil: *Sarcoptiformes* REUTER 1909. — Ergebnisse der wissenschaftlichen Untersuchungen des schweizerischen Nationalparks (N. F.) 5(34): 213–377.

Schweizer, J. (1957): Die Landmilben des schweizerischen Nationalparkes 4.Teil: Ihr Lebensraum, ihre Vergesellschaftung unter sich und ihre Lebensweise. — Ergebnisse der wissenschaftlichen Untersuchungen des schweizerischen Nationalparks (N. F.) 6(37): 9–107 + tabs. I–XII.

Thaler, K. (1997): In memoriam em. Univ. Prof. Dr. Heinz Janetschek (1913–1997). — Berichte des Naturwissenschaftlich-Medizinischen Vereins in Innsbruck 84: 411–417.

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