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New Species of the *Trechus* (*Microtrechus*) *uncifer*-group from the Southern Appalachians (Coleoptera: Carabidae)

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Abstract

Three new species of the *Trechus* (*Microtrechus*) *uncifer*-group BARR, 1962 are described from the southern Appalachians in North Carolina and Tennessee (USA): *T. thunderheadensis* sp.n. from Thunderhead Mountain (Great Smoky Mountains), *T. plottbalsamensis* sp.n. from Waterrock Knob (Plott Balsams) and *T. tusquitensis* sp.n. from Tusquitee Bald (Nantahala Mountains). Three former subspecies of *T. aduncus* BARR, 1962 are raised to proper species: *T. cowensis* BARR, 1979 stat.n., *T. howellae* BARR, 1979 stat.n. and *T. toxawayi* BARR, 1979 stat.n. The aedeagus of all species is figured.

Key Words: Carabidae, Trechinae, Trechini, *Trechus*, *Microtrechus*, Nearctic, USA, North Carolina, Tennessee, Appalachians, taxonomy, new species.

Zusammenfassung

Drei neue Arten der *Trechus* (*Microtrechus*) *uncifer*-Gruppe BARR, 1962 werden aus den südlichen Appalachen in North Carolina und Tennessee (USA) beschrieben: *T. thunderheadensis* sp.n. vom Thunderhead Mountain (Great Smoky Mountains), *T. plottbalsamensis* sp.n. vom Waterrock Knob (Plott Balsams) und *T. tusquitensis* sp.n. vom Tusquitee Bald (Nantahala Mountains). Drei Unterarten des *T. aduncus* BARR, 1962 werden in den Rang von Arten erhoben: *T. cowensis* BARR, 1979 stat.n., *T. howellae* BARR, 1979 stat.n. und *T. toxawayi* BARR, 1979 stat.n. Der Aedeagus aller Arten wird abgebildet.

Introduction

The southern Appalachians are inhabited by a unique diversity of species of the genus *Trechus* CLAIRVILLE, 1806. Around 60 species are known from this comparatively small area! All are wingless and restricted to cool and moist habitats in the forest zone. Therefore most of them are endemics of a single mountain peak or a mountain range above 1000 m or a cave system. The composition of this fauna has been revised in several papers by BARR (1962, 1979, 1985). Nevertheless there are still about 20 species and subspecies waiting for description.

The author conducted intensive collections for 28 days in May/June 2004 in more than 30 locations. The preferred collection technique was sifting humid and wet leaf litter and needle duff from the forest floor. This resulted in findings of thousands of specimens of *Trechus* representing most of the described species and several new ones. The main purpose of this first paper is to summarize the results of these collections with respect to the *uncifer*-group as established by BARR (1962, 1979) of the subgenus *Microtrechus* JEANNEL, 1927.

The subgenus *Microtrechus* is defined within the genus *Trechus* by the following characteristics:

- in males only first segment of protarsus enlarged¹ (otherwise two segments enlarged) and
- endemic in the Southern Appalachians.

All species are wingless and small to moderately large sized (2.5–5.5 mm). Therefore the name *Microtrechus* is misleading. Colour ranges from pale to piceous. Apart from the single dividing characteristic the members of *Microtrechus* look like and live like *Trechus* s.str. Therefore it is a matter of preference to deal with *Microtrechus* as a full genus or as a subgenus of the huge and very diverse genus *Trechus* (ca. 1000 species). Both subgenera are present in the southern Appalachians: *Microtrechus* is more diverse and with the majority of species SW of the Ashville Basin. *Trechus* s.str. with the majority of species NE of the Ashville Basin (BARR 1979).

The subgenus was divided into three groups by BARR (1962, 1979). This paper deals with the *uncifer*-group.

Abbreviations

CO	- County	NC	- North Carolina
GSM	- Great Smoky Mountains	TN	- Tennessee
MD	- Martin Donabauer	USA	- United States of America

Acknowledgements

Thanks to my wife Barbara for her patience and support in the Appalachians. Further more I'm grateful to Dr. Birgit Milachowski, Dr. Alexander Dostal and Dr. Peter Cate for reviewing this paper.

Method

Full taxonomic descriptions are provided for new species. Descriptive statistics for measurements and proportions are provided in tables at the end of the paper. For already described species please refer to the original descriptions. A key is not provided, because there are no significant characteristics beside the aedeagus. For determination please use the distribution map and the aedeagus figures. All specimens including holotypes and paratypes are stored in the author's collection.

Trechus (Microtrechus) uncifer-group BARR, 1979 ⁿ

Definition:

- Male aedeagus with a strongly hooked apex and
- Internal sack armed with large or very large scales

All 11 species belonging to this group are small to medium sized (2.7-4 mm) and rather elongated and convex, i.e. in average larger than most of the members of the *vandykei*-group and smaller than the members of the *nebulosus*-group. In respect of the form of the aedeagus the *uncifer*-group is very similar to *T. verus* BARR, 1962 and *T. stupkai* BARR, 1979 (*nebulosus*-group, both species lack the presence of large scales in the internal sack). Therefore it is uncertain that these two groups are monophyletic. Nevertheless this way of grouping is helpful for determination.

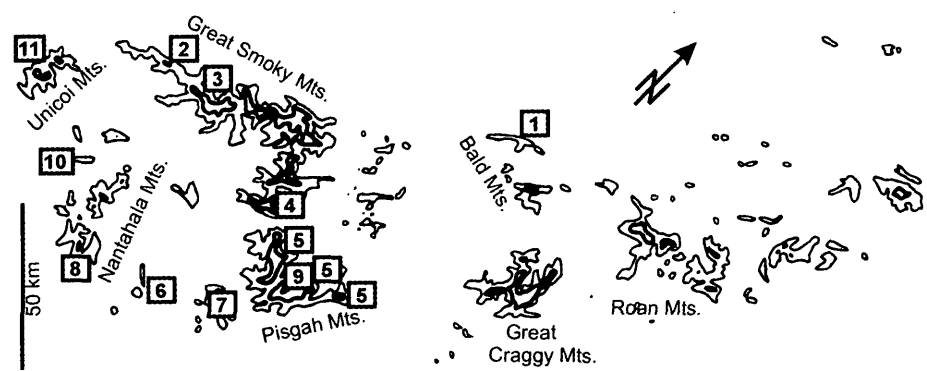
¹ some undescribed Ethiopian *Trechus* share this characteristic.

Catalogue:

1. <i>Trechus (Microtrechus) inexpectatus</i> BARR, 1985	Camp Creek Bald
2. <i>Trechus (Microtrechus) thunderheadensis</i> sp.n.	GSM - Thunderhead Mountain
3. <i>Trechus (Microtrechus) uncifer</i> BARR, 1962	GSM - Central
4. <i>Trechus (Microtrechus) plottbalsamensis</i> sp.n.	Plott Balsam Mountains
5. <i>Trechus (Microtrechus) aduncus</i> BARR, 1962	Great Balsam Mountains, Pisgah Ridge
6. <i>Trechus (Microtrechus) cowensis</i> BARR, 1979 stat.n.	Cowee Mountains: Yellow Mountain
7. <i>Trechus (Microtrechus) toxawayi</i> BARR, 1979 stat.n.	Toxaway Mountain
8. <i>Trechus (Microtrechus) howellae</i> BARR, 1979 stat.n.	Nantahala Mountains: Big Butt
9. <i>Trechus (Microtrechus) satanicus</i> BARR, 1962	Pisgah Ridge: West
10. <i>Trechus (Microtrechus) tusquitensis</i> sp.n.	Tusquitee Bald
11. <i>Trechus (Microtrechus) talequah</i> BARR, 1962	Unicoi Mountains

Habitats: All species are extremely hygrophilous and restricted to cool habitats at the highest elevations of the southern Appalachians. Appropriate habitats are moss carpets on rocks, wet layers of leaf litter around springs, under stones in muddy seeps, etc. None of the species is common. They are much rarer and more localized than the syntopic representatives of the other groups.

Distribution: The members of *uncifer*-group are spread discontinuously over the largest part of the distribution area of *Microtrechus* (see distribution map). An interesting fact is that in most areas only a single species of the group exists. Both other groups are often present with 2-5 syntopic and closely related species on the same mountain. The *uncifer*-group is by far the smallest in respect of the number of species and the morphological diversity. The extreme similarity of the species in the body shape is demonstrated by figures 7 and 8.



Map of distribution: Southern Appalachians in NC and TN. Thin contour level: 1200 m; thick contour level: 1500 m. Numbers are explained in the catalogue.

Annotated Checklist and Descriptions:

1. *Trechus (Microtrechus) inexpectatus* BARR, 1985 (Fig. 23)

No material studied. Type locality: Camp Creek Bald.

Discussion: This geographically very isolated species (derivation of the name!) is the only representative of the group NE of the Ashville basin. Although I visited Camp Creek Bald, investigated several places and was able to collect more than 150 specimens of *Trechus* there, I could not find *T. inexpectatus*. This and the type series consisting of two specimens indicate that *T. inexpectatus* is exceedingly rare. For the aedeagus see a copy of the figure provided by BARR (1985). The scale seems to be wrong.

2. *Trechus (Microtrechus) thunderheadensis* sp. n. (Fig. 1, 4)

Type Material: Holotype ♂ and 32 paratypes (20 ♂♂, 12 ♀♀): USA, NC/TN, Blount/Swain CO, GSM, Thunderhead Mountain, 8.VI.2004, leg. MD (coll. MD).

Diagnosis: a rather small sized species for *Microtrechus*, very close to *T. uncifer*, but separated by the very distinct apex of the aedeagus in dorsal and lateral view.

Description: Length 2.9-3.2 mm. Body moderately elongated and rather convex, elytra elongated oval, Pronotum broad. The body is entirely reddish pale to almost piceous (extremely variable), elytra very shiny with bluish lustre. Legs are entirely pale, contrasting to the body. First segments of antenna are pale, segment 3 or 4 and all following are slightly darker.

Head and Pronotum with strong microsculpture. Elytra more shiny and with less developed microsculpture (40x). Antenna normal. Eyes slightly reduced in size, rather small but not flat, length of temps shorter than eye diameter.

Pronotum comparatively broad, strongly and equally rounded laterally, slightly convex on disc, maximal width before the middle, not strongly constricted and almost not sinuate before the small hind angles, anterior and posterior margin nearly straight; front angles rounded and not prominent; hind angles right angled and small; basal foveae present and strongly impressed; median line distinct, almost extended to the extremities.

Elytra elongate ovate, convex, shoulders completely rounded and not prominent; inner striation 1-3 moderately impressed and slightly irregular, posterior and lateral more and more shallow, outer striation indistinct. The profemur is slightly thicker than in most other *Microtrechus*.

Aedeagus: Lateral view: extremely similar to *T. uncifer*, elongated and slender, shape typical for this species group with strongly hooked apex. The internal sack is armed with extremely large scales of a very characteristic form: very large, rounded, almost like a circle with a distinct and strong apical spine. The internal sack is armed with two simple copulatory pieces, covered by the scales and therefore not visible. The apex is elongated and straight in lateral view, with a distinct, strongly reflexed hook, always situated clearly before the end (very characteristic!). The hook is broader at the end than at the beginning. In dorsal view the apex is symmetric, shorter, broader and more constricted to the end than in *T. uncifer*. The aedeagus is not at all strongly constricted before the apex, neither on the left side (as in *T. uncifer*), nor on the right side (as in *T. plottbalsamensis*).

Distribution: Known from type locality only, most likely strictly endemic to Thunderhead Mountain. This isolated Mountain marks the SW end of the GSM and is inhabited by at least one more endemic species: *T. (Microtrechus) tonritu* BARR, 1962.

Habitats: The specimens were collected near the summit on the northern slopes of Thunderhead Mountain from humid leaf litter together with three other species of *Microtrechus* belonging to the *vandykei*-group. This new species was moderately common at this site.

3. *Trechus (Microtrechus) uncifer* BARR, 1962 (Fig. 2, 5)

Material: 26 ex.: 11 ♂♂, 7 ♀♀: USA, NC/TN, Servier/Swain CO, GSM, Clingmens Dome, 5.VI.2004, leg. MD (coll. MD); 8 ♂♂: USA, NC/TN, Servier/Swain CO, GSM, Mt. Collins, 5.VI.2004, leg. MD (coll. MD).

Aedeagus: in lateral view: elongated and slender, shape typical for this species group with strongly hooked apex. Internal sack is armed with extremely large scales of the same shape as in *T. thunderheadensis*. The internal sack is armed with two simple copulatory pieces. The apex is very elongated and straight in lateral view, with a distinct, strongly reflexed, very variable hook at the end. This hook is located at or near the very end. In dorsal view the apex is straight, parallel and very narrow, clearly turned to the left. The aedeagus is strongly constricted before the apex on the left side, but not at all on the right side.

Distribution: Endemic to the central GSM around Clingmens Dome. Newfound Gap seems to be a distribution barrier because no specimens of this or a related species were collected east of Newfound Gap yet.

Habitats: The specimens were collected near the summit of Clingmens Dome, the highest peak of the GSM from wet cliffs, under stones, under moss mats in spruce-fir forest. This species is comparatively rare in this area and is syntopic with 7 other species of *Microtrechus*. Rather different was the collection site at Mt Collins, where the specimens were sifted from moderately humid leaf litter in a much less 'subalpine' environment (mixed forest on the northern slope) together with the extremely common *T. bowlingi* BARR, 1962.

Discussion: The variability in the form of the apical hook of the aedeagus in the same population is remarkable. I have never made a similar observation in any other population of *Trechus*. At first sight I was convinced that two distinct species coexist on Clingmens Dome. After careful examination I found intermediate forms and there is no doubt that all specimens are conspecific.

4. *Trechus (Microtrechus) plottbalsamensis* sp. n. (Fig. 3, 6, 8)

Type Material: Holotype ♂ and 6 paratypes (4 ♂♂, 2 ♀♀): USA, NC, Haywood/Jackson CO, Waterrock Knob, 27.V.2004, leg. MD (coll. MD).

Diagnosis: A medium sized species for *Microtrechus*, similar to *T. uncifer*, but distinguished by the very distinct apex of the aedeagus in dorsal and lateral view.

Description: Length 3.1-3.4 mm. Description is identical to that of *T. thunderheadensis* and therefore not repeated.

Aedeagus: Lateral view: elongated and slender, ca. 53% of length of elytra, shape typical for this species group with strongly hooked apex. The internal sack is strongly armed with large scales of an elongated form. The apex is very elongated and straight in lateral view, with a distinct, slightly rounded hook at the extreme end. In dorsal view the apex is strongly asymmetric, narrow and strongly constricted, clearly turned to the right. The aedeagus is not at all constricted before the apex on the left side, but slightly on the right side. Parameres of typical shape, elongated.

Discussion: This new species cannot be distinguished from *T. uncifer* by external characteristics alone. Nevertheless the aedeagus is distinguished by the different form of its hooked apex, the different form of the large scales in the internal sack and the apex pointing to the right in dorsal view.

Distribution: Known from type locality only, most likely strictly endemic to the Plott Balsam Mountains.

Habitats: The specimens were sifted in a single place from wet leaf litter around a spring beside the Blue Ridge Parkway on the NW slope of Waterrock Knob. Rare!

5. *Trechus (Microtrechus) aduncus* BARR, 1962 (Fig. 9, 16)

Material: 41 ex: 20 ♂ ♀: USA, NC, Haywood/Buncombe CO, Pisgah Ridge, Mt. Pisgah, 24.V.2004, leg. MD (coll. MD); 2 ♂ ♀: USA, NC, Haywood/Transylvania CO, Pisgah Ridge, Second Falls, 24.V.2004, leg. MD (coll. MD); 19 ♂ ♀: USA, NC, Haywood/Jackson CO, Great Balsam Mountains, Richland Balsam, 27.V.2004, leg. MD (coll. MD).

Distribution: Endemic in the Great Balsam Mountains and the Pisgah Ridge.

Habitats: The specimens were sifted from wet leaf litter around springs and rivulets or were taken under well embedded stones in wet places, always syntopic with the much more common *T. barberi* JEANNEL, 1931 and *T. pisgahensis* BARR, 1979.

6. *Trechus (Microtrechus) cowensis* BARR, 1979 stat. n. (Fig. 10, 17)

Material: 45 ♂ ♀: USA, NC, Macon/Jackson CO, Yellow Mountain, 22.V.2004, leg. MD (coll. MD); 1 ♀: USA, NC, Macon/Jackson CO, Whiteside Mountain, 22.V.2004, leg. MD (coll. MD) (determination uncertain, because no male available).

Distribution: Endemic in the Cowee Mountains.

Aedeagus: Similar to the aedeagus of *T. aduncus*, but generally more curved, apical hook less turned back, with larger structures in the internal sack and finally with a broader and more symmetric apex in dorsal view. Therefore I consider *T. cowensis* as a proper species.

Habitats: The specimens were found under stones beside and on a forest street NW of the summit. The location was moderately shadowed and extremely wet in an oak forest. No other *Trechus* was taken there.

7. *Trechus (Microtrechus) toxawayi* BARR, 1979 stat. n. (Fig. 11, 18)

Material: 1 ♂: USA, NC, Jackson CO, Toxaway Mountain, 4.VI.2004, leg. MD (coll. MD).

Distribution: Endemic of the Toxaway Mountain.

Aedeagus: Not very similar to the aedeagus of *T. aduncus* and *T. cowensis*: much more elongated, straight and slender, apical hook less reflected and finally with a more slender and symmetric apex in dorsal view. Therefore I consider *T. toxawayi* as a proper species.

Habitats: The single specimen was sifted from wet leaf litter at the base of a steep cliff syntopic with the extremely common *T. barberi*. I visited the mountain twice and tried hard to find a suitable habitat for this species, but failed. This species seems to be a relict population and is exceedingly rare (probably close to extinction).

8. *Trechus (Microtrechus) howellae* BARR, 1979 stat. n. (Fig. 12, 19)

Type Material: 22 ♂ ♀: USA, NC, Macon/Clay CO, Nantahala Mountains, Big Butt, 16.V.2004, leg. MD (coll. MD).

Aedeagus: Very distinct to the aedeagus of *T. aduncus* and *T. cowensis*: much thicker and more curved in the basal part, apical hook more simple and finally with much larger structures in the internal sack. Therefore I consider *T. howellae* as a proper species.

Distribution: Endemic in the southern Nantahala Mountains on Big Butt.

Habitats: The specimens were taken under stones and under layers of leaf litter beside a forest street together with *T. barberi*. The location was in the shade and extremely wet.

9. *Trechus (Microtrechus) satanicus* BARR, 1962 (Fig. 13, 20)

Material: 1 ♂, 1 ♀: USA, NC, Haywood/Transylvania CO, Pisgah Ridge, Second Falls, 24.V.2004, leg. MD (coll. MD).

Aedeagus: Very characteristic because of the extreme length and the straight and elongated form, unique in the subgenus *Microtrechus*. Apex with a very strong hook. Similar in shape to *T. toxawayi* (much smaller, shorter, apical hook less developed) and *T. tusquitensis* sp.n. (smaller, shorter, apical hook even more developed).

Distribution: Known from Devils Courthouse and Graveyard Ridge, most likely strictly endemic to the western Pisgah Ridge.

Habitats: The specimens were sifted from wet leaf litter around a spring syntopic with *T. aduncus*, *T. barberi* and *T. pisgahensis*.

10. *Trechus (Microtrechus) tusquitensis* sp. n. (Fig. 7, 14, 21)

Type Material: Holotype ♂ and 12 paratypes (6 ♂ ♂, 6 ♀ ♀): USA, NC, Macon/Clay CO, Tusquitee Bald, 20.V.2004, leg. MD (coll. MD).

Diagnosis: A medium sized species for *Microtrechus*, most similar by the very elongated, slender and straight aedeagus to *T. satanicus*, but distinguished by the shorter aedeagus with an even more developed hook at the end of the apex. Further more both species are totally isolated geographically by three species of the *uncifer*-group in between.

Description: Length 3.0-3.4 mm. Body moderately elongated and convex, elytra elongated oval, Pronotum broad. The body is entirely reddish pale to very dark (extremely variable), elytra shiny with bluish lustre. Legs are entirely pale, contrasting to the body. First segments of antenna are pale, segment 3 or 4 and all following are slightly darker.

Head and Pronotum with strong microsculpture. Elytra more shiny and with less developed microsculpture (40x). Antenna normal. Eyes slightly reduced in size, rather small but not flat, length of temps shorter than eye diameter.

Pronotum comparatively broad, strongly and equally rounded laterally, slightly convex on disc, maximal width before the middle, not strongly constricted and almost not sinuate before the small hind angles, anterior and posterior margin nearly straight; front angles rounded and not prominent; hind angles right angled and small; basal foveae present and strongly impressed; median line distinct, almost extended to the extremities.

Elytra elongate ovate, convex, flat on disc, shoulders completely rounded and not prominent; inner striation 1-4 moderately impressed and slightly irregular, posterior and lateral more and more shallow, outer striation indistinct. The profemur is slightly thicker than in most other *Microtrechus*.

Aedeagus: Lateral view: very elongated and slender, ca. 53% of EL, shape typical for this species group with a strongly hooked apex. The aedeagus is very elongated and straight, slightly similar to the aedeagus of *T. satanicus*. The apex is very elongated and straight in lateral view, with a very strong, not reflexed hook at the end. In dorsal view the apex is almost symmetric, moderately constricted, very slightly turned to the right. Parameres elongated.

Discussion: This new species is not at all similar to its 'neighbours' *T. talequah* and *T. howellae*. Further more several peaks in the surrounding area are not inhabited by representatives of the *uncifer*-group (Wayah Bald, Cheoah Bald, Joanna Bald), although a moderately rich *Trechus* fauna exists there (several undescribed species).

Distribution: Known from type locality only and most probably strictly endemic on Tusquitee Bald.

Habitats: The specimens were taken under stones and sifted from wet layers of leaf litter beside a swampy area around a spring. The exact location is in a good distance below and east of the summit on trail 79. Climbing up, mountain trail 79 passes there the last springs of Tuni Creek in a sharp U-turn of the path to the left. The spring is about 10 m right of the U-turn.

11. *Trechus (Microtrechus) talequah* BARR, 1962 (Fig. 15, 22)

Material: 82 ex. USA, NC, Graham/Monroe CO, Unicoi Mts.: 38 ♂ ♀: Hoa Lead, 10.VI.2004, leg. MD (coll. MD); 13 ♂ ♀: Johns Knob, 19.V.2004, leg. MD (coll. MD); 31 ♂ ♀: Haw Knob, 19.V.2004, leg. MD (coll. MD).

This is the smallest species of the *uncifer*-group.

Distribution: Endemic in the Unicoi Mountain.

Habitats: This species is comparatively common and lives more close to the surface. The specimens were sifted in all collection sites in the Unicoi Mts. from humid/wet leaf litter beside the forest street, around springs and at the base of rock cliffs together with *T. barberi*, *T. luculentus unicoi* BARR, 1979 and *T. haeo* BARR, 1979.

Discussion

BARR (1979) followed a very conservative way when he described *T. cowensis* stat.n., *T. toxawayi* stat.n. and *T. howellae* stat.n. as subspecies of *T. aduncus*. It is certainly true that *T. cowensis* is very close to *T. aduncus*, but both species are separated geographically from each other by *T. toxawayi* with a very distinct aedeagus (fig. 9, 10, 11). BARR (1979) argued that there was or has been in recent times a potential interbreeding between the populations. My collections in the Appalachians lead to a different conclusion. Even within the same mountain range (e.g. Great Smoky Mountains, Wayah Bald and Unicoi Mountains) the single prominent peaks are inhabited by clearly distinct but closely related pairs of species. Thus I conclude that the populations on different mountain ranges were isolated from each other for a sufficient time for the evolution of distinct species.

Because the populations are totally isolated at the present time and show significant differences in the shape of the aedeagus, and no intermediate or interbreeding populations are known at present, I prefer to deal with all populations described in this paper on a species level.

Table 1: Descriptive Statistics of Measurements (mm)

	BL	HW	PWM	PWB	PWA	PL	EW	EL	ANL	AEL
<i>T. thunderheadensis</i> sp.n. (5 ♂♂, 2 ♀♀)										
AVG	3.01	0.63	0.90	0.65	0.57	0.62	1.28	1.81	1.52	0.86
MIN	2.90	0.60	0.88	0.63	0.55	0.60	1.25	1.75	1.45	0.85
MAX	3.15	0.65	0.93	0.70	0.58	0.63	1.35	1.88	1.60	0.88
N	7	7	7	7	7	7	7	7	7	5
SD	0.090	0.019	0.022	0.029	0.009	0.012	0.043	0.059	0.059	0.014
<i>T. plottbalsamensis</i> sp.n. (5 ♂♂, 2 ♀♀)										
AVG	3.25	0.67	0.93	0.69	0.66	0.65	1.36	1.92	1.56	1.00
MIN	3.10	0.63	0.90	0.65	0.65	0.60	1.25	1.80	1.45	1.00
MAX	3.40	0.70	0.98	0.73	0.68	0.70	1.48	2.03	1.68	1.00
N	7	7	6	6	6	6	7	7	7	5
SD	0.100	0.024	0.026	0.030	0.013	0.037	0.069	0.078	0.075	0.000
<i>T. tusquitensis</i> sp.n. (5 ♂♂, 2 ♀♀)										
AVG	3.19	0.66	0.92	0.67	0.61	0.63	1.35	1.95	1.58	1.04
MIN	3.05	0.63	0.90	0.63	0.58	0.60	1.30	1.88	1.50	1.00
MAX	3.35	0.70	0.98	0.73	0.63	0.65	1.40	2.03	1.63	1.05
N	7	7	7	7	7	7	7	7	7	5
SD	0.117	0.028	0.027	0.031	0.020	0.017	0.041	0.053	0.051	0.022

Table 2: Descriptive Statistics of Proportions

	EL/EW	PWM /PL	ANT /BL	AEL /EL	PWM /HW	PWB /PWM	PWA /PWM	PWB /PWA
<i>T. thunderheadensis</i> sp.n. (5 ♂♂, 2 ♀♀)								
AVG	1.41	1.45	0.50	0.47	1.42	0.73	0.64	1.14
MIN	1.39	1.40	0.48	0.45	1.38	0.69	0.62	1.09
MAX	1.44	1.48	0.53	0.49	1.46	0.78	0.66	1.22
N	7	7	7	5	7	7	7	7
SD	0.022	0.028	0.018	0.012	0.026	0.028	0.015	0.046
<i>T. plottbalsamensis</i> sp.n. (5 ♂♂, 2 ♀♀)								
AVG	1.42	1.43	0.48	0.53	1.21	0.74	0.71	1.05
MIN	1.37	1.32	0.46	0.51	0.00	0.70	0.67	1.00
MAX	1.45	1.50	0.50	0.56	1.50	0.76	0.73	1.12
N	7	6	7	4	7	6	6	6
SD	0.032	0.075	0.015	0.019	0.535	0.022	0.022	0.039
<i>T. tusquitensis</i> sp.n. (5 ♂♂, 2 ♀♀)								
AVG	1.44	1.47	0.50	0.53	1.40	0.73	0.66	1.09
MIN	1.43	1.42	0.48	0.52	1.32	0.69	0.64	1.04
MAX	1.46	1.50	0.52	0.55	1.44	0.78	0.68	1.16
N	7	7	7	5	7	7	7	7
SD	0.012	0.031	0.016	0.011	0.046	0.033	0.016	0.038

AVG – Average; MIN – Minimum; MAX – Maximum; N – Number of observations; SD – Standard deviation; BL – Body length; HW – Head width including eyes; PWM – maximal width of Pronotum; PWB – Width of pronotum between basal angles; PWA – Width of pronotum between front angles; PL – Length of pronotum; EW – maximal width of elytra; EL – Length of elytra; ANL – Length of antenna; AEL – Maximal length of aedeagus in lateral view (more or less diagonal).

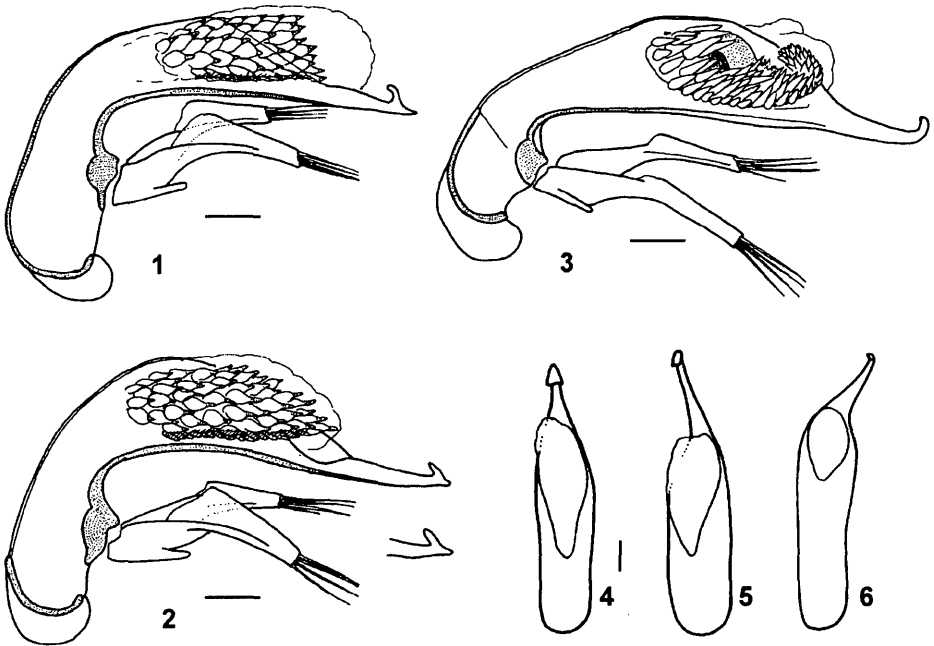


Fig. 1-6: Aedeagus in lateral (1-3) and dorsal (4-6) view, scale = 0.1 mm: 1+4) *T. thunderheadensis* sp.n.; 2+5) *T. uncifer*; 3+6) *T. plottbalsamensis* sp.n.

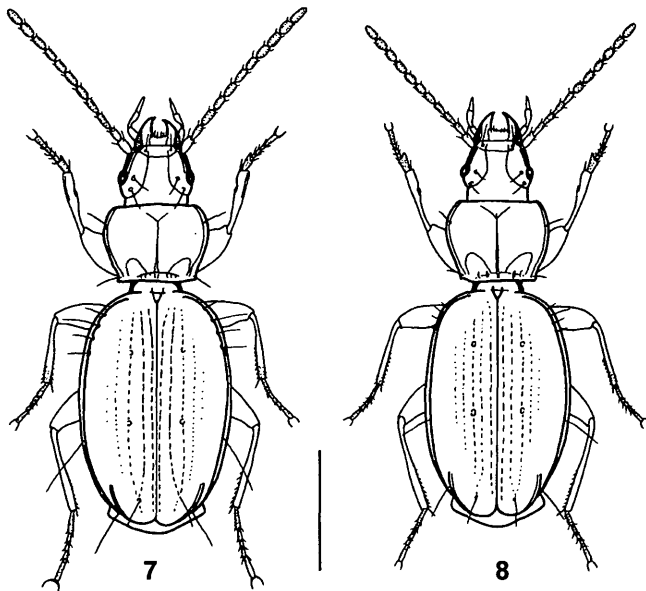


Fig. 7-8: Habitus, scale = 1 mm: 7) *T. tusquitensis* sp.n.; 8) *T. plottbalsamensis* sp.n.

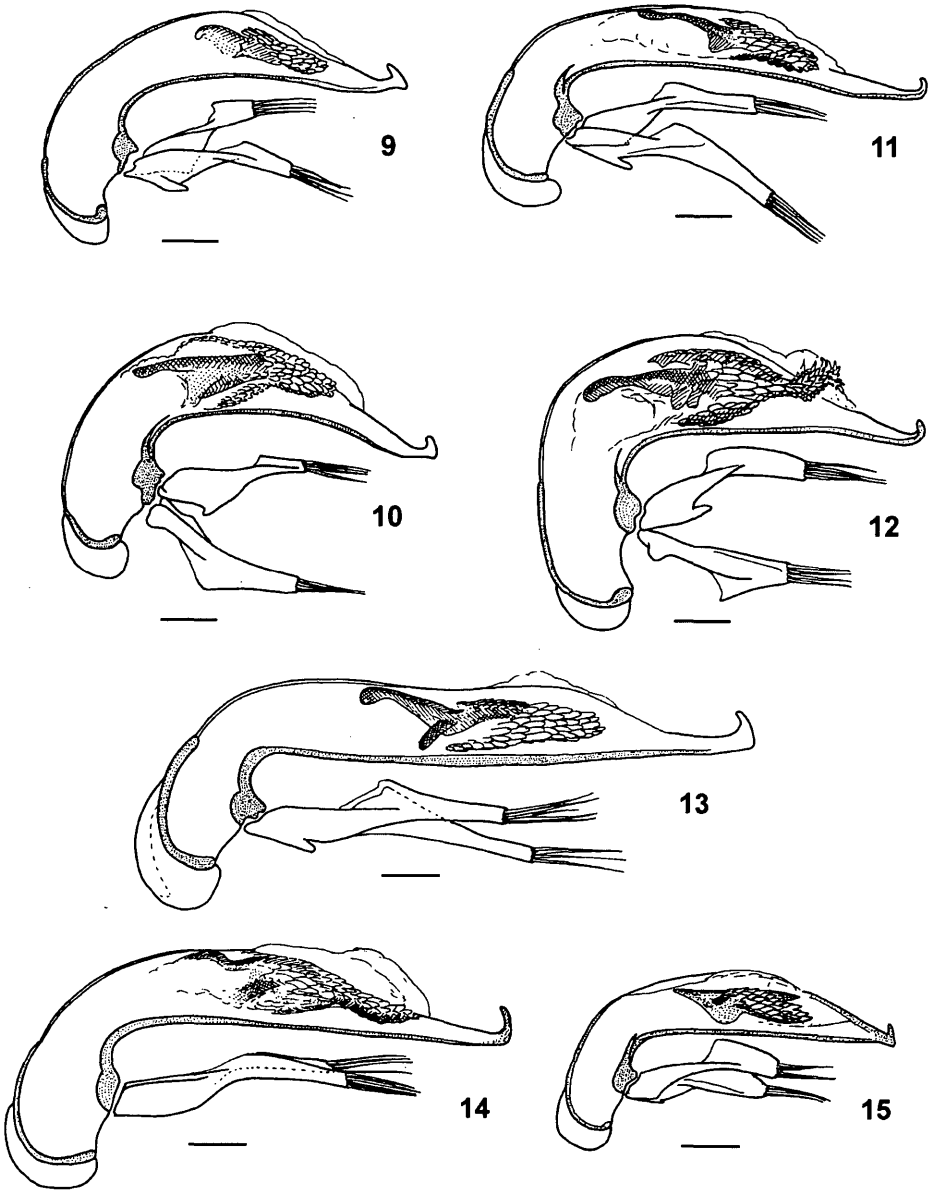


Fig. 9-15: Aedeagus in lateral view, scale = 0.1 mm: 9) *T. aduncus*; 10) *T. cowensis*; 11) *T. toxawayi*; 12) *T. howellae*; 13) *T. satanicus*; 14) *T. tusquitensis* sp.n.; 15) *T. talequah*.

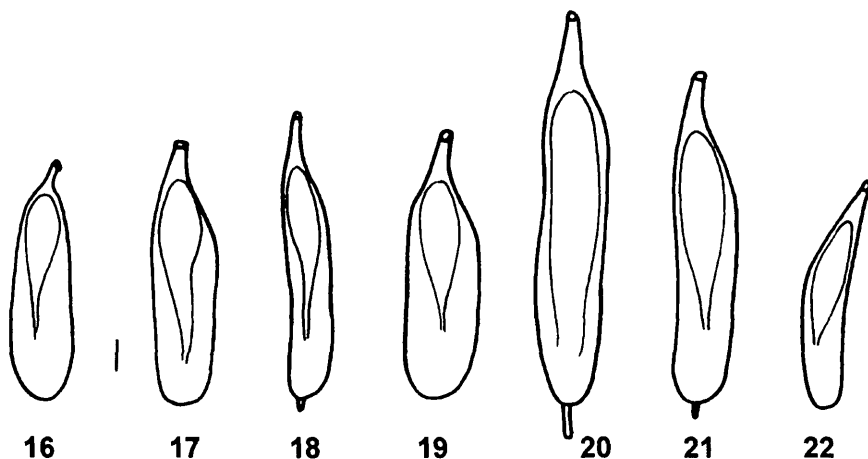


Fig. 16-22: Aedeagus in dorsal-apical view, scale = 0.1 mm: 16) *T. aduncus*; 17) *T. cowensis*; 18) *T. toxawayi*; 19) *T. howellae*; 20) *T. satanicus*; 21) *T. tusquitensis* sp.n.; 22) *T. talequah*.

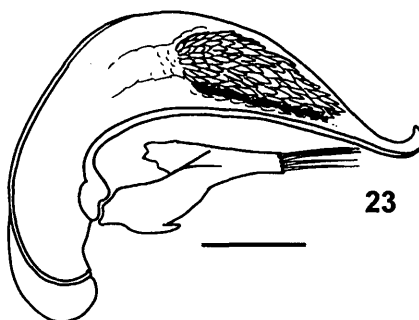


Fig. 23: *T. inexpectatus*: Aedeagus in lateral view, copied from BARR (1985), scale 0.1 mm. The scale seems to be wrong, because there is no remark on a very small aedeagus in the description!

LITERATURE

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