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New species of the *Trechus* (*Microtrechus*) *vandykei* group from the southern Appalachians (Coleoptera: Carabidae: Trechinae)

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Abstract

Two new species of the *Trechus* (*Microtrechus*) *vandykei* group are described from the southern Appalachians in North Carolina and Tennessee (USA): *T. pseudobarberi* sp.n. (Eastern Great Smoky Mountains, Plott Balsam Mountains); *T. pseudosubtilis* sp.n. (Eastern Great Smoky Mountains).

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

Zusammenfassung

Zwei neue Arten der *Trechus* (*Microtrechus*) *vandykei*-Gruppe werden aus den südlichen Appalachen in North Carolina und Tennessee (USA) beschrieben: *T. pseudobarberi* sp.n. (Eastern Great Smoky Mountains, Plott Balsam Mountains); *T. pseudosubtilis* sp.n. (Eastern Great Smoky Mountains).

Introduction

The southern Appalachians are inhabited by a unique diversity of species of the genus *Trechus* CLAIRVILLE, 1806. About 60 species and subspecies are known from this comparatively small area. All taxa 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 have limited ranges above 1000 m a.s.l. The faunal composition of *Trechus* has been revised in several studies by BARR (1962, 1979, 1985) and DONABAUER (2005a, 2005b). Nevertheless, there are still more species awaiting 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 finding thousands of specimens of *Trechus* representing most of the described and several new species. The main purpose of this third paper is to summarize the results of these collections with respect to the *T. vandykei* group (sensu BARR 1962) of the subgenus *Microtrechus* JEANNEL, 1927.

Abbreviations: CO – County; NC - North Carolina; GSM - Great Smoky Mountains; TN – Tennessee.

Method

Full taxonomic descriptions are provided for new species. For described species please refer to the original descriptions. Descriptive statistics for measurements and proportions are provided in tables at the end of the paper. The body length is measured from anterior margin of labrum to apex of elytra. All specimens, including holotypes and paratypes, have been collected by the author and are stored in his collection.

Trechus (*Microtrechus*) *vandykei* group (sensu Barr 1962)

All species belonging to this group are immediately separable from other *Microtrechus* by very small or small body size (< 3 mm, exceptionally slightly larger), convex sides of elytra and convex on disc and the typical shape of aedeagus (please refer to the following key and figures). With respect to the uniform shape of the aedeagus and habitus (see Figs. 1-6) the *T. vandykei* group is likely monophyletic.

Trechus vandykei is the type species of *Microtrechus* and among the smallest within this subgenus. The name "*Microtrechus*" is highly misleading. The body size within *Microtrechus* varies significantly, and the largest species having body length up to 5.5 mm.

Notes: Correct determination of taxa is difficult and always requires extraction of male aedeagi, clearing of aedeagi to make the internal sac visible, examination at magnification of at least 100x, and finally the equipment for taking exact measurements.

Habitats: All species are moderately hygrophilous, much less than other *Microtrechus*. Most species are restricted to cool habitats at the highest altitudes of the southern Appalachians, inhabiting a wide spectrum of microhabitats on forest floor surface (leaf litter, needle duff, moss carpets, beyond rotten logs, beside streams, etc.). Several species are locally extremely abundant. Wherever they exist, they outnumber representatives of the *T. uncifer* group and *T. nebulosus* group significantly, up to 100times.

At least *T. barberi* occurs at lower elevations than most other *Microtrechus*. Therefore, some of the populations seem to be less isolated, resulting in a comparatively large distributional area.

Distribution: The members of the *T. vandykei* group are spread all over the entire distribution area of *Microtrechus* (Fig. 46; with the exception of two isolated lowland cave dwelling species). An interesting fact is that on Cataloochee Balsam in the GSM five species coexist (Figs. 1-5, 46), which is a very helpful argument for the validity of those species. In the majority of the area two species coexist. The highest diversity of taxa can be found in the GSM.

Catalogue (in alphabetical order):

T. (M.) barberi Jeannel, 1931 (=? *rivulis* Dajoz, 2005)	widespread, south of French Broad River
T. (M.) bowlingi Barr, 1962	GSM
T. (M.) haoe Barr, 1979	Unicoi Mountains
T. (M.) pisgahensis Barr, 1979	Pisgah Ridge, Whiteside Mountain
T. (M.) pseudobarberi sp.n.	Eastern GSM, Plott Balsam Mountains
T. (M.) pseudosubtilis sp.n.	Eastern GSM

T. (M.) subtilis Barr, 1962	Eastern GSM, Plott Balsam Mountains
T. (M.) tonitru Barr, 1962	Western GSM: Thunderhead Mountain
T. (M.) tusquitee Barr, 1979	Tusquitee Bald, Cheoah Bald
T. (M.) vandykei Jeannel, 1927 s.l.	north of French Broad River, GSM

Key to the subgenera, species-groups and subgroups of the southern Appalachians:

1 Males with two segments of protarsus enlarged . . . . . **Subgenus *Trechus* s.str.**
- Males with one segment of protarsus enlarged . . . . . **Subgenus *Microtrechus*** 2
2 Aedeagus with apex reflexed or hooked AND internal sac armed with many large scales, which obscure the transfer apparatus; smaller species 2.7-3.9 mm. Refer to Donabauer (2005a). . . . . ***T. uncifer* group**
- Aedeagus different. 3
3 Aedeagus large or very large, with heavy sclerotized copulatory pieces, variable in shape, but never as in the following group. Medium sized to large species, 3.3-5.5 mm. Stria of elytra deeper on disc. Specialized, strongly hygrophilous species with a tendency to live in deeper soil than species of the following group. Refer to Donabauer (2005b). . . . . ***T. nebulosus* group**
- Aedeagus small or extremely small, with lamellar, weakly sclerotized and very simple copulatory pieces, aedeagal apex always simple and slightly turned up, never hooked, reflexed. Very small, small or (exceptionally) medium sized species, 2.4-3.3 mm. Striation on elytra very shallow even on disc. Generally less hygrophilous species, more common. . . . . ***T.* v*andykei* group** 4
4 Body size in average larger, 2.8-3.3 mm (see Figs. 1-3, 6). Aedeagus larger, more slender and elongated, rather straight, apex elongated, slender with sharp tip. Pronotum anterior of small basal angles slightly sinuate. Widespread in the southern Appalachians south of the Frenchbroad River. . . . . ***T. barberi* subgroup**
- Body size on average significantly smaller, 2.5-2.9 mm (see Figs. 4-5). 5
5 Aedeagus straight, significantly larger with elongated, pointed apex. Internal sac armed with clearly visible, dense scales, moderately obscuring the much larger copulatory pieces. Endemic in the GSM. . . . . ***T. bowlinig* subgroup**
- Aedeagus curved, small and simple with highly characteristic, short and thick apex. Internal sac armed with hardly visible scales, not hiding short copulatory pieces. Several extraordinary similar species, vicariously distributed south and north of the Frenchbroad River. . . . . ***T. vandykei* subgroup**

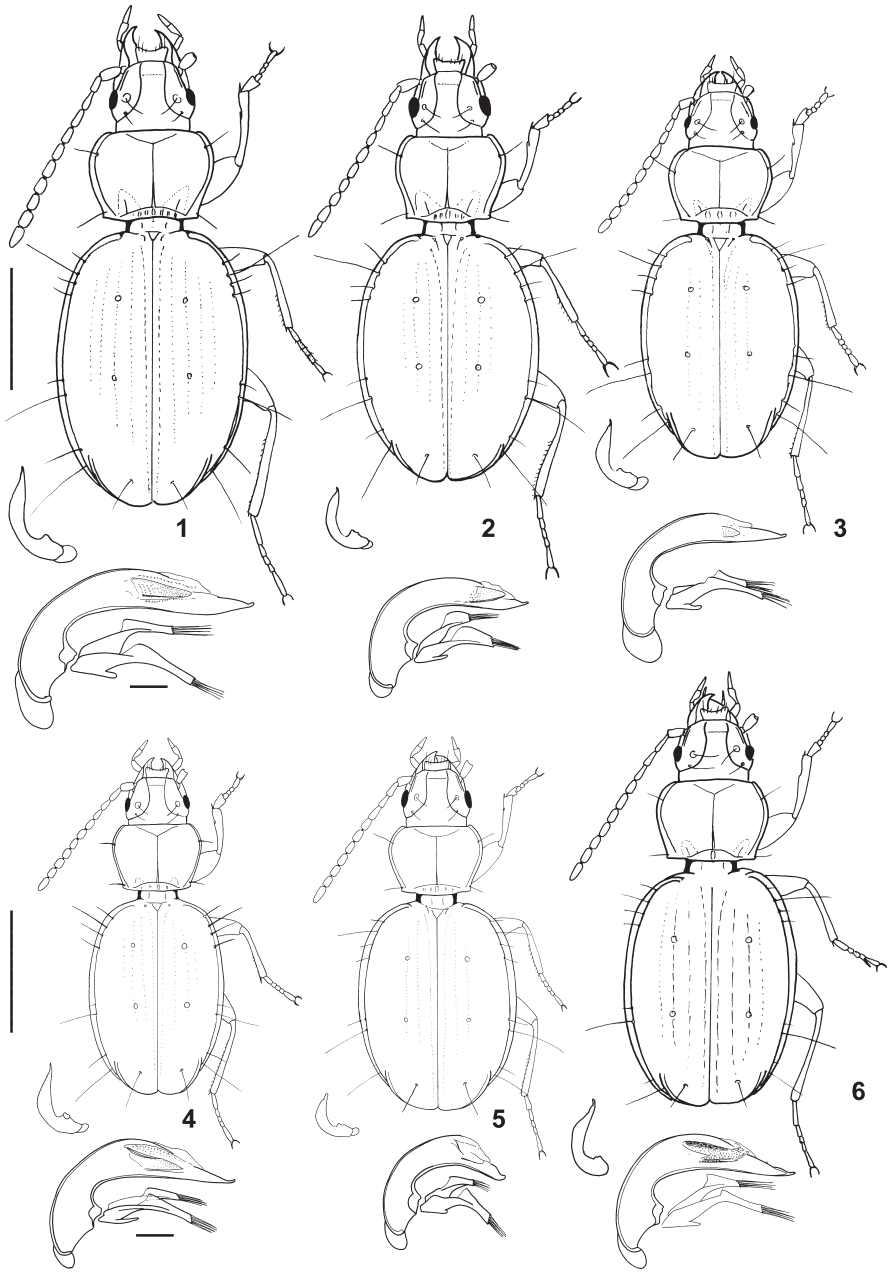
Annotated checklist and descriptions

Trechus (*Microtrechus*) *barberi* -subgroup

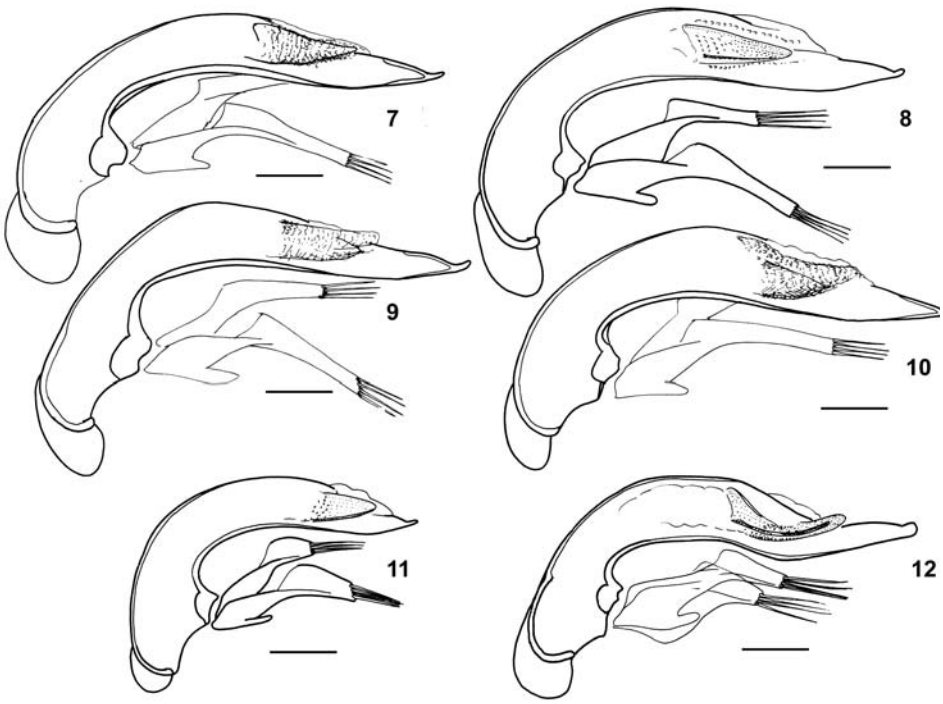
***Trechus* (*Microtrechus*) *subtilis* Barr, 1962** (Figs. 1, 7, 8, 9, 10, 22, 46)

Material examined: 140 ex.: NC/TN, Cocke/Madison CO, Bald Mtns, Bluff Mountain = Tennessee Bluff, 28.V.2004; 1 ex.: TN/NC, Swain/Haywood CO, GSM, Cataloochee Balsam (Summit), 27.V.2004; 2 ex.: NC, Haywood CO, GSM, Mt. Sterling, Spring of Baxter Creek, 26.V.2004; 2 ex.: NC, Haywood/Jackson CO, Waterrock Knob, 27.V.2004.

Notes: This "large"-sized species is very rare, wherever other species of the *T. barberi* subgroup exist. On Tennessee Bluff however it is the only species and locally abundant at



Figs. 1 - 6: Habitus and shape of extracted aedeagus (scale = 1 mm) and enlarged aedeagus in lateral view (scale = 0.1 mm) representing five sympatric species from the summit of Cataloochee Balsam in the eastern GSM (1-5) and of the widespread *T. barberi* (6): (1) *T. subtilis*; (2) *T. pseudosubtilis* sp.n.; (3) *T. pseudobarberi* sp.n.; (4) *T. bowlingi*; (5) *T. vandykei* s.l.; (6) *T. barberi* (Pisgah Ridge, Devils Courthouse).



Figs. 7 - 12: Aedeagus in lateral view of taxa related to *T. barberi* and *T. bowlingi* of the *T. vandykei* group (scale = 0.1 mm): (7) *T. subtilis*, Tennessee Bluff; (8) *T. subtilis*, Cataloochee Balsam (GSM); (9) *T. subtilis*, Mt. Sterling (GSM); (10) *T. subtilis*, Waterrock Knob; (11) *T. pseudosubtilis* sp.n., Cataloochee Balsam (GSM); (12) *T. tonitru*, Thunderhead Mountain (GSM).

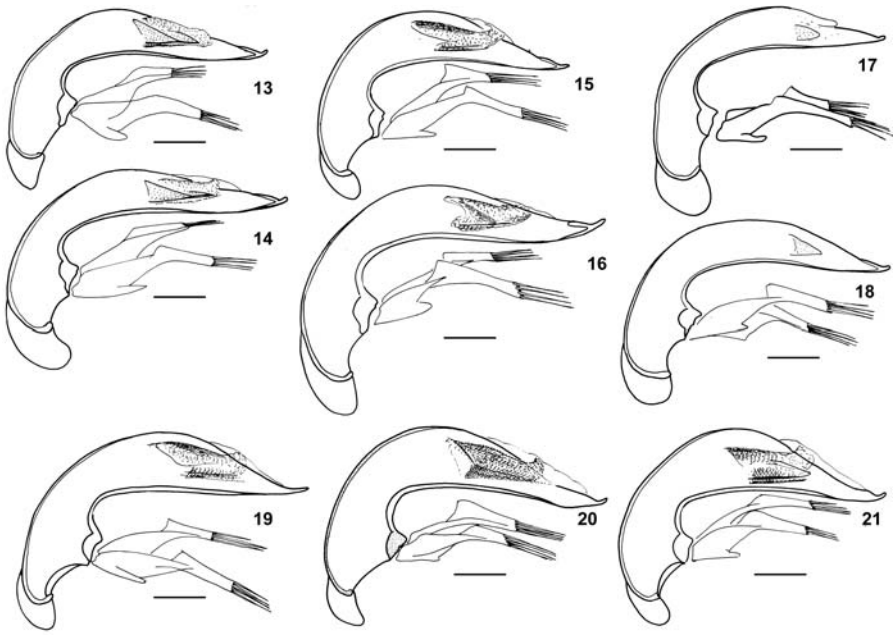
springs. *Trechus subtilis* can be separated by large body size (Fig. 1), very large aedeagus (Figs. 7-10) and the elongated apex in dorsal view (Fig. 22).

***Trechus* (*Microtrechus*) *pseudosubtilis* sp.n.** (Table 1; Figs. 2, 11, 23, 46)

Type material: Holotype (♂) and 25 paratypes (14 ♂♂, 11 ♀♀): TN/NC, Swain /Haywood CO, GSM, Cataloochee Balsam (Summit), 27.V.2004.

Diagnosis: A large sized representative of the *T. vandykei* group (Fig. 2), most similar to *T. subtilis*, *T. pseudobarberi*, *T. barberi* and *T. tonitru*. Distinguished by aedeagal characteristics alone: aedeagus significantly shorter and smaller (0.53-0.55 mm, 30% of EL, Fig. 11), apex much shorter as well, best visible in dorsal view (Fig. 23), parameres broader than in *T. subtilis*, *T. pseudobarberi* and *T. barberi*.

Description: Habitus as in Fig. 2; length 2.9-3.2 mm. Body dark reddish piceous, paler on head, along suture and along sides of elytra; elytra shiny with strong bluish lustre; legs pale, contrasting with body; first segments of antenna pale, segment 3 or 4 and all following darker.



Figs. 13 - 21: Aedeagus in lateral view of taxa related to *T. barberi* and *T. bowlingi* of the *T. vandykei* group (scale = 0.1 mm): (13) *T. barberi*, Haw Knob (Unicoi Mts.); (14) *T. barberi*, Big Butt (Nantahala Mts.); (15) *T. barberi*, Pisgah Ridge, Devils Courthouse; (16) *T. barberi*, Whiteside Mountain; (17) *T. pseudobarberi* sp.n., Cataloochee Balsam (GSM); (18) *T. pseudobarberi* sp.n., Waterrock Knob; (19) *T. bowlingi*, Thunderhead (GSM); (20) *T. bowlingi*, Clingmens Dome (GSM); (21) *T. bowlingi*, Ramsey Cascade (GSM).

Head with strong microsculpture. Elytra and pronotum shinier and with less developed microsculpture (examined with 40 x). Antenna of normal length. Eyes slightly reduced in size, length of temples slightly shorter than eye diameter.

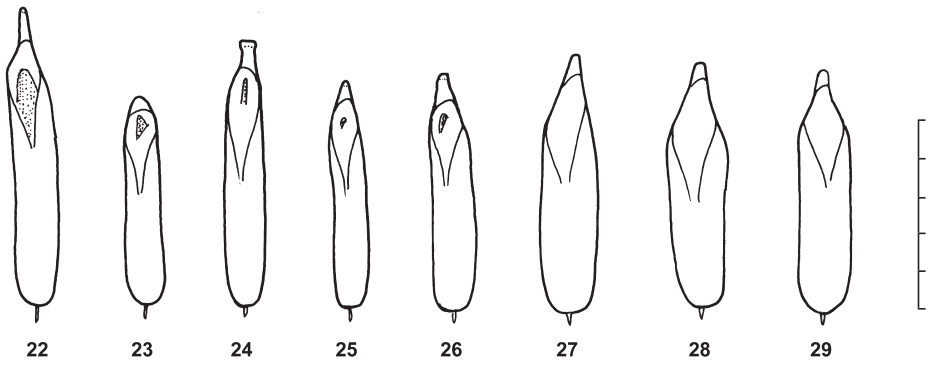
Pronotum normal, regularly rounded laterally, convex on disc, maximal width in anterior half, not strongly constricted and slightly sinuate anterior of small basal angles, anterior and posterior margins nearly straight; front angles rounded and not prominent; basal angles rectangular or slightly obtuse and small; basal foveae present and strongly impressed; median line distinct, almost extended to margins.

Elytra elongate ovate, strongly convex, shoulders completely rounded and not prominent; inner striae variable, 1-3 weakly impressed and not punctuate, posterior and lateral striae indistinct. Chaetotaxy normal.

Aedeagus (Figs. 2, 11, 23): Similar to that of *T. subtilis* (compare with Figs. 7-10) and of *T. barberi* (compare with Figs. 13-16) by sharing the general shape, but immediately distinguishable by smaller size, much shorter apex and broader parameres.

Distribution: Eastern GSM.

Habitats: All specimens sifted from wet or humid leaf litter.



Figs. 22 - 29: Aedeagus in dorsal view of taxa related to *T. barberi* and *T. bowlingi* of the *T. vandykei* group (scale = 0.5 mm): 22) *T. subtilis*, Tennessee Bluff; 23) *T. pseudosubtilis* sp.n., Cataloochee Balsam; 24) *T. tonitru*, Thunderhead (GSM); 25) *T. barberi*, Richland Balsam; 26) *T. pseudobarberi* sp.n., Waterrock Knob; 27) *T. bowlingi*, Thunderhead (GSM); 28) *T. bowlingi*, Mt. Kephart (GSM); 29) *T. bowlingi*, Cataloochee Balsam (GSM).

***Trechus* (*Microtrechus*) *tonitru* BARR, 1962** (Figs. 12, 24, 46)

Material examined: 27 ex.: TN/NC, Blount/Swain CO, GSM, Thunderhead Mountain, 8.VI.2004.

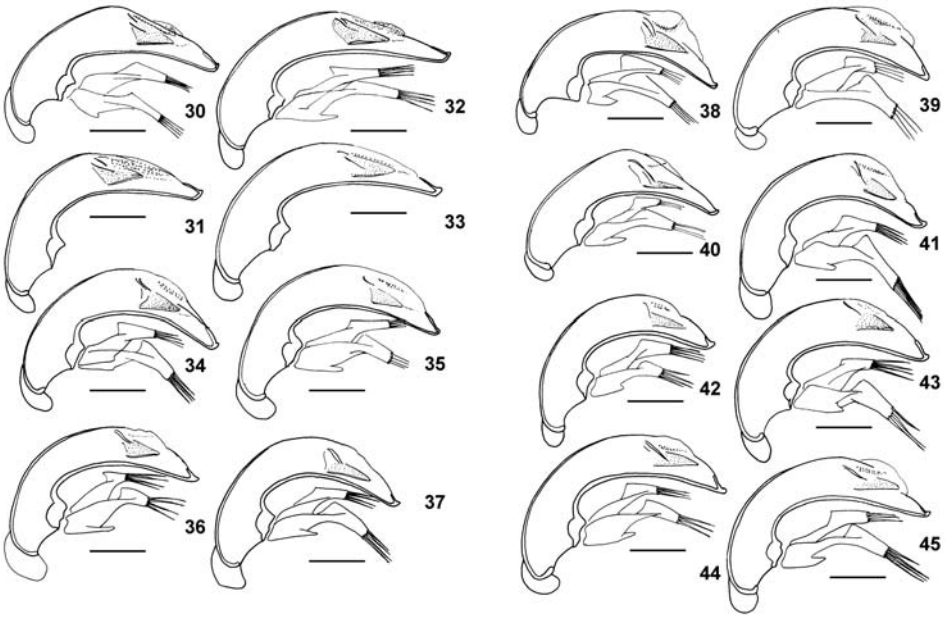
This is the most distinctive species in respect of aedeagal characteristics of the entire *T. vandykei* group and I hereby confirm the validity of this taxon. Strictly endemic on Thunderhead Mountain, eastern GSM.

***Trechus* (*Microtrechus*) *barberi* JEANNEL, 1931** (Figs. 6, 13, 14, 15, 16, 25, 46)

Material examined: 90 ex.: NC/TN, Graham/Monroe Co., Unicoi Mountains, Haw Knob, 19.V.2004; 80 ex.: NC/TN, Graham/Monroe Co., Unicoi Mountains, Johns Knob, 19.V.2004; 1 ex.: NC/TN, Graham/Cherokee Co., Snowbird Mountains, Joanna Bald, 19.V.2004; 35 ex.: NC, Macon CO, Copper Ridge Bald – Burningtown Gap, 21.V.2004; 90 ex.: NC, Macon CO, Nantahala Mts., Wayah Bald, 17.V.2004; 70 ex.: NC, Macon/Clay CO, Nantahala Mountains, Big Butt, 16.V.2004; 133 ex.: NC, Macon/Jackson CO, Whiteside Mountain, 22.V.2004; 90 ex.: NC, Jackson CO, Toxaway Mountain, 4.VI.2004; 20 ex.: NC, Haywood/Jackson CO, Great Balsam Mountains, Richland Balsam, 27.V.2004; 65 ex.: NC, Haywood/Transylvania CO, Devils Courthouse, 24.V.2004.

A very common and unusually widespread species, distributed throughout the southern Appalachians outside the GSM and the Plott Balsam Mountains, where *T. barberi* is replaced by several similar species. On several mountains this species coexists with smaller species like *T. pisgahensis*, *T. haoe* or *T. tusquitee,* or is replaced by them at higher altitudes.

DAJOZ (2005) described *T. rivulis* from Buck Creek Road (see map of distribution). The provided description, the geographical position and low altitude of the type locality and the habitat description would perfectly fit to *T. barberi*. However the aedeagal figure (the quality is obviously poor) gives a different picture. He did not compare this species with *T. barberi*, although it is the most common and similar species of this area.



Figs. 30 - 45: Aedeagus in lateral view of taxa related to *T. vandykei* of the *T. vandykei* group (scale = 0.1 mm): (30+31) *T. tusquitee* (Cheoah Bald); (32+33) *T. tusquitee* (Tusquitee Bald); (34) *T. pisgahensis* (Whiteside Mountain); (35) *T. pisgahensis* (Mt. Pisgah); (36) *T. haoe* (Unicoi Mountains, Haw Knob); (37) *T. haoe* (Unicoi Mountains, Haoe Lead); (38-44) *T. vandykei* s.l.; (38) GSM east, Thunderhead Mountain; (39) GSM central, Clingmans Dome; (40) GSM East, Ramsey Cascades; (41) GSM East, Cataloochee Bald; (42) GSM East, Baxter Trail; (43) Tennessee Bluff; (44) Camp Creek Bald; (45) Unaka Mountain.

***Trechus* (*Microtrechus*) *pseudobarberi* sp.n.** (Table 2; Figs. 3, 17, 18, 26, 46)

Type material: Holotype (♂) and 120 paratypes: NC, Haywood/Jackson CO, Waterrock Knob, 24.V.2004; 4 ex. (2 ♂♂, 2 ♀♀): TN/NC, Swain/Haywood CO, GSM, Cataloochee Balsam (Summit), 27.V.2004.

Diagnosis: A medium sized representative of the *T. vandykei*-group, replacing the more widespread *T. barberi* in the eastern GSM and on Waterrock Knob. Distinguished from this species by aedeagal characteristics alone: shape of aedeagus like in *T. subtilis* and *T. barberi*, but copulatory pieces smaller and internal sack clear, not covered by dense scales. Separated from *T. pseudosubtilis* and *T. tonritu* by more styliform parameres.

Description: Habitus as in Fig. 3; length 2.85 - 2.95 mm. Body rarely reddish piceous, in most specimens dark piceous, paler on head, along suture and along sides of elytra; elytra shiny with bluish lustre; legs paler, contrasting with body; first segments of antenna pale, segment 3 or 4 and all following darker.

Head with strong microsculpture. Elytra and pronotum shinier and with less developed microsculpture (examined with 40 x). Antenna of normal length. Eyes slightly reduced in size, length of temples slightly shorter than eye diameter.

Pronotum normal, regularly rounded laterally, convex on disc, maximal width in anterior half, not strongly constricted and slightly sinuate anterior of small basal angles, ante-

rior and posterior margins nearly straight; front angles rounded and not prominent; basal angles rectangular or slightly obtuse and small; basal foveae present, strongly impressed; median line distinct, almost extended to margins.

Elytra elongate ovate, strongly convex, shoulders completely rounded and not prominent; inner striae variable, 1-3 weakly impressed and not punctuate, posterior and lateral striae indistinct. Chaetotaxy normal.

Aedeagus (Figs. 3, 17, 18, 26): Similar to that of the vicariant *T. subtilis* (compare with Figs. 7-10) and syntopic *T. barberi* (compare with Figs. 13-16) by sharing the general shape and styliform parameres, but immediately distinguishable by the smaller copulatory pieces and the internal sack not covered by dense scales.

Distribution: Eastern GSM and Waterrock Knob.

Habitats: By far the most common *Trechus* on Waterrock Knob, in a variety of microhabitats. Most specimens sifted from wet or humid leaf litter.

Trechus (*Microtrechus*) *bowlingi* subgroup

Notes: Easily identified by small body size (Fig. 4), obtuse basal angles of pronotum and characteristic shape of aedeagus: aedeagus in comparison to body length large, in dorsal view broader than in any of the previous species, large copulatory pieces, internal sac covered with dense, very small scales. Strictly endemic to the entire chain of GSM, common and widespread at high altitudes. The population of Thunderhead Mountain shows a consistently distinct aedeagal apex (Fig. 19).

Trechus (*Microtrechus*) *bowlingi* Barr, 1962 (Figs. 19, 20, 21, 27, 28, 29, 46)

Material examined: 17 ex.: TN/NC, Blount/Swain CO, GSM, Thunderhead Mountain, 8.VI.2004; 11 ex.: TN/NC, Servier/Swain CO, GSM, Clingmans Dome, 5.VI.2004; 84 ex.: NC/TN, Servier/Swain CO, GSM, Mt. Collins, 5.VI.2004; 20 ex.: TN, Servier CO, GSM, Ramsey Cascade, 6.VI.2004; 76 ex.: TN/NC, Sevier/Swain CO, GSM, Newfound Gap - Mt. Kephart, 9.VI.2004; 48 ex.: TN/NC, Swain/Haywood CO, GSM, Cataloochee Balsam (Summit), 27.V.2004.

Trechus (*Microtrechus*) *vandykei* subgroup

Notes: Kane et al. (1990) studied several isolates of this and the previous subgroup by genetic analysis. Based on these results five distinct species have been established. Unfortunately the results for *T. bowlingi* provide a doubtful picture. These authors erroneously assumed, that *T. bowlingi* entirely replaces the *T. vandykei* clade in the GSM. Four out of five of my samples from the GSM consist of T. *bowlingi* AND a representative of this subgroup. Therefore, I strongly believe that specimens used for genetic analysis represent a good mixture of several species and these results are inconclusive.

Trechus (*Microtrechus*) *tusquitee* Barr, 1979 (Figs. 30, 31, 32, 33, 46)

Material examined: 107 ex.: NC, Macon/Clay CO, Tusquitee Bald, 20.V.2004; 186 ex.: NC, Graham/Swain CO, GSM, Cheoah Bald, 11.VI.2004.

Endemic on Tusquitee Bald and Cheoah Bald. Significant genetic distance of these two populations has been shown by Kane et al (1990).

***Trechus* (*Microtrechus*) *pisgahensis* Barr, 1979** (Figs. 35, 46)

Material examined: 30 ex.: NC, Macon/Jackson CO, Whiteside Mountain, 22.V.2004; 100 ex.: NC, Haywood/Buncombe CO, Pisgah Ridge, Mt. Pisgah, 24.V.2004; 60 ex.: NC, Buncombe/Madison CO, Sandymush Bald, 3.VI.2004; 136 ex.: NC, Haywood/Transylvania CO, Pisgah Ridge, Second Falls, 24.V.2004; 21 ex.: NC, Haywood/Transylvania CO, Pisgah Ridge, Devils Courthouse, 24.V.2004; 13 ex.: NC, Haywood/Jackson CO, Great Balsam Mountains, Richland Balsam, 27.V.2004.

Notes: A moderately widespread species, mainly on the Pisgah ridge, very similar to *T. vandykei*, but distributionally isolated (see distribution map), and genetically isolated (Kane et al. 1990) and with slight differences in shape of pronotum and aedeagus (Barr 1979).

***Trechus* (*Microtrechus*) *vandykei* Jeannel, 1927** (Figs. 44, 45, 46)

Material examined: 290 ex.: NC/TN, Bald Mountains, Camp Creek Bald, 31.V.2004; 96 ex.: NC/TN, Unicoi/Mitchell CO, Unaka Mtn, 1.VI.2004; 165 ex.: NC/TN, Green/Madison CO, Bald Mountains, Big Bald, 1.VI.2004.

Notes: A widespread and common species north of the Ashville Basin.

Populations similar to *T. vandykei* in the GSM (Figs. 5, 38-43, 46)

Material examined: 17 ex.: TN, Servier CO, GSM, Ramsey Cascade, 6.VI.2004; 14 ex.: TN/NC, Servier/Swain CO, GSM, Clingmans Dome, 5.VI.2004; 133 ex.: TN/NC, Blount/Swain CO, GSM, Thunderhead Mountain, 8.VI.2004; 1 ex.: TN/NC, Swain/Haywood CO, GSM, Cataloochee Balsam (Summit), 27.V.2004; 1 ex.: TN/NC, Sevier/Swain CO, GSM, Newfound Gap - Mt. Kephart, 9.VI.2004; 67 ex.: NC, Haywood CO, GSM, Mt. Sterling, Spring of Baxter Creek, 26.V.2004; 2 ex.: NC/TN, Cocke/Madison CO, Bald Mtns, Bluff Mountain = Tennessee Bluff, 28.V.2004.

The rich material at hand clearly demonstrates that *T. vandykei* s.l. is NOT absent from the GSM, as reported by Barr (1962, 1979) and Kane et al. (1990). In most places coexistence with the externally extraordinarily similar *T. bowling* was observed. The observed aedeagal variability (Figs. 38-45) is – from my point of view – inconclusive. The GSM populations may belong to *T. vandykei* or represent one ore more subspecies or distinct species. Further careful genetic analysis of all populations is required.

***Trechus* (*Microtrechus*) *haoe* Barr, 1979** (Figs. 36, 37, 46)

Material examined: 178 ex.: NC/TN, Graham/Monroe Co., Unicoi Mountains, Haoe Lead, 10.VI.2004; 4 ex.: NC/TN, Graham/Monroe Co., Unicoi Mountains, Haw Knob, 19.V.2004.

Endemic in the Unicoi Mountains. Possibly identical with *T. vandykei* or in the rank of a subspecies.

Discussion

As many as 50 taxa of *Microtrechus* have been described from an area measuring approximately 150 x 100 kilometres. The origin and relationship of *Microtrechus* within the tribe Trechini is still obscure. This massive, doubtless monophyletic radiation is best comparable with those found on oceanic islands or highly isolated mountain ranges, such as

Tables of measurements (mm) and proportions of new taxa

Table 1: *T. pseudosubtilis* sp.n., Cataloochee Balsam (5 ♂♂, 5 ♀♀)

Sex ♂	HW	PWM	PWB	PWA	PL	EW	EL	ANL	AEL	BL	EL/ EW	PWM/ PL	ANL/ BL	AEL/ EL	PWM/ HW	PWB/ PWM
MIN	0,63	0,83	0,60	0,55	0,60	1,33	1,75	1,48	0,53	2,90	1,27	1,36	0,47	0,29	1,32	0,69
AVG	0,65	0,89	0,65	0,58	0,63	1,40	1,83	1,52	0,54	3,11	1,31	1,40	0,49	0,29	1,36	0,73
MAX	0,68	0,93	0,68	0,63	0,68	1,45	1,90	1,58	0,55	3,20	1,32	1,44	0,51	0,30	1,38	0,75
N	10	10	10	10	10	10	10	10	5	10	10	10	10	5	10	10
SD	0,018	0,029	0,023	0,021	0,021	0,038	0,052	0,033	0,014	0,093	0,021	0,033	0,013	0,004	0,025	0,015

Table 2: *T. pseudobarberi* sp.n., Waterrock Knob (5 ♂♂, 5 ♀♀)

Sex	HW	PWM	PWB	PWA	PL	EW	EL	ANL	AEL	BL	EL/ EW	PWM/ PL	ANL/ BL	AEL/ EL	PWM/ HW	PWB/ PWM
MIN	0,60	0,83	0,58	0,55	0,58	1,20	1,63	1,33	0,63	2,85	1,30	1,35	0,45	0,35	1,36	0,70
AVG	0,62	0,87	0,64	0,59	0,61	1,29	1,76	1,41	0,64	2,95	1,36	1,42	0,48	0,35	1,39	0,74
MAX	0,68	0,95	0,68	0,65	0,65	1,35	1,83	1,48	0,65	2,95	1,44	1,52	0,50	0,37	1,41	0,76
N	10	10	10	10	10	10	10	10	5	10	10	10	10	5	10	10
SD	0,022	0,041	0,034	0,033	0,026	0,052	0,085	0,059	0,014	0,069	0,040	0,048	0,018	0,009	0,031	0,024

AVG – average; MIN – minimum; MAX – maximum; N – number of measurements; SD – standard deviation; HW – Head width including eyes; PWM – maximal width of pronotum; PWB – width of pronotum between basal angles; PWA – width of pronotum between anterior angles; PL – length of pronotum; EW – maximal width of elytra; EL – maximal length of elytra; ANL – length of antenna; AEL – maximal length of aedeagus in lateral view (diagonal); BL – body length from anterior end of labrum.to apex of elytra.

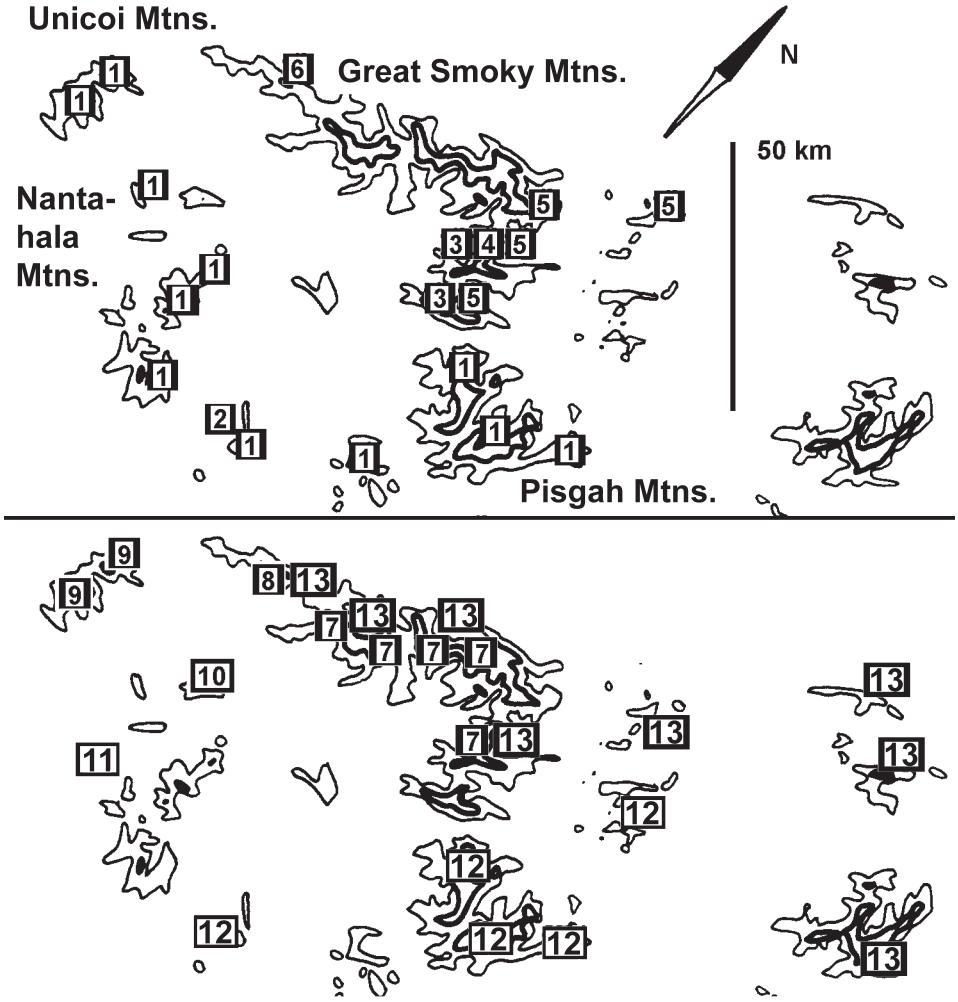


Fig. 46: Southern Appalachians in NC and TN, thin contour level: 1200 m, thick contour level: 1500 m. 1 - *T. barberi*; 2 - *T. rivulis* = *T. barberi* ?; 3 - *T. pseudobarberi*, 4 - *T. pseudosubtilis*; 5 - *T. subtilis*; 6 - *T. tonitru*, 7 - *T. bowlingi*; 8 - *T. bowlingi* population on Thunderhead Mountain, 9 - *T. haoe*; 10 - *T. tusquitee* population on Cheoah Bald; 11 - *T. tusquitee* population on Tusquitee Bald; 12 - *T. pisgahensis*; 13 - *T. vandykei* s.l.

hose of *Trechus* on the Island Madeira (20 taxa) or mount Elgon in Uganda (approx. 20). Although the split of *Microtrechus* from other Trechini might have taken place a very long time ago, most speciation events seem to have happened rather recently. This is clearly indicated by similar patterns of vicarious species. Additional twelve species of *Trechus* s.str. exist in the southern Appalachians (Barr 1979 and personal observations), forming another aberrant, monophyletic lineage of uncertain relationship and origin. All together, the southern Appalachian fauna represents approximately 80% of the known *Trechus* diversity in North America north of Mexico.

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