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A Description of New Species of the Bradycelline Subgenus *Tachycellus* from India and Nepal with Notes on the *B. anchomenoides* Group (Coleoptera: Carabidae: Harpalini)

N. ITO & B. JAEGER

A b s t r a c t : A new species of the subgenus *Tachycellus* of the genus *Bradycellus* is described from India and Nepal (type locality: India, West Bengal, Singalila Dara, ca. 2.5 km SE of Gairibas, alt. 2,880 m).

It is revealed by re-examination of the diagnostic characters of the *B. anchomenoides* species group that the microtrichia cluster on inner sac of aedeagus only can be hypothesized as an autapomorphic characteristic state for this species group. A revised key to the species groups of the subgenus *Tachycellus* is given.

Bradycellus (*Tachycellus*) *nipponensis* JAEGER et WRASE, *B. (T.) saitoi* MORITA, *B. (T.) nepalensis nepalensis* JAEGER et N. ITO and *B. (T.) nepalensis ghoropaniensis* JAEGER et N. ITO are recorded from new localities. *B. (T.) anchomenoides* (BATES) is firstly recorded from Nepal, Bhutan and Vietnam.

Based on examination of new specimens the taxonomic position of *B. saitoi* MORITA is discussed.

Key words : Coleoptera, Carabidae, Harpalini, *Bradycellus*, *Tachycellus*, new species, new records, Nepal, China, Vietnam, Japan.

Introduction

Many species of the bradycelline subgenus *Tachycellus* have been described from East and South East Asia, but only a single species consisting of two subspecies has been hitherto known from the Himalaya. Recently, we examined numerous material of the subgenus and found several species from new localities among them with two additional species from Nepal, Bhutan and North India, one of which is a new species.

We also re-examined the characters of all species of the *B. anchomenoides* group, described since JAEGER's revision in 1993 and concluded that the chaetotaxy of the 6th abdominal sternite represents two characteristic states. Below, we propose a modified diagnosis of the *B. anchomenoides* group and give a revised key to the species groups of the subgenus *Tachycellus*. Simultaneously, we describe a new species under the name of *Bradycellus* (*Tachycellus*) *picipes* and present new records for some species of the *B. anchomenoides* group.

Material and Methods

Material

The examined material is deposited in the institutions and private collections listed below. The following acronyms are used in the text:

CNC.....	The Canadian National Collection, the Agriculture and Agri-Food Canada, Ottawa, Canada
MHNG.....	the Museum d'Histoire Naturelle, Genève, Switzerland
MHMB.....	the Naturhistorisches Museum, Basel, Switzerland
NSMN.....	the National Science Museum (nat.), Tokyo, Japan
SMNS.....	the Staatliches Museum für Naturkunde, Stuttgart, Germany
Nic.....	Collection of N. Ito, Kawanishi, Japan
BJc.....	Collection of B. Jaeger, Berlin, Germany
JWc.....	Collection of J. Weipert, Ilmenau, Germany
DWWc.....	Collection of D. W. Wrase, Berlin, Germany
JSc.....	Collection of J. Schmidt, Rostock, Germany

Methods

Concerning the preparation of genitalia and measurements of body parts, see JAEGER et ITO 1995 and ITO 1998c.

The *Bradycellus anchomenoides* group

The *B. anchomenoides* group, sensu JAEGER 1993, of the subgenus *Tachycellus* MORAWITZ was characterized by the bisetose 6th abdominal sternite in males and the inner sac of aedeagus armed with conical sclerites uni- or biserially arranged in apical half and with a triangular cluster of microtrichia in basal half. The group was firstly composed of eight species and one subspecies. Thereafter, nine new species of the species group were described (MORITA 1993, JAEGER et WRASE 1994, JAEGER 1995, JAEGER et ITO 1995, JAEGER et WRASE 1996, MORITA 1997). The characters of most species completely agree with those of the group mentioned above except for *B. (T.) angulicollis* JAEGER 1995, *discrepans* JAEGER 1995 and *saitoi* MORITA 1997. These species present the characteristic structures of the aedeagal inner sac, but the 6th abdominal sternite is quadrisetose instead of being bisetose. Therefore, the bisetose margin of the 6th sternite is obviously less important for recognition of the *B. anchomenoides* group and cannot be interpreted as an autapomorphic characteristic state of the group. The number of setae on the margin of the 6th abdominal sternite is often variable in many other taxa of the tribe Harpalini, e.g. the genus *Trichotichnus* MORAWITZ, the genus *Hyphaereon* MACLEAY etc. Especially in many trichotichine species the numbers of setae are varied not only among species but also among examples of one species (ITO 1998a and b, 1999a and b).

Here we propose only the cluster of microtrichia of aedeagal inner sac as the apomorphic character state of the *B. anchomenoides* group.

A key to species groups of the subgenus *Tachycellus*

1. Left mandible more or less prolonged and not truncate vertically at apex; inner sac of aedeagus armed with uni- or biseriate conical sclerites near apex and with triangular cluster of microtrichia near base *B. anchomenoides* group
- 1' Left mandible shortened and often truncate vertically at apex and thick; inner sac of aedeagus armed with sclerites which are not seriate and entirely or partly scattered and not with such a triangular cluster 2
2. Pronotum not angulate at basal angles; aedeagus bearing large conical sclerites all over
..... *B. curtulus* group
- 2' Pronotum subcordate, angulate at basal angles; aedeagus not bearing the sclerites near base *B. chinensis* group

Bradycellus (Tachycellus) nipponensis JAEGER et WRASE 1994

Bradycellus nipponensis JAEGER et WRASE 1994 - Linzer biol. Beitr. 26: 476-478 (type locality: Yoshibezawa, Kawai, Iwate Pref., Northeast Japan).

S p e c i m e n e x a m i n e d : 1 male, Mt. Togakushi, Nagano Pref., Central Japan, 14. VI. 1974, N. Ito leg. (Nlc).

This species is known from the type locality only. We newly record the species from Mt. Togakushi far apart from the type locality.

Bradycellus (Tachycellus) saitoi MORITA 1996

Bradycellus saitoi MORITA 1996 - Elytra 25: 151-154. (type locality: Mt. Houou, Yamanashi Pref., Central Japan).

S p e c i m e n s e x a m i n e d : 13 males, 12 females, Shirakoma pond, Mts. Kita-yatsugatake, Nagano. Japan, 13-16. IX. 1996, T. Ito leg.; 1 female, Mt. Houou, South Alps, Yamanashi, Japan, 15. VIII. 1989, T. Ito leg. (BJc and Nlc).

In the description of *B. saitoi*, inner structure of the aedeagus was not clearly drawn and therefore, we would like to give the figure with clear inner structure (Fig. 1-A). MORITA (1996: 154) noted that: „Judging from the shape of pronotum and chaetotaxy of anal sternite, this new species is rather closely allied to *B. (T.) chinensis* JEDLIČKA (1953, p. 143)“. These species are similar in external characteristics, especially in pronotal shape, to each other, but the important characteristic in male genitalia are quite different as mentioned below. Therefore, we hesitate that *B. saitoi* is situated near *B. chinensis*.

We are placing *B. italic* in the *B. anchomenoides* group because the inner sac of aedeagus possess the triangular cluster of microtrichia near base and two rows of conical sclerites near apex. Within the *B. anchomenoides* group the shape of apex of median lobe of aedeagus of *B. saitoi* is rather similar to *B. (T.) discrepans* JAEGER 1995 and *yulongshanus* JAEGER 1996 both described from China, the latter unwingend and endemic to Yulong Mts. in Yunnan. However, we believe that *B. saitoi* is derived from one of the winged species of *B. anchomenoides* group

B. (T.) chinensis JEDLIČKA represents an independent lineage within the subgenus *Tachycellus*, because its innerstructures of aedeagus differs clearly from both the members of *B. anchomenoides* group and *B. curtulus* group too. A close relationship to *B. saitoi* is therefore impossible.

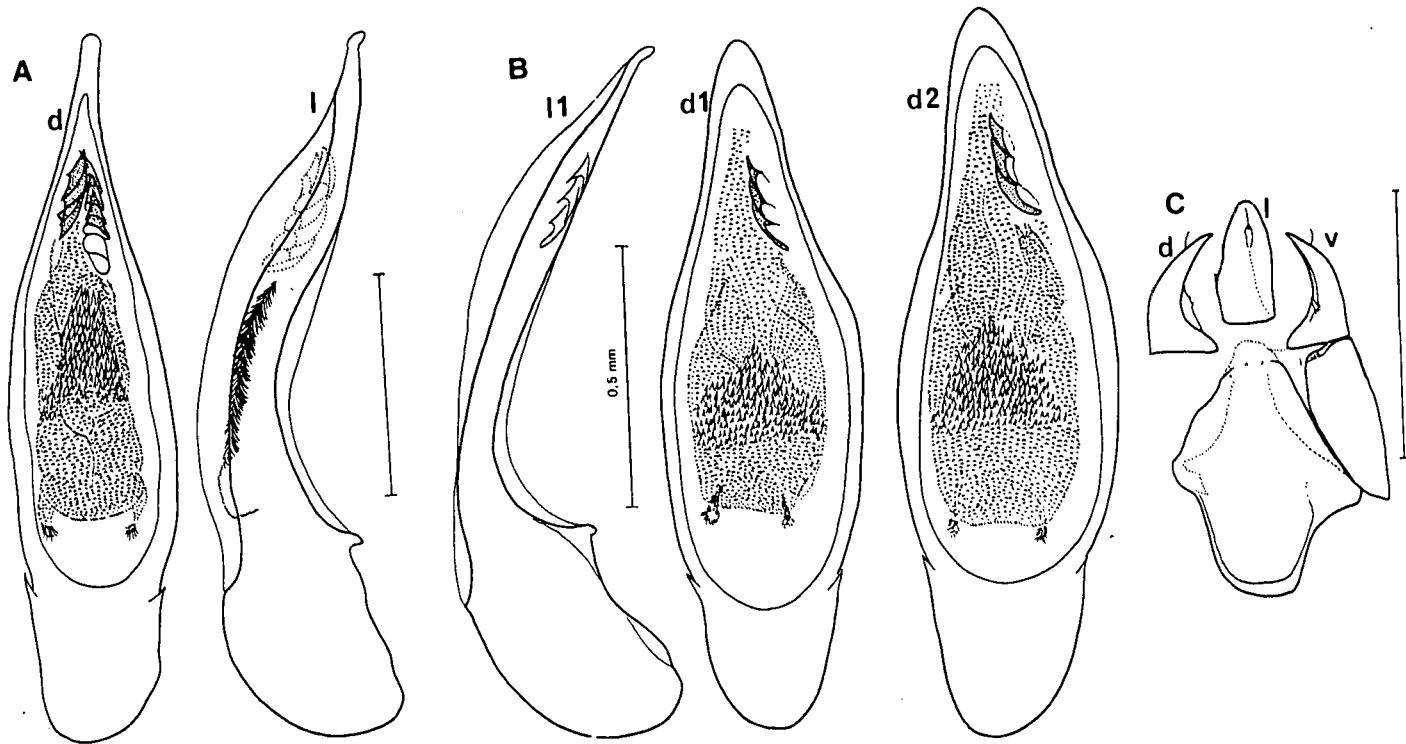


Fig. 1 Genitalia of *Bradycellus* spp. A – B. (*Tachycellus*) *saitoi* MORITA; B and C – B. (*T.*) *picipes* N. ITO et JAEGER, sp. nov.; d, dorsal aspect; l, lateral aspect; m, male genitalia; A and B, male genitalia; C, female genitalia; B-1, example from 2.5 Km SE of Gairibas; B-2, example from Kalipokhri.

Biological note: *B. (T.) saitoi* might be endemic on high mountainous region (alt.2100-2400 m) of central to southern high land of central Japan, since it presents the reduced hind wings and short metepisterna. Here the species can be found associated with *B. (T.) subditus* (LEWIS 1879) under the litter of fallen leaves. Contrary to the restricted distribution of *B. saitoi*, *B. subditus* is very widely distributed from Japan and Russian Far East to Southern China and occurs from lowlands to highlands. In Sichuan it was even taken at 3600-4200 m.

***Bradycellus (Tachycellus) nepalensis nepalensis* JAEGER et N. ITO 1995**

Bradycellus (Tachycellus) nepalensis nepalensis JAEGER et ITO 1995 - Linzer biol. Beitr. 27: 1080 (type locality: above Shermathang, alt. 2,900m, Prov. Bagmati, Nepal).

S p e c i m e n s e x a m i n e d : 1 ex., 106 KTM Phulchoki, alt. 2,000-2,300 m, Quercus, III. 1980, Martens et Ausobsky leg. (SMNS); 1 ex., Mt. Phulchoki, alt. 2,300-2,500 m, Kathmandu, VI. 1997, Weipert leg. (JWc); 1 ex., Mt. Phulchoki, Kathmandu-Tal, I. 1997, Nepal Expeditionen, Jochen Martens leg. (Preserved in SMNS); 1 ex., Mt. Phulchoki, alt. 2,600 m, Kathmandu Valley, XI. 1979, Y. Nishikawa leg. (NSMN); 1 ex., Mt. Phulchoki, alt. 2,600 m, IV. 1982, Smetana leg. (MHNG).

Until now, the nominotypical subspecies was known only from the localities mentioned in the description. Recently we examined additional material from Mt. Phulchoki. The new data provide information for the habitat, dwelling range of altitude, and the phenology of the subspecies.

***Bradycellus (Tachycellus) nepalensis ghoropaniensis* JAEGER et N. ITO 1995**

Bradycellus (Tachycellus) nepalensis ghoropaniensis Jaeger et Ito 1995 - Linzer biol. Beitr. 27: 1081 (type locality: Ghoropani Pass, alt. 2,850m., Parbat Distr., Nepal).

S p e c i m e n s e x a m i n e d : 4exs., Krapa Danda, alt. 2,500 m, Nepal, V. 1997, Schmidt leg. (JSc and BJc).

The subspecies has been hitherto known only from type locality. We examined additional specimens collected in 15km Northeast from Pokhara.

***Bradycellus (Tachycellus) anchomenoides* (BATES 1873)**

Tachycellus anchomenoides Bates 1873 - Trans. Ent. Soc. London, 265 (type locality: Nagasaki, Japan).

S p e c i m e n s e x a m i n e d . In addition to the specimens reported in JAEGER (1993) and JAEGER et WRASE (1994), the following specimens were examined.

China: About 50 exs., 110.06 E, 34.27 N, N. Valley of Hua Shan, 1,200-1,400 m, Qin Ling Shan, 118 km East from Xian, Shaanxi, VIII. 1995, Wrase et Schülke leg., (DWWc, BJc, Nlc); 8 exs., 25.04 N, 102.41 E, Kunming, Western Hill, I, 800 m, Yunnan, VII. 1996, Smetana leg., (CNC, BJc).

Vietnam: 1 ex., Deo O Quy Ho, alt. 1,750 m, Sa Pa, Lao Cai Prov., 16. V. 1995, Y. Nishikawa leg. (NSMN); 5 exs Deo Tram Ton, alt. 1,840 m, Lao Cai Prov., N Vietnam, 10. X. 1994, Y. Nishikawa leg. (NSMN and Nlc); 6 exs., Sa Pa, alt. 1,500 m, Lao Cai Prov., N Vietnam, 9.+10. X. 1994, M. SATO leg. (NSMN, BJc and Nlc).

Bhutan: 1 ex., Chimakothi, alt. 1,900-2,300 m, V. 1972, Nat.-Hist. Museum Basel-Bhutan Expedition, (NHMB); 1 ex., Dechhi Paka, alt. 3,300 m, VI. 1972, (NHMB); 1 ex., Dorjee Khandu, Chasilakha, 1978, (NHMB); 1 ex., Thimphu, IV. 1984, Nat.-Hist. Museum Basel-Bhutan Expedition, (NHMB).

Nepal: 1 ex., Lamobagar-Hedangna (Arun), alt. 1,400-1,800 m, E Nepal, VI. 1983, Brancucci leg., (NHMB); 1 ex., For. NE Kuwapani, alt. 2,500 m, Khandbari Distr., IV. 1982, Smetana leg., (MHNG); 1 ex., Landrung, alt. 1,600 m-Damphus, alt. 1,350 m, nr. Pokhara, X. 1981, M. Sakai leg., (NSMN); 1 ex., Modi Khola, Landrung-Pothana, alt. 1,600-1,900 m, W Nepal, VI. 1984, Holzschuh leg., (NHMB); 1 ex., Lethe Khola (right banks) near Lethe, alt. 2,400 m, V. 1995, Martens et Schawaller (SMNS); 1 ex., Sikles, N Pokhara, alt. 1,700 m, V. 1993, Schmidt leg., (JSc); 1 ex., Annapurna, Krapa Danda, 1800 m, V. 1997, Schmidt (JSc).

Japan: All specimens are preserved in Nlc. 2 exs., Riv. Minabe, Wakayama, 20. II. 1974, M. Yoshida leg.; 1 ex., Riv. Muko, Takedao, Hyōgo, 21. IX. 1995, I. Tanaka leg.; 1 ex., Muroto, Kochi, 5. V. 1988, T. ITO leg.; 1 ex., Mt. Ohyama, Kanagawa, 4. VII. 1994, N. Ito leg.

Until now, *B. anchomenides* was known from Japan and China. Recently we were able to examine new specimens from Asian continent, China, Vietnam, Nepal and Bhutan, additionally from Japan. The specimens from Asian continent show the external characteristics including aedeagi similar one another. The body size is within 4.2-5.5 mm (4.4-5.4 mm in examples from China, 4.9-5.5 mm in those from Vietnam, 4.2-4.8 mm in those from Himalaya), the fore and mid tarsi are relatively slender, the elytral microsculpture is obscure, and the apical lobe of aedeagus is short. But the typical Japanese specimens from Honshu, Shikoku and Kyushu are relatively different from them, namely, the body is larger in size (5.2-6.0 mm), the pronotum is more coarsely punctate in base, the fore and mid tarsi are rather strongly expanded, and the elytral microsculpture is clearer, and the apical lobe of aedeagus is longer. Such a variation between Japanese specimens and continental specimens is usually found. For examples, *Bradycellus* (*T.*) *subditus* (LEWIS, 1879) and *Bradycellus* (*T.*) *curtulus* (MOTSCHULSKY 1860) are species indicating such a phenomenon (JAEGER 1993: 941; JAEGER & WRASE 1994: 455). *B. anchomenoides* must be also a polythetic species like them. On the other hand, JAEGER and WRASE (1994) suggested that *Bradycellus* (*Tachycellus*) *mons* HABU 1975 and *B. (T.) jaegeri* Morita 1997 (= *B. (T.) insularis* MORITA 1993 nec REICHARDT 1976) represent the infraspecific units of *B. (T.) anchomenoides* due to the similarity in the shapes and inner structures of aedeagi. However, now, we are do not change the formal nomenclatural status, because additional material from the unrecorded regions should be examined.

***Bradycellus (Tachycellus) picipes* N. ITO et JAEGER sp. nov. (Figs. 1-B & Fig. 2)**

Body oblong, rather thick, pitchy black, very shiny, not iridescent; palpi yellowish brown, tarsi light brown, antennae brown to light brown, tibiae dark brown in apical half.

Head relatively wide, 0.70-0.74 times as wide as the pronotal width, moderately elevated, very minutely and sparsely punctate; labrum subquadrate, shallowly emarginate at apex; clypeus weakly protrudent at apical corners, linearly depressed a little behind apex, gently swollen before and behind the depression; clypeal suture clearly carved lengthwise, from each end of which frontal impression arcuately runs behind and is deep throughout; eyes large, gently prominent; temples short, steeply convergent towards neck constriction; antennae submoniliform, apical two segments reaching elytra, 3rd segment sparsely pubescent, as long as the 4th and two-fifths longer than the 2nd; mandibles sharpened apicad, 3rd segment of labial palpus tumid medially, one-fifth longer than the 2nd; ligula parallel-sided, truncate at apex; mentum regular-triangularly toothed at apex, epilobes narrow and weakly expanded apicad; microsculpture obscure and partly impressed, observed as square meshes on clypeus and transverse meshes near temples.

Pronotum transversely quadrate, moderate in shape, 1.45-1.48 times as wide as long, widest a little behind apical two-fifths, rather steeply declivous apico-laterad, mostly smooth,

coarsely punctate in basal foveae; sides gently arcuate in front and straightly oblique behind from the widest point, somewhat widely bordered; apex shallowly emarginate, straight at bottom where border is interrupted; base as wide as apex, hardly bisinuate, unbordered in middle half; apical angles narrowly rounded; basal angles fairly larger than right angle and obtuse; lateral furrows each carved in a line lengthwise, isolated from small and rounded basal fovea by a weak hump; front transverse impression shallow, the hind one obscurer than the front one; median line vague, reaching apex and base; microsculpture mostly invisible, consisting of vague transverse meshes in lateral furrows and basal foveae.

Elytra suboval, well convex, very sparsely furnished with extremely minute punctures; sides gently curved in humeri, subarcuate in middle, gradually strongly convergent behind from apical third, preapical sinus very shallow; apices weakly produced behind, rounded at tips which are narrowly separated from each other; bases each shallowly emarginate, not angulate at humeral angles; striae fine and shallow throughout, finely crenulate, 4th to 7th striae brokenly impressed, scutellar striole relatively long; intervals quite flat or slightly convex, a setiferous pore on 3rd interval near apical two-fifths; marginal series divided into three groups, though the hind two groups are narrowly isolated, fore group composed of 5-6 umbilicate pores, middle one of 3-4 pores, and hind one of 4-5 pores; microsculpture invisible or hardly detectable in part as transverse meshes. Hind wings entirely developed.

Ventral surface moderately densely pubescent on abdominal sternites; metepisternum strongly contracted behind, elongate, one-third longer than wide; 6th abdominal sternite in males unisetose and in females bisetose at each side, in both sexes widely arcuate at apical margin.

Hind femur bisetose postero-ventrally; fore tibia bi- or trispinous apico-externally, without sulcus, terminal spur lanceolate; tarsi comparatively narrow, mid tarsus in male biserially squamous on ventral side of 1st to 4th Segments, hind tarsus nearly four-fifths times in males and seven-tenths times in females as long as the width of head, 1st segment one-fourth shorter than the 2nd and 3rd taken together, 3rd segment two-sevenths shorter than the 2nd and one-fourth longer than the 4th, claw segment unisetose along each ventral margin.

Aedeagus (Fig. 1-B) in lateral aspect thin, gently curved, weakly bent obliquo-ventrad at apex, in dorsal aspect widely boat-shaped; apical lobe small, as wide as long; apical orifice widely opening, inner sac armed with a series of three spines in right side near apex and with a triangular cluster of microtrichia. Stylus (Fig. 1-C) moderately curved outwards, unispinous at ventro-external margin, with a long seta a little apart from apex.

Length: 5.6-5.9 mm. Width: 2.7-3.0 mm.

Holotype: male, Singalila Dara, ca. 2.5-km SE of Gairibas, alt. 2,880 m, West Bengal, India, 6-XI-1981, S. Uéno leg. (preserved in NSMN)

Paratypes: 2 females, same data as the holotype; 1 female, Singalila Dara, Gairibas, alt. 2,680 m, NE India, 5-XI-1981, Y. Nishikawa leg.; 1 male, Kalapokhri, Singalila Dara, alt. 3,020 m, E Nepal, 2-X-1983, Y. Nishikawa leg.; 1 female, ditto, 3,090m; S. Uéno leg.; 1 female, Singalila Dara, Kaiyakata, alt. 2,960 m, 5-XI-1981, Y. Nishikawa leg.; 1 male, S Mansingma, forest, alt. 2,250 m, Khandbari Distr., Nepal, 12-IV-1984, Smetana & Löbl leg.; 1 female, 258 Panchthar Dist. zw. Deorali, Puspati u. Sheldoti, 28-VIII-1983, Tsuga Lithocarp., Martens & Daams, Nepal-Expeditionen Jochen Martens. (Paratypes preserved in NSMN, CNC, SMNS and NLC).

B. (*T.*) *picipes* sp. nov. is the third species of the subgenus recorded from Nepal and a member of the *B. anchomenoides* group due to the characteristics of male aedeagal inner sac.

The new species is easily distinguished from *Bradycellus (Tachycellus) anchomenoides* (BATES 1873) by the larger size (Himalayan members of *anchomenoides* are only 4.2-4.8 mm), the microsculpture much obscurer and the elytral striae shallower and not entire in part. The new species is more or less similar to *Bradycellus (Tachycellus) nepalensis nepalensis* JAEGER et N. ITO 1995, but is different from the latter in having the body larger in size and more shiny, the pronotum and elytra not brownish in outer margins, the hind wings not obsolete, and the microsculpture much obscurer. Besides *B. picipes* sp. nov. differs from both species in the external shape of median lobe of aedeagus and its particular structure of inner sac.



Fig. 2 Habitus of *Bradycellus (Tachycellus) picipes* N. ITO et JAEGER, sp. nov.

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Zusammenfassung

Eine neue Art der *Bradycellus* Untergattung *Tachycellus* wird aus Nord-Indien und Nepal beschrieben (locus typicus: India, West Bengal, Singalila Dara, ca. 2.5 km SE of Gairibas, alt. 2,880 m).

Eine kritische Untersuchung der diagnostischen Merkmale der der *B. anchomenoides* Gruppe ergab, dass nur die spezifischen Strukturen des Aedoeagus-Internalsacks als Autapomorphie der Artengruppe wahrscheinlich gemacht werden können. Für die Artengruppen der *Bradycellus*-Untergattung *Tachycellus* wird eine revidierte Bestimmungstabelle vorgelegt.

Für *Bradycellus (Tachycellus) nipponensis* JAEGER et WRASE, *B. (T.) nepalensis nepalensis* JAEGER et N. ITO, *B. (T.) nepalensis ghoropaniensis* JAEGER et N. ITO, *B. (T.) anchomenoides* (BATES) und *B. (T.) saitoi* MORITA werden neue Daten zur Verbreitung und Biologie präsentiert. *B. anchomenoides* kann erstmalig aus Nepal, Bhutan und Vietnam nachgewiesen werden.

Nach Untersuchung neuen Materials werden die verwandtschaftlichen Beziehungen von *B. saitoi* MORITA diskutiert.

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