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Trogulus falcipenis, spec. nov., ein neuer Brettkanker aus den Alpen und dem Dinarischen Gebirge

(Arachnida, Opiliones, Trogulidae)

Christian Komposch

Komposch, C. (2000): *Trogulus falcipenis*, spec. nov., a new trogulid from the Alps and the Dinaric Alps (Arachnida, Opiliones, Trogulidae). – Spixiana **23/1:** 1-14

Trogulus falcipenis, spec. nov., the smallest hitherto known species of the genus, is described. This trogulid is characterized by its small body size (♂< 4.7/♀< 5.3 mm), large interocular distance, dark-brown chelicerae and in males, by the short penis (< 1.25 mm), the rod-shaped truncus and the sickle-shaped stylus. Further morphological differences compared to *Trogulus tricarinatus* (Linnaeus, 1767) and data on the variability of both species are given. *Trogulus tricarintus hirtus* Dahl, 1903 is closely related to *T. falcipenis*, spec. nov., but is distinguishable by long, vertical-standing hairs an the legs. *T. falcipenis*, spec. nov. is known from Austria (Carinthia), Slovenia, Croatia, Yugoslavia (Montenegro, Serbia) and Albania. Particularly in the northern part of its distribution the species inhabits the litter mainly of beech- and mixed forests and seems to occur mainly in the higher montane-zone. The associated harvestmen-fauna is listed and the endangered status of the species is discussed.

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Einleitung

Brettkanker sind aufgrund ihrer gleichförmigen Körpergestalt und ihres Erdmantels an Körper und Laufbeinen merkmalsarme Weberknechte. Die Bedeutung des männlichen Genitalapparates wurde erst in den letzten Jahrzehnten erkannt; darauf aufbauende Revisionen und Neubeschreibungen lieferten erstmals verläßliche taxonomische Grundlagen. In der Folge wurden in den letzten Jahren aus keiner anderen Weberknechtfamilie so viele neue (mittel)europäische Arten beschrieben wie Brettkanker (Avram 1971, Martens 1978, Chemini 1983, Chemini & Martens 1988, Martens & Chemini 1988). Dadurch bedingt sind ältere faunistische Angaben zu mittel- und südeuropäischen Troguliden ohne Revision des Materials oftmals schwer interpretierbar; die tatsächliche Verbreitung einzelner Arten ist revisionsbedürftig bzw. ungenügend bekannt (vergl. Chemini 1984, Weiss et al. 1999). Aufgrund der erwähnten äußeren Merkmalsarmut sowie in vielen Fällen sehr diffizilen Unterschieden zwischen nah verwandten Arten gelten die Vertreter der Gattung Trogulus Latreille, 1802 auch heute noch als außerordentlich schwierige und taxonomisch unzureichend geklärte Gruppe.

Die hier beschriebene Art ist vor allem aufgrund ihrer geringen Körpergröße und Ausdifferenzierung des Penis gut charakterisiert und von allen übrigen Arten der Gattung abgrenzbar. Die Zahl der bisher bekannten validen mitteleuropäischen *Trogulus*-Arten erhöht sich damit auf neun (*T. falcipenis*, spec. nov; *T. tricarinatus* (Linnaeus, 1767); *T. nepaeformis* (Scopoli, 1763); *T. closanicus* Avram, 1971; *T. oltenicus* Avram, 1971; *T. cisalpinus* Chemini & Martens, 1988; *T. martensi* Chemini, 1983; *T. tingiformis*

C. L. Koch, 1848; *T. coriziformis* C. L. Koch, 1839). Die Frage nach dem Artstatus von *T. oltenicus* ist allerdings noch nicht endgültig geklärt (vergl. Weiss 1978).

Material und Methoden

Falls nicht anders vermerkt, wurden die Tiere mittels Bodensieb bzw. durch Handfang vom Verfasser gesammelt. Die Belegexemplare befinden sich in der Sammlung des Verfassers am Institut für Faunistik und Tierökologie, Graz. Das vermessene und gezeichnete *Trogulus tricarinatus*-Material stammt aus Deutschland (Sachsen-Anhalt), Österreich (Kärnten, Steiermark, Burgenland, Niederösterreich, Vorarlberg), Italien, Slowenien, Kroatien, Bosnien-Herzegowina, Jugoslawien (Montenegro, Serbien) und Mazedonien (unpublizierte Funddaten, Coll. I. Karaman bzw. Ch. Komposch). Fundortbezeichnungen sind folgenden Kartengrundlagen entnommen: Österreichische Karten 1:50 000 (Bundesamt für Eich- und Vermessungswesen, Wien), Der große Atlas Slowenien 1:50 000 (Ljubljana, 2. Auflage, 1992), Kroatien 1:250 000 (freytag & berndt), Jugoslawien – Makedonien 1:300 000 (RV Verlag), Albanien 1:400 000 (Ravenstein).

Meßstrecken: Der Meßwert für die Körperbreite wird an der breitesten Stelle des Opisthosoma knapp hinter der Körpermitte ermittelt. Die Länge der Kopfkappe wird vom Vorderrand der Augen gemessen. LB II-Länge versteht sich als Summe der Längen der Einzelglieder ohne Tarsalkralle.

Abkürzungen

B:	Breite
BS:	Bodensieb
HF:	Handfang
Juv:	Juvenus
KB:	Körperbreite
KL:	Körperlänge
L:	Länge
LB:	Laufbein
M:	Mittelwert
ÖK:	Österreichische Karte 1:50 000
P:	Proben-Nr., Coll. Komposch
µm:	Mikrometer

Trogulus falcipenis, spec. nov.

Figs 1, 2, 4-6, 8-9, 12-14, 17-21

Typen. Holotypus: ♂, Österreich, Kärnten, Koschuta, Karawanken, S Zell-Pfarre, zw. Koschutahaus und Grosalm, 46°27'N, 14°23'E, 1350-1390m, ÖK 212, 04.07.1995 (P1), BS, Ch. Komposch leg. (Naturhistorisches Museum Wien, Inv.-Nr. 19.105). – Paratypen: 16♂♂, 11♀♀: Naturhistorisches Museum Bern (1♂, 1♀); Senckenberg-Museum Frankfurt (1♂, 1♀); Naturhistorisches Museum Wien (7♂♂, 5♀♀); Zoologische Staatssammlung München (1♂, 1♀); Coll. Ch. Komposch (4♂♂, 2♀♀); Coll. J. Martens (1♂, 1♀); Coll. T. Novak (1♂).

Diagnose. Sehr kleine Art der Gattung (KL ♂ bis 4,7/♀ bis 5,2 mm). Penis auffallend kurz (L bis 1,25 mm), charakteristisch ausdifferenzierter Truncus mit sichelförmigem Stylus. Großer Augenabstand. Dunkelbraun bis braunschwarz gefärbte Cheliceren. Behaarung der Laufbeine kurz und schräg abwärts gerichtet. Aus den SE-Alpen und dem Dinarischen Gebirge bekannt.

Beschreibung

Körperform, Zeichnung und Färbung (Dorsalseite, Abb 1-2). Gattungstypische Körperform, ähnlich *T. tricarinatus*; erdfarben-grau, oftmals mit vereinzelten kleinen schwarzen Flecken, Körpermitte rötlich-braun-(orange) erscheinend (Ränder stärker erdinkrustiert als zentrale Bereiche); frisch gehäutete Tiere ohne Inkrustierung einheitlich gelblich-hellbraun gefärbt; dichter Besatz mit Tuberkeln.

Bewehrung: laterale prosomale Wulste als Aneinanderreihung von flachen Höckern ausgebildet, median mit oftmals kaum merklicher Aufwölbung. Schultern abgesetzt und deutlich ausgebildet.

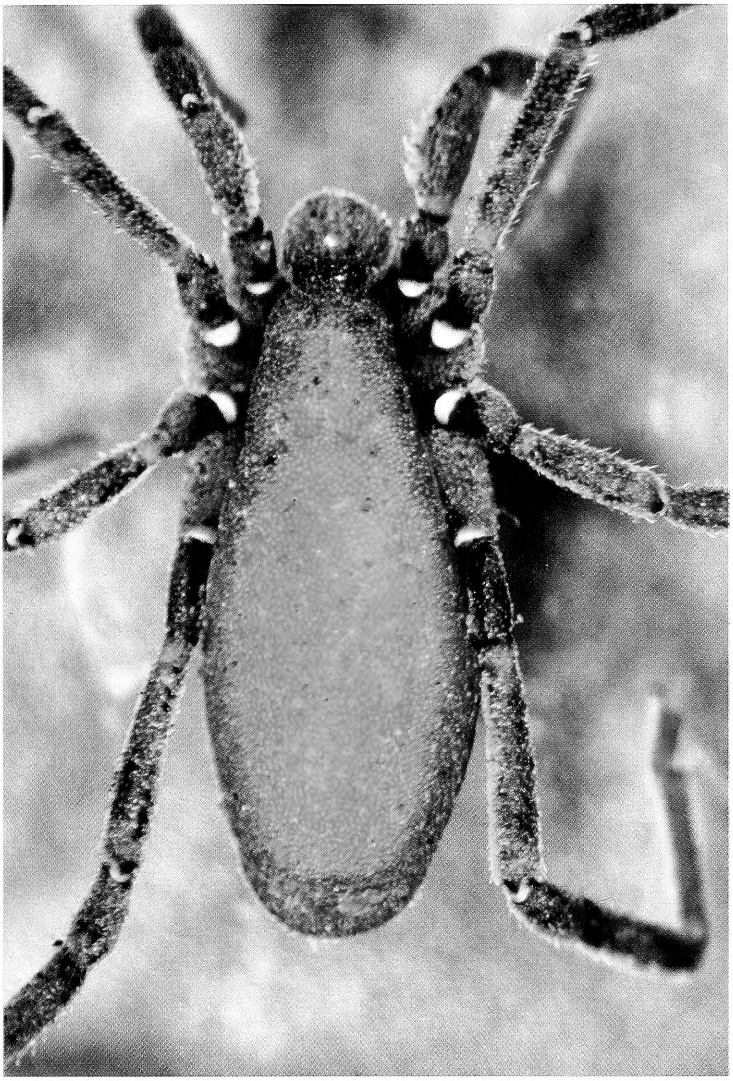


Abb. 1. *Trogulus falcipenis*, spec. nov., ♂ (A: Kärnten, Koschuta). Habitus Dorsalansicht.

Niedriger Augenhügel, median leicht gefurcht; große Augendistanz (Tab. 1); Augendurchmesser ca. 65 μm.

Körpermaße (Tab. 1). ♂ kleiner und schmäler als ♀.

Cheliceren. Gattungstypisch ausdifferenziert, auffallend dunkelbraun-braunschwarz gefärbt (bei altem Alkoholmaterial ausgebleicht), Grundglied prolateral hellbraun bis gelblich-weiß.

Pedipalpen. Blaß gelblichbraun, selten dunkelbraun gefärbt; Trochanter und Femur meist etwas dunkler, prolateral heller.

Laufbeine. Alle Glieder bis auf Calcaneus und Tarsus dicht mit Tuberkeln besetzt, Borstenhaare der Tuberkel kurz und schräg abwärts gerichtet; ausgeprägter Erdmantel; Tarsal-Gliederung der LB I-IV: 2-2-3-3 (selten mit einseitig unvollständig ausgebildeter Segmentierung eines Tarsus); Tarsus II hellbraun bis schwarz gefärbt, mit sehr zarter, graziler Kralle (Abb. 4); Tarsus I, III, IV mit großer Kralle.

Laufbein-Längen (Tab. 2). ♂ trotz geringerer KL ähnliche LB-L I-IV wie ♀; ♂ etwas höherer Längenverhältnis-Wert von Grundglied zu Endglied des LB II-Tarsus als ♀.

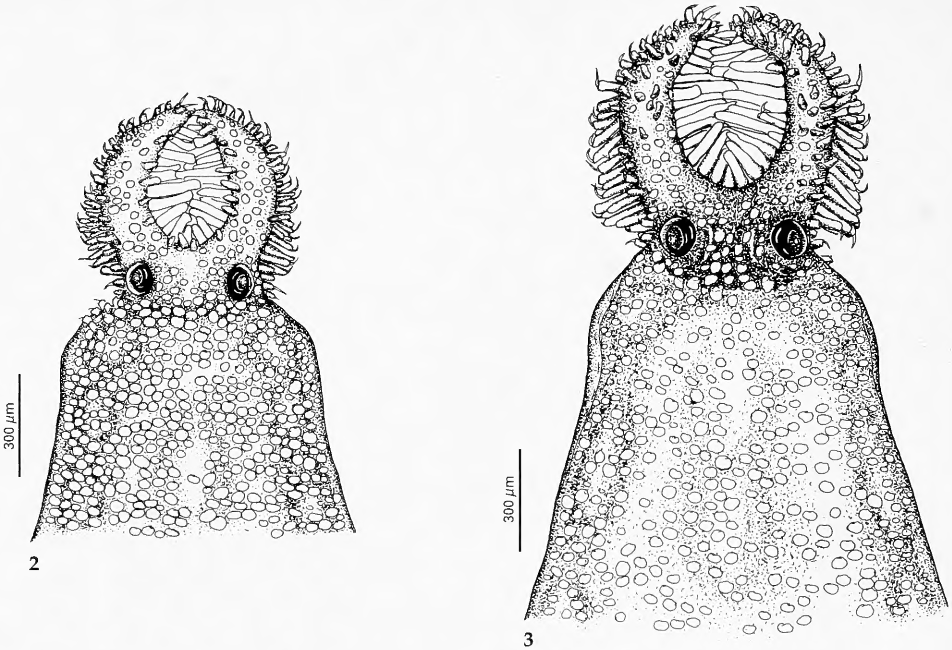


Abb. 2-3. Habitus: Kopfkappe und Prosoma dorsal, von Erdinkrustierung befreit. **2.** *Trogulus falcipenis*, spec. nov., ♂ (SLO: Krn). **3.** *Trogulus tricarinatus* (Linnaeus, 1767), ♂ (SLO: Breg, NW Ribnica).

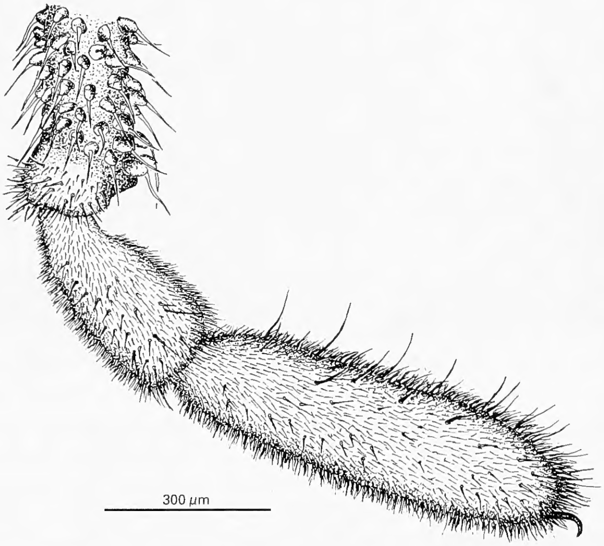


Abb. 4. *Trogulus falcipenis*, spec. nov., ♂ (A: Kärnten, Koschuta). Tarsus II links, prolateral.

Variabilität von *Trogulus tricarinatus* (Linnaeus, 1767). Als Ergänzung zu den eigenen Messungen wird im folgenden ein Vergleich mit Literaturdaten vorgenommen: Die von Weiss (1978) für *T. tricarinatus* aus Siebenbürgen beschriebene Variabilität der Körperlänge liegt im Mittel für ♂♂/♀♀ bei 4,85/ 5,60 mm; Min/Max-Werte: 4,56/5,13 - 5,13/5,81 mm. Die von Weiss angegebenen Meßwerte bezüglich der Augendistanz weichen von den eigenen deutlich ab. Messungen der KL, KB, LB-Längen und Penis-

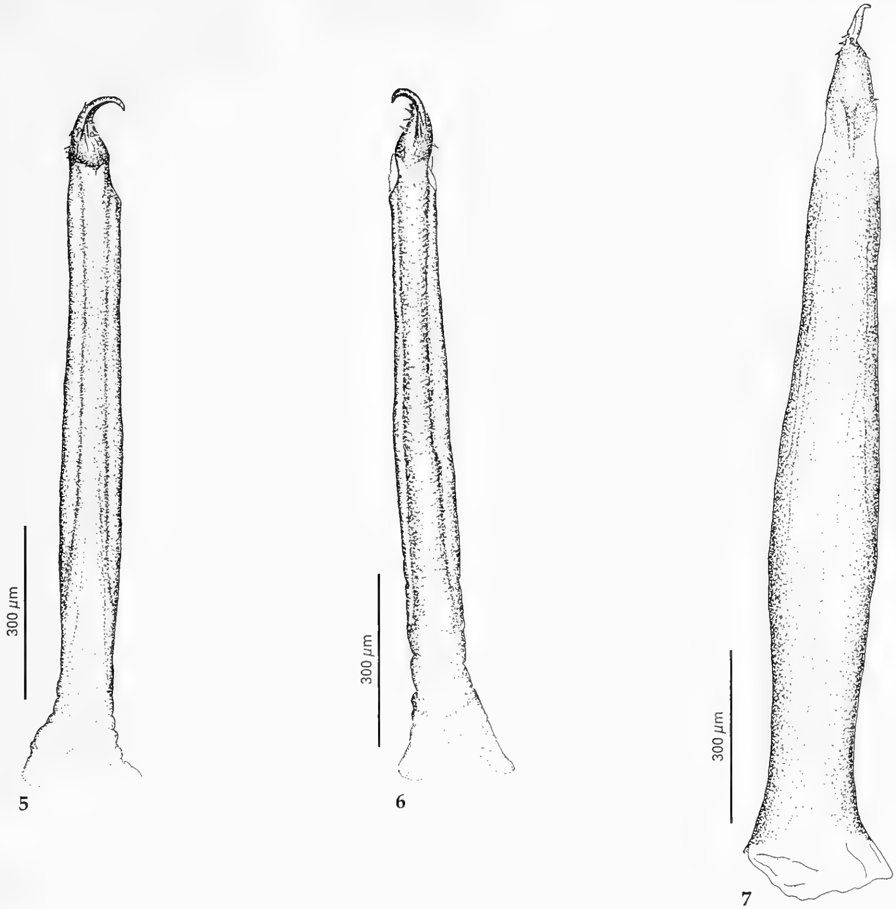


Abb. 5-7. Penis. **5-6.** *Trogulus falcipenis*, spec. nov., ♂, Holotypus (A: Kärnten, Koschuta); ventral (5), dorsolateral (6). **7.** *Trogulus tricarinatus* (Linnaeus, 1767), ♂ (A: Kärnten, Elsgraben E St. Veit); ventral.

L von *T. tricarinatus* bei Avram (1971) und Starega (1976) fügen sich gut in dieses Bild. Deutlich größere Tiere müssen Silhavy (1956) vorgelegen haben: er nennt Körperlängen für ♂♂ von 5,4-6,0 mm; ob sich die ♀♀ mit einer KL von 7,0-8,0 mm wirklich auf *T. tricarinatus* beziehen, bleibt fraglich. Martens (1978) führt für *T. tricarinatus* ♂ einen Maximalwert der Körperlänge von 6,5 mm an; besonderes Augenmerk verdient der Hinweis auf extrem kleine nordgriechische (Chalkidike) *T. tricarinatus* ♂♂ von 4,4-4,9 mm KL, wobei die Artzugehörigkeit fraglich ist. Das Längenverhältnis Ta-Grundglied zu Ta-Endglied des LB II beträgt für die dem Verfasser vorliegenden *T. tricarinatus* ♂♂ 1,73-2,26 (M=1,75), für ♀♀ 1,55-2,42 (M=1,75).

Genitalmorphologie (Tab. 3, Abb. 5-6, 8-9, 12-14). ♂: Truncus penis kurz, schlank und +/– parallelrandig (in der Mitte undeutlich verbreitert), stabartig geformt (Tiefe des Penis nur etwas geringer als die Breite an der schmalsten Stelle nahe der Basis) mit dorsaler und ventraler Längsrinne, basal leicht verengt, Basis mit fließendem Übergang zwischen sklerotisiertem und häutigem Bereich; Truncus dorsal braun erscheinend, ventral weißlich mit braunen Rändern; Glans mit einzelnen Sinnesborsten besetzt, Stylus sklerotisiert und sichelförmig, von ventral stark nach rechts gebogen. – ♀: Ovipositor ähnlich *T. tricarinatus*. Receptacula seminis: jederseits relativ große, vierlappige (je zwei große Säcke), +/– tropfenförmig-längsovale Rezeptakeln (Abb. 13-14).

Etymologie. Die Benennung der Art erfolgt nach der charakteristisch sichelförmig gebogenen Glans penis (lat. *falx* = Sichel). Als deutscher Name wird Zwergbrettkanker vorgeschlagen.

Fundorte

Österreich (A): Kärnten: Koschuta [Locus typicus], Karawanken, S Zell-Pfarre, E Koschutahaus, 46°27'01"N, 14°23'40"E, 1320-1380 m, tiefgründige Laubstreu eines Rotbuchen-(Fichten, Lärchen) Hangwaldes in Steillage, 27.07.1993 (P6), BS 1♂; ÖK 212; ibidem, zw. Koschutahaus und Grosalm, 1370-1410 m, tiefgründige Laubstreuansammlungen eines Rotbuchen (Krüppelbuchen)-Hangwaldes in W-Exposition, 04.07.1995 (P1), BS 1♂; ibidem, 30.07.1999, BS 5♀♀; ibidem, 06.09.1999, BS 2♂♂, 1♀.

Slowenien (SLO): Vrsic, Julische Alpen, V. Mojstrovka E, N Trenta, SSW Kranjska Gora, SSE Ticarjev dom (Paßübergang), 46°25'N, 13°4'E, 1600 m, dünne Laubstreu in Rotbuchenwald nahe der Waldgrenze, S bzw. SW Exposition, 07.08.1993 (P1), BS 1♀; Kobariski Stol Ostseite, NW M. vrh, Julische Alpen, SSW Zaga, SW Srpenica,

Tab. 1. Morphometrische Daten von *Trogulus falcipenis*, spec. nov. und *T. tricarinatus* (Linnaeus, 1767): Körperlängen (KL), -breiten (KB), Augendistanz, Kopfkappen-Länge und Schulterbreite (B-Schulter) (Abmessungen des Holotypus, Mittelwerte, Minimum- und Maximumwerte).

		KL (mm)	KB (mm)	Augendist. (μm)	L-Kopfkappe (μm)	B-Schulter (μm)
T. falcipenis	Holotypus ♂	4,45	1,70	300	520	735
T. falcipenis	♂ Mittelwert	4,33	1,62	263	521	749
	Variabilität (n=15)	3,96-4,65	1,31-1,75	210-322	462-616	644-820
T. falcipenis	♀ Mittelwert	4,72	1,85	306	549	818
	Variabilität (n=10)	4,40-5,22	1,61-2,01	252-343	518-600	728-868
T. tricarinatus	♂ Mittelwert	4,96	1,87	243	617	807
	Variabilität (n=18)	4,55-5,63	1,75-2,01	195-280	520-760	740-875
T. tricarinatus	♀ Mittelwert	5,66	2,26	273	663	890
	Variabilität (n=29)	5,29-6,03	2,01-2,51	224-301	560-740	812-966

Tab. 2. Morphometrische Daten von *Trogulus falcipenis*, spec. nov.: Längen der Laufbeine I-IV, Länge der Einzelglieder (Trochanter, Femur, Patella, Tibia, Metatarsus, Tarsus) von LB II und Längenverhältnis des Grundgliedes (G) zum Endglied (E) des LB II-Tarsus (Abmessungen des Holotypus, Mittelwerte, Minimum- und Maximumwerte).

T. falcipenis, spec. nov.	LB-L (mm)				LB II-L (mm)						LB II-Ta
	I	II	III	IV	Tr	Fe	Pt	Ti	Mt	Ta	Verh. G:E
Holotypus ♂	3,45	5,72	3,98	5,18	0,44	1,63	0,63	0,94	1,20	0,882	1:1,86/1,91
♂ Mittelwert	3,20	5,80	3,79	5,10	0,45	1,64	0,63	0,93	1,18	0,989	1:1,90
Variabilität (n=13)	2,77-3,60	5,10-6,76	3,30-4,20	4,52-5,80	0,41-0,53	1,50-1,93	0,41-0,73	0,80-1,05	1,02-1,33	0,75-1,19	1:1,72-2,15
♀ Mittelwert	3,37	5,81	3,86	5,19	0,47	1,60	0,65	0,94	1,18	0,952	1:1,82
Variabilität (n=8)	3,04-3,62	5,16-6,26	3,62-4,13	4,90-5,56	0,44-0,49	1,32-1,74	0,60-0,70	0,85-1,01	1,08-1,25	0,89-1,01	1:1,64-1,98

Tab. 3. Abmessungen des Penis von *Trogulus falcipenis*, spec. nov. und *T. tricarinatus*: Penis-Länge, Penis-Breite an der schmalsten Stelle der Basis, maximale Penis-Breite im ersten Drittel des Truncus und maximale Penis-Tiefe des dreidimensional ausdifferenzierten Truncus (Maße des Holotypus, Mittelwerte, Minimum- und Maximumwerte).

		Penis-Länge (mm)	Penis-Breite Basis min. (μm)	Penis-Breite max. (μm)	Penis-Tiefe max. (μm)
T. falcipenis, spec. nov.	Holotypus ♂	1,13	84	98	70
T. falcipenis, spec. nov.	♂ Mittelwert	1,14	78	100	70
Variabilität (n=14)		1,00-1,24	70-98	95-109	65-74
T. tricarinatus	♂ Mittelwert	1,49	151	154	65
Variabilität (n=18)		1,40-1,76	112-182	125-182	55-77

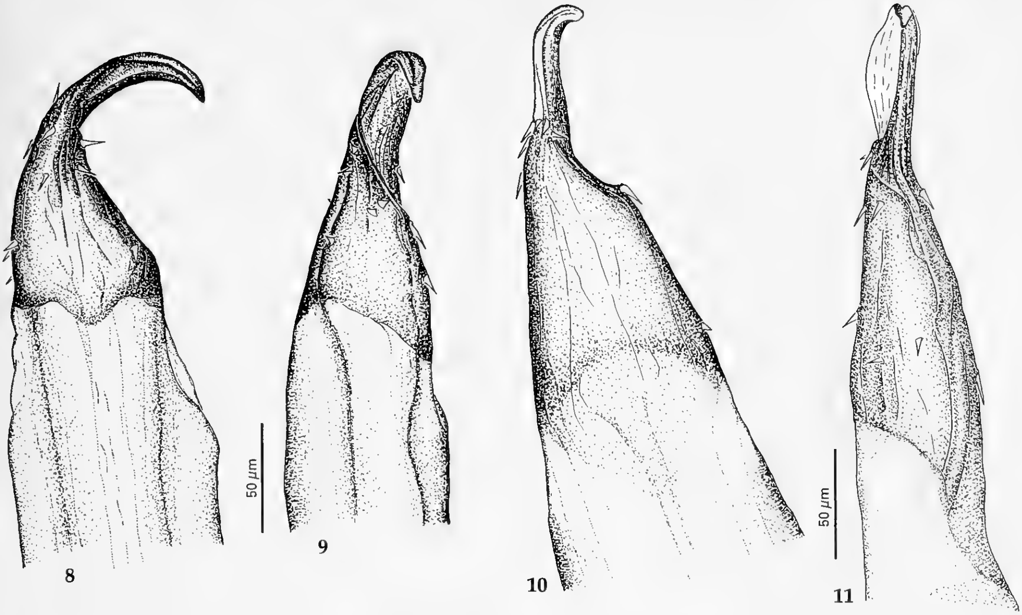


Abb. 8-11. Glans penis. **8-9.** *Trogulus falcipenis*, spec. nov., ♂, Holotypus (A: Kärnten, Koschuta); ventral (8), lateral (9). **10-11.** *Trogulus tricarinatus* (Linnaeus, 1767), ♂ (A: Kärnten, Elsgraben E St. Veit); ventral (10), lateral (11).

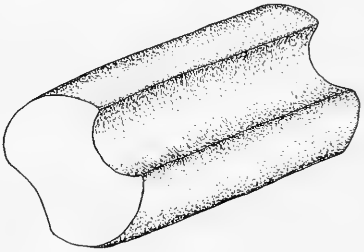


Abb. 12. *Trogulus falcipenis*, spec. nov., ♂. Truncus penis, Schema (Anschnitt in Penismitte), dorsal.

SW Bovec, Na verilih, S Pl. pri Starih Hramih, 46°17'(16')N, 13°28'E, 1300-1480 m, Streuschicht eines Rotbuchenwaldes in Nord-Exposition, 01.08.1993 (P2), BS 1♂; Krn Südseite, Julische Alpen, N Pl. Zaslap, ENE Kobarid, NNW Tolmin, 1km S/SSW Gipfel, S Gomisckovo zavetisce, neben Wanderweg, 46°15'N, 13°39'E, 1700-1800 m, unter Stein am Wegrand in subalpinen Rasen, 03.08.1993 (P2), HF 1♂; Soca-Tal, SE Kamno, 1,5 km SE Ortschaft, NW Tolmin, Julische Alpen, 46°13'N, 13°39'E, 200 m, feuchte Streuschicht eines Laubmischwaldrandes (Rotbuchen, Hainbuchen), nahe Straße, 31.07.1998, BS 1♂, L. Slana & T. Novak leg.; Matajurski vrh Südseite, Julische Alpen, E Tolmin, NNE Koritnica, N Rut, NNE Grant, NE Rutarski Gozo, 46°13'N, 13°52'E, 950-1150 m, tiefgründige Fallaubschichten eines Rotbuchen-(Ahorn, Fichten) Waldes, 25.08.1995 (P2), BS 1♂, (1Juv?); Nanos, W Postojna, Rebrnice, E Lozice, 45°46'N, 14°03'E, 25.06.-04.07.? (Nr. 894), 1♂, Ganglbauer leg.; Goteniska Gora, Medvedjek, W Gotenica, W Kocevja, E Forsthaus Zaga, 45°37'N, 14°42'E, 950 m, tiefgründige Streuschicht am Grund einer Doline (Durchmesser 10 m) eines Rotbuchenwaldes, 10.10.1993 (P2), BS 2♂♂, 2 Juv.

Kroatien (HR): Cres (Insel), "nord v nond", 44°58'N, 14°24'E, ~200-300 m, Streuschicht unter alten Eichen, 29.10.1980, 1♂, C. Deeleman leg.; Boven Jablanac, Velebit, SE Rab, S Starigrad, ~44°43'N, 14°54'E, 400 m, 18.10.1980, ?, 1♂, C. Deeleman leg.; Imotski – Zagvozd, Paßstraße zwischen beiden Ortschaften, ESE Split, ~43°26'N, 17°08'E, "*Pinus niger*", 22.10.1980, 1♂, C. Deeleman leg.

Jugoslawien (YU): Serbien: Tara Mt., Mitrovac, zw. Bajina Basta und Kremna, NW Uzice, 43°52'-44°02'N, 19°15'-19'E, 1300 m, 25.08.1982, 1♀, I. Karaman leg. (Nr. 255); Montenegro: Sustak, oberhalb Bar, Montenegro-S, Küste, SSW Podgorica, ~42°05'N, 19°07'E, +/– 300 m, *Quercus*, *Carpinus*, 14.04.1981, 1♂, 1♀, C. Deeleman leg.;

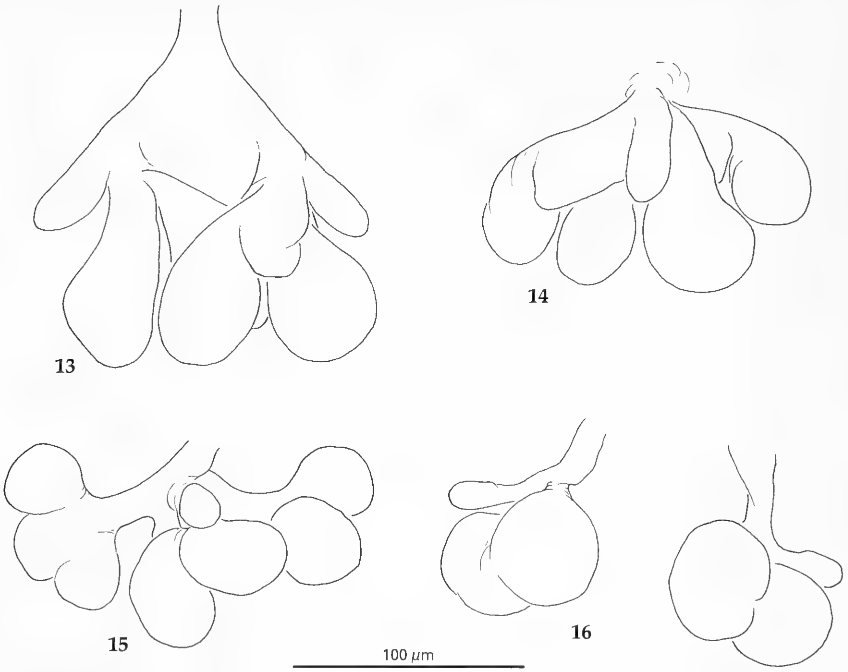


Abb. 13-16. Receptacula seminis. **13-14.** *Trogulus falcipenis*, spec. nov., ♀ (A: Kärnten, Koschuta). **15-16.** *Trogulus tricarinatus* (Linnaeus, 1767), ♀ (A: Steiermark, Mölten NE Graz).

Ulcinj, S-Montenegro, SW Shkoder, 41°56'N, 19°13'E, 02.09.1957 (Nr. 283), 1♂, H. Schweiger leg.

Albanien (AL): Vermosa = Vermosh ?, N-Albanien, NNE Shkoder, 42°35'N, 19°42'E, 17.06.1914, BS 2♂♂, 1♀, Denther leg.

Zwei fragliche Weibchenfunde von *Trogulus* sp. nahe *falcipenis* liegen von Nemila (Reitter leg.) und Korfu, Gasturi (Beier leg., 02.04.1929) vor.

Verbreitung. *Trogulus falcipenis*, spec. nov. (Abb. 17) ist im westlichen Slowenien weiter verbreitet, die stärkste Häufung von Funden liegt in den Julischen Alpen. In Südkärnten dürfte mit den Karawanken die nördliche Arealgrenze erreicht werden. Aufgrund der vorliegenden grenznahen Lokalitäten ist ein Vorkommen in Norditalien zu erwarten; gleiches gilt für Bosnien-Herzegowina. Die bisherigen Funde zeigen eine weite Verbreitung im Dinarischen Gebirge, die südlichsten Nachweise stammen von der montenegrinischen Küste und aus Nord-Albanien.

Verbreitungstyp: südost-alpin-dinarisch.

Vertikalverbreitung: Zahlreiche Funde von *T. falcipenis* zwischen 950 und ca. 1600 m deuten auf einen Schwerpunkt der Vertikalverbreitung in der oberen Montanstufe hin; die mittlere Seehöhe liegt sowohl in Bezug auf die Anzahl der Serien als auch Individuen bei 1100 m. Der bislang niedrigste Fundort liegt im Soca-Tal SE Kamno, der höchste am slowenischen Krn zwischen 1700 und 1800 m.

Ökologie und Biologie

Trogulus falcipenis ist nach bisheriger Kenntnis zumindest im nördlichen Teil des Areals ein Bewohner der mehr oder weniger tiefgründigen Streuschicht von Rotbuchen- und Buchenmischwäldern; neben Hochwaldhabitaten werden an der Waldgrenze auch Krüppelbuchenbestände besiedelt. Davon abweichend gelangen Funde in der Streuschicht eines collinen Buchen-Hainbuchenbestandes (SLO: Soca-Tal), einem Eichen-Hainbuchenbestand (YU: Montenegro) bzw. in einem strukturreichen subalpinen Rasen (SLO: Krn) unter einem Stein. Die vorliegenden Daten zum ökologischen Verhalten in den südlicheren Breiten sind bruchstückhaft.

Die Art wurde bislang v. a. in Einzelindividuen gesammelt. Vorzugshabitat zumindest am nördlichen Rand des Areals (A: Kärnten, Koschuta) scheinen tiefgründige und feuchte Laubstreuansammlungen zwischen Totholz-, Felselementen und Wurzeln in Krüppelbuchenbeständen zu sein (4♂♂, 6♀♀). Zwei ♂♂ und 2 Juv. (?) wurden in einer tiefgründigen Streuschicht am Grund einer Doline eines südslowenischen Rotbuchenwaldes festgestellt (Gotensika Gora).

Phänologie: Adulte Tiere (♂/♀) liegen aus den Monaten April (1/1), Juni (2/1), Juli (4/5), August (3/2), September (3/1) und Oktober (4/1) vor, Jungtiere von Oktober (2) bzw. August (1), Artzugehörigkeit hier fraglich. Entsprechend den Verhältnissen bei den übrigen Troguliden ist Eurychronie anzunehmen. Sex ratio: 17♂♂: 11♀♀.

Begleitfauna

Von den österreichischen und mehreren slowenischen Lokalitäten ist die begleitende Weberknechtfauna bekannt (Tab. 4). In Summe konnten 24 Weberknechtarten in Syntopie mit *T. falcipenis* gefunden worden, die drei Felsbewohner *Gyas annulatus, Leiobunum roseum* und *L. rupestre* eingeschlossen. Mit hoher Stetigkeit waren der Zwergweberknecht *Siro duricorius*, die Fadenkanker *Nemastoma bidentatum bidentatum* und *Paranemastoma quadripunctatum*, der Brettkanker *Anelasmocephalus hadzii* und der die Bodenstreu besiedelnde *Lophopilio palpinalis* vertreten. Sympatrie mit *Trogulus nepaeformis* bzw. *T. closanicus* wurde in mehreren Fällen festgestellt, mit *T. tricarinatus* nur ein einziges Mal (SLO: Vrsic).

Tab. 4. Weberknecht-Begleitfauna von *Trogulus falcipenis*, spec. nov. (Fundorte in Österreich/ Kärnten und Slowenien, die genaue Lage ist der Fundortliste zu entnehmen. Anzahl (♂/♀/Juv. bzw. Gesamtindividuenzahl bei *S. duricorius* part.).

Arten (Opiliones)	Koschuta, 27.07.93, P6	Koschuta, 4.07.95, P1	Koschuta, 30.07.99	Koschuta, 06.09.99	Vrsic, 7.08.93, P1	Kobariski Stol, 1.08.93, P2	Krn, 3.08.93, P2	Matajurski vrh, 25.08.95, P2	Goteniska Gora, 10.10.93, P2	Soca, S Kamno, 31.07.98
Siro duricorius (Joseph)	34/26/0			2/2/0		0/1/0		37	430	
Holoscotolemon unicolor Roewer				0/0/1						
Nemastoma triste (C. L. Koch)			1/1/0	6/10/11						
Nemastoma bidentatum bid. Roewer	0/1/0	0/1/0	6/4/0	2/5/27				0/2/0		2/0/0
Nemastoma bid. bidentatum <> sparsum									1/1/0	
Nemastoma dentigerum Canestrini							2/2/3			2/4/0
Paranemastoma quadripunctatum (Perty)		0/0/4	5/4/5	0/2/0		1/1/0		2/0/0	0/0/1	0/1/0
Histricostoma dentipalpe (Ausserer)	1/0/0							1/2/0		
Mitostoma chrysomelas (Hermann)				1/0/0				0/1/0		
Dicranolasma scabrum (Herbst)										1/0/0
Trogulus tricarinatus (Linne)					0/1/0					
Trogulus nepaeformis (Scopoli)	0/1/0	0/1/0	2/6/0	0/1/0			1/0/0			
Trogulus closanicus Avram			1/0/0		1/1/0			0/2/2		
Trogulus sp. Juv.	0/0/3		0/0/13	0/0/12		0/0/1		0/0/2		
Anelasmocephalus hadzii Martens	0/1/0	1/1/0	2/4/0	0/1/0	3/2/0	0/2/0		1/0/0		
Ischyropsalis cf. hellwigi (Panzer)		0/0/1		0/0/2		0/0/2				
Platybunus bucephalus (C. L.Koch)							3/0/0			
Rilaena triangularis (Herbst)			0/0/5	0/0/9						
Lophopilio palpinalis (Herbst)					0/0/2	0/0/2		0/0/2		0/0/1
Lacinius ephippiatus (C. L.Koch)	1/0/0	0/0/1	1/0/0							
Mitopus morio (Fabricius)						0/0/1	0/0/4			
Gyas annulatus (Olivier)					1/1/1					
Amilenus aurantiacus (Simon)								0/0/4		
Astrobunus helleri (Ausserer)								2/4/1		
Leiobunum roseum C. L.Koch								0/1/0		
Leiobunum rupestre (Herbst)								0/1/0		

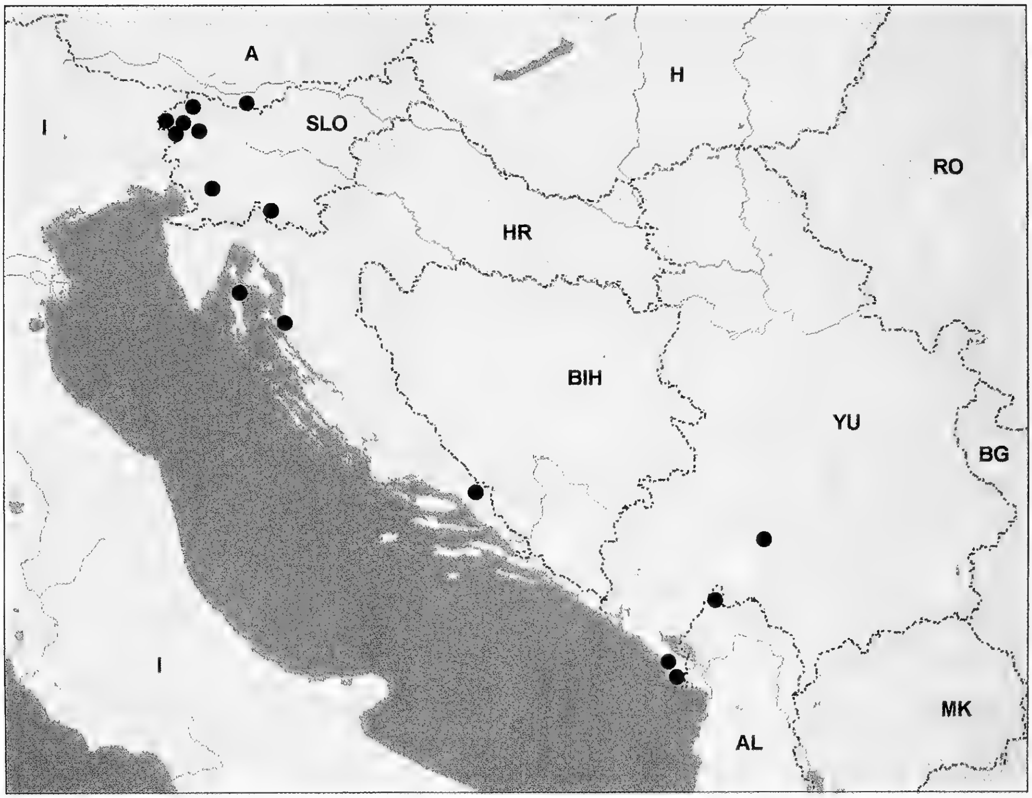


Abb. 17. Fundlokalitäten und bisher bekannte Verbreitung von *Trogulus falcipenis*, spec. nov.

Differentialdiagnose

Trogulus falcipenis, spec. nov. ist von *T. tricarinatus* (Linnaeus, 1767) gut abgrenzbar (Tab. 5). Diffiziler erscheint die Unterscheidung zwischen *T. falcipenis* und *T. tricarinatus hirtus* Dahl, 1903, zweier im Habitus und der männlichen Genitalmorphologie ähnlicher Taxa. Die systematische Stellung der von Dahl beschriebenen "behaarten" *hirtus*-Form erscheint bislang unzureichend geklärt. Dahl (1903) beschreibt in einem einzigen Satz seine neue "Variation" *hirta* aufgrund der senkrecht abstehenden und langen Behaarung auf Schenkeln und Schienen, wobei die meisten Haare mit ihren Tuberkeln länger als der Durchmesser der Schienen sind. Roewer (1923: 641) führt *T. tricarinatus hirtus* als Unterart neben der Nominatform *T. tricarinatus tricarinatus*; die Unterart *hirtus* wird im Bestimmungsschlüssel wiederum ausschließlich über das Merkmal Behaarung abgespalten: "Borstenhaare der Tuberkeln am ersten bis vierten Femur und Tibia senkrecht abstehend und auf der ersten bis vierten Tibia größer als der Tibien-Durchmesser".

Bestes Unterscheidungsmerkmal ist nach bisherigem Wissen neben der Behaarung die Ausdifferenzierung des Truncus penis: beträgt die minimale Breite des Penis in Ventralansicht an dessen Basis bei *T. falcipenis* 70-98 µm, sind es bei *T. tricarinatus hirtus* lediglich 56-58 µm; der Wert für die Penis-Tiefe liegt bei *T. falcipenis* zwischen 65-74 µm, bei *T. tricarinatus hirtus* zwischen 74-84 µm.

Im folgenden soll die Abgrenzung von *Trogulus falcipenis*, spec. nov. zum habituell ähnlichen *T. tricarinatus* (Linnaeus, 1767) in tabellarischer und grafischer Form gegeben werden (Tab. 5, Abb. 18-21).

Verwandtschaftliches Umfeld

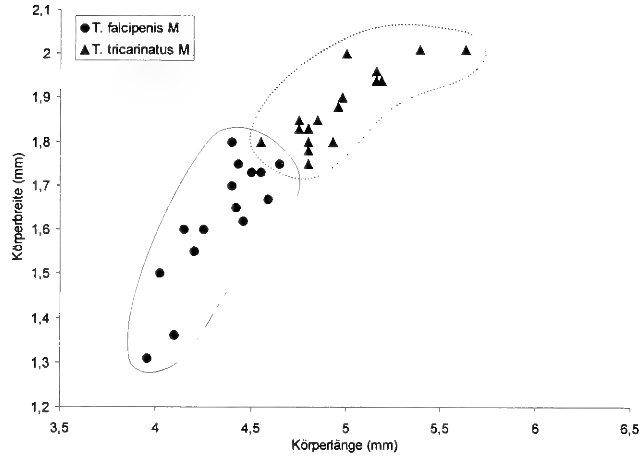
Rezente Beschreibungen neuer Brettkanker aus der *Trogulus nepaeformis*-Gruppe basieren auf diffizilen und z.T. schwer abgrenzbaren Merkmalen: "... the situation is complicated and far from being solved" (Chemini & Martens 1988: 80). Die Sichtung umfangreichen Materials von "*Trogulus tricarinatus*" läßt auch bei diesen Brettkankern einen Artenkomplex vermuten. Neben dem von Martens (1978: 169, Abb. 273-274) abgebildeten *T. tricarinatus*-Penis fand sich auch die in Abbildung 7 und 10-11 widergegebenen Form mit bauchigem Truncus und hakenförmigem Stylus. Auch auf die unklare Situation von *Trogulus* cf. *tricarinatus* in England (Martens 1988) sowie die parthenogenetischen Populationen in weiten Bereichen Deutschlands sei an dieser Stelle hingewiesen. Eine umfassende Revision dieser Artengruppe mit der Abbildung eines "echten" *T. tricarinatus* aus Dresden zur Festlegung der Identität der Art scheint notwendig (J. Martens in litt.).

Demgegenüber ist *T. falcipenis*, spec. nov. unter anderem aufgrund der Körpergröße, Behaarung und Genitalmorphologie von den bisher bekannten Arten der Gattung i. allg. klar zu unterscheiden (Tab. 5, Abb. 18-21). Einzige Ausnahme dabei ist der revisionsbedürftige *T. tricarinatus hirtus* Dahl, 1903. Nach Meinung des Verfassers handelt es sich hierbei um keine Unterart von *T. tricarinatus*, sondern um eine selbständige Art aus dieser Verwandtschaftsgruppe. Voruntersuchungen zeigten eine weitgehende Übereinstimmung im Bau von Glans und Stylus penis zwischen *T. falcipenis* und *T. tricarinatus hirtus*, weshalb selbige nach bisherigem Wissen als Schwesterarten aufzufassen sind. Eine Wiederbeschreibung von *T. tricarinatus hirtus* ist geplant.

Hinsichtlich der Grundglied/Endglied-Proportionen des Ta II sollte *Trogulus falcipenis* in das verwandtschaftliche Umfeld des größeren *T. tricarinatus* gestellt werden, weiters ist eine entfernte Ähnlichkeit mit der hakenförmigen Glans penis des türkischen *T. uncinatus* (Gruber 1969) gegeben. Allerdings nimmt *T. falcipenis* aufgrund des gattungsuntypischen, stabförmigen Truncus penis – der Penis der übrigen *Trogulus*-Arten ist stets deutlich dorsoventral abgeflacht – eine isolierte Stellung ein. Folglich bleibt die Zugehörigkeit zur Gattung *Trogulus* vorerst fraglich.

Tab. 5. Abgrenzung von *Trogulus falcipenis*, spec. nov. zu *T. tricarinatus* (Linnaeus, 1767). Färbungsmerkmale beziehen sich auf frisches Alkoholmaterial.

Merkmal	*T. falcipenis*, spec. nov.	*T. tricarinatus*
Körperlänge (♂/♀) (Tab. 1)	KL <4,65/5,22 mm	KL >4,5/5,3 mm
Körperbreite (♂/♀), (Tab. 1)	KB <1,75/2,01 mm	KB >1,75/2,0 mm
Cheliceren-Färbung	dunkelbraun bis braunschwarz	hell, gelblich-braun
Pedipalpen-Färbung	gelblichbraun	hell, schmutzig weiß bis gelblich-hellbraun
Penis-Länge/Breite (Tab. 3)	kurz (<1,24 mm)/schmal (<110 μm)	lang (>1,4 mm)/breit (>125 μm)
Truncus penis	stabförmig mit dorsaler & ventraler Längsrinne (Abb. 5-6, 11)	deutlich dorso-ventral abgeflacht (Abb. 7)
Stylus penis	sichelförmig gebogen (Abb. 8-9); stark sklerotisiert	Spitze leicht hakenförmig gekrümmt (Abb. 10-11); wenig sklerotisiert
Receptacula seminis	jederseits große, vierlappige, +/- tropfenförmig-längsovale Rezeptakeln (Abb. 13-14)	jederseits dreilappige, kugelige Rezeptakeln (Abb. 15-16)
Augendistanz in Bezug auf Körperlänge	groß (Abb. 2)	klein (Abb. 3)
Verbreitung	SE-Alpen und Dinarisches Gebirge (Abb. 17)	Europa part. (Martens 1978), revisionsbedürftig
Vertikalverbreitung	Schwerpunkt vermutlich zw. 950 und 1600 m; 200 - ca. 1700 m	Schwerpunkt <1000 m; 0-2000 m



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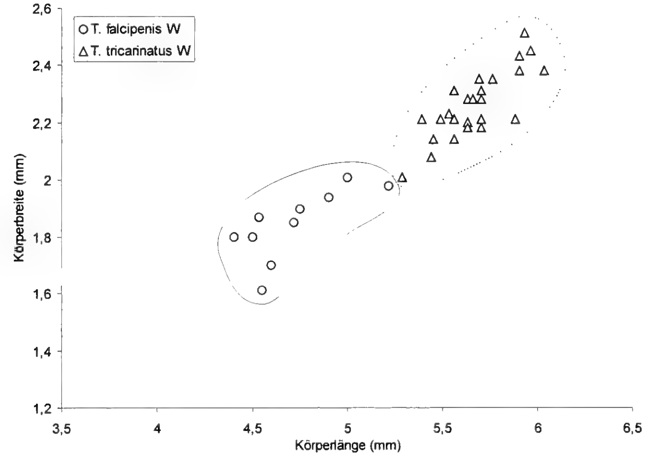

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Abb. 18-19. Streudiagramm zur Körpergröße (Körperlänge/ Körperbreite) von *Trogulus falcipenis,* spec. nov. und *T. tricarinatus* (Linnaeus, 1767); Männchen (**18**), Weibchen (**19**).

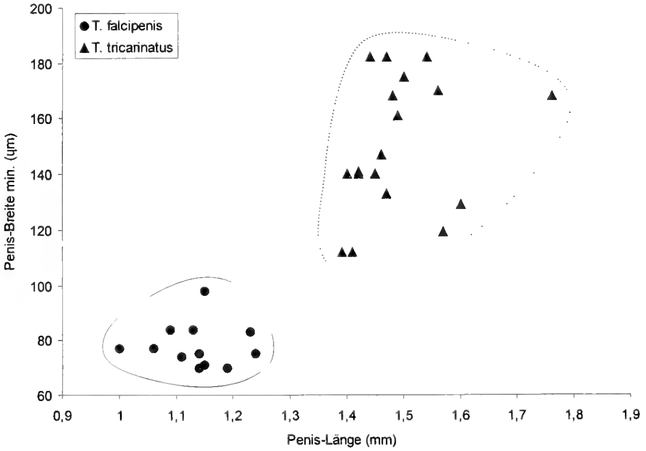

Abb. 20. Streudiagramm zu den Penis-Abmessungen (Penis-Länge/Penis-Breite Basis min.) von *Trogulus falcipenis,* spec. nov. und *T. tricarinatus* (Linnaeus, 1767).

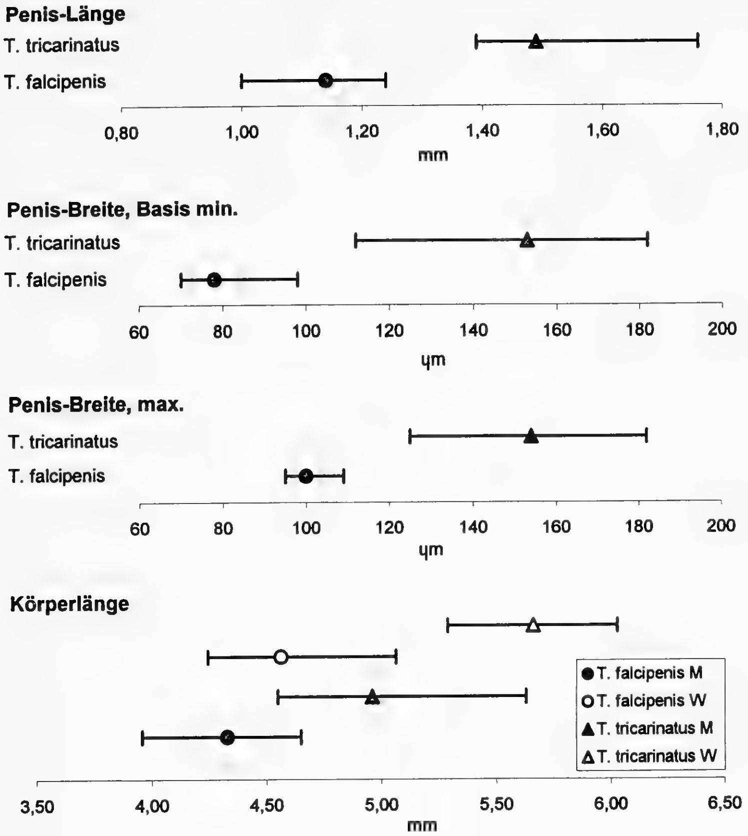

Abb. 21. Morphometrische Daten zur Differenzierung zwischen *Trogulus falcipenis*, spec. nov. und *T. tricarinatus* (Linnaeus, 1767) (Körperlänge, Penis-Breite max., Penis-Breite Basis min., Penis-Länge): Mittelwerte (Dreiecke, Kreise), Minimum- und Maximumwerte (♂: n=14, ♀: n=10).

Naturschutzfachliche Aspekte

Aufgrund ihrer geringen Vagilität und Stenotopie sind viele Brettkanker – und generell bodenbewohnende Weberknechte – ausgezeichnete Bioindikatoren für die Ursprünglichkeit bzw. anthropogene Veränderung von Landschaftsteilen.

Der Erforschungsgrad der Weberknechtfauna Sloweniens und Kärntens kann – abgesehen von Defiziten im Wissen um die Biologie und Ökologie einzelner Arten/gruppen – als gut bzw. sehr gut bezeichnet werden. Für eine Rote Liste gefährdeter Weberknechte Sloweniens wird eine Einstufung in die Kategorie R (extrem selten) vorgeschlagen, in der Roten Liste gefährdeter Weberknechte Kärntens wird *Trogulus falcipenis* in der Kategorie 1 (vom Aussterben bedroht) geführt (Komposch 1999). Der einzig bekannte Fundort in Kärnten (Koschuta) ist ein Rotbuchen-Niederwald nahe der Waldgrenze, der als Teil des Truppenübungsplatzes Koschuta anthropogenen Einflüssen ausgesetzt ist. Die heutige Seltenheit von *T. falcipenis* in den Karawanken könnte unter anderem mit der konsequenten Vernichtung der ursprünglichen Rotbuchen- und Mischwälder dieses Gebirgszuges Hand in Hand gehen. Die größte rezente Gefährdung dieses kleinräumig verbreiteten Brettkankers dürfte von der Forstwirtschaft ausgehen; ein Erlöschen der Koschuta-Population im Zuge forstlicher Maßnahmen kann nicht ausgeschlossen werden.

Zusammenfassung

Trogulus falcipenis, spec. nov. wird als kleinste bisher bekannte Art der Gattung beschrieben. Sie ist charakterisiert durch die geringe Körperlänge (♂< 4,7 / ♀ < 5,3 mm), den großen Augenabstand, die dunkelbraune Färbung der Cheliceren und im männlichen Geschlecht durch den kurzen Penis (< 1,25 mm), den stabförmigen Truncus sowie den sichelförmig gebogenen Stylus. Weitere Unterscheidungsmerkmale zum ähnlichen *T. tricarinatus* (Linnaeus, 1767) sowie Angaben zur Variabilität von beiden Arten werden angeführt. Das Auftreten von zwei unterschiedlichen Penis-Typen von "*T. tricarinatus*" lassen eine umfassende Revision der Artengruppe notwendig erscheinen. Nächstverwandte Art von *T. falcipenis* dürfte *T. (tricarinatus) hirtus* sein, die sich bei ähnlicher Genitalmorphologie v.a. durch die abstehende Behaarung der Laufbeine und des Körpers deutlich unterscheidet.

T. falcipenis ist als Bewohner der Streuschicht vorwiegend von Rotbuchen- bzw. Mischwäldern aus Österreich (Süd-Kärnten), Slowenien, Kroatien, Jugoslawien (Montenegro, Serbien) und Albanien bekannt. Die seltene Art scheint den Schwerpunkt ihrer Höhenverbreitung in der oberen Montanstufe zu haben. Die Weberknecht-Begleitfauna wird angeführt und die Gefährdung der Art kurz diskutiert.

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Die westpaläarktischen Arten von *Exephanes* Wesmael

(Insecta, Hymenoptera, Ichneumonidae, Ichneumoninae)

Rolf Hinz (†) & Klaus Horstmann

Hinz, R. & K. Horstmann (2000): The Western Palearctic species of *Exephanes* Wesmael (Insecta, Hymenoptera, Ichneumonidae, Ichneumoninae). – Spixiana **23/1:** 15-32

Eight Western Palearctic species of *Exephanes* Wesmael are revised, described and included in keys to females and males. Lectotypes are designated for four taxa, and 13 new synonyms are indicated. Neotypes are designated for *Exephanes fulvescens* Snellen van Vollenhoven and for *Ichneumon venustus* Tischbein. *Exephanes tauricus* from Turkey is described as new. *Ichneumon cordiger* Kriechbaumer is transferred to *Vulgichneumon* Heinrich, and *Exephanes nigrifemur* Tischbein is provisionally transferred to *Barichneumon* Thomson. Seven European species have been reared from their hosts, and details on their life histories are given.

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Vorbemerkung des Zweitautors

Rolf Hinz hat sich seit 1950 bemüht, die Wirte der europäischen Arten von *Exephanes* Wesmael zu ermitteln; es war dies die erste Artengruppe der Ichneumonidae, auf deren Zucht er sich konzentriert hat. Zusätzlich hat er im Laufe der Zeit das Material dieser Gattung in vielen Museumssammlungen determiniert und hat dabei auch mehrere Typen revidiert. Publikationen liegen dagegen nur zu einigen Teilaspekten vor (Hinz 1956, 1957, 1962), es ist unklar, warum die Veröffentlichung einer zusammenfassenden Revision unterblieb. Ich selbst habe eine persönliche Erinnerung an diese frühen Untersuchungen: Ich bin als Schüler im Jahr 1957 mit Rolf Hinz an die Ostseeküste bei Lübeck gefahren, wo wir – damals vergeblich – nach Wirten von *Exephanes femoralis* Brischke gesucht haben.

In dem mir vorliegenden Nachlaß fanden sich ein Manuskript mit allgemeinen Bemerkungen über die Systematik und Ökologie der Gattung und Hinweisen auf die Lebensweise der europäischen Arten, das vermutlich die Grundlage für einen im Jahr 1961 gehaltenen Vortrag bildete (Hinz 1962), Bestimmungsschlüssel für beide Geschlechter mit Hinweisen auf einige ergänzende Merkmale, eine Beschreibung von *Exephanes tauricus*, spec. nov., Abbildungen einiger Bestimmungsmerkmale, Notizen zu revidierten Sammlungen und Typen und Notizen zu Zuchten und zur Lebensweise der Arten. In der Sammlung Hinz liegen alle europäischen Arten in Zuchtserien beider Geschlechter vor, dazu längere Serien gefangenen Materials, eine unverzichtbare Grundlage für die vorliegende Bearbeitung und für zukünftige Revisionen. Ich habe die von Hinz benutzten und einige zusätzliche Merkmale mit Hilfe dieser Sammlung studiert, die Abbildungen ergänzt, das Material aus Museen in Eberswalde und München und einige Exemplare aus London nachgeprüft, alle erreichbaren Typen noch einmal revidiert, mich um die Deutung der nicht durch Typen repräsentierten Taxa bemüht, revidierte Bestimmungsschlüssel und Beschreibungen entworfen und die Angaben zur Lebensweise der Arten nach den vorliegenden Notizen und dem Sammlungsmaterial zusammengestellt. Die Arbeit hat deshalb zwei Autoren; Hinz allein ist allerdings Autor der Art *E. tauricus*, spec. nov.

Für ihre Hilfe beim Entleihen von Untersuchungsmaterial danke ich: E. Diller (Zoologische Staatssammlung, München – ZSM), J.-P. Kopelke (Natur-Museum Senckenberg, Frankfurt/Main – SMF), R. Meier (Zoologisk Museum, København – ZMK), K. Schneider (Institut für Zoologie, Halle/Saale), A. Taeger (Deutsches Entomologisches Institut, Eberswalde – DEI), C. Taylor (Natural History Museum, London – NHML) und M. Wanat (Muzeum Przyrodnicze, Wroclaw – MPW). K. Fiedler (Lehrstuhl für Tierökologie, Bayreuth) und M. R. Shaw (National Museums of Scotland, Edinburgh) wiesen mich freundlicherweise auf Literatur zur Lebensweise der Noctuidae hin.

Einleitung

Die Gattung *Exephanes* Wesmael wurde von Wesmael (1845: 13) und den meisten nachfolgenden Autoren wegen des caudal verlängerten und zugespitzen Gasters und des vorstehenden Bohrers der Weibchen zu den "Oxypygi" nahe *Ichneumon* Linnaeus gestellt. Beide Merkmale lassen sich aber als Anpassungen an die Parasitierung von endophagen Wirten interpretieren. Zwei Merkmale sprechen für eine Zuordnung zu den "Amblypygi" (= Amblytelina): Die Subgenitalplatte der Weibchen ist groß und reicht weit nach caudal, was nur wegen des vorstehenden Bohrers nicht auffällt. Außerdem stechen die Arten zur Eiablage die Larven ihrer Wirte an. Eine Diskussion dieser Merkmale findet sich bei Heinrich (1961: 475 f.), der allerdings zu keiner Entscheidung kommt. Carlson (1979: 507 f.) stellt *Exephanes* ohne Angabe von Gründen zu den Amblytelina, dieser Auffassung wird hier zugestimmt.

Die Weibchen der *Exephanes*-Arten sind relativ leicht zu erkennen: Das siebente Tergit ist verlängert, länger als das sechste, und auch das achte Tergit steht etwas vor. Dazu steht der Bohrer deutlich vor, und die Bohrerklappen sind auffällig breit (Abb. 10-13). Als einziges kennzeichnendes Merkmal der Männchen wird genannt, daß die apicalen Haare der Cerci etwa so lang wie diese sind (Abb. 16-22) (Perkins 1960: 131). Zusätzlich weist das zweite bis vierte Gastersternit eine Längsfalte auf (die des vierten Sternits nicht immer deutlich), die Subgenitalplatte ist caudal-median mehr oder weniger stark vorgezogen (Abb. 14-15), und das siebente Tergit ist vergleichsweise groß (aber nicht so auffällig wie beim Weibchen). Weitere Merkmale beider Geschlechter sind, daß das Mittelfeld des Postpetiolus deutlich längsgestreift ist und daß die Gastrocoelen und Thyridien relativ klein sind. Weil sich die Segmente der Gasterspitze durch ungeschickte Manipulationen beim Nadeln der Tiere leicht verschieben und ihre Proportionen dann nicht mehr zu beurteilen sind, hatten frühere Autoren oft Schwierigkeiten, bei Einzelexemplaren die Gattung zu erkennen, und es sind *Exephanes*-Arten in anderen Gattungen und Arten anderer Gattungen in *Exephanes* beschrieben oder hierher gestellt worden. Zusätzlich sind die Typen mehrerer Taxa verloren, und um ihre Deutung hat sich bisher niemand bemüht. Die Klärung dieser Probleme ergab 13 neue Synonyme, und von den sieben europäischen Arten müssen vier umbenannt werden.

Revisionen und Diagnosen der Arten

Exephanes femoralis Brischke

Exephanes femoralis Brischke, 1878: 36 f. – Lectotypus hiermit festgelegt: ♀, "Danzig Brischke" (= Gdansk/Polen), "*Exephanes femoralis* Brischke Type!" (ZSM)). Auf dieses Exemplar bezieht sich die Bemerkung von Kriechbaumer (1893: 326). Zwei weitere Syntypen (1♀, 1♂) befinden sich in der Sammlung Strobl in Admont (Strobl 1901: 135).

Octatomus tricolor Tischbein, 1881: 186 f. (Brischke 1881: 216). Der Holotypus (♀) dieses Taxons stammte ebenfalls aus Gdansk und ist mit der Sammlung Tischbein zerstört worden (Hilpert 1992: 14).

Beschreibung

♀: Körperlänge 10 mm; Fühlergliederzahl 35-38; viertes Fühlerglied 1,7-1,8 mal so lang wie breit; Schläfen relativ kurz, rundlich verengt, Berührungslinien an Augen und Schläfen (von oben gesehen) schneiden sich auf dem Postscutellum oder Propodeum, Haargruben auf den Schläfen klein und nicht besonders vertieft; Scutellum wenig gewölbt; Hinterfemora 2,7-2,9 mal so lang wie hoch, außen subventral und an der ventralen Kante dicht und fein punktiert, Punkte dort zuweilen auf einer kleinen flachen Stelle etwas größer; Klauen relativ schlank, apical um etwa 70° umgebogen; Area superomedia 1,0-1,1 mal so lang wie breit, caudale Begrenzung verwischt oder fehlend; Längsfalte auf dem zweiten und dritten Gastersternit, selten auch auf der Basis des vierten; Bohrerklappen kurz, die Cerci ragen über die Mitte der Bohrerklappen deutlich hinaus.

Stirnorbiten gelbbraun-rötlich; Flagellum proximal gelbbraun, distal schwarz, median mit weißem Sattel; Coxen und Trochanteren schwarz; Hinterfemora schwarzbraun, basal und ventral rotbraun; schwarzer Apicalring der Hintertibien etwa doppelt so lang wie die Dicke der Tibien; erstes bis drittes Gastertergit und die Basis des vierten (dieses variabel) rotbraun, die folgenden schwarz, das siebente mit einem großen, das achte caudal mit einem kleinen weißen Fleck, selten auch das sechste caudal weiß gefleckt.

♂: Körperlänge 11-12 mm; Fühlergliederzahl 40-42; viertes Fühlerglied 1,8-1,9 mal so lang wie breit; Schläfen wie ♀; Scutellum etwas gewölbt; Hinterfemora 3,2-3,3 mal so lang wie hoch, außen subventral und auf der ventralen Kante dicht und fein punktiert; Klauen sehr schlank, apical um 50° umgebogen; Area superomedia 0,9-1,1 mal so lang wie breit, caudal deutlich oder undeutlich begrenzt; Subgenitalplatte caudal-median breit vorgerundet; Genitalklappen apical gerundet (Abb. 16).

Clypeus und Gesicht ganz gelb, die gelbe Zeichnung der Stirnorbiten reicht bis etwa zum Dorsalrand der Stirngruben oder wenig darüber hinaus und endet dort abgerundet oder zugespitzt; Scapus ventral gelb, Flagellum ventral gelbbraun, dorsal dunkelbraun; ein kurzer Strich vor der Hinterecke des Pronotums, der Subtegularwulst (dieser nicht immer) und das Scutellum weißgelb; Vordercoxen und -trochanteren gelb gefleckt; Mittel- und Hinterbeine wie ♀; erstes Gastertergit braun überlaufen, das zweite bis vierte rotbraun, die folgenden schwarz.

Exephanes fulvescens Snellen van Vollenhoven

Exephanes fulvescens Snellen van Vollenhofen, 1875: 5 – Holotypus (♀) verschollen (Krikken et al. 1981: 259), Neotypus hiermit festgelegt: ♀, "L. 30.4.1954 Hannover", "1954/II 12.6.54", "ex: *Miana ophiogramma* Esp. (Lep.)" (Coll. Hinz/ZSM). Der Lectotypus von *Exephanes ulbrichti* Hinz (vgl. unten) wird als Neotypus von *E. fulvescens* festgelegt, um die Benennung der Art zu stabilisieren. Diese Interpretation wird bereits von Teunissen (1972: 95) angedeutet. Die Beschreibung und Abbildung von *E. fulvescens* stimmen sehr gut mit der vorliegenden Art überein, insbesondere sind die Geißelbasis hell, die Hinterfemora median breit schwarz, das erste Gastertergit schwarz, das siebente und achte Tergit weiß gefleckt und die Bohrerklappen relativ kurz. In einem Punkt gibt es eine Divergenz zwischen der Beschreibung und der Abbildung: Nach der Beschreibung ist das sechste Tergit schwarz, nach der Abbildung weiß gefleckt. Hier wird angenommen, daß die Beschreibung korrekt ist. Der Fundort des Neotypus liegt in hinreichender Nähe zum ursprünglichen Typenfundort Rotterdam.

Exephanes ulbrichti Hinz, 1957: 89 f. (syn. nov.) – Lectotypus (♀) hiermit festgelegt: das oben als Neotypus von *E. fulvescens* gekennzeichnete Exemplar aus Coll. Hinz (ZSM). Hinz (l. c.) hatte den Namen als "nom. nov." gekennzeichnet, aber es handelt sich nicht um ein Nomen novum im Sinne der Nomenklaturregeln, sondern um eine Neubeschreibung unter der Annahme, daß der für das Taxon bisher verwendete Name *annulicornis* Kriechbaumer nicht verfügbar sei (vgl. unten). In der Beschreibung werden als Syntypen genannt: 2♀♀, die von Ulbricht (1908: 357 f.) und von Heinrich (1928: 86 f.) unter dem Namen *E. amabilis* (Kriechbaumer) beschrieben worden waren, sowie beide Geschlechter in einer Zuchtserie aus *Apamea ophiogramma* (Esper) aus dem Leinetal bei Hannover. Neben dem Lectotypus sind in Coll. Hinz als Paralectotypen 3♂♂ vom Typenfundort und aus dem gleichen Wirt vorhanden. Unklar ist, ob auch bei Hannover gefangene Exemplare (6♀♀, 12♂♂) als Syntypen zu betrachten sind; sie wurden nicht entsprechend beschriftet.

Das Taxon *Ichneumon amabilis* Kriechbaumer var. *annulicornis* Kriechbaumer (1895: 106 f.) gehört auch zu dieser Art, aber der Name wird als infrasubspezifisch und deshalb als nicht verfügbar angesehen (Hinz l. c.; Horstmann 1997: 49). Das Belegmaterial (?1♂) ist verschollen.

Beschreibung

♀: Körperlänge 8,5-10 mm; Fühlergliederzahl 37-39; viertes Fühlerglied 2,4-2,6 mal so lang wie breit; Schläfen relativ lang und gerade verengt, Berührungslinien an Augen und Schläfen schneiden sich auf dem Mesoscutum oder Scutellum, Haargruben auf den Schläfen klein und nicht besonders vertieft; Scutellum deutlich gewölbt; Hinterfemora 3,5-3,7 mal so lang wie hoch, außen ventrolateral und auf der ventralen Kante relativ dicht und fein punktiert; Klauen kräftig, apical um 80° umgebogen; Area superomedia 0,9-1,1 mal so lang wie breit, caudale Begrenzung meist verwischt; zweites und drittes Gastersternit mit Längsfalte; Bohrerklappen kurz, Cerci über die Mitte hinausragend.

Apicalrand des Clypeus und die Stirnorbiten rötlich; Flagellum proximal gelbbraun, distal schwarz, median mit weißem Sattel; Coxen schwarz, Vordercoxen teilweise apical gelblich, Trochanteren in der Regel gelbbraun, Hinterfemora überwiegend schwarz, basal und ventral rötlich, schwarzer Apicalring der Hintertibien etwa doppelt so lang wie die Dicke der Tibien; zweites und drittes Gastertergit rotbraun, die folgenden schwarz, das siebente und achte dorsal mit großen weißen Flecken.

♂: Körperlänge 10-12 mm; Fühlergliederzahl 39-41; viertes Fühlerglied 2,1-2,3 mal so lang wie breit; Schläfen wie ♀; Scutellum wie ♀; Hinterfemora 3,7-4,0 mal so lang wie hoch, Punktierung wie ♀; Klauen etwas schlanker, apical um 60-70° umgebogen; Area superomedia 0,9-1,1 mal so lang wie breit, caudal durch eine kräftige gerade Leiste geschlossen; Subgenitalplatte caudal-median breit vorgerundet (Abb. 14); Genitalklappen relativ schlank, ventral deutlich vorgezogen (Abb. 17).

Clypeus und Gesicht ganz gelb, die gelbe Zeichnung der Stirnorbiten reicht bis zum Dorsalrand der Stirngruben und endet dort zugespitzt; Scapus ventral gelb, Flagellum proximal-ventral bis zur Mitte gelbbraun, dorsal dunkelbraun (selten auch dorsal bis zur Mitte gelblich), 14.-18. Fühlerglied mit gelblichem Ring, distal dunkelbraun; ein kurzer Strich vor der Hinterecke des Pronotums und das Scutellum hellgelb, Subtegularwulst schwarz; Coxen schwarz oder die Vordercoxen apical gelb gezeichnet, Trochanteren meist gelb; Hinterfemora und -tibien wie ♀; zweites und drittes Gastertergit frontal jeweils gelbrot, caudal zu 0,3-0,7 mit schwarzer Querbinde, das dritte zuweilen ganz schwarz, die folgenden schwarz.

Exephanes ischioxanthus (Gravenhorst)

Ichneumon hilaris Gravenhorst, 1829: 328 f. – praeocc. durch *Ichneumon hilaris* Say, 1829 (Januar) – Lectotypus (♀) von Rasnitsyn (1981: 114) festgelegt: ohne Originaletikett (MPW). Der Typus war auf einer relativ kurzen Nadel sehr weit unten genadelt, er stammt deshalb möglicherweise aus Netley/England (vgl. Townes 1965: 407). In Zusammenhang mit der vorliegenden Revision wurde er höher auf die Nadel geschoben. Außerdem ist der Typus beschädigt (Teile des Kopfes, der Beine und die Unterseite und Spitze des Gasters fehlen), aber sicher zu determinieren.

Ichneumon ischioxanthus Gravenhorst, 1829: 330 f. (Wesmael 1859: 39) – Holotypus (♂) von Rasnitsyn (1981: 116) beschriftet: ohne Originaletikett, nach der Beschreibung aus Breslau (= Wroclaw/Polen) (MPW).

Ichneumon exulans Gravenhorst, 1829: 522 f. (Wesmael, 1845: 17) – Lectotypus (♂) von Rasnitsyn (1981: 127) festgelegt: ohne Originaletikett, nach Details in der Beschreibung aus Breslau (= Wroclaw/ Polen) (MPW).

Exephanes subnudus Tischbein, 1881: 168 (Kriechbaumer, 1893: 327) – Holotypus (♀) aus Thüringen mit der Sammlung Tischbein zerstört (Hilpert 1992: 14). Kriechbaumer (l. c.) hat den Typus revidiert; seine Interpretation ist glaubwürdig. Allerdings war das Exemplar ungewöhnlich groß (Körperlänge 13 mm).

Die Taxa *Exephanes hilaris* (Gravenhorst) var. *marginalis* Kriechbaumer und var. *bisignata* Kriechbaumer (1890: 290) werden als infrasubspezifisch und deshalb als nicht verfügbar angesehen (Horstmann 1997: 49).

Beschreibung

♀: Körperlänge 8,5-10 mm; Fühlergliederzahl 38-40; viertes Fühlerglied 1,8 mal so lang wie breit; Clypeus apical ein wenig ausgerandet; Schläfen kurz, rundlich verengt, Berührungslinien an Augen und Schläfen schneiden sich auf dem Scutellum oder Postscutellum, Haargruben auf den Schläfen deutlich, aber klein, etwa so breit wie die Zwischenräume; Scutellum fast flach; Hinterfemora 3,5-3,6 mal so lang wie hoch, außen subventral dicht punktiert, mit einer abgeflachten oder wenig eingedrückten Stelle, Haargruben dort etwas größer, aber kaum zu Strichen ausgezogen; Klauen schlank, apical etwa um 50° umgebogen; Area superomedia 0,8-0,9 mal so lang wie breit, die caudale Begrenzung oft verwischt, in der Anlage nach frontal eingebogen; zweites bis viertes Gastersternit mit Längsfalte; Bohrerklappen lang, Cerci nicht bis zur Mitte reichend (Abb. 10).

Stirnorbiten zuweilen etwas rötlich; Flagellum proximal und distal schwarz, median mit weißem Sattel; alle Coxen und Trochanteren und die Hinterfemora schwarz, schwarzer Apicalring der Hintertibien etwa doppelt so lang wie die Dicke der Tibien; zweites und drittes Gastertergit und die Basis des vierten rotbraun, die folgenden schwarz, das sechste caudal mit einer weißen Querbinde, das siebente caudal mit einem großen weißen Fleck (Abb. 10), selten auch das fünfte caudal mit einem kleinen weißen Fleck.

♂: Körperlänge 9-12 mm; Fühlergliederzahl 41-43; Clypeus apical deutlich etwas ausgerandet; Schläfen wie ♀; Scutellum wenig gewölbt; Hinterfemora 3,6-3,9 mal so lang wie hoch, Punktierung wie ♀; Klauen wie ♀; Area superomedia 0,7-1,0 mal so lang wie breit, die caudale Begrenzung kräftig, wenig bis deutlich nach frontal eingebogen; Subgenitalplatte caudal-median schmal zungenförmig vorgezogen (Abb. 15); Genitalklappen breit, apical gerade abgestutzt (Abb. 18).

Clypeus und Gesicht ganz gelb, die gelbe Zeichnung der Stirnorbiten ragt in der Regel über den Dorsalrand des Stirngruben hinaus und endet dort abgerundet (selten ist sie kürzer und endet zugespitzt); ein langer Strich vor der Hinterecke des Pronotums, der Subtegularwulst und das Scutellum hellgelb; Coxen und Trochanteren der Vorder- und Mittelbeine oft gelb gefleckt; Zeichnung der Beine sonst wie ♀; zweites und drittes Gastertergit ganz gelbrot, seltener caudal mit dunklen Flecken, das vierte ganz gelbrot bis fast ganz schwarz und nur in den Vorderecken hell, die folgenden schwarz.

Exephanes occupator (Gravenhorst)

Ichneumon contaminatus Gravenhorst, 1829: 391 (Wesmael 1859: 47) – Holotypus (♂) von Rasnitsyn (1981: 119) revidiert: ohne Originaletikett, nach der Beschreibung aus Warmbrunn (= Cieplice/Polen) (MPW). Es handelt sich um ein charakteristisches Exemplar der Art.

Ichneumon occupator Gravenhorst, 1829: 425 f. – Lectotypus (♂) von Rasnitsyn (1981: 121) festgelegt: ohne Originaletikett, nach Details in der Beschreibung und Art der Montierung wahrscheinlich aus Netley/England (MPW). Der Typus war auf einer relativ kurzen Nadel sehr weit unten genadelt, wurde aber in Zusammenhang mit der vorliegenden Revision höher auf die Nadel geschoben (vgl. oben bei *Ichneumon hilaris* Gravenhorst). Er ist beschädigt (größere Teile der Beine und die Unterseite und Spitze des Gasters fehlen), und seine Determination ist nicht ganz sicher. Für die herkömmliche Interpretation spricht: Fühlergliederzahl 42; Schläfen relativ lang und gerade verengt, die Berührungslinien an Augen und Schläfen schneiden sich auf dem Scutellum; gelbe Zeichnung der Stirnorbiten reicht bis zum Dorsalrand der Stirngruben und endet dort zugespitzt; Hinterfemora 4,2 mal so lang wie hoch. Allerdings ist die Area superomedia relativ lang (0,9 mal so lang wie breit), und ihre caudale Begrenzungsleiste ist gerade. Die Klauen der Hinterbeine sind nicht erhalten.

Exephanes uniguttatus Kriechbaumer, 1895: 104 f. (Hellén 1941: 43) – Syntypen (1♀, 1♂) aus Augsburg verschollen (Aubert 1968: 193), wahrscheinlich mit der Sammlung Munk zerstört (Hilpert 1992: 162). Für die vorliegende Interpretation spricht die große Körperlänge (♀ 13 mm, ♂ 14,5 mm). Die beschriebene Zeichnung der Gasterspitze (nur siebentes Tergit weiß gefleckt) kommt bei Weibchen von *E. occupator* selten vor, bei Männchen ist sie nicht ungewöhnlich.

Ichneumon (*Exephanes*?) *munki* Kriechbaumer, 1895: 107 (syn. nov.) – Holotypus (♂) aus Augsburg verschollen, wahrscheinlich mit der Sammlung Munk zerstört. Die Beschreibung ist inhaltsarm und paßt zu *E. occupator* oder *E. venustus* (Tischbein). Für die hier vorgenommene Interpretation spricht die große Körperlänge (14 mm).

Exephanes occupator (Gravenhorst) var. *unipunctatus* Strobl, 1901: 135 (syn. nov.) – Holotypus (♂) aus Admont/Österreich nicht untersucht, entspricht dem ♂ von *E. uniguttatus* Kriechbaumer.

Die Taxa *Exephanes occupator* (Gravenhorst) var. *bisignatus* Ulbricht, var. *brinki* Ulbricht, var. *mediorufus* Ulbricht, var. *nigromaculatus* Ulbricht, var. *geldubensis* Ulbricht, var. *carbonarius* Ulbricht, var. *aterrimus* Ulbricht (1921: 26) und var. *mediofulvus* Ulbricht (1926: 1) werden als infrasubspezifisch und deshalb als nicht verfügbar angesehen (Horstmann 1997: 52).

Beschreibung

Während die Weibchen dieser Art recht einheitlich sind, sind die Männchen in der Färbung äußerst variabel, worauf viele Autoren hingewiesen haben. Besonders umfangreiche Aufstellungen der Farbvariationen finden sich bei Ulbricht (1921: 25 f.; 1926: 1 f.).

♀: Körperlänge 11-14 mm (die meisten Exemplare im oberen Größenbereich); Fühlergliederzahl 39-41; viertes Fühlerglied 1,9-2,1 mal so lang wie breit; Schläfen relativ lang und gerade, Berührungslinien an Augen und Schläfen schneiden sich auf dem Scutellum oder Postscutellum (Abb. 1), Haargruben auf den Schläfen deutlich, aber klein, durch dorsoventrale Runzeln oft verwischt; Scutellum fast flach; Hinterfemora 3,9-4,1 mal so lang wie hoch, außen subventral nur spärlich punktiert, dort nicht oder nur an einer kleinen Stelle eingedrückt, diese mit höchstens 1-2 größeren Haargruben; Klauen kräftig, apical um 80° umgebogen (Abb. 5); Area superomedia 0,6-0,9 mal so lang wie breit, caudale Begrenzungsleiste kräftig, oft nach frontal eingebogen (Abb. 8), selten gerade; zweites und drittes Gastersternit mit Längsfalte; Bohrerklappen kurz, Cerci über die Mitte hinausragend.

Stirnorbiten oft schmal rotbraun gezeichnet; Flagellum proximal und distal schwarz, median mit weißem Sattel; Coxen und Trochanteren schwarz, Hinterfemora rotbraun (ob immer?), schwarzer Apicalring der Hintertibien häufig sehr schmal; zweites und drittes Gastertergit rotbraun, selten auch die Basis des vierten, die folgenden schwarz, häufig das sechste und siebente deutlich weiß gefleckt, selten nur das siebente oder das fünfte bis siebente oder vierte bis siebente weiß gefleckt, gelegentlich auch das achte mit einem kleinen weißen Fleck.

♂: Körperlänge 12-15 mm (die meisten Exemplare im oberen Größenbereich); Fühlergliederzahl 39-45; viertes Fühlerglied 1,5-1,8 mal so lang wie breit; Schläfen wie ♀; Scutellum etwas gewölbt; Hinterfemora 3,9-4,5 mal so lang wie breit, außen subventral relativ fein und dicht punktiert, ohne Besonderheiten; Klauen wie ♀; Area superomedia 0,6-0,9 mal so lang wie breit, caudale Begrenzungsleiste fast immer sehr kräftig und nach vorne eingebogen (selten gerade); Subgenitalplatte caudal-median breit vorgerundet; Genitalklappen apical breit, fast senkrecht abgeschnitten, ventral etwas vorgezogen (Abb. 19).

Gesicht lateral unterschiedlich ausgedehnt gelb, die gelbe Zeichnung dorsal höchstens bis zum dorsalen Rand der Stirngruben reichend und dort zugespitzt, zusätzlich selten ein bis zwei gelbe Flecke unter den Fühlergruben und/oder auf dem Clypeus; Scapus ventral unterschiedlich ausgedehnt gelb, Flagellum dorsal schwarz, ventral etwas aufgehellt; kurzer Strich vor der Hinterecke des Pronotums, Subalarwulst und Scutellum hellgelb, die helle Zeichnung des Pronotums und Subalarwulsts häufig, die des Scutellums selten reduziert (hier selten nur zwei kleine Punkte), Thorax zuweilen ganz schwarz; Zeichnung der Beine wie ♀ oder selten Hinterfemora fast ganz schwarz und/oder schwarzer Apicalring der Hintertibien breiter; zweites und drittes Gastertergit ganz schwarz oder frontal sehr unterschiedlich ausgedehnt rotbraun oder gelb gezeichnet oder ganz rotbraun oder gelb, seltener auch das vierte basal rotbraun, die folgenden schwarz, häufig das siebente, selten auch das sechste mit einem weißen Längsstrich oder Punkt.

Exephanes rhenanus Habermehl

Exephanes rhenanus Habermehl, 1918: 51 – Holotypus: ♂, "Worms (7) Habermehl", "*Exephanes occupator* Grav. f. *rhenanus* Haberm. ♂" (SMF). Das zweite Etikett wurde von Habermehl später zugefügt, weil Ulbricht (1921: 26) *E. rhenanus* als Varietät zu *E. occupator* gestellt hatte. Ein von Ulbricht entsprechend determiniertes Männchen in München gehört in der Tat zu *E. occupator*, aber der Holotypus von *E. rhenanus* gehört zu der vorliegenden Art. Er weist folgende Kennzeichen auf: Fühlergliederzahl 45; Schläfen sehr stark verengt, Berührungslinien an Augen und Schläfen schneiden sich auf dem Mesoscutum; gelbe Zeichnung der Stirnorbiten ragt über den dorsalen Rand der Stirngruben hinaus und endet abgerundet; Klauen schlank, apical um 60° umgebogen; caudale Begrenzungsleiste der Area superomedia gerade.

Exephanes calamagrostis Heinrich, 1950: 15 f. (syn. nov.) – Holotypus: ♀, "24.7.47. Oberharz. leg. Hinz" (ZSM).

Beschreibung

♀: Körperlänge 9-11 mm; Fühlergliederzahl 42-45; viertes Fühlerglied 2,0-2,1 mal so lang wie breit; Schläfen relativ lang und gerade verengt, Berührungslinien an Augen und Schläfen schneiden sich auf dem Mesoscutum bis Scutellum (Abb. 2), Haargruben auf den Schläfen klein und verwischt, dazu dorsoventrale Runzeln vorhanden; Scutellum fast flach; Hinterfemora 3,7-4,1 mal so lang wie hoch, außen subventral und auf der ventralen Kante deutlich spärlicher punktiert, ohne Eindellung und größere Haargruben; Klauen schlank, apical um 60° umgebogen (Abb. 6); Area superomedia 0,7-0,8 mal so lang wie breit, caudale Begrenzungsleiste häufig undeutlich, in der Anlage meist gerade; Längsfalte auf dem zweiten bis vierten Gastersternit, auf dem vierten nicht immer deutlich; Bohrerklappen lang, Cerci erreichen nicht die Mitte (Abb. 11).

Stirnorbiten teilweise schmal rotbraun; Flagellum proximal gelbbraun, distal schwarz, median mit weißem Sattel; Coxen und Trochanteren schwarz, Hinterfemora rot, schwarzer Apicalring der Hintertibien 1-2 mal so breit wie die Dicke der Tibien; zweites und drittes Gastertergit rotbraun, die folgenden schwarz, auf dem siebenten ein großer (Abb. 11), selten auch auf dem sechsten ein kleiner weißer Fleck.

♂: Körperlänge 11-14 mm; Fühlergliederzahl 43-46; viertes Fühlerglied 1,7-1,8 mal so lang wie breit; Schläfen wie ♀; Scutellum etwas gewölbt; Hinterfemora 3,8-4,2 mal so lang wie hoch, Struktur wie ♀; Klauen wie ♀; Area superomedia 0,7-0,9 mal so lang wie breit, caudale Begrenzungsleiste vollständig und gerade; Subgenitalplatte caudal-median breit vorgerundet; Genitalklappen apical breit gerundet, ventral etwas vorgezogen (Abb. 20).

Gesicht lateral gelb, die gelbe Zeichnung der Stirnorbiten reicht über den Dorsalrand der Stirngruben hinaus und endet abgerundet, Gesicht häufig zusätzlich mit zwei kleinen gelben Punkten oder einem U-förmigen Fleck unter den Fühlergruben und/oder Clypeus mit zwei Flecken oder einer Querbinde oder gelbe Zeichnung zusammenfließend, aber Basalfurche und Apicalrand des Clypeus immer schwarz gezeichnet; Scapus ventral gelb gefleckt, Flagellum ventral wenig aufgehellt; fast immer ein kurzer oder längerer Strich vor der Hinterecke des Pronotums und häufig der Subtegularwulst gelb, Scutellum fast ganz oder ganz hellgelb; Hinterfemora schwarz, basal schmal rotbraun, selten überwiegend rotbraun und nur innen und außen dunkel gefleckt; Zeichnung der Beine sonst wie ♀; zweites und drittes Gastertergit rotbraun, caudal gelegentlich mit kleinen schwarzen Flecken oder Querbinden, die folgenden schwarz, selten das vierte basal rotbraun.

Exephanes riesei (Habermehl)

Ichneumon (*Exephanes*?) *amabilis* Kriechbaumer, 1895: 105 ff. – praeocc. durch *Ichneumon amabilis* Giraud, 1863 – Lectotypus hiermit festgelegt: ♂, "Trostbg. 23.6.94 Jemiller" (= Trostberg /Süddeutschland), "10/27.", "*amabilis* m. ♂" (ZSM). Aubert (1981: 313) hat den Typus als Holotypus bezeichnet, aber Kriechbaumer hatte mehrere Exemplare der Nominatform vor sich.

Ichneumon riesei Habermehl, 1916: 284 (syn. nov.) – Holotypus: ♂, "aus Raupe (Riese)" (Fundort unbekannt), "*Ichneumon riesei* Haberm. ♂" (SMF).

Exephanes amabilis (Kriechbaumer) forma *rhenana* Habermehl, 1923: 278 (syn. nov.) – praeocc. durch *Exephanes rhenanus* Habermehl, 1918 – Lectotypus hiermit festgelegt: ♂, "Worms 10.6.20 Haberm.", "*Exephanes amabilis* Kriechb. ♂ f. *rhenana* Haberm." (SMF). Der Paralectotypus (♂) aus Leverkusen ist in Frankfurt ebenfalls vorhanden und gehört zu *E. fulvescens*. Die Typen von *I. amabilis*, *I. riesei* und *E. amabilis* forma *rhenana* wurden direkt miteinander verglichen.

Exephanes hoerhammeri Heinrich, 1949: 101 (Heinrich 1950: 15) – Holotypus: ♀, "Haag Amper Ober-Bayern IV 48" (ZSM).

Das Taxon *Ichneumon amabilis* Kriechbaumer var. *ramifer* Kriechbaumer (1895: 106), ein bisher übersehener Name, wird als infrasubspezifisch und deshalb als nicht verfügbar angesehen (vgl. Horstmann 1997: 47 ff., wo ein Hinweis auf diesen Namen allerdings fehlt). Die an gleicher Stelle beschriebene var. *annulicornis* Kriechbaumer gehört zu *E. fulvescens*.

Beschreibung

♀: Körperlänge 10-12 mm; Fühlergliederzahl 42-43; viertes Fühlerglied 2,0-2,1 mal so lang wie breit; Schläfen relativ lang und deutlich verengt, wenig gerundet, außen an Augen und Schläfen gelegte Berührungslinien schneiden sich auf dem Scutellum oder Postscutellum, Haargruben auf den Schläfen deutlich und tief, an den meisten Stellen breiter als die Zwischenräume; Scutellum fast flach; Hinterfemora 4,0-4,3 mal so lang wie hoch, außen subventral und an der ventralen Kante dicht und fein punktiert, ohne Besonderheiten; Klauen schlank, apical um 60° umgebogen; Area superomedia 0,9-1,0 mal so lang wie breit, caudale Begrenzungsleiste meist verwischt, in der Anlage meist gerade; zweites bis viertes Gastersternit mit Längsfalte; Bohrerklappen lang, Cerci nicht bis zur Mitte reichend.

Stirnorbiten meist schmal rötlich; Flagellum proximal und distal schwarz, median mit weißem Ring; Coxen und Trochanteren schwarz, Hinterfemora schwarz, basal oft rot gezeichnet, schwarzer Apicalring der Hintertibien etwa doppelt so breit wie die Dicke der Tibien; zweites und drittes Gastertergit rotbraun, häufig das dritte, selten auch das zweite caudal schwarz, selten das dritte fast ganz schwarz, die folgenden schwarz, das siebente mit einem großen hellgelben Fleck, selten auch das sechste und/oder das achte caudal mit kleinen hellgelben Flecken.

♂: Körperlänge 11-13 mm; Fühlergliederzahl 42-46; viertes Fühlerglied 2,0-2,2 mal so lang wie breit; Schläfen wie ♀; Scutellum etwas gewölbt; Hinterfemora 4,0-4,3 mal so lang wie hoch, Struktur wie ♀; Klauen wie ♀; Area superomedia 0,8-1,0 mal so lang wie breit, caudale Begrenzungsleiste deutlich ausgebildet, gerade oder etwas nach frontal eingebogen; Subgenitalplatte caudal-median breit vorgerundet; Genitalklappen breit, apical etwas ausgerandet, nach ventral etwas vorgezogen (Abb. 21).

Labrum, Mandibeln, Clypeus und Gesicht ganz hellgelb, gelbe Zeichnung der Stirnorbiten in der Regel über den dorsalen Rand der Stirngruben hinausreichend und dort abgerundet (selten kürzer und zugespitzt); Scapus ventral gelb, Flagellum ventral gelbbraun, dorsal schwarzbraun; kurzer Strich vor der Hinterecke des Pronotums und Subalarwulst hellgelb, selten dort nur kleine Flecke, Scutellum in der Regel hellgelb, selten nur mit gelber Querbinde; Coxen und Trochanteren der Vorder- und Mittelbeine deutlich hellgelb gezeichnet oder fast ganz gelb, Hinterfemora schwarz, basal und apical oft schmal gelblich, schwarzer Apicalring der Hintertibien etwa doppelt so breit wie die Dicke der Tibien; zweites und drittes Gastertergit frontal rotbraun, caudal mit breiter schwarzer Binde, diese selten zu einem Punkt reduziert oder ganz fehlend, die folgenden schwarz.

Exephanes tauricus Hinz (spec. nov.)

Typen. Holotypus: ♀, “97/69”, “Aintab (Taurus) *tauricus* m. 3♀” (Türkei). – Paratypen: 2♀♀ mit den Etiketten “97/70” beziehungsweise “97/71” (ohne Fundortangabe, aber vermutlich vom gleichen Ort) (alle ZSM). Die Art ist schon von Kriechbaumer benannt, aber nicht beschrieben worden.

Beschreibung

♀: Körperlänge 12 mm; Fühlergliederzahl 42, viertes Fühlerglied 2,2-2,3 mal so lang wie breit; Schläfen stark und relativ gerade verengt, Berührungslinien an Augen und Schläfen schneiden sich auf der Scutellargrube (Abb. 3), Haargruben auf den Schläfen klein; Wangenraum etwas kürzer als die Breite der Mandibelbasis; Mesoscutum fein und sehr dicht punktiert; Scutellum fast flach; Mesopleuren auf glattem Grund kräftig und überwiegend dicht punktiert, Speculum klein; Hinterfemora 4,0-4,4 mal so lang wie hoch, außen subventral und auf der ventralen Kante etwas spärlicher punktiert, ohne abgeflachte Stelle; Klauen sehr schlank, apical um 50° umgebogen (Abb. 7); Area superomedia 0,6-0,7 mal so lang wie breit, caudale Begrenzung nach frontal gebogen, etwas undeutlich; Mittelfeld des Postpetiolus dicht und fein gestreift, ohne Punkte; zweites bis viertes Gastersternit mit Längsfalte; Bohrerklappen kurz, Cerci über die Mitte hinausreichend (Abb. 12).

Clypeus schwarz; dorsale Hälfte der Gesichtsorbiten und die Stirnorbiten deutlich hellrotbraun gezeichnet; Scapus ventral breit rotbraun, Flagellum proximal und distal schwarz, median mit weißem Sattel; Scutellum hellgelb; Coxen, Trochanteren und die Hintertarsen schwarz, Femora, Tibien und Tarsen sonst rotbraun, schwarzer Apicalring der Hintertibien sehr schmal; zweites und drittes Gastertergit rotbraun, dazu das vierte an den Vorderecken oder fast ganz rotbraun, die folgenden schwarz, das fünfte bis siebente caudal mit breiter weißer Binde, das achte caudal schmal weiß gerandet (Abb. 12), bei einem Paratypus auch das vierte caudal schmal weiß gerandet.

♂ unbekannt.

Exephanes venustus (Tischbein)

Ichneumon venustus Tischbein, 1876: 286 – Syntypen (♂♂) aus Birkenfeld (Hunsrück/Westdeutschland) mit der Sammlung Tischbein zerstört (Hilpert 1992: 14), Neotypus hiermit festgelegt: ♀, "L. 30.6.63 Celle" (in Norddeutschland), "1963/XLIV 5.8.63", "ex: *Tapinostola pygmina* Haw. (Lep.)" (Coll. Hinz/ZSM). Folgende Befunde führten zu der Festlegung des Neotypus: Kriechbaumer (1894: 282) hat noch einen Typus der Art untersucht, hält ihn für artidentisch mit 2♂♂ aus Coll. von Siebold (ZSM) und stellt dieses Material mit Bedenken zu *E. occupator*. Die beiden Exemplare sind in München erhalten. Sie gehören nach allen Merkmalen zu der vorliegenden Art, die Kriechbaumer von *E. occupator* nicht unterscheiden konnte. Zusätzlich sind in München 3♀♀ aus Coll. von Siebold vorhanden (möglicherweise aus derselben Serie, alle ohne Fundortangaben), die ebenfalls hierher gehören. Die Beschreibung erlaubt keine sichere Entscheidung, zwei Merkmale sprechen für eine Zuordnung zu *E. venustus*: Körperlänge 11-12 mm; Area superomedia so lang wie oder wenig kürzer als breit. Durch die hier vorgenommende Interpretation bekommt eine schwer abzutrennende Art einen Namen, der durch einen Typus aus einer Zuchtserie gesichert ist. Die Wahl eines Weibchens als Neotypus folgt Artikel 75(d)(4) der Nomenklaturregeln. Der Fundort des Neotypus liegt in hinreichender Nähe zum Fundort der ursprünglichen Syntypen, zudem kommt die Art mindestens bis Süddeutschland vor (1♀ aus München in ZSM).

Ichneumon insidiator Tischbein, 1876: 287 (syn. nov.) – praeocc. durch *Ichneumon insidiator* Fabricius, 1781 – Holotypus (♂) aus Danzig (= Gdansk/Polen) mit der Sammlung Tischbein zerstört. Tischbein (l. c.) gibt an, daß die Art mit *I. venustus* Tischbein "nahe verwandt" sei. Kriechbaumer (1894: 340) hat den Typus noch untersucht, stellt ihn zu *Exephanes* und vermutet eine Zugehörigkeit zu *E. femoralis* Brischke (vermutlich in erster Linie wegen des identischen Typenfundorts beider Taxa). Er hat das Männchen dieser Art aber nicht aus eigener Anschauung gekannt, und die Beschreibung spricht eindeutig gegen diese Interpretation (bei *I. insidiator* Gesicht nicht ganz gelb; Hinterfemora rotbraun). Dagegen ist die Übereinstimmung der Beschreibung mit einigen Männchen von *E. venustus* gut, und insbesondere die kleine Körperlänge (11 mm) spricht für diese Zuordnung.

Exephanes caelebs Kriechbaumer, 1890: 289 f. (syn. nov.) – Holotypus: ♂, "Sondbg." (= Sønderborg/Dänemark), "♂", "Type der Beschreibung Kriechb.", "Coll. Wüstnei", "*caelebs* Kriechb." (ZMK). Folgende Merkmale sprechen für die hier vorgeschlagene Determination des Holotypus: Körperlänge 11,5 mm; Schläfen hinter den Augen rundlich verengt, Berührungslinien an Augen und Schläfen schneiden sich auf der Area basalis; Hinterfemora 4,0 mal so lang wie hoch, außen subventral mit der Spur einer Eindellung, innen und außen schwarz gefleckt; Area superomedia so lang wie breit.

Beschreibung

Die Art ist sehr variabel und von *E. occupator* in beiden Geschlechtern nicht immer sicher zu unterscheiden. Die Zuchtserie aus *Photedes pygmina* (Haworth) (Coll. Hinz) und zahlreiche gefangene Exemplare aus verschiedenen Museen sind recht klein (kleiner als die meisten Exemplare von *E. occupator*) und auch im Körperbau relativ einheitlich. Wenige aus anderen Wirten gezüchtete Exemplare sind aber größer, vermutlich in Abhängigkeit von der Wirtsgröße. Alle untersuchten Exemplare aus Irland (NHML) zeichnen sich durch fast ganz schwarze Hinterfemora aus (Perkins 1960: 204). Schließlich sind einige gefangene Weibchen und Männchen zwischen *E. occupator* und *E. venustus* intermediär und nicht sicher zuzuordnen. Die folgende Beschreibung erfaßt die Nominatform; auf abweichende Exemplare wird am Schluß hingewiesen.

♀: Körperlänge 9-10 mm; Fühlergliederzahl 35-38; viertes Fühlerglied 1,8-1,9 mal so lang wie breit; Schläfen relativ kurz und rundlich verengt, außen an Augen und Schläfen gelegte Berührungslinien schneiden sich auf dem Postscutellum, Propodeum oder ersten Gastersegment (Abb. 4), Haargruben auf den Schläfen mäßig groß, durch dorsoventrale Runzeln etwas verwischt; Scutellum fast flach; Hinterfemora 3,5-3,8 mal so lang wie hoch, außen subventral spärlicher punktiert, mit einer abgeflachten oder wenig eingedrückten Stelle, auf der sich 3-12 größere und häufig langgezogene Haargruben befinden, auf der ventralen Kante sehr spärlich punktiert; Klauen kräftig, apical um 80° umgebogen; Area superomedia 0,7-1,0 mal so lang wie breit, caudale Begrenzungsleiste in der Regel gerade und oft durch Runzeln undeutlich (Abb. 9); zweites und drittes Gastersternit mit Längsfalte; Bohrerklappen nicht weit vorstehend, Cerci über die Mitte hinausreichend (Abb. 13).

Stirnorbiten höchstens sehr schmal rötlich gezeichnet; Flagellum proximal und distal schwarz, median mit weißem Ring oder Sattel; Coxen und Trochanteren schwarz, Hinterfemora rot, schwarzer Apicalring der Hintertibien sehr schmal bis zweimal so breit wie die Dicke der Tibien; zweites und drittes Gastertergit rotbraun, häufig auch die Vorderecken des vierten rotbraun, gelegentlich das dritte caudal schwarz gerandet, die folgenden schwarz, das siebente mit einem großen (Abb. 13), häufig auch das sechste caudal mit einem kleinen weißgelben Fleck.

♂: Körperlänge 10-12 mm; Fühlergliederzahl 37-41; viertes Fühlerglied 1,7-1,8 mal so lang wie breit; Schläfen wie ♀; Scutellum wenig gewölbt; Hinterfemora 3,4-4,1 mal so lang wie breit, außen subventral fein und dicht punktiert, in der Regel ohne Besonderheiten, sehr selten mit einer sehr kleinen abgeflachten Stelle; Klauen wie ♀; Area superomedia 0,7-1,1 mal so lang wie breit, caudale Begrenzungsleiste deutlich, gerade oder nach frontal eingebogen; Subgenitalplatte caudal-median breit vorgerundet; Genitalklappen apical breit, fast senkrecht abgeschnitten, ventral etwas vorgezogen (Abb. 22).

Gesicht lateral gelb, gelbe Zeichnung der Stirnorbiten bis zum Dorsalrand der Stirngruben und dort zugespitzt, gelegentlich Gesicht unter den Fühlergruben und Clypeus mit 1-2 kleinen gelben Flecken, sehr selten diese Zeichnung teilweise zusammenfließend; Scapus unten gelb gezeichnet, Flagellum ventral gelbbraun bis schwarz, dorsal schwarz; dorsale Ecke des Pronotums und Subalarwulst häufig schwarz, selten hellgelb gezeichnet, Scutellum fast ganz hellgelb oder mit einer hellen Querbinde, selten schwarz; Beine häufig wie ♀, selten Hinterfemora innen und außen schwarz gefleckt; zweites und drittes Gastertergit gelb oder rotbraun, häufig auch die Basis des vierten hell, seltener das zweite und/oder dritte caudal mit schwarzen Flecken oder Querbinden, die folgenden schwarz, selten das siebente mit einem kurzen weißen Längsstreif.

Folgende Exemplare stimmen in wichtigen Merkmalen (Form der Schläfen; Proportion und Struktur der Hinterfemora) mit dieser Beschreibung überein, weichen aber in einigen Details ab:

a) 1♀ aus Bayreuth, ex *Gortyna flavago* (Denis et Schiffermüller) (Coll. Horstmann): Körperlänge 12,5 mm; Fühlergliederzahl 40.

b) 2♀♀ aus Irland (NHML): Körperlänge 10 mm; Hinterfemora schwarz, basal etwas aufgehellt. Auf diese Exemplare bezieht sich die Beschreibung von Perkins (1960: 204). Ein von ihm genanntes Merkmal läßt sich nicht bestätigen: Die Klauen sind kräftig und apical deutlich umgebogen.

c) 1♀, 1♂ aus Irland, ex *Amphipoea crinanensis* (Burrows) (NHML): Körperlänge 12-13 mm; Hinterfemora schwarz, nur basal und ventral-apical etwas aufgehellt.

Bestimmungstabellen für die Arten

Weibchen

1. Bohrerklappen weit vorstehend, länger als das zweite Glied der Hintertarsen, Cerci nicht bis zur Mitte der Bohrerklappen reichend (Abb. 10-11) .... 2.

– Bohrerklappen nicht so weit vorstehend, höchstens so lang wie das zweite Glied der Hintertarsen, Cerci über die Mitte der Bohrerklappen hinausreichend (Abb. 12-13) .... 4.

2. Clypeus apical über die ganze Breite etwas ausgerandet; sechstes Gastertergit caudal mit einer breiten Querbinde, siebentes Tergit caudal mit einem weißen Fleck, der in der Regel nicht bis zum Caudalrand des sechsten Tergits reicht (Abb. 10) .... *ischioxanthus* (Gravenhorst)

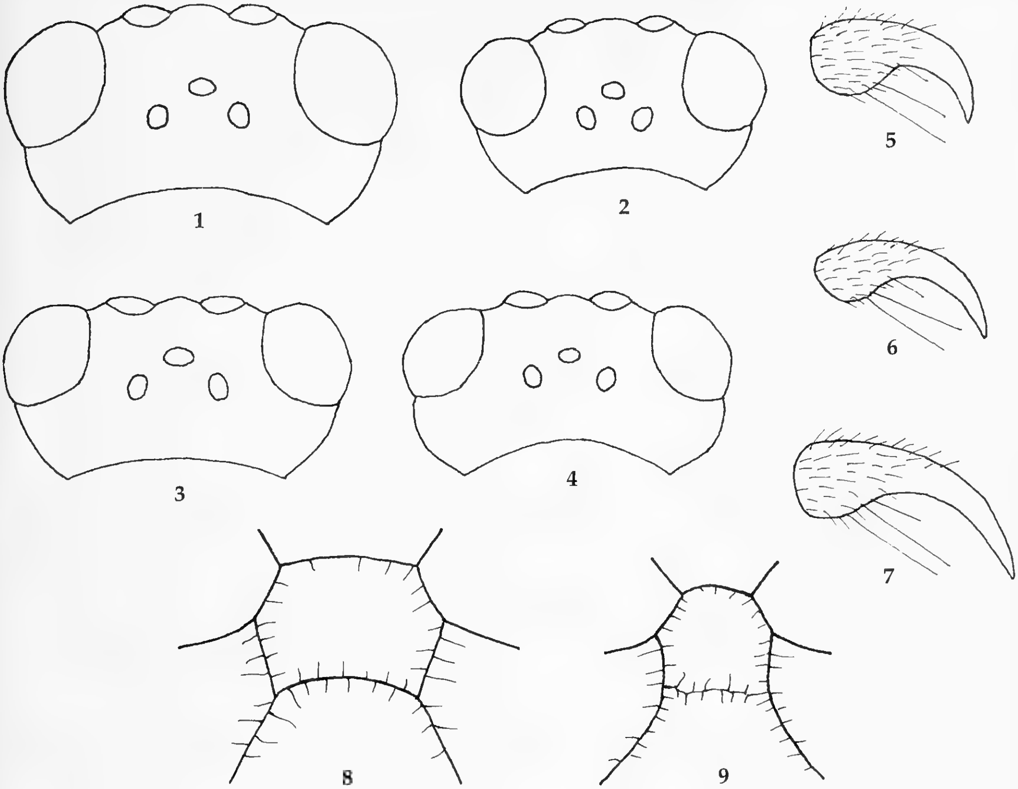


Abb. 1-4. Dorsalansicht des Kopfes. **1.** *Exephanes occupator*, ♀. **2.** *E. rhenanus*, ♀. **3.** *E. tauricus*, ♀. **4.** *E. venustus*, ♀.
Abb. 5-7. Klauen der Hinterbeine. **5.** *E. occupator*, ♀. **6.** *E. rhenanus*, ♀. **7.** *E. tauricus*, ♀.
Abb. 8-9. Area superomedia. **8.** *E. occupator*, ♀. **9.** *E. venustus*, ♀.

– Apicalrand des Clypeus gerade; sechstes Tergit caudal schwarz oder mit einem kleinen weißen Fleck, siebentes Tergit mit einem großen weißen Fleck, der in der Regel bis zum Caudalrand des sechsten Tergits reicht (Abb. 11) .... 3.

3. Schläfen gerade und stark verengt, Berührungslinien an Augen und Schläfen schneiden sich auf dem Mesoscutum (Abb. 2), Haargruben auf den Schläfen relativ klein und verwischt; Flagellum proximal gelbbraun; Hinterfemora rotbraun .... *rhenanus* Habermehl

– Schläfen rundlich und weniger verengt, Berührungslinien an Augen und Schläfen schneiden sich auf dem Scutellum oder Postscutellum, Haargruben auf den Schläfen relativ groß und tief; Flagellum proximal schwarz; Hinterfemora median breit schwarz .... *riesei* (Habermehl)

4. Fünftes bis siebentes Gastertergit caudal mit einer breiten weißen Querbinde, die den Caudalrand des vorhergehenden Tergits nicht erreicht (Abb. 12); zweites bis viertes Gastersternit mit Längsfalte .... *tauricus* Hinz (spec. nov.)

– Siebentes Gastertergit mit einem großen weißen Fleck, der in der Regel den Caudalrand des sechsten Tergits erreicht (Abb. 13), das sechste caudal höchstens mit einem kleineren weißen Fleck; nur zweites und drittes Gastersternit mit Längsfalte .... 5.

5. Fühler schlank, das vierte Glied 2,4-2,6 mal so lang wie breit; Scutellum verhältnismäßig hoch gewölbt; Clypeus lateral und apical hellrotbraun gezeichnet . *fulvescens* Snellen van Vollenhoven

– Fühler weniger schlank, das vierte Glied höchstens 2,1 mal so lang wie breit; Scutellum nur wenig gewölbt; Clypeus schwarz .... 6.

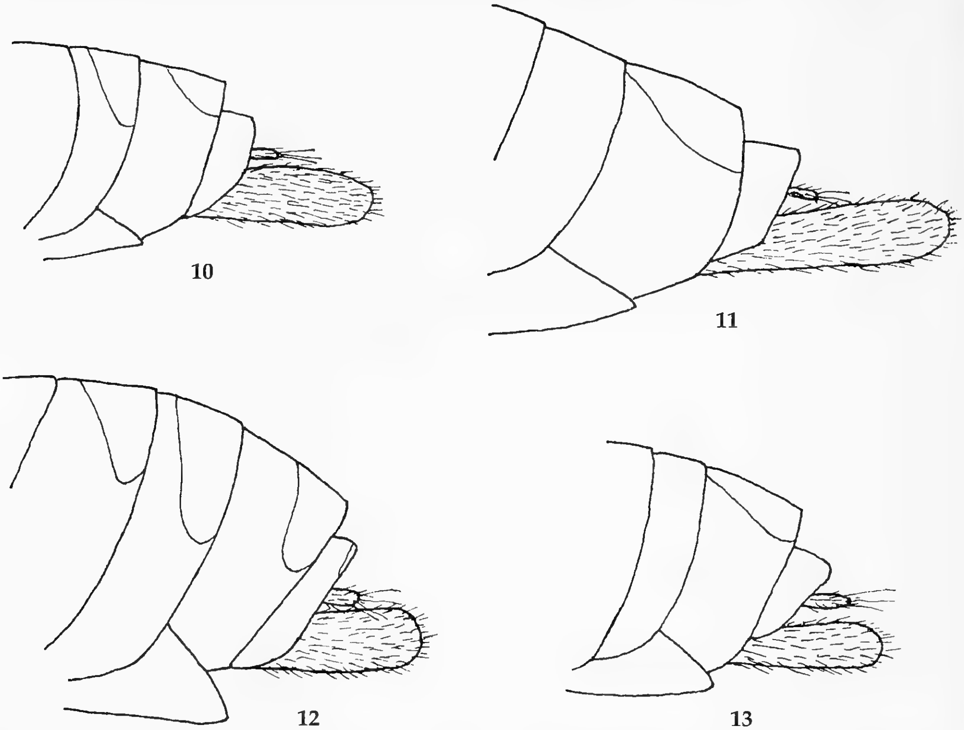


Abb. 10-13. Lateralansicht der Gasterspitze (Ausdehnung der weißen Zeichnung der Tergite angedeutet). **10.** *Exephanes ischioxanthus*, ♀. **11.** *E. rhenanus*, ♀. **12.** *E. tauricus*, ♀. **13.** *E. venustus*, ♀.

6. Flagellum proximal gelbbraun; Hinterschenkel sehr gedrungen, 2,7-2,9 mal so lang wie hoch, außen subventral und an der ventralen Kante dicht und fein punktiert .... *femoralis* Brischke

– Flagellum proximal schwarz; Hinterschenkel mindestens 3,5 mal so lang wie hoch, außen subventral und an der ventralen Kante deutlich spärlicher punktiert als median (Unterscheidung der beiden folgenden Arten nicht immer möglich) .... 7.

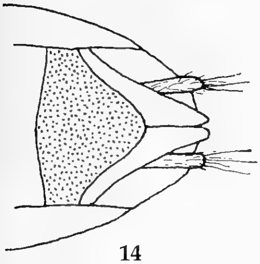
7. Schläfen relativ gerade und stark verengt, außen an Augen und Schläfen gelegte Berührungslinien schneiden sich auf dem Scutellum oder Postscutellum (Abb. 1); Hinterfemora 3,9-4,1 mal so lang wie hoch, außen subventral selten mit einer kleinen abflachten oder eingedrückten Stelle, dort höchstens 1-2 größere Haargruben (häufig nur auf einer Seite); caudale Begrenzungsleiste der Area superomedia häufig kräftig und nach frontal eingebogen (Abb. 8) .... *occupator* (Gravenhorst)

– Schläfen rundlich verengt, außen an Augen und Schläfen gelegte Berührungslinien schneiden sich auf dem Postscutellum bis ersten Gastersegment (Abb. 4); Hinterfemora 3,5-3,8 mal so lang wie breit, außen subventral mit einer abgeflachten oder eingedrückten Stelle, dort 3-12 größere und häufig langgezogene Haargruben; caudale Begrenzungsleiste der Area superomedia häufig verwischt und eher gerade (Abb. 9) .... *venustus* (Tischbein)

Männchen
(Männchen von *E. tauricus* unbekannt)

1. Clypeus und Gesicht nicht ganz gelb, in der Regel nur die Gesichtsränder gelb, seltener zusätzlich gelbe Flecke unter den Fühlergruben und auf dem Clypeus, diese Zeichnung selten zusammenfließend, zumindest die Basalfurche und der Apicalrand des Clypeus schwarz gezeichnet; Hinterfemora teilweise ganz rot .... 2.

– Clypeus und Gesicht ganz gelb; Hinterfemora immer mit schwarzer Zeichnung .... 4.



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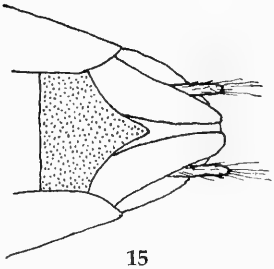

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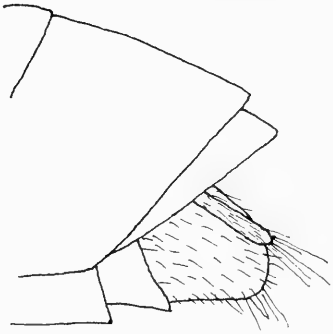

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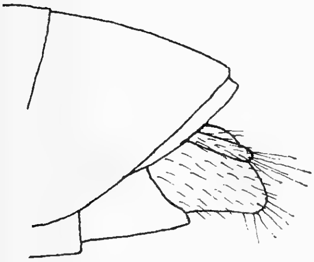

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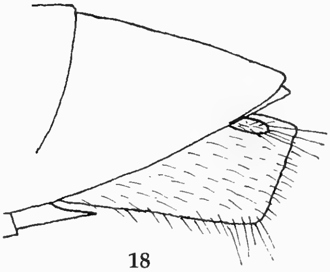

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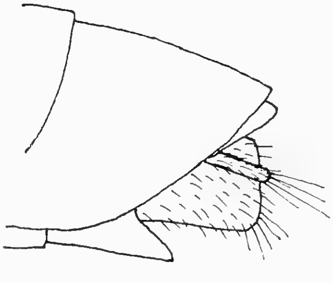

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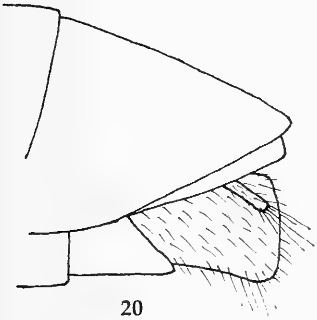

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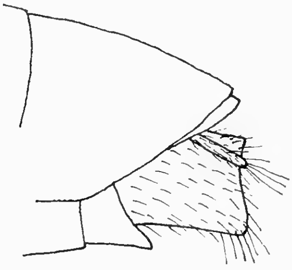

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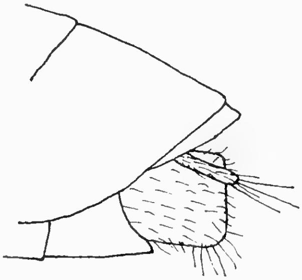

22

Abb. 14-15. Ventralansicht der Gasterspitze (Subgenitalplatte punktiert). **14.** *Exephanes fulvescens*, ♂. **15.** *E. ischioxanthus*, ♂.
Abb. 16-22. Lateralansicht der Gasterspitze. **16.** *E. femoralis*, ♂. **17.** *E. fulvescens*, ♂. **18.** *E. ischioxanthus*, ♂. **19.** *E. occupator*, ♂. **20.** *E. rhenanus*, ♂. **21.** *E. riesei*, ♂. **22.** *E. venustus*, ♂.

2. Gelbe Zeichnung der Stirnorbiten reicht über den Dorsalrand der Stirngruben hinaus und endet dort abgerundet; Hinterfemora ganz oder teilweise schwarz; Klauen schlank, apical um 60° umgebogen (Abb. 6) .... *rhenanus* Habermehl

– Gelbe Zeichnung reicht nicht über den Dorsalrand der Stirngruben hinaus und endet zugespitzt; Hinterfemora häufig ganz rot (aber gelegentlich auch schwarz gezeichnet); Klauen kräftig, apical um 80° umgebogen (Abb. 5) (Unterscheidung der beiden folgenden Arten nicht immer möglich) .... 3.

3. Schläfen relativ lang und gerade verengt, Berührungslinien an Augen und Schläfen schneiden sich auf dem Scutellum oder Postscutellum (Abb. 1); Hinterfemora 4,0-4,5 mal so lang wie hoch; Area superomedia 0,6-0,9 mal so lang wie breit, die caudale Begrenzungsleiste fast immer kräftig und deutlich nach frontal eingebogen (Abb. 8) .... *occupator* (Gravenhorst)

- Schläfen rundlich verengt, Berührungslinien an Augen und Schläfen schneiden sich auf dem Postscutellum bis ersten Gastersegment (Abb. 4); Hinterfemora 3,4-4,1 mal so lang wie hoch; Area superomedia 0,7-1,1 mal so lang wie breit, die caudale Begrenzungsleiste häufig gerade und durch Runzeln undeutlich (Abb. 9) .... *venustus* (Tischbein)

4. Clypeus apical in seiner ganzen Breite deutlich etwas ausgerandet; Dorsalrand des Pronotums lateral mit einem langen gelben Strich; Subgenitalplatte caudal-median zu einer zungenförmigen Spitze ausgezogen (Abb. 15) .... *ischioxanthus* (Gravenhorst)

- Clypeus apical gerade; Dorsalrand des Pronotums höchstens vor der Hinterecke mit einem kurzen Strich; Subgenitalplatte caudal-median breit vorgerundet (Abb. 14) .... 5.

5. Flagellum median mit einem deutlichen hellgelben Ring, selten proximal und median insgesamt gelblich (auch dorsal); Scutellum deutlich vorgewölbt .... *fulvescens* Snellen van Vollenhoven

- Flagellum dorsal dunkelbraun bis schwarz, ventral gelbbraun bis braun, median ohne hellen Ring; Scutellum wenig vorgewölbt .... 6.

6. Schläfen mit feinen Haargruben, die deutlich schmäler als ihre Zwischenräume sind; Coxen und Trochanteren der Mittelbeine schwarz; Hinterfemora 3,2-3,3 mal so lang wie hoch .... *femoralis* Brischke

- Schläfen mit tiefen Haargruben, die in der Regel breiter als ihre Zwischenräume sind, dazu mit dorsoventralen Runzeln; Coxen und Trochanteren der Mittelbeine deutlich hellgelb gefleckt; Hinterfemora 4,0-4,3 mal so lang wie hoch .... *riesei* (Habermehl)

Bemerkungen zur Lebensweise

Die Phänologie der europäischen Arten scheint im wesentlichen übereinzustimmen: Beide Geschlechter schlüpfen im Juni oder Juli aus den Wirtspuppen, sind etwa von Juni bis Oktober als Imagines zu finden und kopulieren in dieser Zeit. Die Weibchen überwintern (für *E. femoralis* und *E. fulvescens* nicht gesichert), aber über die Überwinterungsorte ist wenig bekannt. In den normalen Überwinterungsquartieren der Ichneumoninae (Totholz, hohle Pflanzenstengel, unter Borke oder Moos, in Erdhöhlen an Wurzeltellern umgestürzter Bäume) kommen europäische *Exephanes*-Weibchen anscheinend nicht vor. *E. ischioxanthus* wurde überwinternd in Höhlen gefunden (Hedwig 1943: 4, Selfa & Escola 1992: 167), und auch von *E. rhenanus* lagen 2♀♀ vor, die in Höhlen gesammelt worden waren. Heinrich (1961: 475) fand eine nordamerikanische Art zahlreich überwinternd in Baumstümpfen. Vielleicht überwintern die europäischen Arten in ihren Lebensräumen in Grashorsten, wo sie nur durch Zufall zu entdecken sind. Die Weibchen werden dann wieder im April und Mai gefangen; bei *E. femoralis* und *E. fulvescens* liegen Funde aus dem Frühjahr bis jetzt nicht vor. Die Weibchen stechen zur Eiablage endophytische Lepidopteren-Raupen der Familie Noctuidae an. Die Wirte leben überwiegend in Stengeln von Gräsern, seltener auch in Stengeln zweikeimblättriger Kräuter (vgl. unten). Die Vorgang der Parasitierung wurde im Freiland bisher noch nicht beobachtet. Zwar wurden Weibchen im Frühjahr schon mehrfach erbeutet, die offensichtlich auf der Suche nach Wirten waren, doch sind die Tiere dann so scheu, daß eine Beobachtung der Eiablage, wie sie bei anderen Ichneumoninae durchaus möglich ist, hier nicht gelang. Über den Polyphagie-Grad der Arten ist wenig bekannt. *E. occupator* und *E. venustus* sind offensichtlich oligophag. Die anderen Arten wurden in den Untersuchungen, über die hier berichtet wird, nur aus jeweils einer Wirtsart gezogen, aber für einige dieser Arten gibt es Hinweise auf andere Wirte, die nicht verifiziert werden konnten.

Exephanes femoralis Brischke

Der einzige bekannte Wirt ist *Photedes elymi* (Treitschke), er wird schon von Brischke (1878: 37) genannt. Die Wirtsraupe lebt an den Küsten der Nord- und Ostsee auf Sanddünen in den Stengeln von *Elymus arenarius*, sie überwintert dort und verpuppt sich im Juni in einem Kokon im Fraßgang unterhalb der Bodenoberfläche. *E. femoralis* wurde ebenfalls an der Nord- und Ostseeküste gefangen, von Nordost-Polen (Brischke l. c.) bis Nordwestdeutschland (Horstmann 1988: 198) und den Niederlanden (Teunissen 1972: 95). Anscheinend kommt sie nur sehr lokal vor: In mühsamer Suche an großen Strecken der

Ostseeküste wurden in der Regel nur die Wirtstiere und nur an einer Stelle bei Großenbrode (nördlich Lübeck) auch Parasiten erhalten. In drei Zuchtserien von diesem Fundort wurden aus zusammen 534 als Raupen und Puppen gesammelten Wirten 4♀♀ und 4♂♂ von *E. femoralis* gezogen. Da der Wirt als Raupe überwintert und da Parasitenweibchen bisher nur im Herbst gefangen wurden (in sehr geringen Zahlen), ist die Möglichkeit derzeit nicht auszuschließen, daß die Parasitierung im Herbst geschieht. Vermutlich besitzt *E. femoralis* noch eine weitere Wirtsart: 4♀♀ wurden bei Leipzig gefangen (DEI); dort kommt *P. elymi* nicht vor.

Exephanes fulvescens Snellen van Vollenhoven und *E. riesei* (Habermehl)

Beide Arten parasitieren an *Apamea ophiogramma* (Esper) (Hinz 1957: 89). Die Wirtsraupen leben in den Stengeln von *Phalaris arundinacea* und *Glyceria maxima* und überwintern dort. Die Verpuppung findet im Juni in dichten Kokons am Boden in den Stengeln oder neben der Futterpflanze statt. Man findet die Wirte und die Parasiten in feuchten Niederungen an Rändern von Flüssen, Bächen, Altwässern und Teichen. In drei Zuchtserien wurden aus zusammen 143 als Raupen gesammelten Wirten 10♀♀ und 5♂♂ von *E. fulvescens* sowie 4♀♀ und 2♂♂ von *E. riesei* gezogen, jeweils nebeneinander an zwei Fundstellen in Nordwestdeutschland. Weibchen von *E. riesei* wurden auch im Frühjahr, Weibchen von *E. fulvescens* dagegen nur im Herbst gefangen, dann aber in größeren Zahlen (vgl. auch Hinz l. c.). Die Möglichkeit ist nicht auszuschließen, daß die Parasitierung durch *E. fulvescens* im Herbst geschieht. An 2♂♂ von *E. fulvescens* vom Fundort Hamburg (ZSM) findet sich die Wirtsangabe *Tapinostola fulva* (recte: *Photedes pygmina* (Haworth)), in eigenen Zuchten des Wirts (vgl. unten) schlüpfte diese Parasitenart allerdings nicht.

Exephanes ischioxanthus (Gravenhorst)

Die Art parasitiert an *Mesoligia furuncula* (Denis et Schiffermüller). Die Wirtsraupe lebt in den Stengeln verschiedener Gramineae (*Deschampsia cespitosa, Arrhenatherum elatius, Festuca arundinacea* und andere), überwintert dort und verpuppt sich im Juni in einem Hohlraum unten an der Futterpflanze. Die Wirtsart kommt an warmen Hängen, Wegen, Bahndämmen, auf Waldlichtungen, Heiden und Sanddünen vor, und der Parasit ist anscheinend entsprechend weit verbreitet und nicht, wie die anderen Arten, an Feuchtgebiete gebunden. So wurde eine größere Serie an warmen Lößhängen im Kaiserstuhl (Südwestdeutschland) gefangen, und gezüchtete Tiere stammen vom Strand der Ostsee bei Lübeck. Weibchen fliegen auch im Frühjahr. Aus 45 als verpuppungsreife Raupen gesammelten Wirten schlüpfte 1♀ von *E. ischioxanthus*, dazu kommen 2♂♂ aus Einzelzuchten. Snellen van Vollenhoven (1875: 5) gibt *Photedes elymi* (Treitschke) als Wirt an; dabei handelt es sich aber möglicherweise um eine Verwechselung der Wirtsarten, die beide auf Sanddünen an der Küste vorkommen.

Exephanes occupator (Gravenhorst)

Diese Art ist als einzige schon oft aus ihren Wirten gezüchtet worden, und zwar vor allem aus *Nonagria typhae* (Thunberg) in Stengeln von *Typha latifolia* und *T. angustifolia*, daneben aus *Archanara*-Arten in Stengeln verschiedener meist einkeimblättriger Sumpf- und Wasserpflanzen. Zwölfer (1963: 354) zog sie aus *Hydraecia micacea* (Esper), die in Stengeln, Wurzelstöcken und Knollen verschiedener Kräuter in Feuchtgebieten lebt. Diese Wirte haben gemeinsam, daß sie als Ei überwintern, als junge Raupen zumindest teilweise oben in Stengeln oder dicken Blättern, als Altraupen dagegen unten in Stengeln oder Wurzelstöcken leben, wo sie sich in der Regel von Juni bis August verpuppen. *E. occupator* kommt stellenweise sehr häufig in Schilffeldern an Ufern von Flüssen, Teichen und Seen vor. Aus einer Serie von 154 Raupen und Puppen von *Nonagria typhae* aus *Typha latifolia* von einem Fundort bei Einbeck (Norddeutschland) schlüpften 10♀♀ und 4♂♂, und aus einer Serie von 111 Raupen und Puppen von *Archanara geminipuncta* (Haworth) von demselben Fundort schlüpfte 1♂ von *E. occupator* (jeweils neben anderen Parasitenarten). Schließlich lieferten Einzelzuchten von *Hydraecia micacea* 1♀ und 3♂♂ des Parasiten.

Mit den Parasiten vom Fundort Einbeck wurden auch einige Laborversuche durchgeführt: Frisch geschlüpfte Tiere kopulieren bereitwillig, ebenso leicht gelingt die Überwinterung begatteter Weibchen in Torfmoos im Kühlschrank. Die überwinterten Weibchen interessieren sich im Juni sehr stark für Fraßgänge und Laufspuren von jüngeren Raupen von *N. typhae* (10-20 mm lang), die zu dieser Zeit im Luftgewebe in den oberen Teilen der fleischigen Blätter von *T. latifolia* minieren. Die Raupen werden durch die Blätter hindurch in ihren Fraßgängen angestochen. Dabei sind viele vergebliche Anstiche zu beobachten; der Wirt kann offensichtlich nicht direkt geortet werden. Aus den Raupen konnten 4♀♀ des Parasiten erzogen werden.

Exephanes rhenanus Habermehl

Die Art parasitiert an *Photedes fluxa* (Hübner) (Hinz 1956: 258). Die Wirtsraupen leben an *Calamagrostis epigejos*, wo sie auch überwintern. Sie fressen vorzugsweise in den Stengeln, die sie von Zeit zu Zeit wechseln, und sie verpuppen sich im Juni im Boden neben der Futterpflanze. Entsprechend dem Vorkommen der Futterpflanze leben die Wirte und Parasiten vor allem auf feuchten Waldlichtungen. In einer Zuchtserie aus der Umgebung von Hannover wurden aus ungefähr 23 Wirtsraupen 3♀♀ und 3♂♂ von *E. rhenanus* erzogen. Zwei im April bei der Wirtssuche gefangene Weibchen stachen Raupen von *P. fluxa* im Labor bereitwillig an (die Weiterzucht wurde nicht versucht).

Exephanes venustus (Tischbein)

Aus eigenen Zuchten wurde nur *Photedes pygmina* (Haworth) als Wirt bekannt; diese Art nennt auch Habermehl (1929: 258; ZSM). Die Wirte überwintern anscheinend als Ei (Skou 1991: 187), leben als Raupen in den Stengeln verschiedener *Carex*-Arten, *Juncus*-Arten und Gramineae und verpuppen sich im Juli in den Fraßgängen. In eigenen Aufsammelungen wurde der Wirt in Stengeln von *Juncus effusus* gefunden, auf feuchten Wiesen und an Rändern von Gewässern. An entsprechenden Stellen fliegen auch die Parasiten (beide Geschlechter im Spätsommer, die Weibchen auch im Frühjahr). Aus drei Zuchtserien mit zusammen 90 Raupen des Wirts von einem Fundort bei Celle (Nordwestdeutschland) schlüpften 4♀♀ und 7♂♂ des Parasiten, dazu kommen weitere Parasiten aus Einzelzuchten. An Einzelexemplaren aus anderen Sammlungen werden weitere Wirtsarten genannt: *Amphipoea crinanensis* (Burrows) (1♀, 1♂ in NHML), *Gortyna flavago* (Denis et Schiffermüller) (1♀ in Coll. Horstmann*), *Phragmitiphila nexa* (Hübner) (1♀ in DEI). Die Parasiten aus den zwei erstgenannten Wirten sind deutlich größer als solche aus *P. pygmina*, entsprechend der unterschiedlichen Körpergröße der Wirte.

Nicht zu *Exephanes* gehörende Arten

Exephanes macilentus Tischbein, 1881: 168 f. – Holotypus (♀) aus Tirol (Österreich oder Italien) mit der Sammlung Tischbein zerstört (Hilpert 1992: 14). Kriechbaumer (1893: 327) hat den Typus noch untersucht und gibt einige Ergänzungen zur Beschreibung, insbesondere vermutet er, daß die Spitze des Gasters deformiert sei. Nach den Beschreibungen stimmt *E. macilentus* mit *Ichneumon nigrantennator* Hilpert gut überein (*E. macilentus*: Antennen borstenförmig, fast ganz schwarz; Färbung der Beine; Gastrocoelen groß und breit; sechstes und siebentes Gastertergit mit großen weißen Flecken, das achte mit einem kleinen weißen Strich; Fundort in Tirol). Deshalb wird *E. macilentus* zu *Ichneumon* Linnaeus gestellt (comb. nov.), mit *I. nigrantennator* als jüngerem Synonym (syn. nov.). Der Artname ist weder ein primäres noch ein sekundäres Homonym von *Diphyus macilentus* (Cresson).

Exephanes nigrifemur Tischbein, 1881: 169 f. – Holotypus (♀) aus Eutin (Norddeutschland) mit der Sammlung Tischbein zerstört. Kriechbaumer (1893: 328) stellt die Art nach einer Untersuchung des Typus zu *Ichneumon* Linnaeus (s. l.) und gibt einige Ergänzungen zur Beschreibung. Aufgrund dieser Angaben gehört die Art offenbar zu einer der mit *Barichneumon* Thomson näher verwandten Gattungen, kann dort aber wegen einer fehlenden Revision nicht determiniert werden. *E. nigrifemur* wird hier provisiorisch zu *Barichneumon* gestellt (comb. nov.).

Exephanes propinquus Taschenberg, 1870: 371 f. – Holotypus (♀) aus Halle/Saale in der Sammlung Taschenberg (Inst. Zool. Halle) derzeit nicht auffindbar. Kriechbaumer (1893: 326) synonymisiert die Art nach einer Untersuchung des Typus mit *Ichneumon emancipatus* Wesmael. Aus der Sammlung Kriechbaumer (ZSM) läßt sich allerdings ersehen, daß dieser zwischen *I. emancipatus* und *I. gracilicornis*

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* Wegen der relativ großen Körperlänge und einer kurzen Area superomedia hatte ich dieses Exemplar ursprünglich, vor Beginn der Studien zu der hier vorgelegten Revision, als *E. occupator* determiniert. Die Angabe in Freese (1997: 76) beruht auf dieser Fehldetermination (Horstmann).

Gravenhorst nicht unterscheiden konnte, sondern beide Arten unter *I. emancipatus* eingeordnet hat. Die Determination von *E. propinquus* nach Hilpert (1992: 328) mit Hilfe der Beschreibung führt problemlos zu beiden Arten, läßt aber eine Differenzierung nicht zu. Ein Merkmal aus der Beschreibung spricht für eine Übereinstimmung mit *I. gracilicornis*: Das vierte bis siebente Gastertergit sind weiß gefleckt, wie es bei *I. gracilicornis* forma *quadrimaculata* Habermehl vorkommt (vgl. Hilpert 1992: 109), bei *I. emancipatus* aber anscheinend nicht. Deshalb wird *E. propinquus* als jüngeres Synonym zu *I. gracilicornis* gestellt (syn. nov). Möglicherweise könnte der Typus in Halle noch aufgefunden werden, dann wäre eine neue Beurteilung erforderlich.

Exephanes variegator Tischbein, 1881: 166 f. – Holotypus (♀) aus Birkenfeld (Hunsrück/Westdeutschland) mit der Sammlung Tischbein zerstört. Kriechbaumer (1893: 327) hat den Typus untersucht, macht aber keine Angaben zur Interpretation. Nach der Beschreibung stimmen die Nominatform und die beiden beschriebenen Varietäten mit *Baranisobas ridibundus* (Gravenhorst) gut überein. *E. variegator* wird deshalb als jüngeres Synonym zu *B. ridibundus* gestellt (syn. nov.).

Ichneumon cordiger Kriechbaumer, 1882: 145 f. – Lectotypus (♂) von Aubert (1981: 307) als solcher beschriftet, aber in seiner Publikation fälschlich als Holotypus bezeichnet: "Budap. Hung. Mocs." (= Budapest), "Hungar. *Ichn. cordiger* Krchb. ♂. ad Sect. VIII." (ZSM). Aubert (l. c.) stellt die Art zu *Exephanes*, aber sie gehört zu *Vulgichneumon* Heinrich (comb. nov.), nahe *V. cagnatus* (Boyer de Fonscolombe).

Ichneumon jemilleri Kriechbaumer, 1893: 263 f. – Holotypus: ♂, "Trostbg. 7.7.92. Jemiller" (= Trostberg/Süddeutschland), "7/490.", "Bavar. *Ichn. Jemilleri* Krchb. ♂. E.N. 1893. p.263." (ZSM). Aubert (1981: 308) stellt die Art zu *Exephanes*, aber sie ist ein jüngeres Synonym von *Aoplus defraudator* (Wesmael) (syn. nov.).

Ichneumon mesopyrrhus Kriechbaumer, 1893: 261 f. – Holotypus, ♂, "Trostbg. 7.7.92. Jemiller", "7/565.", "Bavar. *Ichn. mesopyrrhus* Krchb. ♂. E.N. 1893. p.261." (ZSM). Aubert (1981: 309) stellt die Art zu *Exephanes*, aber sie ist ein jüngeres Synonym von *Aoplus castaneus* (Gravenhorst) (syn. nov.).

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Review of the *Pericalus guttatus*-complex

(Insecta, Coleoptera, Carabidae, Lebiinae)

Martin Baehr

Baehr, M. (2000). Review of the *Pericalus guttatus*-complex (Insecta, Coleoptera, Carabidae, Lebiinae). – Spixiana **23/1:** 33-39

The *guttatus*-complex within the nominate subgenus of the carabid genus *Pericalus* Macleay is reviewed and a new species, *P. imitator*, spec. nov. from Malaysia is described. *P. guttatus violaceus* Andrewes is raised to full specific status. The subgenus *Pericalus* s. str. is now known to occur east of Wallace's line, too, and the *guttatus*-complex is distributed from the Asian mainland (Malayan Peninsula) through the Greater Sunda Islands and the western part of the Lesser Sunda Islands southeastwards to Sulawesi (Celebes).

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Introduction

The Oriental ground beetle genus *Pericalus* Macleay includes about 30 species, of which 12 belong to the nominate subgenus *Pericalus* s. str. which is characterized by the wide, rather explanate lateral margins of the pronotum, and by generally wide, depressed elytra. The species of the genus are distributed throughout South Asia, from India to Taiwan, and south to New Guinea and New Britain. However, thus far no species of *Pericalus* s. str. had been recorded south and east of Java, Borneo, and Palawan.

Pericalus guttatus Chevrolat has been regarded until now a polymorpic species of the subgenus *Pericalus* s. str. Apart from the nominate form which has black elytra with yellow spots, there is a blue or violaceous form that had been originally described as var. *violaceus* Andrewes. *P. guttatus* s. l. was recorded so far from Sumatra and Java. *P. funestus* Andrewes from Sumatra is a very similar species that certainly is very closely related to *P. guttatus*.

Recently collected material at my disposal revealed that this complex has a far wider geographic distribution, and, on the other hand, that it includes an additional undescribed taxon. Hence, a general investigation of this complex was made to distinguish the taxa and fix their taxonomic status and level. Whereas *P. funestus* immediately was given full specific rank by its describer, this was not done in the taxon *violaceus* that had been described as a variation of *guttatus*. In the meantime, Lorenz (1998) raised it to subspecific status. However, there are distinct and consistent differences between the form *violaceus* and the nominate form *guttatus*, and, moreover, both taxa occur in the same area. Hence, *violaceus* is raised to full specific rank, because it is sympatric and probably even syntopic with *guttatus*. The description of an additional, distinctive taxon brings the number of closely related forms to four, and, mainly on heuristic reasons, they all are regarded as species. Further work may prove this opinion or may demonstrate that all or some are merely subspecies of a species, or taxa of a widespread superspecies. However, this can be only assured by more specialized and non-morphological methods.

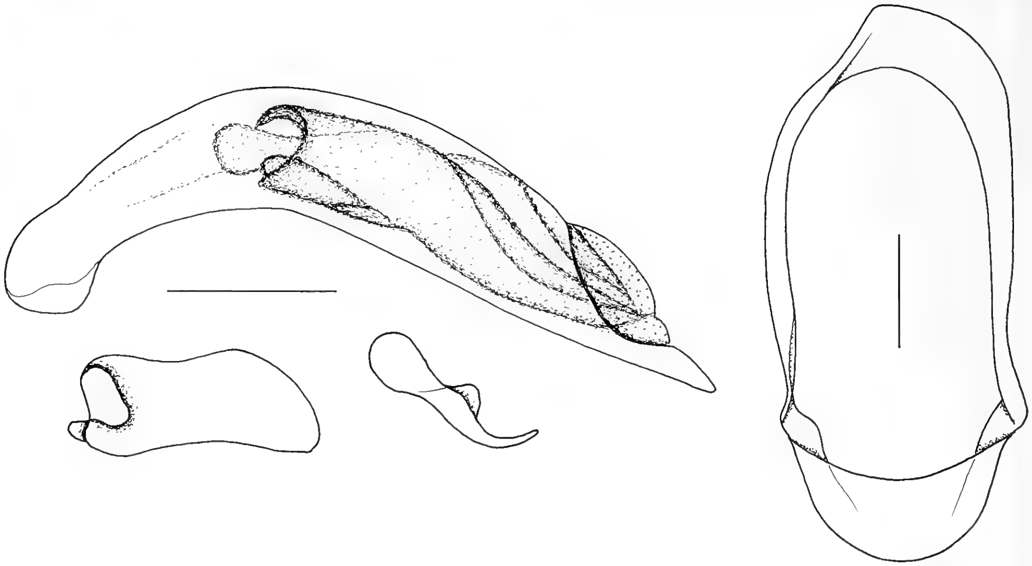


Fig. 1. *Pericalus guttatus* Chevrolat. ♂ genitalia. Aedagus, right and left parameres, and genital ring. Scale: 0.5 mm.

Measurements

Measurements have been taken using an ocular micrometer. Length of body has been measured from tip of labrum to apex of elytra including the elytral spines. Hence, measurements may slightly differ from those in the literature. To accomodate the measured ratio of width/length of the prothorax with the optical impression, length of prothorax has been measured from tip of anterior angles to apex of posterior angles, not along midline!

Material

Altogether, c. 60 specimens of the *guttatus*-complex were available, including, unfortunately, only the two specimens of the type series of *Pericalus funestus* Andrewes.

Pericalus funestus Andrewes

Andrewes, 1926: 284; Csiki 1932: 1369; Lorenz 1998: 430.

Types. Holotype: ♂, Type/ W. Sumatra E. Jacobson B.M. 1926-2./ Gunung Singgalang (Sumatra's Westkust) 1.800 M leg. E. Jacobson 1925/ *Pericalus funestus* Andr. Type H. E. Andrewes det. (BMNH). – Paratype: 1♀, same data / *Pericalus funestus* Andr. Cotype H. E. Andrewes det.(BMNH).

Diagnosis. Easily distinguished from the other species of the *guttatus*-complex by the rounded sutural angle of the elytra, the distinct incision of the lateral border at anterior third, and the remarkably wide, explanate lateral margin behind this incision.

Distribution. Thus far recorded from Sumatra only.

Pericalus guttatus Chevrolat

Figs 1, 4

Chevrolat, 1832: CI. IX, Pl. 46; Csiki 1932: 1369; Jedlicka 1963: 378; Lorenz 1998: 430 *(guttatus guttatus).*

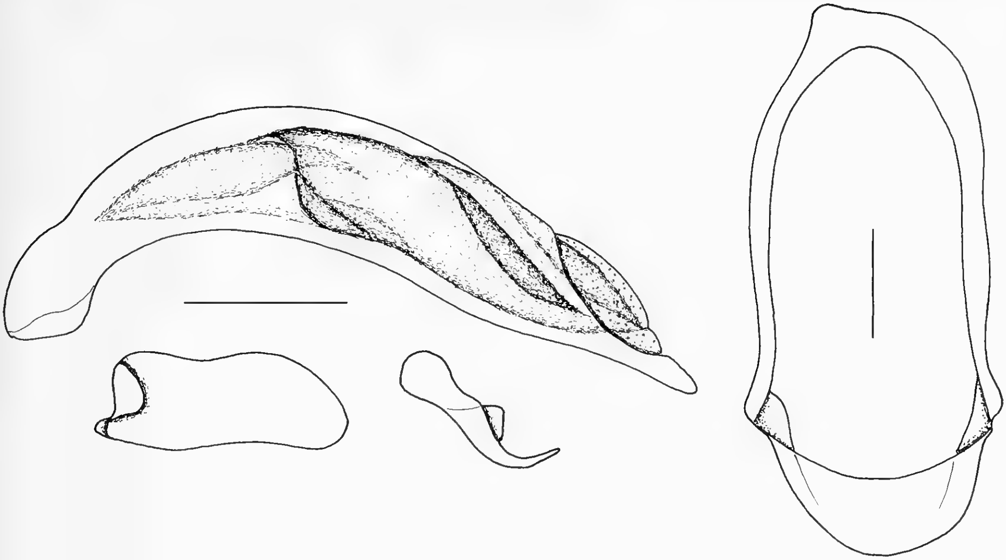


Fig. 2. *Pericalus violaceus* Andrewes. ♂ genitalia. Aedagus, right and left parameres, and genital ring. Scale: 0.5 mm.

Types. Syntype(s) (possibly not seen). Presumably in the Oxford University Museum.

Diagnosis. Distinguished from the other species of the *guttatus*-complex by angulate sutural angle of the elytra, black colour of first basal antennomere only, black colour of elytra with distinctly divided light spots of the anterior fascia, irregular sulci on head, and not markedly raised frons.

Distribution. A well known species, first described from Java, thus far recorded from Sumatra and Java. New records are now available from the island of Bali. It seems to be restricted to the mentioned islands.

Pericalus violaceus Andrewes (stat. nov.)

Figs 2, 5

Andrewes, 1926: 284 *(guttatus* var. *violaceus)*; 1929: 313; Csiki 1932: 1369; Jedlicka 1963: 378; Lorenz 1998: 430 *(guttatus* ssp. *violaceus)*.

Types. Lectotype (by present designation): ♂, Co-type/ Fort de Kock W. Sumatra E. Jacobson B.M.1927-48./ *Pericalus guttatus* Chevr. v. *violaceus* And. H. E. Andrewes det. (BMNH). – Paralectotypes: 1♂, Co-type/ Fort de Kock (Sumatra) 920 M. leg. E. Jacobson. 1926/ H. E. Andrewes Coll. B.M.1947-97. (BMNH); 1♂, Co-type/ Holländ. Indien/ Ex Mus. Buitenzorg/ H. E. Andrewes Coll. B.M.1947-97. (BMNH).

Note. The type series includes two additional cotypes that, however, belong to the following new species.

Diagnosis. Distinguished from the other species of the *guttatus*-complex by the angulate sutural angle of the elytra, black colour of first basal antennomere only, comparatively short and wide, blue-violaceous elytra with broadly contiguous light spots of the anterior fascia, regular sulci on head with rather smooth centre of frons, and not markedly raised frons.

Distribution. First described from Sumatra, now recorded from Sumatra, Java, Borneo (Sabah), and Sulawesi (Celebes).

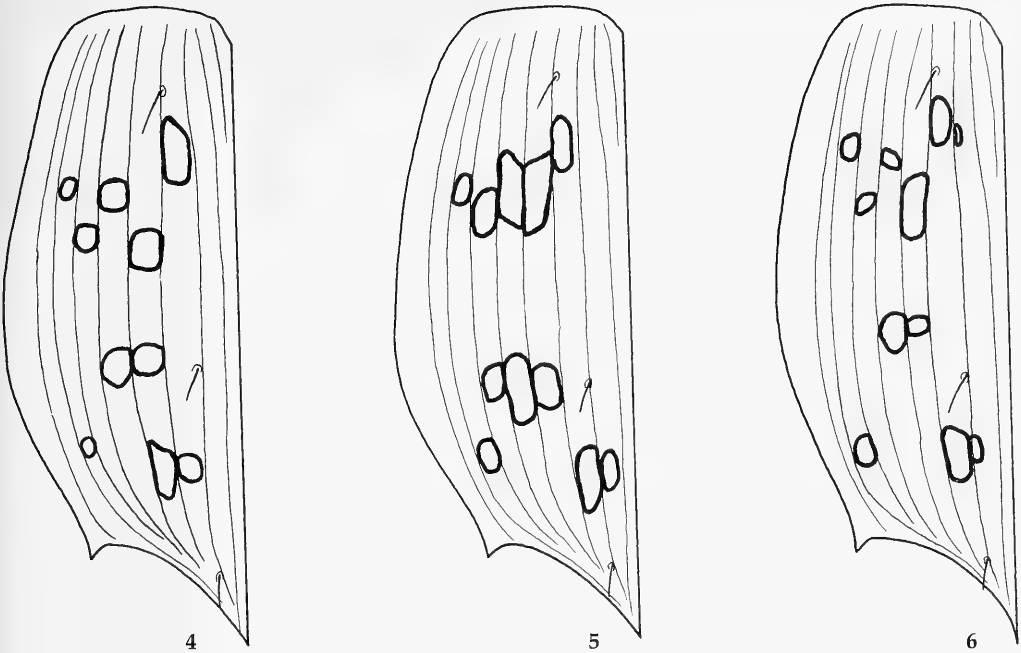
Fig. 3. *Pericalus imitator*, spec. nov. ♂ and ♀ genitalia. Aedagus, right and left parameres, genital ring, and stylomeres 1 and 2. Scale for ♂ genitalia: 0.5 mm; for ♀ genitalia: 0.25 mm.

Pericalus imitator, spec. nov.

Figs 3, 6

Types. Holotype: ♂, W-MALAYSIA, Pahang Tanah Rata, Gn. Jasar, Cameron Highlands, 19.-25.6.1995, lgt. S. Becvar (ZSM). – Paratypes: 2♂♂, 3♀♀, same data (CBM, ZSM); 1♂, WEST MALAYSIA, Pahang, C. Highlands, Tanah Rata, 20.-25.1.1995, Gn. Jasar, 14-1500m, lgt. S. Becvar J. & S. (CBM); 4♂♂, 1♀, MALAYSIA: Pahang, Cameron Highlands, Umg, Tanah Rata, 1500m, 27.-31.7.1993, lg. Schuh (NHMW); 1♂, MALAYSIA, Pahang, Cameron Highlands, Parit Falls, degraded rainforest/ from fungus-grown stumps at night, No. 91. 27.III.1995. O. Merkl (NHMW); 1♀, MALAYSIA, Pahang, Cameron Highlands, 2 km S Tanah Rata on Tapah Road/ montane rainforest at light, Nr. 93. 29.III.1995. O. Merkl & I. Szikossy (NHMW); 1♀, Co-type/ 350/ PERAK, F.M.S. Batang Padang. Jor Camp 1800 ft. Jan: 22nd 1925 H. M. Pendlebury./ H. E. Andrewes Coll. B.M.1947-97./ Det. Cotype *Pericalus guttatus* Chevr. v. *violaceus* Andrewes (BMNH); 1♂, Co-type/ Malay Penin. mm. Cameron/ H. E. Andrewes Coll. B.M.1947-97./ Det. Cotype *Pericalus guttatus* Chevr. v. *violaceus* Andrewes (BMNH).

Diagnosis. Distinguished from the other species of the *guttatus*-complex by the spinose sutural angle of the elytra, black colour of four basal antennomeres, comparatively elongate, blue-violaceous elytra with widely separated light spots of the anterior fascia, remarkably raised frons, and distinctly convex lower margin of aedeagus.



Figs 4-6. Colour pattern of elytra. **4.** *Pericalus guttatus* Chevrolat. **5.** *P. violaceus* Andrewes. **6.** *P. imitator*, spec. nov. All same size.

Description

Measurements. Length: 10.2-11.0 mm; width: 4.1-4.5 mm. Ratios. Width/length of pronotum: 1.07-1.11; width base/apex of pronotum: 0.87-0.88; width of pronotum/width of head: 1.03-1.10; length/width of elytra: 1.96-1.98; width elytra/pronotum: 1.29-1.40.

Colour. Head, Pronotum, lower surface, legs, and four basal antennomeres black. Elytra bluish with violaceous lustre in middle of either elytron. Mouth parts and outer antennomeres piceous.

Head. Large and wide, slightly wider than pronotum. Eyes semicircular, laterally very far projecting. Labrum and mandibles, and palpi of average size. Medially of eye with a remarkably deep sulcus, frons markedly raised above head and eye sulcus, distinctly raised above eye when seen from laterally. Also anteriorly of raised frons with a weak transverse sulcus. Surface remarkably irregularly sulcate, especially on frons. Surface superficially microreticulate.

Pronotum. Comparatively wide, remarkably cordiform, widest behind anterior third. Base distinctly wider than apex. Apex deeply excised, straight. Anterior angles far produced, very broadly rounded. Lateral border remarkably convex in anterior two thirds, then concave towards basal angles. Lateral margins widely explanate, slightly upturned. Basal angles less than rectangular, dentiform, laterally considerably produced, base almost straight, laterally slighly oblique. Apex not margined, base coarsely margined. Anterior transverse sulcus fairly distinct, median line shallow, basal transverse sulcus very deep, bisinuate. Anterior lateral seta situated at anterior third, in front of widest diameter, posterior marginal seta situated just in front of basal angle. Surface very densely rugose-striolate and densely microreticulate, microsculpture more superficial only in middle of disk.

Elytra. Apart from colour and pattern very similar to those of *P. guttatus* and *P. violaceus*. Lateral margin not incised, little explanate in anterior third. Intervals convex, 3rd interval with three setiferous punctures, the anterior one in basal sixth, adjacent to 3rd stria, the posterior two behind middle and close to apex, both adjacent to 2nd stria. Sutural angle with comparatively elongate spine.

Lower surface. As in related species.

Legs. As in related species.

Male genitalia (Fig. 3). Genital ring moderately wide, at apex almost evenly rounded. Aedeagus rather large, comparatively short, lower surface markedly convex near apex, then slightly concave.

Apex comparatively short, straight, rather acute at tip. Internal sac without any sclerotizations within. For parameres see fig. 3.

Female genitalia (Fig. 3). Very similar to those described for the subgenus *Coeloprosopus* (see. Baehr 1994). Stylomere 1 apparently without setae at apex. Stylomere 2 very slender and elongate, apically curved, with 3 ventral ensiform setae, a short, preapical dorsal ensiform seta, but without nematiform setae.

Variation. Very little variation of size, colour, and elytral pattern noted. Centre of head in some specimens rather smooth, also centre of pronotum commonly fairly glossy.

Distribution. Cameron Highlands and vicinity, Perak District, Malaysia.

Collecting circumstances. One specimen from the type series was collected in montane rainforest at light, another in "degraded rainforest/from fungus-grown stumps at night".

Habits. A trunk and log inhabiting rainforest species, like the related species.

Etymology. The name refers to the high external similarity with the other species of the *guttatus*-complex.

Relationships. Unique within the *guttatus*-complex by its markedly spinose instead of angulate elytral apices and the remarkably raised frontal part of the head. Probably it is more closely related to *guttatus* and *violaceus* than to *funestus*, though less closely related to both *guttatus* and *violaceus* than either two.

Appendix

Summary of measurements and ratios for all species of the *Pericalus guttatus*-complex.

For better recognition of the species measurements and ratios for all species of the *guttatus*-complex are compiled in the following table. Of *P. funestus* only two specimens of the type series were available.

	body length (mm)	ratio width/length pronotum	ratio width base/apex pronotum	ratio width head/pronotum	ratio length/width elytra	ratio width elytra/pronotum
funestus	10.2-11.4	1.18-1.21	0.91-0.93	1.13-1.15	1.85-1.91	1.27-1.35
guttatus	10.6-11.2	1.15-1.17	0.96-1.02	1.12-1.16	1.86-1.90	1.26-1.28
violaceus	10.1-11.0	1.13-1.16	0.98-1.01	1.16-1.21	1.72-1.77	1.30-1.34
imitator	10.2-11.0	1.07-1.11	0.87-0.88	1.03-1.10	1.96-1.98	1.29-1.40

Key to the species of the *Pericalus guttatus*-complex

1. Sutural angle of elytra clearly rounded; lateral border of elytra distinctly incised at basal third, margin behind incision remarkably explanate. Sumatra .... *funestus* Andrewes

– Sutural angle of elytra angulate or spinose; lateral border of elytra not incised at basal third, margin less explanate .... 2.

2. Light spots of anterior elytral fascia broadly contiguous (Fig. 5); sulci on head rather regular, centre of frons rather smooth, and frons not markedly raised. Sumatra, Java, Borneo (Sabah), Sulawesi .... *violaceus* Andrewes

– Light spots of anterior elytral fascia more or less widely separated (Figs 4, 6); either sulci on head rather irregular and covering centre of frons, or frons markedly raised above eye sulcus .... 3.

3. Elytra black; only 1st antennomere black, remainders brown; frons convex though not markedly raised above eye sulcus; sutural angle of elytra angulate or shortly spinose (Fig. 4); lower surface of aedeagus almost straight (Fig. 1). Sumatra, Java, Bali .... *guttatus* Chevrolat

– Elytra bright blue-violaceous; 1st-4th antennomeres black; frons markedly raised above eye sulcus; sutural angle of elytra markedly spinose (Fig. 6); lower surface of aedeagus distinctly convex near apex (Fig. 3). Malaysia (Cameron Highlands) .... *imitator*, spec. nov.

Remarks

So far the species of the *guttatus*-complex were recorded from the Greater Sunda Islands only. Newly collected material now demonstrates that the species of this complex occupy a vast range and cover the whole area from the Malayan Peninsula on mainland Asia through the Greater Sunda Islands, the westernmost of the Lesser Sunda Islands, to Sulawesi in the Moluccas. The Sulawesi record of *P. violaceus* also is the first record of a species of the nominate subgenus *Pericalus* s. str. from east of Wallace's Line, which is contrary to the opinion expressed by me few years ago (Baehr 1994). This is evidence that species of the nominate subgenus were as well able to cross this biogeographically important border line as were species of the subgenus *Coeloprosopus*. Nevertheless, this crossing most probably occurred quite recently, because the population on Sulawesi was not yet able to develop into a separate taxon.

The record of *P. imitator* in Malaysia also is the first record of a species of the *guttatus*-complex from mainland Asia.

The occurrence of three very closely related species of the *guttatus*-complex in Sumatra *(funestus, guttatus,* and *violaceus)* raises the question of the innidation of the three species on this island. Unfortunately, much too less is known about the habits, or even the exact collecting circumstances of the species, for example altitude range, forest type etc. Hence, such questions must be left open, until more exact information is available.

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Buchbesprechungen

1. Bone, Q. (Ed.): The Biology of Pelagic Tunicates. – Oxford University Press, Oxford, 1998. xiv + 340 pp. ISBN 0-19-854024-8 hbk.

The combined expertise of 13 specialists form the body of this volume, which concerns two (or three or more?) closely related and often neglected holopelagic urochordate taxa: Thaliacea, (pyrosomids, salps and doliolarians), which may be di- or even polyphyletic, and the enigmatic Appendicularia or Larvacea. 18 clear-cut chapters provide excellent reviews of anatomy and fine-structure, functional morphology and physiology, aut- and synecology, and finally phylogeny, biogeography, and taxonomy (including identification keys). A highly detailed and instructive reference list concludes the volume.

Quentin Bone, one of the world-leading scholars on the subjects, is to thank for this impressive compilation of highly valuable contributions. The only point to be negatively mentioned is the sometimes very poor quality of (reproduced) photos, being at least partly caused by the minor quality of the paper. Nevertheless, this book certainly is a "must" for everybody who is interested in the subject, may it be a specialist of any urochordate taxon or a person interested in pelagic taxa in general. Needless to say that the volume should be present in every library concerning Zoology or Marine Biology in general to inform University teachers as well as advanced students.

G. Haszprunar

2. Dippenaar-Schoeman, A. S. & R. Jocqué: African Spiders. An Identification Manual. – Plant Protection Research Institute Handbook No. 9, Pretoria, 1997. 392 S., 129 Tafeln. ISBN 0-621-17544-7

A. S. Dippenaar-Schoeman & R. Jocqué haben mit ihrem Werk eine hervorragende Zusammenfassung aller Daten über Afrikanische Spinnen auf Familien- und Gattungsniveau geleistet. Mit 71 von insgesamt 106 Spinnenfamilien sind über ⅔ der weltweit bekannten Familien erfaßt. Das Buch ist übersichtlich gegliedert und mit vielen Abbildungen versehen. Die Zeichnungen heben die typischen Merkmale der einzelnen Familien und Gattungen deutlich hervor. Mit den Bestimmungsschlüsseln zu den Hauptgruppen und Familien, unterstützt durch charakteristische Ganzkörper Abbildungen, ist eine recht unkomplizierte Determination zumindest bis zur Familie möglich. Bei einzelnen Familien hilft ein weiterer Bestimmungsschlüssel, die Unterfamilien zu identifizieren. Die Gattungen werden allerdings nur aufgelistet und ihre Verbreitung dokumentiert.

Dieses Buch bildet die Basis für alle faunistisch-ökologisch durchgeführten Untersuchungen an Afrikanischen Spinnen, sowie für alle weiteren Revisionen der Afrikanischen Spinnenfauna. Es ist daher ein unentbehrliches Werk für alle Taxonomen, Systematiker, Faunisten, Ökologen und arachnologisch Interessierte, die sich mit der Afrikanischen Spinnenfauna beschäftigen.

B. Baehr

3. Schwenninger, H. R.: Die Wildbienen Stuttgarts, Verbreitung, Gefährdung und Schutz. – Schriftenreihe des Amtes für Umweltschutz, Heft 5/1999, 151 S., ISSN 1438-3918.

Der Wildbienenspezialist Hans Schwenninger untersuchte im Stuttgarter Stadtkreis unter Einbeziehung des Materials der Naturkundemuseen die heutigen Bestände der Wildbienen. Ursprünglich waren 258 Wildbienenarten in Stuttgart beheimatet, wie der Nachweis durch historische Funddaten ergab. 49 Arten gelten derzeit für diese Region als ausgestorben, und mehrere Arten sind stark gefährdet. Es werden die Ursachen des Rückganges dieser wichtigen Blütenbestäuber, besonders der "Rote Listen-Arten" analysiert und Vorschläge für Schutz- und Förderungsmaßnahmen gemacht. Die verschiedenen Lebensbereiche der Bienen in Stuttgart wurden gründlich untersucht, zumal diese durch das günstige Weinbauklima und die hügelige Lage sehr unterschiedlich zu anderen Biotopen sind. Ein Quellen- und Literaturverzeichnis und ein Artenkatalog mit Kartierungskarten ergänzt die vorbildliche Untersuchung.

Die Arbeit ist an der Infothek des Rathauses beim Amt für Umweltschutz, Gaisburgstraße 4, D-70182 Stuttgart (Tel.: 0711 216-8727) zu beziehen.

E. Diller

4. Biondi, M., M. Daccordi & D. G. Furth (eds.) 1998: Proceedings of the Fourth International Symposium on the Chrysomelidae. Proceedings of a Symposium, XXth International Congress of Entomology. – Atti di Museo Regionale di Scienze Naturali, Torino. 327 S. ISBN 88-86041-31-4.

Dieser Tagungsband beinhaltet die Beiträge (Vorträge und Poster) über Chrysomelidae, die während des Internationalen Entomologen-Kongresses 1996 in Florenz im Rahmen eines Symposiums präsentiert wurden. Die Arbeiten erstrecken sich von morphologischen über systematische und zoogeographische bis hin zu biologischen Aspekten und spiegeln den aktuellen Bearbeitungsstand über diese Käferfamilie gut wider. Druck, Papierqualität und Illustrationen sind hervorragend; vermißt wird lediglich ein Index.

R. Gerstmeier

SPIXIANA	23	1	41–45	München, 01. März 2000	ISSN 0341-8391

A new species of the leleupidiine genus *Colasidia* Basilewsky from New Guinea

(Insecta, Coleoptera, Carabidae, Zuphiinae)*

Martin Baehr

Baehr, M. (2000): A new species of the leleupidiine genus *Colasidia* Basilewsky from New Guinea (Insecta, Coleoptera, Carabidae, Zuphiinae). – **23/1:** 41-45

Colasidia garainae, spec. nov. from central Papua New Guinea is described. This fourth New Guinean species of *Colasidia* is most similar to *C. madang* Darlington, but is distinguished by even smaller eyes and longer and narrower elytra. A determination key and a distribution map of the recorded Australian-New Guinean species of the genus *Colasidia* are added.

Dr. Martin Baehr, Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München, Germany.

Introduction

The leleupidiine genus *Colasidia* is distributed from the southern part of the Malay Peninsula through Sumatra, northern Borneo, Papua New Guinea to northeastern Australia (Baehr 1997). Within this large area there are some striking gaps from where no records are available so far. It is uncertain, however, whether these gaps are caused by insufficient sampling, whether they reflect actual distribution gaps. Solving of this question is difficult, because leleupidiine beetles everywhere seem to be rare, perhaps due to their life in soil litter, from where they are mainly caught by sieving or Berlese extraction. Hence, collectors who do not conduct regular sieving, almost invariably fail to find these beetles.

One of the mentioned apparent distribution gaps is Irian Jaya, the western part of the large island of New Guinea. Whereas in Papua New Guinea three species have been recorded from a rather limited area, even quite accurate recent sampling in several parts of Irian Jaya failed to yield any specimens of Leleupidiini. The more striking is the discovery of a fourth species in central Papua New Guinea through the efforts of A. Riedel that is described in this paper.

This paper is rendered a supplement to my most recent paper on the genus *Colasidia* (Baehr 1997). Measurements and technics were conducted in the same way as in that paper.

The holotype is presented to Zoologische Staatssammlung, München (ZSM), paratypes are kept in the working collection of the author at ZSM.

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* Results of the entomological explorations of A. Riedel in New Guinea in 1998.

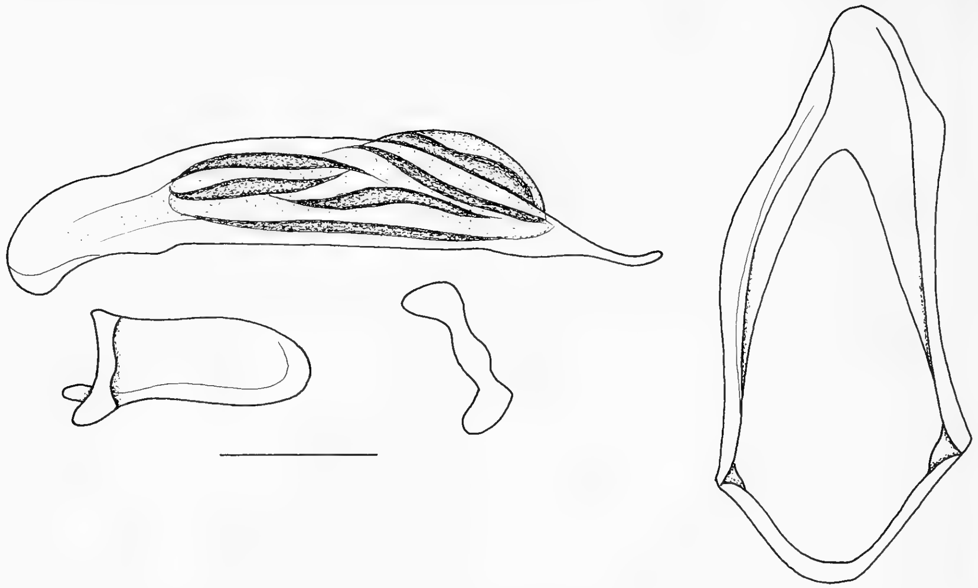

Fig. 1. *Colasidia garainae,* spec. nov. ♂ genitalia. Aedagus (left side), left and right parameres, genital ring. Scale: 0.25 mm.

Key to the species of *Colasidia* Basilewsky from New Guinea and Australia

For the benefit of the user some figures from printed papers are mentioned in this key. **B87**: Baehr 1987; **B91**: Baehr 1991.

1. Head parallel, or wider across eyes than across orbits; base of head usually considerably rounded .... 2.
– Head decidedly wider at posterior angles or across orbits than across eyes; base of head less rounded, more square .... 3.

2. Head short, eyes very large, orbits to neck <1.5 × as long as eyes; basal angles of head very widely rounded off (**B91** fig. 6); puncturation of elytra irregular, rather confused; odd intervals raised in anterior half; aedeagus unknown. Kokoda, central Papua Peninsula, eastern Papua New Guinea .... *kokodae* Baehr
– Head longer, eyes smaller, orbit to neck c. 3 × as long as eye; basal angles of head less widely rounded off; puncturation of elytra in regular rows; all intervals slightly raised along the whole of their length; aedeagus unknown. Dobodura, central Papua Peninsula, eastern Papua New Guinea .... *papua* Darlington

3. Eyes very small, orbit to neck >5 × as long as eye; head very elongate, usually markedly triangular (**B87** fig. 1). Northeastern Queensland, Australia .... *monteithi* Baehr
– Eyes larger, orbit to neck <4.5 × as long as eye; head shorter, usually less markedly triangular. New Guinea .... 4.

4. Pronotum shorter and wider, ratio length/width c. 1.05; elytra shorter and wider, less depressed, ratio width of elytra/width of prothorax >2.05, ratio length/width of elytra c. 1.40; aedeagus unknown. Damanti, Huon Peninsula, northern Papua New Guinea .... *madang* Darlington
– Pronotum longer and narrower, ratio width/length >1.12; elytra longer and narrower, more depressed, ratio width of elytra/width of prothorax <1.90, ratio length/width of elytra >1.48; aedeagus rather elongate, with elongate, at tip upturned apex (Fig. 1). Garaina, northwestern Papua Peninsula, eastern Papua New Guinea .... *garainae*, spec. nov.

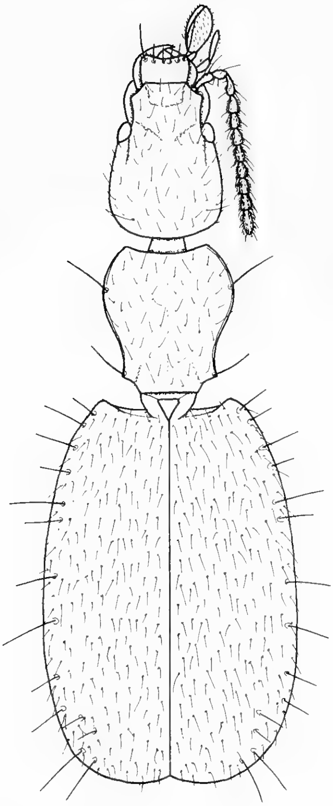

Fig. 2. *Colasidia garainae*, spec. nov. Habitus. Length: 4.2 mm.

Colasidia garainae, spec. nov.

Figs 1-3

Types. Holotype: ♂, Papua NG, Morobe-Pr., Saureri, 10 km s. Garaina, 1600-1700 m, 23.-24.3.1998, A. Riedel (ZSM). – Paratypes: 1♂, 1♀, same data (CBM).

Diagnosis. Medium-sized species with posteriorly widened, shortly rounded head, distinguished from most similar *Colasidia madang* Darlington by longer and narrower pronotum and elytra and by smaller eyes.

Description

Measurements. Length: 4.2-4.35 mm; width: 1.48-1.52 mm. Ratios. Lenght/width of head: 1.48-1.50; lenght orbit/eye: 4.35-4.45; length/width of pronotum: 1.13-1.18; width widest part/base of pronotum: 1.55-1.61; width pronotum/head: 1.18-1.19; length/width of elytra: 1.48-1.51; width elytra/pronotum: 1.87-1.89.

Colour. Dark piceous to almost blackish, suture of elytra very faintly lighter. Labrum, palpi, legs, and antennae yellowish.

Head. Large, rather elongate, somewhat quadrate, posteriorly slightly widened, widest far behind eyes at posterior third, just in front of orbital curvature. Orbit rather shortly rounded off. Upper surface gently convex. Frons on either side with a shallow, oblique groove. Eyes very small, depressed, length <¼ of orbit length. Clypeus anteriorly almost straight, lateral angles (above base of antenna) slightly projecting. Clypeal seta far removed from apex, at apex on either side two hairs. Clypeal suture laterally with shallow grooves. Labrum anteriorly gently excised, 6-setose, though inner 4 setae slightly shorter, lateral margin pilose. Mandibles short. Mentum with wide, at apex slightly excised tooth.

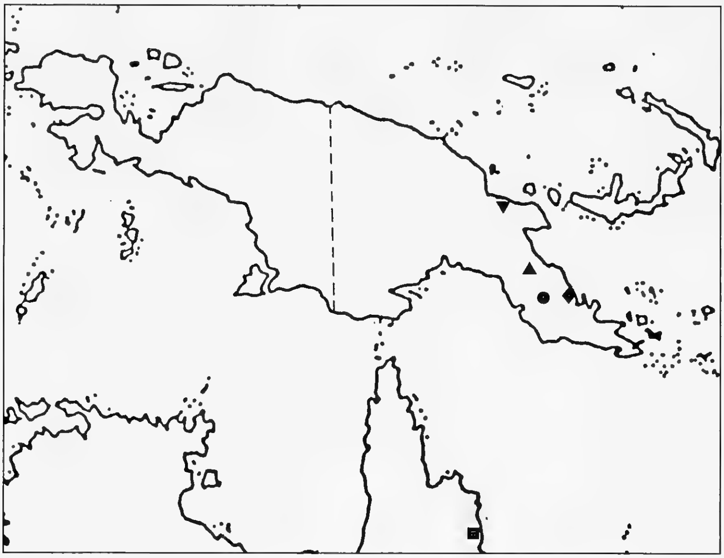

Fig. 3. Distribution of the Australian and New Guinean species of *Colasidia*. *C. monteithi* Baehr: ■; *C. kokodae* Baehr: ●; *C. papua* Darlington: ♦; *C. madang* Darlington: ▼; *C. garainae*, spec. nov.: ▲.

Labium truncate. Maxillary palpus elongate, apex obtusely rounded. Terminal segment of labial palpus large though comparatively short. Antenna short, just attaining the apical third of pronotum. Median antennomeres considerably wider than long, 3rd antennomere by far shorter than 1st, barely longer than 2nd antennomere. Surface glossy, with traces of microreticulation only on clypeus and anterior margin of frons. Puncturation fairly coarse, very sparse, distance between punctures c. 4-6 × as wide as diameter of punctures, laterally distance slightly less. Pilosity very sparse, very elongate, hirsute, erect, inclined anteriorly. Both supraorbital setae barely recognizable within the elongate pilosity, posterior supraorbital setae situated far behind eye behind beginning of basal curvature.

Pronotum. Rather cordiform, slightly longer than wide, distinctly wider than head, widest in anterior third. Upper surface gently convex. Lateral margin strongly convex in anterior half, deeply sinuate in front of posterior angles, though straight and slightly oblique in basal third. Apex rather wide, slightly excised, anterior angles convex, rather projecting. Base wide, laterally excised, posterior angles projecting as small, acute denticles. Lateral margin slightly raised, with distinct border line, with rather wide marginal channel. Median line distinct, though rather shallow. Prebasal grooves moderately deep. Anterior marginal seta elongate, situated at anterior fourth of pronotum, posterior setae situated at basal angle. Surface without microreticulation, glossy, with rather sparse, coarse puncturation. Distance between punctures more than twice as wide than diameter of punctures. Pilosity rather sparse, moderately elongate, hirsute, irregularly inclined.

Elytra. Elongate, narrowly triangular, laterally weakly curved, widest in posterior fifth or quarter, upper surface rather depressed. Humeri wide, oblique, faintly projecting. Apex wide, gently convex, slightly oblique, not redressed to suture. Striae not recognizable. Puncturation fairly sparse, rather irregular, very coarse, becoming finer and sparser behind middle. Distance between punctures about as large or even slightly smaller than diameter of punctures. Fixed setae in third interval hardly recognizable within the coarse puncturation. Series of marginal pores very difficult to detect when setae broken, apparently consisting of 8 basal, 2 postmedian, 5 apical pores, and 1 pore at apex of 3rd stria. Setae very elongate. Surface without microreticulation, glossy. Pilosity rather sparse, moderately elongate, hirsute, irregular, inclined posteriorly, rather depressed.

♂ genitalia. Genital ring fairly narrow, rather parallel, apex wide, asymmetric. Aedeagus moderately elongate, with elongate, narrow, at tip distinctly upturned apex. Lower surface almost straight. Aedeagus very weakly sclerotized, therefore, no heavily sclerotized parts visible, though internal sac apparently bearing a somewhat coiled sclerite in middle. For parameres see fig. 1, left paramere rather elongate.

♀ genitalia. Stylomere 2 rather elongate with acute apex, with 2 elongate ventral ensiform seta the lower one being shorter, one elongate dorsal ensiform seta, and a nematiform seta arising from a large groove in apical third of median surface. Apex of stylomere 1 apparently asetose.

Variation. Very little variation noted.

Etymology. The name refers to the type locality.

Distribution. Northwestern Papua Peninsula, Papua New Guinea. Known only from type locality.

Collecting circumstances. Collected by sieving ground litter in rain forest at median altitude.

Remarks. This species is very similar and probably most closely related to *C. madang* Darlington though the actual relationships are unknown because the male genitalia of both Darlingtons's species (*C. madang, C. papua*) are yet unknown.

Acknowledgements

My thank is due to Mr. A. Riedel, München, who kindly submitted the specimens for examination.

References

Baehr, M. 1987. Revision of the Australian Zuphiinae 2. *Colasidia monteithi* sp. nov. from North Queensland, first record of the tribe Leleupidiini in Australia (Insecta: Coleoptera: Carabidae). – Mem. Quensland Mus. **25**: 135-140

–– 1991. On new and rare Leleupidiini from the Oriental and Australian Regions (Coleoptera, Carabidae, Zuphiinae). – Mitt. Münchner Ent. Ges. **81**: 193-202

–– 1997. Leleupidiini from the Oriental Region. 1. New species of the genus *Colasidia* Basilewsky (Insecta, Coleoptera, Carabidae, Zuphiinae). – Rev. Suisse Zool. **104**: 611-659

Buchbesprechungen

5. Witt, R.: Wespen: beobachten, bestimmen. – Naturbuch Verlag Augsburg, 1998. 360 S., zahlreiche Schwarzweiß- und Farbabbildungen, ISBN 3-89440-243-1.

Mit diesem Wespen-Taschenbuch sollten nicht nur die zumeist üblichen "berüchtigten" Faltenwespen behandelt werden, sondern es werden auch alle übrigen Wespenfamilien und -gattungen inerhalb der Aculeata (Stechimmen) vorgestellt. Hier ist ein breites Publikum angesprochen, wie Naturfreunde, Studenten, Biologen und Ökologen, und es wird versucht, das teilweise unberechtigte schlechte Image der stechenden Hautflügler in ein positives Licht zu rücken. Der allgemeine Teil behandelt als Schwerpunkt die mannigfaltigen Verhaltensweisen und Lebensräume dieser interessanten Tiere. Es folgen im speziellen Teil die mit erklärenden, guten Zeichnungen versehenen Bestimmungsschlüssel der Wespenfamilien und -gattungen. Natürlich ist es in diesem Rahmen nicht möglich, bei den über 630 in Deutschland vorkommenden Arten und den über 120 Gattungen vollständige Artenschlüssel zu verfassen. Schöne Farbbilder stellen die einzelnen Gattungen mit zumeist mehreren verschiedenen Arten als Vertreter in charakteristischen Verhaltenstudien dar. Dadurch wird das Erkennen der Gattungen und teilweise auch der Arten wesentlich erleichtert. Ein Literaturverzeichnis mit den wichtigsten verwendeten Arbeiten beschließt dieses schöne und für viele Sparten brauchbare Bestimmungsbuch. E. Diller

6. Gershenson, Z. S. & S. A. Ulenberg: The Yponomeutinae (Lepidoptera) of the World exclusive of the Americas. – North-Holland, Amsterdam/Oxford/New York/Tokyo, 1998. 202 S., 3 Farbtaf., 6 S/W-Taf., zahlreiche Textabb. ISBN 0-444-85819-9.

In den letzten Jahren erscheint in zunehmendem Maße Fachliteratur über sog. "Kleinschmetterlinge". Hier reiht sich auch das vorliegende Werk ein, das in toto 231 Arten (einschließlich 4 Fossilien und mehrerer neuer Taxa) behandelt.

Nach einer allgemeinen und methodologischen Einführung folgen Kapitel über Forschungsgeschichte, Morphologie, Biologie, Futterpflanzen (eine besonders erfreuliche Bereicherung des Buches), Verbreitung, Klassifikation, Bestimmungsschlüssel für die Gattungen, Literaturverzeichnis und die kommentierte, streng alphabetisch aufgebaute systematische Liste, die den den Schwerpunkt des Werks bildet. Hierin sind für die jeweiligen Taxa neben Erstbeschreibungsnachweisen eine umfangreiche Bibliographie und möglichst vollständige Angaben zu Typenverbleib, Typenlokalität, ggf. Lectotypenfestlegung, Verbreitung, Imaginalphänologie und Raupensubstrat enthalten. Beschreibungen und Textabbildungen von Faltern und Genitalien (in durchwegs brauchbaren Zeichnungen) erfolgen nur bei neuen bzw. bisher nicht oder unzureichend abgebildeten Taxa. Für die schwierige Gattung *Yponomeuta* wird zusätzlich ein Bestimmungsschlüssel präsentiert. Mehrere qualitativ sehr gute Farbtafeln mit ausgewählten Arten, s/w Fotos einiger Genitale sowie Indices der Lepidopteren- und Pflanzentaxa runden das Werk ab.

Etwas bedauerlich ist, daß nur ein Teil der behandelten Arten überhaupt abgebildet ist, manche davon auf Farbtafeln, andere in Form von Textzeichnungen; diese Mixtur erschwert objektive Vergleiche. Auch ist der konsequente Ausschluß der Nearktis ein Wermutstropfen, wenigstens Querverweise auf die dortige Fauna hätte man sich gewünscht. Bei der Fülle der von den Autoren zu bewältigenden Recherchierarbeit sind einige Unschärfen und Fehler naturgemäß unvermeidlich. Einige Beispiele: Die Ausgabe der bedeutenden *Kessleria*-Arbeit von Huemer & Tarmann (Mitt. Münch. ent. Ges. Bd. 81) erfolgte erst 1992 und nicht 1991, so daß für zahlreiche Arten leider eine falsches Urbeschreibungszitat angegeben ist. *Kessleria alpicella* fliegt nicht im Januar, Februar und April; hier haben die Autoren unkritisch Daten von Zuchten übernommen. *K. zimmermanni* kommt nicht in Österreich vor, wie ausführlich bei Huemer & Tarmann (s.o.) diskutiert. Bei den Futterpflanzen fehlen z.B. der gewöhnliche Hausapfel (*Malus domestica* Bkh.) oder die Substratangabe für *Yponomeuta diffluellus (Euonymus)*.

Trotz dieser und einiger weiterer, erst im Detail offensichtlicher Mängel schließt das Buch eine wichtige Lücke. Erstmals seit Meyrick's Yponomeutidae-Liste im "Lepidopterorum Catalogus" von 1914 existiert nunmehr wieder eine revidierte Aufstellung dieser Gruppe, die seither enormen Artenzuwachs erfahren hat. Das Werk ist für Taxonomen, Bearbeiter von Checklisten u.ä. ein unentbehrliches Referendum und kann durchweg empfohlen werden. A. H. Segerer

7. Giachino, P. M. & S. B. Peck (eds.) 1998: Phylogeny and Evolution of Subterranean and Endogean Cholevidae (= Leiodidae, Cholevinae). Proceedings of a Symposium, XXth International Congress of Entomology. – Atti di Museo Regionale di Scienze Naturali, Torino. 295 S. ISBN 88-86041-32-2.

Acht Beiträge bilden den Inhalt dieses Tagungsbandes über Cholevidae, wiederum während eines Symposiums des XX. Internationalen Entomologen-Kongresses 1996 in Florenz gehalten. Hier stehen phylogenetische Aspekte im Vordergrund. R. Gerstmeier

SPIXIANA	**23**	1	47–53	München, 01. März 2000	ISSN 0341-8391

A new species of *Phyllonastes* Heyer from the Chapare region of Bolivia, with notes on *Phyllonastes carrascoicola*

(Amphibia, Anura, Leptodactylidae)

Jörn Köhler

Köhler, J. (2000): A new species of *Phyllonastes* Heyer from the Chapare region of Bolivia, with notes on *Phyllonastes carrascoicola* (Amphibia, Anura, Leptodactylidae). – Spixiana **23/1:** 47-53

A new minute leptodactylid frog of the genus *Phyllonastes* Heyer is described from lower montane rainforests of the Departamento Cochabamba, Bolivia, 1250 m a.s.l. *Phyllonastes ritarasquinae,* spec. nov. is characterized mainly by having two phalanges in the fourth finger, well-expanded toe tips with terminal papillae, two pale dorsolateral bands, and by lacking a visible tympanum. In addition, information on morphological variation and distribution of *Phyllonastes carrascoicola* De la Riva & Köhler is provided. Its advertisement call is described and illustrated.

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Introduction

Minute leptodactylid frogs undoubtedly are much more common and diverse within Neotropical herpetofaunas than is expectable when reviewing the literature. Due to their small size and their occurrence in dense forest litter, these frogs go partly unnoticed or are at least not adequately represented in herpetological surveys. Among the described genera of minute leptodactylids – an overview is given by De la Riva & Köhler (1998) – is the genus *Phyllonastes*, erected by Heyer (1977) to accommodate two species originally placed in the genus *Euparkerella* (Lynch, 1976). The genus *Phyllonastes* has been reported for the first time from Bolivia by Reynolds & Foster (1992), was subsequently figured by Köhler et al. (1995), and this finally led to the description of a new species supposedly endemic to the country (De la Riva & Köhler 1998). As a result, five species of *Phyllonastes* have been named until today (Lynch 1976, 1986, Duellman 1991, De la Riva & Köhler 1998). Moreover, undescribed related species have already been recognized in western Bolivia and Peru (M. Harvey, in litt.) and the discovery of additional ones is very probable.

The purpose of this paper is (1) to describe a new species of *Phyllonastes* discovered during fieldwork in lower montane rainforest of Bolivia, and (2) to provide new information on the variation, distribution, and biology of *Phyllonastes carrascoicola.*

Material and Methods

Notes on colour in life were taken in the field, as were colour slides of specimens and habitat. Measurements of specimens are in millimeters (mm) and were taken to the nearest 0.1 with dial calibers. Sexes were determined by dissection. The phalangeal condition in the fourth finger of the single specimen of the new species was determined using binoculars with through-light appliance. Geographic positions were obtained using a Magellan 3000 XL GPS receiver. Calls were recorded using a Sony WM-D6C tape recorder, a Sennheiser Me-80 directional microphone, and a TDK MA60 cassette. Recordings were sampled with a rate of 22.05 kHz and 16-bit resolution, and were analyzed with the sound analysis software Cool Edit 96 (Syntrillium Software Corp.) on IBM compatible computers. Frequency information was obtained through fast Fourier transformation (FFT, width 1024 points). Terminology in the description of call characteristics generally follows Heyer et al. (1990). Terminology and description of morphological characters follow De la Riva & Köhler (1998). Morphometric abbreviations used throughout the text are: E-N, eye to nostril distance; IOD, interorbital distance; SVL, snout-vent length. Institutional abbreviations are as follows: CBF, Colección Boliviana de Fauna, La Paz; USNM, National Museum of Natural History, Smithsonian Institution, Washington; ZFMK, Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn.

Results

Phyllonastes ritarasquinae spec. nov.

Figs 1-2

Types. Holotype: CBF 3350; an adult female, from 31 km on the "old" road from Paractito via Palmar to Cochabamba (17°06'50"S, 65°34'19"W), Provincia Chapare, Departamento Cochabamba, Bolivia, 1250 m above sea level; collected on 19 December 1998 by Jörn Köhler and Gandy Suárez.

Diagnosis. A species of *Phyllonastes* characterized by (1) having only two phalanges in the fourth finger; (2) well-expanded, pointed discs on toes, ending in terminal papillae; (3) lacking a visible tympanum; and (4) a brown dorsum with two broad, pale, dorsolateral bands.

The two Andean species *P. heyeri* and *P. lynchi* are distinguished by having a longer fourth finger with three phalanges. Furthermore, *P. lynchi* differs from the new species by having pustular dorsal skin and a row of tubercles on the outer edge of the tarsus, and *P. heyeri* differs by having less expanded toe tips lacking terminal papillae. From *P. lochites* and *P. myrmecoides*, *P. ritarasquinae* differs mainly by lacking a visible tympanum and by its colouration. The Bolivian species *P. carrascoicola* lacks the pale dorsolateral bands present in *P. ritarasquinae* and has less expanded toe tips which lack terminal papillae. An undescribed species from the Yungas de La Paz region, Bolivia, exhibits a visible tympanum and less expanded toe tips. Another unnamed species from Peru is distinguished by its large inguinal glands (M. Harvey, in litt.).

Description of holotype

Snout rounded in dorsal view, subacuminate in lateral profile; head wider than long, head width 33.3 % SVL; top of head flat; upper eyelid lacking tubercles; width of upper eyelid 55.6 % of IOD; nostrils hardly protuberant, directed slightly dorsolaterally; distance from nostril to eye about the same as from nostril to tip of snout; canthus rostralis evident, slightly rounded; loreal region slightly concave; E-N 50.0 % of eye length; supratympanic fold absent; tympanum and tympanic annulus absent. Forearms gracile; palmar tubercles large, round, distinct but relatively flat; subarticular tubercles round, distinct, the proximal more marked than the distal ones; relative length of fingers I < II = IV < III; tips of fingers slightly expanded; webbing absent (Fig. 2). Hindlimbs robust; tibia length 46.1% of SVL; no row of tubercles on outer edge of tarsus; inner side of tarsus with well-defined, short fold; inner and outer metatarsal tubercle prominent, conical, nearly equal in size, round in outline; subarticular tubercles distinct, round, the proximal more marked than the distal ones; plantar surfaces smooth; tips of toes expanded, width of tip of toe IV about two times the toe width; discs on outer toes attenuated distally, forming papillae; circumferential grooves present, complete; relative length of toes I < II < V < III < IV; webbing absent (Fig. 2). Skin on dorsum smooth; no dorsolateral or discoidal folds; skin on all ventral surfaces smooth. Choanae small, round; vomerine teeth absent. Tongue subrectangular, anteriorly attached to floor of mouth, its length about two times its width.

Colouration. In life, dorsum tan; interorbital bar broad, dark brown; scapular region with irregular reddish-brown markings; posterior dorsum pale; two symmetric pale dorsolateral bands, with diffuse orange marbling, extending from posterior corner of eye to groin, its dorsal border slightly irregular posteriorly, its lateral border well-defined, straight; two dark brown inguinal spots, somewhat irregular in shape; flanks brown, contrasting with pale dorsolateral bands; upper lip brown, with few, well-

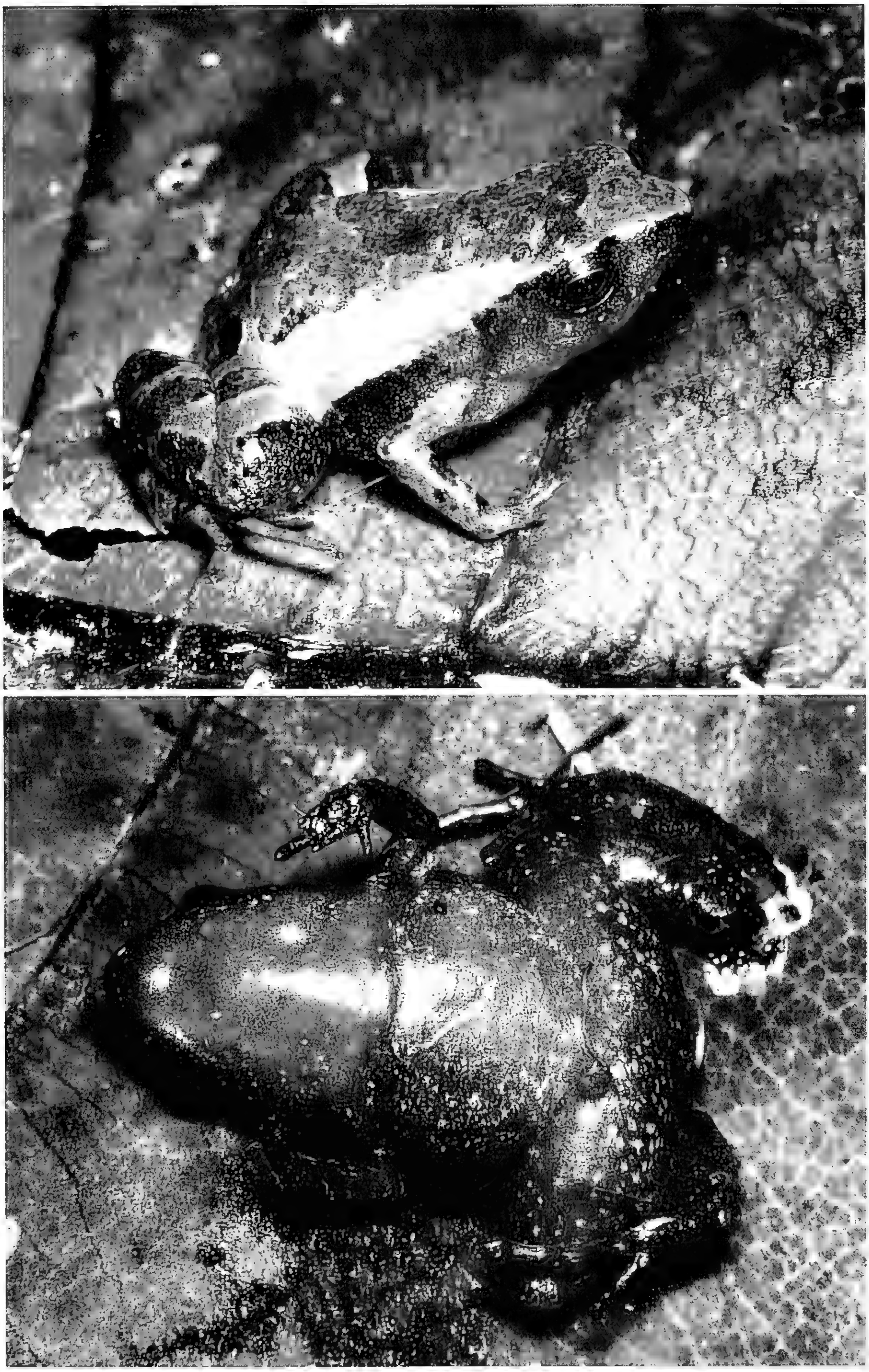

Fig. 1. Dorsolateral and ventral view of the holotype of *Phyllonastes ritarasquinae*, spec. nov. (CBF 3350) in life. SVL 14.1 mm.

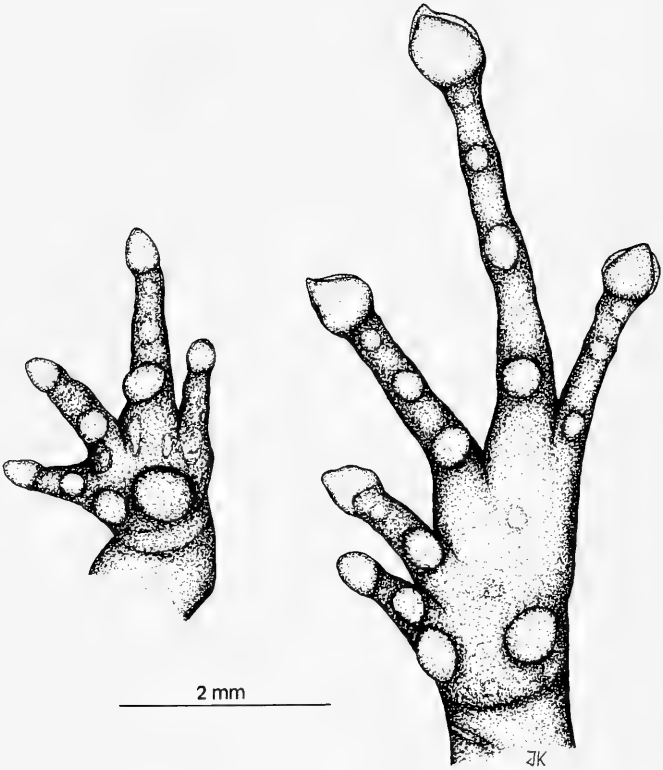

Fig 2. Ventral surfaces of left hand and foot of the holotype of *Phyllonastes ritarasquinae*, spec. nov. (CBF 3350).

separated, white spots; lower lip brown; loreal region brown; groin pale; upper surfaces of limbs tan; hindlimbs with distinct, dark brown bars; posterior side of thighs brown with pale spotting and mottling; cloacal region dark brown; plantar surfaces brown, toe tips brown; forearms dorsally with dark brown flecks; ventral surfaces of forearms dark brown, with irregular white spotting; palmar surfaces brown, finger tips brown; throat orange coloured, with scattered brown mottling; chest orange with diffuse brown mottling; venter reddish brown medially, brown with diffuse white spotting laterally; ventral surfaces of hindlimbs dark brown with distinct scattered white spots; iris dark copper brown, with black spotting.

In alcohol, the ventral colouration differs considerably. The orange and reddish brown colours faded completely and turned into a pale gray. All ventral surfaces appear grayish with fine brown mottling, although the white spots on the ventral surfaces of the hindlimbs remained distinct. The dorsolateral bands turned pale gray, too.

Measurements. SVL: 14.1; head width: 4.7; head length: 4.3; upper eyelid width: 1.0; IOD: 1.8; eye length: 1.8; E-N: 0.9; tibia length: 6.5; foot length: 9.4.

Distribution and Ecology. *Phyllonastes ritarasquinae* is known only from the type locality. The locality is situated within lower montane rainforest of the Río San Mateo valley. Annual precipitation in the region was expected to range from 3000 to more than 5000 mm (Ibisch 1996). All months are humid. The region is characterized by extremely steep slopes covered with evergreen forest of medium height (≥ 30 m). The forest is rich in small streams whereas lentic water is rare. The single female was discovered being active during the day in leaf litter at the edge of primary forest. It has enlarged, empty oviducts indicating that a clutch had recently been laid. Other anuran species found in sympatry with *P. ritarasquinae* include *Atelopus tricolor, Bufo justinianoi, B. veraguensis, Bufo* spec., *Gastrotheca testudinea, Hyla* cf. *callipleura, Hyla* spec., *Eleutherodactylus cruralis, E. danae, E. mercedesae, E. olivaceus, E. platydactylus, E. rhabdolaemus, Leptodactylus griseigularis,* and *L. rhodonotus.*

Etymology. The specific name is dedicated to Rita Rasquin (Krefeld) in recognition of her efforts in supporting taxonomic research and nature conservation.

Phyllonastes carrascoicola De la Riva & Köhler

When De la Riva & Köhler (1998) described *Phyllonastes carrascoicola*, only six specimens were referable to this species. The status of another specimen (USNM 257845) from the upper Chapare region of Bolivia (also reported by Reynolds & Foster 1992) was discussed but remained questionable. During fieldwork carried out in the wet seasons 1997/98 and 1998/99, additional specimens of *Phyllonastes* similar to *P. carrascoicola* were collected at Sehuencas (type locality), Provincia Carrasco, as well as in the upper Provincia Chapare, Bolivia. In the following, data on variation in these specimens as well as the resulting conclusions are provided.

Variation. All specimens of the female type series of *Phyllonastes carrascoicola* are relatively dark coloured and exhibit pale white lines middorsally, along the posterior surface of hind limbs, as well as midventrally (the midventral line is missing only in ZFMK 59569). The venter is brown with fine white spotting and dark inguinal spots are present except in one specimen (De la Riva & Köhler 1998). A more recently collected female from Sehuencas (ZFMK 66829, SVL 14.7 mm) is similar in having relatively dark dorsal colour but it lacks a pale midventral line and a pale line on the posterior surface of hind limbs. Ventrally, a white line is present only on the throat. The ventral sides of hind limbs and the outer regions of the belly are densely spotted with white and therefore appear pale. A dark brown hourglass-shaped marking is hardly visible on the dorsum. The female ZFMK 71643 (SVL 15.7 mm), collected at 50.5 km on the "old" road from Paractito to Cochabamba, Provincia Chapare, 2100 m a.s.l., exhibits a nearly identical colouration and there remains no doubt that both specimens are conspecific. Two males (CBF [number unknown]; ZFMK 66991, SVL 12.3 mm) from the same locality generally exhibit the same pattern when compared with the female, but are much paler. The dorsum is pale brown and ventral surfaces are cream with brown mottling. This colour pattern coincides well with the male specimen USNM 257845, collected at a nearby locality (see De la Riva & Köhler, 1998). In contrast, a juvenile specimen (ZFMK 71644, SVL 9.2 mm) from the upper Provincia Chapare has a dark venter and a distinct pale line on the posterior surface of hind limbs like present in the *P. carrascoicola* type specimens from Sehuencas. Dark inguinal spots or flecks are present in all of the recently collected specimens.

Summarizing, there is considerable intrapopulational variation regarding colour pattern. At both localities, Sehuencas and the upper Provincia Chapare, specimens occur showing pale lines on dorsum, venter, and/or posterior surface of thighs, as do specimens which lack these lines (or at least part of them) and have a somewhat paler venter. Furthermore, the specimens do not differ in other morphological characters (i.e. condition of digit tips, tympanum, and tubercles). Thus, the only resolved conclusion is that the specimens and populations mentioned above correspond to a single species with intraspecific colour variation, *Phyllonastes carrascoicola*. There seems to be sexual dimorphism in *P. carrascoicola*, with the males being smaller and paler coloured.

However, the knowledge about variation within the species *P. carrascoicola* is far from satisfying. Part of the differences in colouration might be seasonal variation and others might be due to the procedure of preservation. Especially, the ventral colour of certain specimens changed remarkably in alcohol.

Vocalization. Advertisement calls (Fig. 3) were recorded on 29 January 1999, 11.00 h, on the "old" Chapare road, Provincia Chapare, Departamento Cochabamba, 2100 m a.s.l. Males called during the day from the leaf litter forming choruses (compare Reynolds & Foster 1992). Calls consisted of a series of 5-8 soft notes (mean 6.0 ± 1.2); call duration varied from 254-436 ms (mean 332.3 ± 62.6); note duration varied from 12-20 ms; notes were repeated in regular intervals at a rate of approximately 16 notes per second; calls were repeated in regular intervals at a rate of approximately 10 calls per minute; call energy was distributed from 2500-5000 Hz; a distinct upward frequency modulation was present within the calls, with the first note having a dominant frequency of approximately 3300 Hz and the last one having it at almost 4000 Hz. Sixteen calls of three individuals were analyzed. The air temperature was 16.4 °C during recording. Identical calls were heard at an elevation of 1850 m a.s.l. along the same road.

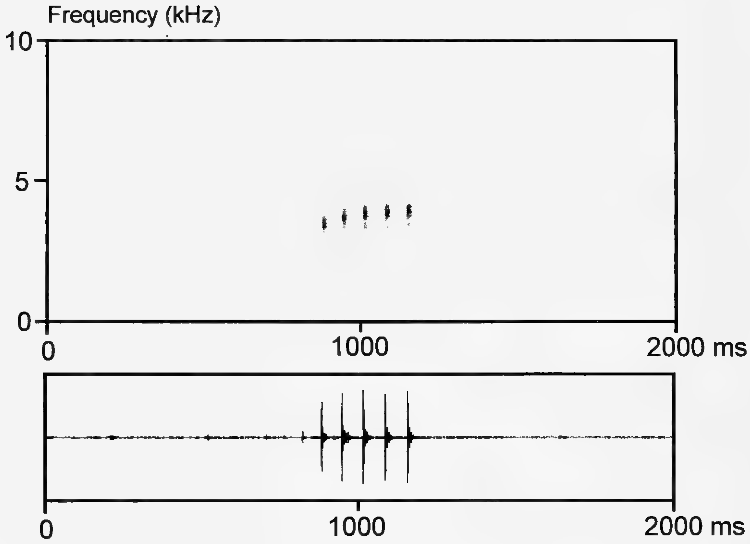

Fig 3. Audiospectrogram and oscillogram of the advertisement call of *Phyllonastes carrascoicola* De la Riva & Köhler. Recording obtained on 29 January 1999, 11.00 h, at 50.5 km on the "old" road from Paractito to Cochabamba, Provincia Chapare, Departamento Cochabamba, Bolivia, 2100 m a.s.l. Air temperature 16.4 °C.

Males always called hidden under fallen leafs within dense vegetation. Thus, it was not possible to observe *P. carrascoicola* while calling to see the size and shape of the inflated vocal sac. However, *P. carrascoicola* was the only anuran species found when searching the places from which calls were emitted.

The call of *Phyllonastes carrascoicola* can be confused with that of the sympatric *Eleutherodactylus llojsintuta*. However, the call of *P. carrascoicola* is softer, has a higher note repetition rate, a higher dominant frequency, a more distinct frequency modulation, and was emitted only during the day from the ground (compare Köhler & Lötters 1999). *Eleutherodactylus llojsintuta* is a nocturnal species calling from bushes and ferns.

Reynolds & Foster (1992) reported low-pitched, clicky, two-note calls in a chorus made up by males from which the specimen USNM 257845 was taken. This description generally coincides with the data presented above, although the calls analyzed were composed of a larger number of notes.

Distribution. Compiling the results presented herein as well as already published data, *Phyllonastes carrascoicola* is distributed in upper montane rainforests and adjacent cloud forests (1850-2700 m a.s.l.) along the northeastern Andean slopes, at least from Provincia Chapare, Departamento Cochabamba, eastward to Provincia Caballero, Departamento Santa Cruz, Bolivia.

Remark. An additional species of minute leptodactylid frog, seemingly related to *Phyllonastes,* has been discovered in the Yungas de La Paz region. This new taxon will supposedly be described as a new genus (M. Harvey, in litt.). It may turn out that *P. carrascoicola* actually is more closely related to this new genus than to other species of *Phyllonastes*.

Acknowledgments

I am indebted to James Aparicio of the Colección Boliviana de Fauna, La Paz, for his collaboration, as well as to Michael Harvey for providing unpublished information. Thomas Ziegler kindly helped with the drawing and Miguel Vences made useful comments on the manuscript. Thanks also to my field companions Stefan Lötters and Gandy Suárez. Fundación Amigos de la Naturaleza, Santa Cruz de la Sierra, provided working space and facilities. Fieldwork in Bolivia was funded by grants of the German Academic Exchange Service (DAAD) and the "Graduiertenförderung des Landes Nordrhein-Westfalen".

Resumen

Se describe una especie nueva del género *Phyllonastes* de un bosque húmedo de montaña, Departamento de Cochabamba, Bolivia, 1250 m s.n.m. *Phyllonastes ritarasquinae* spec. nov. se characteriza principalmente por poseer solo dos falanges en el cuarto dedo de la mano, dilataciones terminales de los dedos anchas, dos rayas dorsolaterales claras, y por la ausencia del tímpano. Adicionalmente, se presentan datos nuevos sobre la variación, distribución y el canto de la especie *Phyllonastes carrascoicola*.

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8. Ball, G. E., A. Casale & A. Vigna Taglianti (eds.) 1998: Phylogeny and Classification of Caraboidea (Coleoptera: Adephaga). – Proceedings of a Symposium, XXth International Congress of Entomology. – Atti di Museo Regionale di Scienze Naturali, Torino. 543 S. ISBN 88-86041-29-2.

Das Symposium über Caraboidae (mit Schwerpunkt Carabidae) war sicher das umfangreichste Symposium über Käfer auf dem XX. Internationalen Entomologen-Kongress 1996 in Florenz. Die zwanzig Beiträge zeugen einerseits vom breiten Spektrum der Carabiden-Forschung, andererseits spiegeln sie auch das hohe Niveau der Bearbeitung sehr gut wider. Neben "klassischer" Taxonomie und Phylogenie halten hier auch moderne molekularbiologische Techniken Einzug. Ein kompletter Index erleichtert das Auffinden einzelner Taxa.

R. Gerstmeier

9. Colonelli, E., S. Louw & G. Osella 1998: Taxonomy, Ecology and Distribution of Curculionoidea (Coleoptera: Polyphaga). Proceedings of a Symposium, XXth International Congress of Entomology. – Atti di Museo Regionale di Scienze Naturali, Torino. 294 S. ISBN 88-86041-30-6.

17 Beiträge beinhaltet der Band über das Rüsselkäfer-Symposium innerhalb des XX. Internationalen Entomologen-Kongresses 1966 in Florenz. Morphologische, taxonomische, faunistische, zoogeographische und ökologische Aspekte spielen hier eine Rolle. Für die EDV-Bearbeitung ist sicher der Beitrag über das "World Weevil Database Project" interessant.

R. Gerstmeier

10. Huber, W. 1998. Münchner Naturforscher in Südamerika – Berichte der Freunde der ZSM (1); Verl. Friedrich Pfeil, München, 168 S. viele Farbfotos, Zeichnungen und Kartenskizzen. ISBN 3-931516-47-4.

Die Freunde der Zoologischen Staatssammlung München haben eine neue Schriftenreihe begründet. Diese "Berichte der Freunde der ZSM" sollen die Wissenschaft aus dem Umfeld der Zoologischen Staatssammlung einer breiteren Öffentlichkeit zugänglich machen. Es ist sicher kein Zufall, dass sich das erste Werk dieser neuen Reihe mit den Wurzeln der Zoologischen Staatssammlung München befaßt, und es ist ein besonderes Glück, dass mit dem Autor ein "Laie" diese Aufgabe übernimmt. Walter Huber war Verwaltungsdirektor und auf seine Initiative ist die allgemein bekannte "Fußgängerzone" der Münchner Innenstadt zurückzuführen. Aber er war schon von Jugend an der Zoologie und insbesondere der Zoologischen Staatssammlung München verbunden.

Das Buch stellt die besondere Beziehung der Münchner Zoologen zum südamerikanischen Kontinent dar. Die Ursprünge der wissenschaftlichen Zoologie in München lassen sich auf die Brasilienexpedition von Johann Baptist Spix und Carl Friedrich Philipp von Martius zurückführen. Das umfangreiche Material, das diese beiden großen Forscher aus der Neuen Welt mitbrachten, ist noch heute der Grundstock der Zoologischen und Botanischen Staatssammlungen Münchens. Der Autor beschreibt die Forschungsreise von Spix und Martius zwischen 1817 und 1820 ebenso lebendig und ausführlich wie die Reisen der Therese Prinzessin von Bayern von 1888 und 1898. Durch mühsame Quellenstudien konnte der Autor auch einiges über die Forschungsreise von Professor Lorenz Müller (1909-1910) nach Brasilien eruieren und berichten. Weitere wichtige Münchner Forscher, die Südamerika bereist haben, waren Walter Hellmich, Walter Forster sowie Hans Krieg, dessen Forschungsreisen (z.B. Gran Chaco-Expedition) der Autor besonders ausführlich schildert. Das Werk berichtet aber auch über die Südamerika-Reisen von heute noch aktiven Münchner Wissenschaftlern (z.B. Eibl-Eibesfeldt, Fittkau und anderen).

Das Buch lässt die Naturbegeisterung des Autors spüren und besticht durch gründliche historische Recherche. Darüber hinaus ist es insgesamt hervorragend und reichhaltig bebildert und für seine Ausstattung ausgesprochen preiswert. So fallen auch die gelegentlichen Wiederholungen nicht ins Gewicht und das Fehlen eines Stichwortverzeichnisses kann man angesichts der detaillierten Gliederung leicht verschmerzen. Dieser gelungene Einstieg in die neue Schriftenreihe kann uneingeschränkt empfohlen werden und es ist zu hoffen, dass noch viele ähnlich schöne Bücher folgen werden.

K. Schönitzer & J. Schuberth

SPIXIANA	**23**	1	55–60	München, 01. März 2000	ISSN 0341-8391

Description of *Phyllidia schupporum*, a new nudibranch species from the northern Red Sea

(Gastropoda, Nudibranchia, Phyllidiidae)

Alexander Fahrner and **Michael Schrödl**

Fahrner, A. & M. Schrödl (2000): Description of *Phyllidia schupporum*, a new nudibranch species from the northern Red Sea (Gastropoda, Nudibranchia, Phyllidiidae). – Spixiana **23/1:** 55-60

Phyllidia schupporum spec. nov., a new species of phyllidiid nudibranch, is described externally and anatomically. It is characterized by its distinct colour pattern of white, black and orange on the dorsum and its bright orange-red digestive gland internally. The new species is compared with other species of the genus *Phyllidia*, it comes closest to *Phyllidia exquisita* Brunckhorst, 1993. Details of the alimentary system and reproductive system are presented. *Phyllidia schupporum* spec. nov. is presently known from the Gulf of Aqaba in the northern Red Sea.

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Introduction

The family Phyllidiidae Rafinesque, 1814 comprises a number of medium sized, conspicuously coloured sponge feeders inhabiting the coral reefs of the Indo-Pacific and the Atlantic Ocean. They have been revised recently by Brunckhorst (1993), thus amounting to 49 valid Indo-Pacific species in 6 genera, to which 5 species from the Atlantic Ocean have to be added (Valdés & Ortea 1996). Containing 15 species, *Phyllidia* Cuvier, 1797 is both the largest and the most widespread genus, with representatives being distributed throughout the tropical Indo-West Pacific Ocean and the Mediterranean Sea (Brunckhorst 1993). Phyllidiids are among the most common nudibranchs in the Red Sea. A review on the phyllidiid fauna of this region by Yonow (1986, 1988) revealed that *Phyllidia* is the most diverse genus there as well.

With *Phyllidia varicosa* Lamarck, 1801, *Phyllidia elegans* Bergh, 1869, *Phyllidia ocellata* Cuvier, 1804 and the new species described in this paper, four *Phyllidia* species are known yet to occur on the coral reefs of the Red Sea.

Methods

The single specimen was collected using SCUBA and photographed alive before preservation. It was anaesthetized with a 10 % $MgCl_2$ solution, fixed in 3,7 % buffered seawater formalin and preserved in 70 % ethanol. The specimen was examined in detail and dissected by a circular dorsal incision. Drawings were made with the aid of a camera lucida.

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Fig. 1. *Phyllidia schupporum,* spec. nov. Living holotype (30 mm).

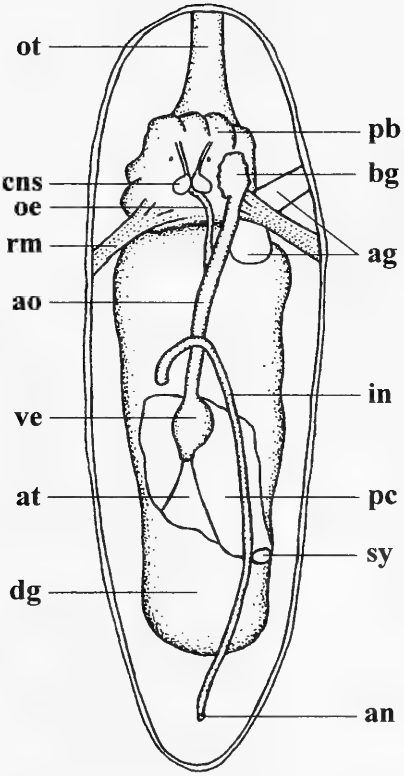

Fig. 2. *Phyllidia schupporum*, spec. nov. Outline of the general anatomy of the preserved holotype. Abbreviations: **ag**: anterior genitalia. **an**: anus. **ao**: aorta. **at**: atrium. **bg**: blood gland. **cns**: central nervous system. **dg**: digestive gland. **in**: intestine. **oe**: oesophagus. **ot**: oral tube. **pb**: pharyngeal bulb. **pc**: pericardium. **rm**: retractor muscles. **sy**: syrinx. **ve**: ventricle.

Phyllidia schupporum, spec. nov.
Figs 1-4

Types. Holotype: Zoologische Staatssammlung München (ZSM No. 19991971), 24 mm preserved body length, 13 mm width, collected by Günther Försterra and Verena Häussermann, 27 October 1998, "INMO-reef" in Dahab, Gulf of Aqaba, Red Sea, at 12 m depth, on dead coral.

Description

External morphology (Fig. 1). *Phyllidia schupporum*, spec. nov. is ovate in shape, white, black and orange-yellow in colour and its dorsum is covered with large tubercles. The dorsal pattern is characterized by a white background and two broad, median, longitudinal, black lines from which short, black stripes extend to the mantle margin. The two longitudinal lines reach from behind the rhinophores anteriorly almost until the end of the body posteriorly and are connected by a transverse, black line medially. There are two central, longitudinal, white areas, divided by the transverse, black line. Three or four large, white semicircles separated by the black stripes occur around each side of the mantle margin. Several irregulary shaped black spots of variable size are spread over all white areas. There is no distinctly coloured edge to the mantle margin.

Isolated, rounded tubercles cover the notum, being numerous and low on the mantle margin and few and high medially. They are irregulary scattered over the white areas of the dorsum, only the three largest tubercles are arranged in a median, longitudinal row. All tubercles are white, larger ones are capped in orange-yellow. The small, white rhinotubercles are located immediately behind the rhinophores. The anus opens posteriodorsally, immediately behind a large tubercle. The rhinophores are

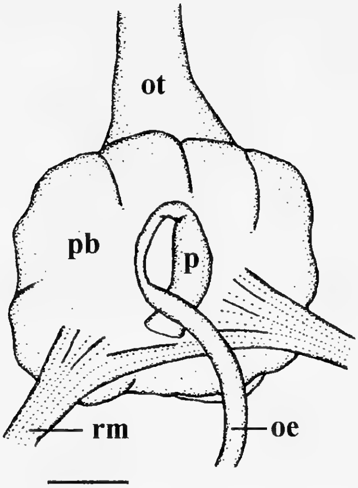

Fig. 3. *Phyllidia schupporum*, spec. nov. Anterior digestive system. Scale bar: 0.5 mm. Abbreviations: **oe**: oesophagus. **ot**: oral tube. **p**: pharynx. **pb**: pharyngeal bulb. **rm**: retractor muscles.

orange and each clavus possesses 14 lamellae. They arise from the anterior, central white area. Ventrally, the foot and notum are white, despite of the black markings on the dorsum which are visible on the hyponotum and the dark grey edge of the foot. There are no characteristic markings on the foot sole. The flat, triangular shaped, grey gill leaflets are placed ventrolaterally in the groove between notum and foot. Large and small leaflets alternate more or less regularly. They are interrupted by the mouth anteriorly and the reproductive openings on the right side. The oral tentacles are separate, conical and white in colour with orange tips.

Anatomy (Fig. 2). An outline of the general anatomy of the dissected holotype is given in Fig. 2.

Digestive system (Figs 2, 3). The mouth passes into a short and broad, thin-walled oral tube which leads back to the cream coloured, musculo-glandular pharyngeal bulb (Fig. 3). Cream coloured bodies of the oral glands cover the posteroventral parts of the thick and swollen, spherical pharyngeal bulb which has about the same length than width. Two very thick retractor muscles arise from the dorsolateral body wall and insert postero-dorsally onto the pharyngeal bulb, on each side of the pharynx. The thick, tubular pharynx leaves the pharyngeal bulb postero-dorsally (Fig. 3) and extends anteriorly before narrowing, turning to the left and running back posteriorly again through the central nerve ring. This region of the foregut is covered by the central nervous system and the blood gland (Fig. 2) and is therefore only visible after removal of the latter organ. The short and narrow oesophagus leads backward, entering the holohepatic, compact digestive gland which occupies around two-thirds of the whole body cavity. In a freshly preserved state, the digestive gland is orange-red in colour. This bright colour gives way to brown after longer exposure to ethanol in the dissected state. No distinct stomach region is detectable within the digestive gland. The very long and narrow, translucent intestine originates dorsally from the anterior third of the digestive gland, anterior and to the left of the heart. It describes a loop to the right, encircling the heart, before straightening to run posteriorly down the right side to the medio-dorsal anal opening. The small anal papilla is cream coloured.

Central nervous system (CNS). The CNS is situated dorsally on the pharyngeal bulb, covering the pharynx entirely. The large rhinophoral ganglia are attached to the completely fused cerebropleural ganglia. The optic nerves are short but eyes are not sessile. The pedal ganglia are more or less spherical and positioned next to the cerebropleural complex with the statocyste nestling in between. The intimately attached buccal and gastroesophagial ganglia are adjacent to the ventrolateral surface of the oesophagus, postero-ventral to the central nerve ring.

Reproductive system (Figs 4A,B). As typical for phyllidiids, the flat whitish gonad overlies the anterior part of the digestive gland, being covered by the kidney dorsally and laterally. The remainder of the triaulic reproductive system occurs on the right side of the body, in the space between pharyngeal bulb and digestive gland. A thin hermaphroditic duct connects the gonad with the very large,

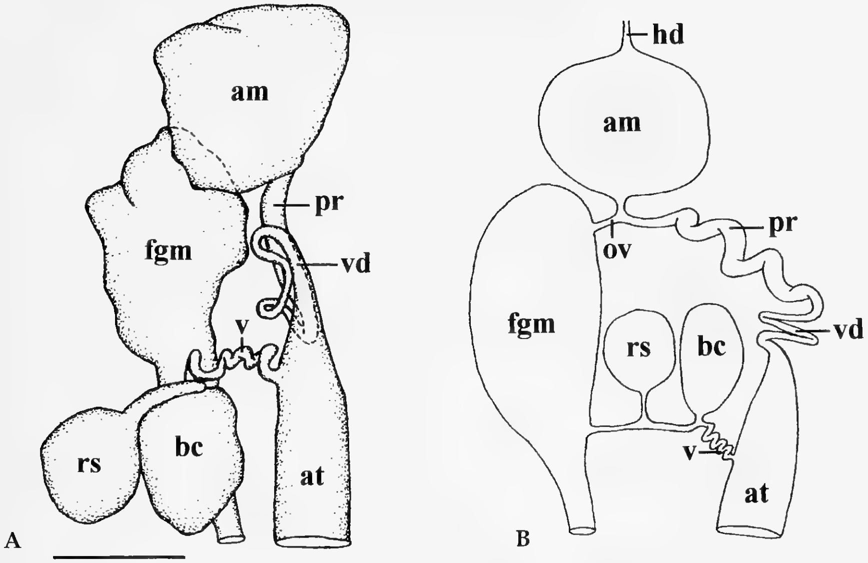

Fig. 4. *Phyllidia schupporum*, spec. nov. Reproductive system. **A.** In situ drawing. Scale bar: 0.5 mm. **B.** Schematic outline. Abbreviations: **am**: ampulla. **at**: common atrium. **bc**: bursa copulatrix. **fgm**: female gland mass. **hd**: hermaphroditic duct. **ov**: oviduct. **pr**: prostatic vas deferens. **rs**: receptaculum seminis. **v**: vagina. **vd**: muscular vas deferens.

spherical, yellow-brownish colored ampulla. Immediately at the base of the ampulla, the postampullar gonoduct divides into the vas deferens and the short oviduct, the latter entering into the cream colored, small female gland mass. The vas deferens enlarges into a convoluted prostatic portion of considerable length and width, becoming very narrow and strongly convoluted again distally. The muscular ejaculatory duct is extremely large in comparison with the other reproductive organs and enters a common vestibulum with the vagina. The narrow and convoluted vagina leads from the repoductive opening into the ovate, thin-walled bursa copulatrix. Arising next to the insertion and entering into the female gland mass, the vaginal duct bears the stalked, muscular, spherical receptaculum seminis. Both allosperm receptacles are translucent-whitish and were not filled in the examined specimen. This indicates, together with the very large ejaculatory portion of the vas deferens and the small size of the female glands, that the holotype was not completely mature when preserved.

Circulatory and excretory systems (Fig. 2). The heart is situated mediodorsally on the digestive gland and kidney, half way down the body length and enclosed in a wide pericard. The muscular ventricle is placed anterior to the atrium. Leading anteriorly, the very broad aorta runs up to the small, thin and flat blood-gland which covers the CNS. Linking the heart with the excretory system, the syrinx occurs far posterior on the right side of the body. The flat, translucent-whitish kidney covers the whole digestive gland and the ovotestis dorsally and laterally. Due to the contrasting orange-red coloration of the digestive gland, the overlying branched vessels of the kidney are extremely conspicuous in *Phyllidia schupporum* spec. nov. and could be traced much easier than in other phyllidiid species.

Mantle. The notum is thick and tough. Basally, it is strengthened by a cross lamellar layer of strong, needle-like spicules. From this layer, spicules arranged like bunches of flowers rise into each single tubercle; these structures are absent in areas between the tubercles. The spicules reaching up to 1 mm in length and around 50 μm in diameter are hollow and all consist of calciumcarbonate. Silicate or chitinuous elements mentioned by Brunckhorst (1993) were not detected within the notum. Upper notum layers have a sponge-like consistency and contain many large, subepidermal glands.

Etymology. *Phyllidia schupporum*, spec. nov. is named in honor of Mr. and Mrs. Hansjörg Schupp who generously supported the biosystematic research at the ZSM.

Discussion

The new species described in this paper belongs to the genus *Phyllidia* as it clearly fits the anatomical and morphological descriptions by Brunckhorst (1993) and Fahrner & Beck (in press). Characteristical features of *Phyllidia* are the large, broad pharyngeal bulb with internal oral glands and thick, short retractor muscles, the pharynx leaving the pharyngeal bulb postero-dorsally, the dorsal anal opening, the separate oral tentacles, the yellow rhinophores and the large tubercles, capped in orange-yellow. *Phyllidia schupporum*, spec. nov. is considered new due to its unique dorsal colour pattern of black lines and spots on a white background, large, rounded, white tubercles, capped in orange-yellow, rhinophores with only 14 lamellae on each clavus and the brightly coloured orange-red digestive gland. The three other species of the genus known from the Red Sea, *Phyllidia varicosa, Phyllidia elegans* and *Phyllidia ocellata,* can all be distinguished clearly from *Phyllidia schupporum* (Fahrner & Schrödl in press, Fahrner & Beck in press). *Phyllidia varicosa* is a very large species with a blue-grey dorsum, three to six longitudinal tuberculate ridges joined by longitudinal black lines and one longitudinal black stripe on the grey sole of the foot. *Phyllidia elegans* is also very large, possesses pink notal tubercles on a black background, a median, longitudinal black stripe on the sole of the foot and black lines on its sides. *Phyllidia ocellata* is a medium sized phyllidiid with orange-yellow background colouration on the dorsum and a pattern of black rings or meandering lines bordered in white and with a dark grey ventral surface.

Phyllidia schupporum, spec. nov. also differs from all other described species of the genus. It is most similar to *Phyllidia exquisita* in the size of the body and the possession of a white background colour and black markings. However, in contrast to *Phyllidia schupporum* the tubercles of *Phyllidia exquisita* occur in two lateral and one median white row, joined by four black, longitudinal lines. Furthermore, the mantle margin of *Phyllidia exquisita* is edged in yellow, no irregulary scattered black spots occur on the dorsum and the rhinophores possess 17-20 lamellae. As the colour pattern of *Phyllidia exquisita* shows little intraspecific variation and as this species is currently only known from the Pacific Ocean and from Thailand (Brunckhorst 1993), it can be easily demarcated from *Phyllidia schupporum* spec. nov. Both *Phyllidia babai* and *Phyllidia willani* also have a white background colour and black markings but are much larger than *Phyllidia schupporum.* Moreover, *Phyllidia babai* is characterised by a pattern of six to eight black rings encircling tubercles and *Phyllidia willani* also differs from *Phyllidia schupporum* in having a granular appearence to the notum, a pattern of black swirls and a grey ventral colouration.

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Vipera barani Böhme & Joger, 1983 aus dem östlichen Pontus-Gebirge, Türkei: Differentialmerkmale, Verbreitung, Habitate

(Reptilia, Serpentes, Viperidae)

Michael Franzen und Ullrich Heckes

Franzen, M. & U. Heckes (2000): *Vipera barani* Böhme & Joger, 1983 from the eastern Pontus mountains, Turkey: differential characters, distribution, habitats (Reptilia, Serpentes, Viperidae). – Spixiana **23/1:** 61-70

Vipera barani Böhme & Joger is reported from two localities in the eastern Pontus mountains (Giresun and Rize provinces, Turkey). Specimens were found in comparably dry, south exposed habitats; at Giresun on a rocky slope with sparse oak forest and in Rize province on a ridge with dry edaphic conditions at the edge of a tea plantation. Morphologically the new specimens agree well with the previously reported material. The morphological comparison of *V. barani* with Bulgarian *V. berus bosniensis* (Rila and Pirin mountains) and *V. nikolskii* (Ukraine) yielded several, mostly hitherto unreported differences: *Vipera barani* differs from *V. nikolskii* and Bulgarian *V. berus bosniensis* by the presence of more crown scales, lower ventral scale counts, more posteriorly situated reductions of dorsal scales, lower circumocular counts, and a tendency towards proportionally larger nasal scales. In addition, *V. barani* differs from *V. nikolskii* by lower gular scale counts and the presence of a more or less extensive light head pattern in adult melanistic specimens. *V. barani* differs from Bulgarian *V. berus bosniensis* by the occurrence of specimens with 23 dorsal scale rows, a distinctly lower tendency towards melanism, and a tendency towards higher numbers of zig-zag turns.

Considering the hitherto known records we suppose sympatry with *V. ammodytes transcaucasiana* to occur to a large extent. We discuss possible local distribution patterns with respect to presumably rather similar habitats of both species.

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Einleitung

Vipera barani Böhme & Joger, 1983 gehört zu den am wenigsten bekannten Vertretern ihrer Gattung. Die Art wurde aus der Umgebung von Adapazarı (Nordwest-Anatolien) nach einem Einzelstück aus dem Tierhandel beschrieben. Bis heute wurden lediglich vier weitere Exemplare ohne Fundortangaben bekannt (Joger et al. 1997). Baran et al. (1997) publizierten allerdings jüngst eine Viper unter dem Namen *Vipera pontica* aus dem Ostpontus in der Provinz Rize (vgl. auch Baran & Atatür 1998), bei der es sich ebenfalls um *V. barani* handelt. Eine Publikation mit Richtigstellung der Artzuordnung durch den Autor ist in Vorbereitung (Joger in litt. 1998). Dank der Hilfsbereitschaft von Prof. Ibrahim Baran (Izmir) konnten wir dieses Exemplar bei der vorliegenden Untersuchung bereits berücksichtigen.

Praktisch zeitgleich mit und unabhängig von der o.g. Publikation gelang dem Erstautor im Ostpontus bei Giresun im Juli 1997 der Nachweis eines weiteren Exemplares von *V. barani*. Gezielte Exkursionen in der Folge ergaben dann zwei weitere Funde. Die morphologischen Daten zu den neuen Stücken werden hier dokumentiert und die Art auf dieser erweiterten Basis mit enger assoziierten Taxa der *V. berus*-Gruppe verglichen *(V. berus bosniensis, V. nikolskii)*. Darüber hinaus werden die Lebensräume der Art erstmals beschrieben.

1. Material und Methoden

Abkürzungen: CS – Coll. Schweiger, Obertrum; MTKD – Staatliches Museum für Tierkunde Dresden; ZDEU – Zooloji Anabilim Dalı, Ege Üniversitesi, Bornova-Izmir; ZFMK – Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn; ZSM – Zoologische Staatssammlung München.

Untersuchtes Material:

Vipera barani. ZFMK 72214: Türkei, Prov. Giresun: südlich Dereli, 650 m NN, 7.7.1997, M. Franzen & U. Rischel leg. (♀); ZSM 476/1999: gleicher Fundort, aber 700 m NN, 23.4.1999, M. Franzen leg. (♂); ZSM 477/1999: Türkei, Prov. Rize: Fırtına-Tal südlich Ardeşen, 500 m NN, 27.4.1999, M. Franzen leg. (♀); ZDEU 81/1995: Türkei, Duyguluköy-Ardeşen, 20.8.1995, R. Topaloğlu leg. (♀); ZFMK 35444: Türkei, nördlich Adapazarı, K. Gutsche leg. (♀, Holotypus); ZFMK 60759, ZFMK (ohne Nummer): Türkei, ohne weitere Funddaten, Beschlagnahme durch Zoll Istanbul (2♀♀); ZDEU (ohne Nummern): Türkei, gleiche Daten (1♂, 1♀).

Vipera berus bosniensis. Bulgarien, Pirin-Gebirge: MTKD 24284: ohne weitere Angaben (♂); MTKD 29963: Fluß Vichren (♀); ZFMK 3699-3702: Banderika-Tal (3♂♂, 1♀); ZFMK 56201: Vichren, Dzenga-Tal (♀); ZFMK 56236-38, 56241-42: Mt. Vichren (3♂♂, 2♀♀); ZSM (SLM) 3219: Banderika-Tal (♂). Bulgarien, Rila-Gebirge: ZFMK 56200: ohne weitere Angaben (♂); ZFMK 56229-30, 56232-35: Sucho Jezero (4♂♂, 2♀♀); ZFMK 56244-45, 56247, 56249-50: Partizanskaya Poljana (2♂♂, 3♀♀).

Tab. 1. Morphologische Merkmale der bisher bekannten Exemplare von *Vipera barani*. Alle Längenmaße in mm. Erläuterungen: Kopflänge: Mittelwert aus rechter und linker Körperseite; GL/SL: Gesamtlänge/Schwanzlänge; V+PV: Ventralia+Präventralia; Reduktion 19: Reduktion auf 19 Dorsalschuppenreihen, gemessen in Ventralia (in Klammern Angabe in Prozent der Ventralia-Gesamtzahl); Nasale: Größe des Nasale im Verhältnis zum Augendurchmesser; Pileusschuppen: Anzahl Intercanthalia+Intersupraocularia; Zacken: Anzahl der Zacken im Rückenzeichnungsmuster. *: fehlende Werte; [*]: Nasale mit dem Pränasale verschmolzen; [35]*: nach Joger et al. (1997), Subcaudaliawerte durch Beschädigung nicht mehr erkennbar.

	ZSM 476/1999	ZFMK 72214	ZSM 477/1999	ZDEU 81/1995	ZDEU ohne Nr.	ZDEU ohne Nr.	ZFMK ohne Nr.	ZFMK 60759	ZFMK 35444
Provinz	Giresun	Giresun	Rize	Rize	*	*	*	*	Adapazarı
Geschlecht	♂	♀	♀	♀	♂	♀	♀	♀	♀
Gesamtlänge	545	605	595	426	520	592	508	540	550
Kopflänge	23,0	24,5	24,0	21,9	23,3	24,5	23,0	25,0	24,5
Schwanzlänge	73	68	65	50	69	62	55	59	67
GL/SL	6,2	7,5	7,8	7,1	6,2	8,2	7,8	7,7	6,8
V+PV	138+4	143+3	142+3	143+2	142+2	141+1	139+3	142+3	145+*
Subcaudalia	36/36	31/30	31/30	31/31	[35]*	26/27	32/31	29/30	37/36
Dorsalia	21	21	23	21	23	21	21	23	21
Reduktion 19	95 (69)	98 (69)	102 (72)	102 (71)	120 (85)	107 (76)	101 (73)	113 (80)	100 (69)
Supralabialia	9/8	9/10	9/9	9/9	9/9	9/9	9/9	9/9	9/9
Sublabialia	12/12	11/11	12/13	11/11	11/11	11/11	11/12	13/11	11/11
Gularia	4/4	4/4	4/4	4/4	4/3	3/3	4/4	4/5	4/5
Canthalia	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	3/3
Lorealia	5/4	4/4	11/9	5/5	4/4	3/3	5/5	5/5	4/4
Nasale	<	=	=	<	[*]	*	=	=	=
Circumocularia	11/10	9/9	11/10	12/12	10/11	12/11	11/10	11/11	11/12
Subocularia-Reihen	1/1	1/1	2/2	2/2	1/1	1/1	2/2	2/2	1/1
Pileusschuppen	14	21	27	33	25	40	23	27	34
Zacken	47/49	52/55	46/46	52/53	53/55	–	–	–	–

Vipera nikolskii. ZFMK 51445, 51625, 52794, 52796-97, 54176-80, 54241: Ukraine, Umgebung von Charkow (8♂♂, 3♀♀); CS (ohne Nummer): Ukraine, 20 km nordwestlich Nikolayev (♂).

Die von uns genommenen Meßstrecken und Pholidosewerte sind selbsterklärend oder entsprechen den allgemein üblichen Standards (vgl. Kramer 1961, Nilson & Andrén 1986: Gesamtlänge, Schwanzlänge, Anzahl der Dorsalia um die Körpermitte [= Hälfte der Ventralia], Präventralia, Ventralia, Subcaudalia, Supra- und Sublabialia, Circumocularia, Subocularia, Gularia, Lorealia). Bei den Schuppen der Kopfoberseite (Intercanthalia + Intersupraocularia) zählen wir nach hinten nur solche mit, deren Fläche zum überwiegenden Teil vor einer gedachten Linie liegt, die die Hinterränder der Supraocularia verbindet. Der Punkt, an dem die Reduktion der Dorsalia auf 19 Reihen erfolgt, wird mittels der bis zu dieser Stelle gezählten Ventralia angegeben. Die Kopflänge ermittelten wir von der Schnauzenspitze bis zum (deutlich erfühlbaren) hinteren Endpunkt des Unterkiefers. Die Anzahl der Zacken der Rückenzeichnung bezieht sich auf die Strecke bis oberhalb der Kloake. Alle entsprechenden Pholidosewerte bzw. Meßstrecken wurden auf der rechten und linken Körperseite ermittelt und zur weiteren Analyse gemittelt. Die im Text angegebenen Signifikanzniveaus beziehen sich auf Mittelwertvergleiche mittels t-Tests (Programm SSPS).

2. Ergebnisse

2.1. Morphologie

In Tab. 1 sind die morphologischen Daten der von uns untersuchten Exemplare von *Vipera barani* zusammengestellt. Zur Zeichnung der Tiere vgl. Abb. 1 und 2; das nicht abgebildete Exemplar ZFMK 72214 entspricht diesbezüglich weitgehend ZSM 477/1999. Bei dem Männchen aus Giresun (Abb. 1) handelt es sich um ein überwiegend schwarz gefärbtes Tier, das aber noch ein deutliches Rückenzeichnungsmuster erkennen läßt. Das Rückenband ist rein schwarz und tritt optisch nur dadurch hervor, daß alle Dorsalia außerhalb davon fein weiß gesprenkelt sind, so daß der Eindruck einer insgesamt helleren Grundfärbung entsteht. Alle drei neuen Exemplare wiesen im Leben eine rot gefärbte Iris und eine unterseits orangefarbene Schwanzspitze auf.

Tab. 2. Morphologische Merkmale von *Vipera barani* im Vergleich zu *V. berus bosniensis* (Bulgarien: Rila- und Pirin-Gebirge) und *V. nikolskii*. Angegeben sind Mittelwerte ± Standardabweichung (in Klammern Größe der Stichprobe). Maximale Gesamtlänge: Spannbreite der vier größten Exemplare aus der Stichprobe. Zur weiteren Erläuterungen siehe Tab. 1.

	Vipera barani	*Vipera berus bosniensis* – Rila	*Vipera berus bosniensis* – Pirin	*Vipera nikolskii*
Maximale Gesamtlänge	592-605	480-595	590-630	615-665
Ventralia ♂♂+♀♀	141,7 ± 2,1 (9)	146,7 ± 4,2 (12)	146,0 ± 3,2 (13)	149,3 ± 4,2 (12)
Ventralia ♂♂	140,0 ± 2,8 (2)	146,1 ± 4,3 (7)	145,6 ± 3,2 (8)	147,7 ± 2,6 (9)
Ventralia ♀♀	142,1 ± 1,9 (7)	147,4 ± 4,5 (5)	146,6 ± 3,4 (5)	154,3 ± 4,6 (3)
Präventralia	2,6 ± 0,9 (8)	2,3 ± 0,7 (12)	2,1 ± 0,6 (13)	2,4 ± 0,7 (12)
Subcaudalia ♂♂	35,5 ± 0,7 (2)	35,1 ± 4,6 (6)	35,8 ± 3,2 (7)	42,2 ± 1,8 (9)
Subcaudalia ♀♀	30,9 ± 3,0 (7)	31,6 ± 3,5 (5)	29,0 ± 2,3 (5)	33,7 ± 4,4 (3)
Anteil Ex. mit mehr als 21 Dorsalia	30 % (9)	0 (12)	0 (13)	25 % (12)
Reduktion 19 (% Ventralia)	73,6 ± 5,5	64,5 ± 5,5	64,0 ± 4,6	67,5 ± 5,1
Supralabialia	9,0 ± 0,3 (9)	8,9 ± 0,5 (12)	9,0 ± 0,5 (13)	9,2 ± 0,3 (12)
Sublabialia	11,4 ± 0,6 (9)	10,7 ± 0,7 (12)	11,0 ± 0,8 (13)	11,5 ± 0,6 (12)
Gularia	3,9 ± 0,5 (9)	4,1 ± 0,6 (10)	4,1 ± 0,6 (13)	4,8 ± 0,8 (12)
Lorealia	4,9 ± 2,0 (9)	3,5 ± 1,3 (12)	4,2 ± 1,9 (13)	4,1 ± 1,3 (12)
Nasale gleichgroß/kleiner Auge (%)	71/29 (7)	38/62 (11)	33/67 (10)	40/60 (10)
Circumocularia	10,8 ± 0,9 (9)	9,3 ± 0,7 (12)	9,3 ± 0,1 (13)	9,4 ± 1,0 (12)
Anteil Expl. mit 2 Subocularia-Reihen	44 % (9)	29 % (12)	38 % (13)	50 % (12)
Pileusschuppen	27,1 ± 7,7 (9)	14,6 ± 3,1 (12)	15,8 ± 4,3 (12)	18,4 ± 4,7 (12)
Zacken	50,8 ± 3,6 (5)	66,8 ± 9,0 (12)	58,8 ± 6,7 (12)	–
Anteil melanistischer Exemplare	56 %	0	0	100 %

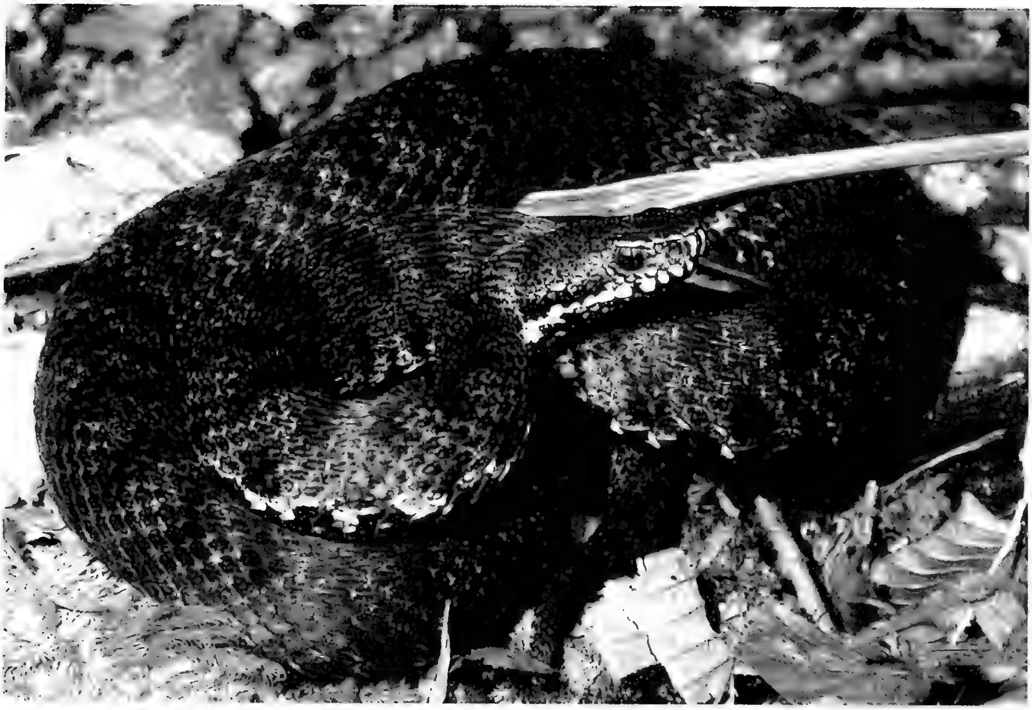

Abb. 1. Männchen von *Vipera barani* (ZSM 476/1999, südlich Dereli/Prov. Giresun, Türkei).

Abb. 2. Weibchen von *Vipera barani* (ZSM 477/1999, südlich Ardeşen/Prov. Rize, Türkei).

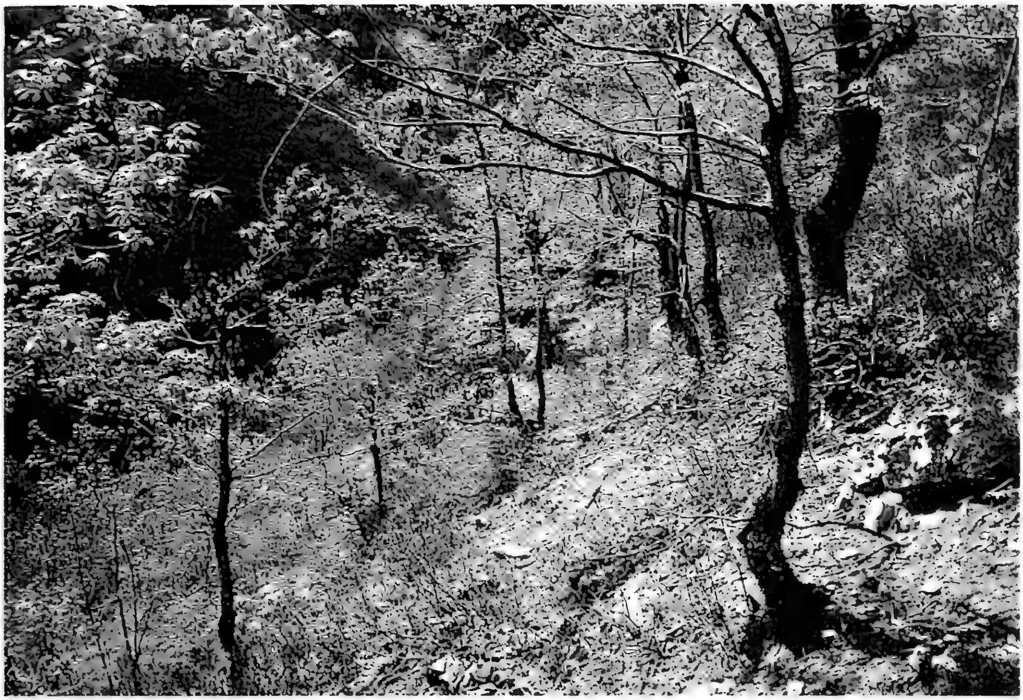

Abb. 3. Lebensraum von *Vipera barani* südlich von Dereli/Prov. Giresun (Türkei).

Abb. 4. Lebensraum von *Vipera barani* südlich von Ardeşen/Prov. Rize (Türkei).

In Tab. 2 sind morphologische Merkmale von *Vipera barani* denen der geographisch nächst gelegenen Populationen von *V. berus bosniensis* aus dem Rila- und Pirin-Gebirge (Bulgarien) sowie denen der ukrainischen *V. nikolskii* gegenübergestellt. Auf Basis dieser Stichproben unterscheidet sich *V. barani* von den bulgarischen *V. b. bosniensis* durch die niedrigeren Ventralia-Zahlen ($p < 0{,}005$), eine höhere Anzahl Circumocularia ($p < 0{,}005$) und einen höheren Fragmentierungsgrad der Schuppen der Kopfoberseite ($p < 0{,}005$), eine geringere Zahl von Zacken der Rückenzeichnung ($p < 0{,}005$ bzw. $p < 0{,}01$) sowie eine weiter caudal erfolgende Reduktion der Dorsalia-Reihen auf 19 ($p < 0{,}005$). Weiterhin treten bei *V. berus bosniensis* keine Exemplare mit 23 Dorsalreihen (vs. *V. barani* drei von neun Tieren) und keine melanistischen Tiere auf (vs. *V. barani* fünf von neun). Das Nasale ist bei *V. berus bosniensis* meist kleiner als das Auge, bei *V. barani* dagegen nur in zwei von sieben Fällen. Zusätzlich zeigt *V. barani* eine verstärkte Tendenz zur Ausbildung von zwei Subocularia-Reihen.

Von *Vipera nikolskii* unterscheidet sich *V. barani* durch niedrigere Ventralia-Zahlen ($p < 0{,}005$), die stärkere Fragmentierung des Pileus ($p = 0{,}005$), die geringere Zahl von Gular-Schuppen ($p < 0{,}005$) und die niedrigere Anzahl von Circumocularia ($p < 0{,}005$). Weiterhin erweist sich auch hier die Reduktion der Dorsalia-Reihen auf 19 als differenzierend; sie erfolgt bei *V. barani* weiter caudal als bei *V. nikolskii* ($p < 0{,}05$). Das Nasale ist bei *V. barani* meist etwa so groß wie das Auge, während es bei *V. nikolskii* in sechs von zehn Fällen kleiner ist. Beide Taxa neigen zum Melanismus: die Stichprobe von *V. nikolskii* umfaßt ausschließlich melanistische Tiere, bei *V. barani* sind es fünf von neun. Während aber bei der letztgenannten alle (adulten) Schwärzlinge im Kopfbereich mehr oder weniger ausgedehnt helle Zeichnungselemente oder zumindest aufgehellte Bereiche aufweisen (Supra-/Sublabialia, Rostrale, Canthus rostralis mit Außenrändern der Supraocularia, Kehle), war dies bei *V. nikolskii* nur bei drei von elf Stücken festzustellen, darunter die beiden einzigen Semiadulten der Stichprobe.

2.2. Fundorte und Habitate

Von den drei eigenen Nachweisen entfallen zwei auf einen Fundort im westlichen Ostpontus südlich von Giresun. Das männliche Exemplar, ZSM 476/1999, wurde am 23. April 1999 in einer kleinen eingewachsenen Blockschutthalde in einem Südhang auf 700 m NN gefangen (Abb. 3). Bei der unmittelbaren Fundstelle handelt es sich um einen lichten, unterwuchsarmen Eichen-Niederwald, in dem nur lokal Gruppen von *Rhododendron luteum* und ganz vereinzelt kleine, schlechtwüchsige Fichten *(Picea orientalis)* stocken. Der Niederwald geht nach Westen hin in einen offenen Bereich mit anstehendem Fels und Grasfluren über. Auf der anderen Seite schließt sich ein nach Osten exponierter, insgesamt etwas feuchterer, niedrigwüchsiger Hangwald an, mit dichter Vegetation aus *Picea orientalis* (vereinzelt), *Carpinus orientalis, Rhododendron ponticum* und *Pteridium aquilinum.* Insgesamt vermittelt die Fundstelle und ihr engeres Umfeld einen trocken-submediterranen Eindruck. Das Exemplar wurde gegen Mittag bei sonnig-warmen Wetter (tags zuvor ausdauernder, kräftiger Regen, Schneefall bis etwa 800 m) ruhend zwischen Gesteinsschutt entdeckt. Das weibliche Exemplar, ZFMK 72214, wurde am 7.7.1997 nachmittags (17 h) unterhalb der oben genannten Fundstelle auf einer Straße frisch überfahren, noch lebend gefunden. Der Fundort ist im wesentlichen durch angrenzendes Kulturland (Mais, Haselnüsse) sowie durch eine Böschung zum unterhalb fließenden Bach mit Gras-Staudenfluren, *Sambucus* cf. *ebulus* und Erlenjungwuchs gekennzeichnet. Die weitere Umgebung des Fundortes wird durch von Buchen dominierten Laubmischwäldern in steilen Hanglagen geprägt. Als Beimischung zu den Buchen findet sich unter anderem *Castanea sativa,* vereinzelt aber auch *Picea orientalis* und *Alnus glutinosa.* Landwirtschaftliche Nutzungen sind meist auf kleine Terrassen in den unteren Hangbereichen und die engere Talaue beschränkt und bestehen aus Haselnußkulturen, kleinen Maisfeldern sowie Walnuß-Pflanzungen.

Syntop mit *Vipera barani* konnte nur ein Exemplar von *Darevskia rudis* an einer felsigen Straßenböschung beobachtet werden. Zusätzliche Funde von Amphibien und Reptilien in der weiteren Umgebung umfassen *Bufo bufo, Anguis fragilis, Darevskia derjugini* (westlichster bisher bekannter Nachweis), *Lacerta viridis* (Beobachtung durch Bischoff & Schmidtler, mündl. Mitt. 1999) und *Coronella austriaca.*

Das dritte Exemplar, ZSM 477/1999, wurde am 27.4.1999 im Fırtına-Tal südlich von Ardeşen gefunden (Provinz Rize, östlicher Ostpontus). Bei der unmittelbaren Fundstelle handelt es sich um den breiten Gebüschsaum einer Teepflanzung in Kuppenlage. Die Vegetation besteht aus *Calluna,* kleinen Eichen und Buchenjungwuchs, einzelnen *Picea orientalis, Rhododendron ponticum, R. luteum, Pteridium aquilinum* und *Rubus* sp. (Abb. 4). Jenseits der Teepflanzung stockt ein geschlossener Buchenwald. Das

Tier wurde gegen 11 Uhr bei heißem und trockenem Wetter halb im Schatten unter einem Gebüsch entdeckt. Syntop konnte *Darevskia derjugini* und, etwas weiter entfernt an einer felsigen Straßenböschung, *D. rudis* und *D. parvula* festgestellt werden.

3. Diskussion

Bezüglich der Pholidose ergibt sich für die drei neuen Tiere eine weitgehende Übereinstimmung mit dem Holotypus und den weiteren bereits bekannten Stücken, sieht man einmal von dem auffallend geringen Fragmentierungsgrad der Schuppen der Kopfoberseite bei ZSM 476/1999 und der ungewöhnlich hohen Zahl von Lorealschuppen bei ZSM 477/1999 ab. Auch Färbung und Zeichnung der neuen Exemplare fügen sich gut in die bislang dokumentierte Variationsbreite (vgl. dazu auch Abb. bei Joger et al. 1997 und Baran & Atatür 1998: pl. 115B und 118 [als *V. pontica*]) und ähneln dabei sehr stark den von uns untersuchten *V. berus bosniensis*. Unsere Exemplare von *V. barani* weisen durchgehend orangefarbene Schwanzspitzen-Unterseiten auf, während bislang nur Gelb als Schwanzfärbung angegeben wurde (als diagnostisches Merkmal: Böhme & Joger 1983, Joger et al. 1997). Hierbei ist aber in Betracht zu ziehen, daß gerade rötliche Farbtöne in Alkohol vielfach zu Gelb entfärbt werden.

Die Analyse der morphologischen Merkmale von *Vipera barani* und den Vertretern der *V. berus*-Gruppe, für die aus chorologischen Gründen Beziehungen am ehesten anzunehmen sind, ermöglicht es, trotz der begrenzten Stichprobengrößen, die Differentialdiagnose zu ergänzen bzw. präziser zu fassen. Festzuhalten ist dabei, daß der diagnostische Wert der Subcaudalia im Sinne von Böhme & Joger (1983; auch noch bei Joger et al. 1997) zu revidieren ist:

Vipera barani unterscheidet sich von *V. nikolskii* bzw. den bulgarischen Gebirgspopulationen von *V. berus bosniensis* durch einen höheren bzw. deutlich höheren Fragmentierungsgrad der Schuppen der Kopfoberseite, die deutlich niedrigeren bzw. niedrigeren Ventraliawerte, eine weiter hinten auf dem Körper erfolgende Reduktion der Dorsalia, die im Mittel höheren Circumocularia-Werte sowie durch ein im Verhältnis zum Auge tendenziell größeres Nasale. Von *V. nikolskii* unterscheidet sich *V. barani* darüber hinaus durch die geringere Zahl von Gular-Schuppen und das durchgehende Vorhandensein von mehr oder weniger umfangreichen hellen Zeichnungselementen im Kopfbereich melanistischer Adulter. Von den bulgarischen Gebirgspopulationen von *V. berus bosniensis* unterscheidet sich *V. barani* zusätzlich durch das Auftreten von Tieren mit 23 Dorsalia-Reihen um die Körpermitte, die ganz offensichtlich deutlich stärkere Tendenz zum Melanismus und die tendenziell geringere Anzahl von Zacken in der Rückenzeichnung.

Als ein weiteres mögliches Differentialmerkmal gegenüber *Vipera nikolskii* kommt die Irisfärbung in Betracht. Hierzu liegen uns jedoch jeweils nur drei Beobachtungen an lebenden Tieren (*V. barani*: Färbung rot) bzw. drei Farbfotografien vor (*V. nikolskii*: Irisfärbung dunkel-bräunlich, Gumprecht 1994 und eig. Beob.). Desweiteren deuten sich Unterschiede in den Subcaudalia-Werten an; die ungleiche Verteilung der Geschlechter in den Stichproben erlaubt hier aber keine gesicherte Aussage.

Dagegen können Mittelwertsdifferenzen bei der Anzahl der Lorealschuppen zwischen *V. barani* einerseits und *V. berus bosniensis* und *V. nikolskii* andererseits, außer acht gelassen werden, da sie im wesentlichen auf den Umstand zurück gehen, daß in die *V. barani*-Stichprobe ein Exemplar mit ungewöhnlich hohen Werten einzubeziehen war (vgl. oben).

Die aktuellen Funde von *Vipera barani* im Ostpontus sind die ersten, bei denen zum einen die Artzuordnung eindeutig ist und die zugleich einen exakt dokumentierten Fundort haben. Die Herkunft des Holotypus "60 km nördlich Adapazarı" erscheint dagegen als nicht endgültig gesichert, da die Art in dieser Gegend trotz vielfacher Nachsuche bisher nicht wieder gefunden wurde (vgl. dazu Nilson et al. 1988, Joger et al. 1997). Darüber hinaus ist uns bekannt, daß der Importeur des Exemplares neben solchen Arten, die für das untere Sakarya-Tal bei Adapazarı charakteristisch und in der Türkei fast ausschließlich hier verbreitet sind (*Bombina bombina*), auch ostpontische Taxa in größerer Stückzahl eingeführt hat (u.a. *Mertensiella caucasica*). Eine Fundortverwechselung ist damit nicht auszuschließen. Andererseits gewinnt – wie schon bei Böhme & Joger (1983) und Joger et al. (1997) erwähnt – ein Vorkommen in der Umgebung von Adapazarı durch den alten Nachweis von "*Vipera berus*" aus Sapanca an Plausibilität (Werner 1914; ungefähr 15 km SW Adapazarı). Da der betreffende Beleg verschollen ist, läßt sich die Artzuordnung heute nicht eindeutig klären. Die wenigen von Werner (1914) angebenen Pholidosewerte fügen sich aber gut in die von uns ermittelte, erweiterte Variationsbreite. Die Herkunft dieses Tieres erscheint uns unzweifelhaft: Es liegen Reiseaufzeichnungen des

Sohnes des Sammlers vor (Bodemeyer 1927), aus denen eindeutig hervorgeht, daß dessen Vater seinerzeit in Nordanatolien außerhalb der Umgebung von Istanbul ausschließlich am Sapanca-See sammelte und hier speziell am direkt südlich davon gelegenen Gebirgszug des Gök dağ. In diesem Zusammenhang ist von Interesse, daß Bodemeyer jr. in seinen Erinnerungen an eine Reise, die ihn an die selben Orte wie seinerzeit seinen Vater führte, schildert, wie sein einheimischer Führer dort eine "Kreuzotter" tötet (Bodemeyer 1927: 29). Dieses Exemplar wurde allerdings nicht konserviert, sondern zur Köderung von Aas-Insekten verwendet. Die kurze Beschreibung weist tatsächlich auf eine *Vipera*-Art ("... in stahlblauer Färbung, die Kreuzlinien tief schwarz eingezeichnet ... aus den Giftzähnen tröpfelte beim Auf- und Zuklappen des Maules Gift heraus."). Da aber die Ansprache von Schlangenarten in weiteren Schilderungen ähnlicher Erlebnisse teils offensichtlich falsch ist, muss offen bleiben, ob Bodemeyer am Gök dağ tatsächlich eine "Kreuzotter" beobachtete.

Insgesamt spricht damit einiges dafür, daß die Art neben den eindeutig belegten Gebieten im Ostpontus auch den etwa 700 km weiter westlich gelegenen Bereich des Sakarya-Tales im Westpontus besiedelt. Wir halten darüber hinaus auch ein Vorkommen in den dazwischen liegenden Gebieten entlang der Schwarzmeerküste für wahrscheinlich. Das Fehlen entsprechender Nachweise ist nicht überraschend, da die Schlangenfauna des Pontus im wesentlichen nur in seinen westlichen und östlichen Endstücken als gut bearbeitet gelten kann.

Für eine weitere Verbreitung spricht auch die Charakteristik der Habitate im Verhältnis zu Klima und Biotopangebot des in Frage kommenden Areals. Die beiden neuen Fundstellen von *V. barani* im Collin des Ostpontus liegen einerseits in insgesamt ausgesprochen niederschlagsreichen Gebieten. Nach Mayer & Aksoy (1986) erhalten die Gebirge südlich Giresun einen Jahresniederschlag von 1200-1500 mm, der Ostpontus im Bereich von Rize sogar über 2500 mm. Andererseits handelt es sich bei den engeren Lebensräumen um ausgesprochen trockene Standorte, wobei dies für die Giresuner Fundstelle (mit submediterranem Charakter, Bodentrockenheit durch Felsstandort, Südlage) noch augenfälliger wird, als für den Fundort im Fırtına-Tal (Südexposition in Kuppenlage, *Calluna*-Bestände [indizieren im großklimatischen Bereich trockene Bodenverhältnisse]). Solche Standorte sind für den gesamten Pontus bezeichnend und treten hier in z.T. kleinräumigem Wechsel mit solchen auf, an denen das niederschlagsreiche Schwarzmeerklima voll zum Tragen kommt. Es sind Süd- und Südosthänge, die durch die Wirkung von Lee-Effekten und expositionsbedingt erhöhter Sonneneinstrahlung/Verdunstung ein vergleichsweise trockenes Lokalklima aufweisen (Hütteroth 1982: 149).

Neben diesen Erwägungen spricht auch der Vergleich mit anderen Arealen von Amphibien und Reptilien im Pontus für die Möglichkeit einer mehr oder weniger geschlossenen Verbreitung. Nach den molekularbiologischen Ergebnissen von Joger et al. (1997) ist von einer engen Verwandtschaft von *Vipera barani* mit der balkanischen *V. berus bosniensis* auszugehen. Damit kommen für einen chorologischen Vergleich vor allem Taxa mit einem großen balkanischen Areal bzw. Arealteil in Betracht, die von dort aus den Ostpontus erreichen und zugleich nördlich des Schwarzen Meeres fehlen. Zu nennen sind *Triturus karelini* (in der Türkei mit einem zusätzlichen ägäischen Arealausläufer: Schmidtler & Schmidtler 1967), *Anguis fragilis* (Baran et al. 1988), *Lacerta viridis* (Çevik & Kumlutaş 1999, Schmidtler 1986) und *Vipera ammodytes* (Nilson et al. 1988, Tok & Kumlutaş 1996, ohne Berücksichtigung der durchweg zweifelhaften Nennungen aus West- und Südanatolien, vgl. dazu Franzen & Schmidtler 1993). Dabei ist die Verbreitung von *Lacerta viridis* besonders bemerkenswert. Letztere erreicht ihre östliche Arealgrenze ebenfalls im östlichen Pontus, etwa 100 km westlich des Rize-Vorkommens von *V. barani* ("Khotz bei Trapezunt" = Çoşandere südlich Maçka: Peters 1962 [als *Lacerta agilis grusinica*] und eigener Nachweis). Das regionale Verbreitungsmuster von *Elaphe longissima* zeigt aber, daß auch unter solchen Arten eine disjunkte Verbreitung entlang des Pontus in Erwägung zu ziehen ist. Nach derzeitiger Datenlage besiedelt die Art im Westen den Bereich etwa bis Zonguldak und tritt dann wieder im Ostpontus auf, mit Vorkommen westlich bis Ünye (Böhme 1993, Tuniyev 1990). Allerdings sind auch für *E. longissima* Nachweisdefizite für den dazwischen liegenden Bereich zu unterstellen.

Die Herpetofauna der Umgebung beider Fundstellen von *V. barani* enthält neben Taxa mit balkanischem Bezug (*Anguis fragilis; Lacerta viridis,* nur bei Dereli; *Elaphe longissima,* nur im Fırtına-Tal) in erster Linie solche mit weiter Verbreitung im Pontus und Kaukasus *(Triturus vittatus,* nur im Fırtına-Tal; *Darevskia rudis)* bzw. zahlreiche kolchisch-kaukasische Arten mit begrenzter östlicher Verbreitung im Pontus (*Mertensiella caucasica; Pelodytes caucasicus,* nur im Fırtına-Tal; *Darevskia clarkorum; D. derjugini; D. parvula,* nur im Fırtına-Tal; vgl. auch Baran et al. 1997 und Franzen 1999). Höhere Zahlen von Taxa des letztgenannten Verbreitungstyps werden in der Türkei sonst nur in unmittelbarer Grenznähe zu Georgien, in der Umgebung von Hopa erreicht (mit *Lacerta agilis grusinica* und *Vipera kaznakovi*).

Unabhängig von den Betrachtungen zum möglichen Gesamtareal von *Vipera barani* ist festzuhalten, daß mit deren Nachweis im Collin des Ostpontus dort mit Sympatrie von maximal vier Arten der Gattung *Vipera* gerechnet werden muss. Von diesen ist allerdings *V. pontica*, die 1990 von Billing et al. aus dem Çoruh-Tal beschrieben wurde, kaum deutbar und daher hier auch nicht weiter zu diskutieren. Für *V. kaznakovi*, die den Bereich von Osten her erreicht, kann nach derzeitiger Datenlage noch von einer allopatrischen Verbreitung mit *V. barani* ausgegangen werden kann, wobei jedoch die Fundstelle von *V. barani* im Fırtına-Tal nur 45 km von den westlichsten Vorkommen von *V. kaznakovi* entfernt liegt (Nilson et al. 1988). Es verbleibt *V. ammodytes*, für die sich ein sympatrisches Vorkommen nicht nur für den östlichen (Tok & Kumlutaş 1996, Nilson et al. 1988 und eigener Fund, 20 km nördl. Aybastı, 300 m NN, Prov. Ordu), sondern auch für den westlichen Nachweisbereich von *V. barani* (Nilson et al. 1988) und damit eine breite Arealüberschneidung ergibt. Ein solcher Fall war aber bislang innerhalb der gesamten Gattung *Vipera* nicht bekannt, zumindest nicht, ohne daß die betreffenden Arten sich auf unterschiedliche Höhenstufen verteilen bzw. standörtlich deutlich unterschiedene Präferenzflächen aufweisen würden. Dieses Prinzip wurde erst jüngst wieder von Nilson et al. (1994, 1995) für die Vipern des Kaukasus belegt. Nach derzeitiger Datenlage besiedelt aber *V. barani* ebenso wie *V. ammodytes* nicht nur die gleiche Höhenstufe, sondern auch ähnliche Lebensraumtypen, nämlich trockene Sonderstandorte, die als Habitatinseln in die zonalen Feuchtwälder eingestreut sind (zur Habitateinbindung von *V. ammodytes transcaucasiana* vgl. Bozhanskii & Kudryavcev 1986, Mushelishvili 1970, Nilson et al. 1988, Tok & Kumlutaş 1996). Eine Koexistenz zweier *Vipera*-Arten im gleichen Raum erscheint unter diesen Voraussetzungen nur dann denkbar, wenn die Verbreitung beider Arten diskontinuierlich ist, mithin also durch den Inselcharakter der Vorkommen die interspezifische Konkurrenz begrenzt wird. Bezüglich der Verteilung der Populationen der beiden Arten spielen dann unter Umständen stochastische Effekte bzw. feine standörtliche Unterschiede eine Rolle.

Zusammenfassung

Vipera barani wird von zwei Fundorten aus den Provinzen Giresun und Rize im östlichen Pontus-Gebirge, Türkei, gemeldet. Die Tiere wurden in vergleichsweise trockenen, südexponierten Habitaten gefunden, in Giresun an einem felsigen Hang mit lichtem Eichenwald, in Rize am Rand einer Teepflanzung in einer bodentrockenen Kuppenlage. Der morphologische Vergleich der bisher bekannten Stücke der Art mit bulgarischen *V. berus bosniensis* und ukrainischen *V. nikolskii* erbrachte mehrere, überwiegend bisher nicht bekannte Unterschiede zwischen diesen Taxa: Anzahl der Kopfschuppen und Ventralia, Position der Reduktion auf 19 Dorsaliareihen, Zeichnungsmuster sowie zum Teil Circumocularia- und Gularia-Werte, relative Größe der Nasalia und Auftreten von Exemplaren mit 23 Dorsalschuppenreihen. Angesichts der derzeit bekannten Verteilung der Fundorte vermuten wir eine weite Sympatrie mit *V. ammodytes transcaucasiana*. Im Hinblick auf die wahrscheinlich sehr ähnlichen Habitatansprüche beider Arten diskutieren wir mögliche lokale Verbreitungsmuster.

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SPIXIANA	**23**	1	71-83	München, 01. März 2000	ISSN 0341-8391

A new species of *Mantidactylus* from northeastern Madagascar with resurrection of *Mantidactylus blanci* (Guibé, 1974)

(Amphibia, Anura, Ranidae)

Frank Glaw & Miguel Vences

Glaw, F. & M. Vences (2000): A new species of *Mantidactylus* from northeastern Madagascar with resurrection of *Mantidactylus blanci* (Guibé, 1974) (Amphibia, Anura, Ranidae). – Spixiana **23/1:** 71-83

Mantidactylus schilfi, spec. nov. is described from the Marojezy massif in northeastern Madagascar. Males of the new frog species are characterized by a distinct colouration of the head sides (a white band along the upper lip which is bordered by a black band), very long hindlegs, and a small snout-vent length (males 27-29 mm). In addition, *M. schilfi* differs from all similar *Mantidactylus* species by advertisement calls. The new species is tentatively included in the subgenus *Gephyromantis*. *Gephyromantis blanci* Guibé, 1974 is resurrected (as *Mantidactylus blanci*) from the synonymy of *Mantidactylus decaryi* (Angel, 1930). Both species are redefined and advertisement calls of *M. decaryi* are described.

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Introduction

Madagascar harbours an enormous diversity of amphibian species of which a large number still remains to be described. 182 valid species were scientifically named until the end of the 20th century, but a total of at least 224-250 species have already been discovered and identified (Glaw & Vences in press). The most speciose amphibian genus in Madagascar is *Mantidactylus* (Ranidae: Mantellinae), which is classified in 12 subgenera (Glaw & Vences 1994). Phylogenetic relationships between these subgenera are largely unknown. In the present paper we describe a new species of *Mantidactylus* from northeastern Madagascar and resurrect another one, which bears similarities to the new species in a number of characters.

Material and methods

Vocalizations were recorded using portable tape recorders with an external microphone (Vivanco EM 238) and were analyzed with the MEDAV sound analyzing system Spektro 3.2. Sonagrams were edited with high frequency resolution (FFT 512). Morphological measurements were taken by the same person (FG) with a calliper to the nearest 0.1 millimeter. For definition of external and internal views of femoral glands, see Glaw et al. (in press). Webbing formula is given according to Blommers-Schlösser (1979). Institutional abbreviations are as follows: MNHN (Muséum national d'Histoire naturelle, Paris); UADBA (University of Antananarivo, Departement de Biologie Animale); ZFMK (Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn); ZSM (Zoologische Staatssammlung, München). SVL is used to abbreviate snout-vent length.

Fig. 1a. Holotype of *Mantidactylus schilfi*, spec. nov. (ZFMK 59885) from the Marojezy massif in dorsolateral view.

Fig. 1b. Holotype of *Mantidactylus schilfi*, spec. nov. Drawing by R. Kühbandner (Photo: M. Müller).

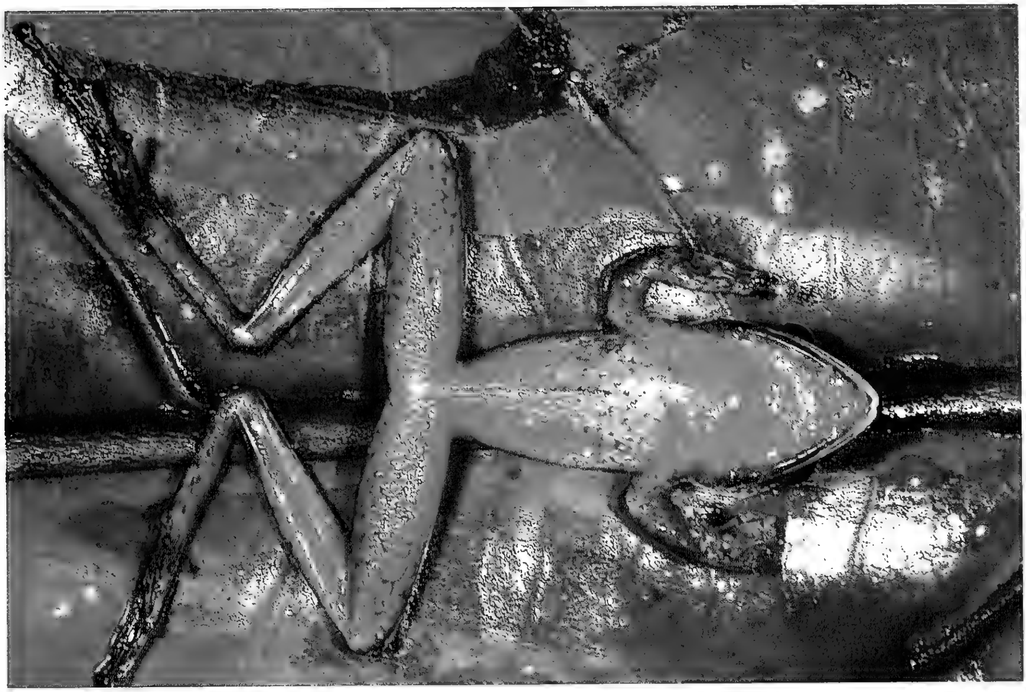

Fig. 2. Holotype of *Mantidactylus schilfi*, spec. nov. in ventral view.

Fig. 3. Paratype of *Mantidactylus schilfi*, spec. nov. (ZSM 587/1999) in dorsolateral view.

Results and Discussion

Mantidactylus schilfi, spec. nov.

Figs 1-5

Types. Holotype: ZFMK 59885, adult male, collected in the "Réserve Naturelle Intégrale Marojezy", Camp 4 (ca. 1250 m above sea level), northeastern Madagascar, on 28 February 1995 by F. Glaw & O. Ramilison. – Paratypes: 2 males: ZSM 587/1999 (originally ZFMK 59886) and UADBA (number unknown), both with same locality, date and collectors as holotype; 1 female: MNHN 1973.931 (with very small oocytes as ascertained by dissection) from Marojezy, 1300 m above sea level, collected by C. P. Blanc on 2 July 1972.

Diagnosis. *M. schilfi* is characterized as a member of the genus *Mantidactylus* by the lack of nuptial pads in males and by its general similarities to other species of the genus. Males differ from all other *Mantidactylus* by a combination of the following characters: (1) Colouration of the head sides (a distinct white band along the upper lip which is bordered by a black band from the snout tip to the insertion of hindlimbs, Fig 1); (2) very long hindlegs (when limbs are adpressed to the body, tibiotarsal articulation reaches far beyond the tip of snout); (3) small snout-vent length (males 27-29 mm); (4) virtually not recognizable femoral glands in calling males; (5) largely, but not completely connected lateral metatarsalia; (6) advertisement calls (see below). It differs from *M. granulatus* (which can have very similarly coloured head sides) by (1) largely connected metatarsalia, (2) less webbing between toes, (3) smaller SVL (males up to 29 mm in *M. schilfi* versus up to 42 mm in *M. granulatus*), (4) lack of black vocal sac folds along the lower jaw in males, (5) advertisement calls, and (6) by the calling habitat (along brooks in *M. granulatus* versus independent from water bodies in *M. schilfi*).

Description

Holotype (Figs 1-2). SVL 29.0 mm. Body slender; head longer than wide, slightly wider than body; snout pointed in dorsal and lateral views; nostrils directed laterally, slightly protuberant, nearer to snout tip than to eye; canthus rostralis distinct, slightly concave; loreal region weakly concave; tympanum distinct, rounded, horizontal tympanum diameter (1.9 mm) is 50 % of eye diameter (3.8 mm); supratympanic fold recognizable (appears distinct by the strong colour border), rather straight; tongue ovoid, distinctly bifid posteriorly; vomerine teeth small but distinct, positioned posterolateral to choanae; choanae rounded. Arms slender; subarticular tubercles single; outer metacarpal tubercle not recognizable, inner metacarpal tubercle indistinct; fingers without webbing; relative length of fingers: 1<2<4<3; finger disks distinctly enlarged; nuptial pads absent. Hindlimbs slender; tibiotarsal articulation reaches far beyond snout tip; lateral metatarsalia largely, but not completely connected; inner metatarsal tubercle small but distinct; outer metatarsal tubercle rudimentary and indistinct; webbing formula between toes: 1(1), 2i(1.5), 2e(1), 3i(2.25), 3e(1.5), 4i(3), 4e(2.5), 5(1); relative length of toes: 1<2<3<5<4. Skin on the upper surface smooth, back with rather indistinct dorsolateral folds; ventral side largely smooth, slightly granular on the venter. No distinct tubercles in the anal region. Femoral glands (in life and in preservative) very poorly delimited and very indistinct from both external and internal view (not referable to the gland types defined in Glaw et al. in press). After more than four years in alcohol, dorsum grey-brown, more beige posteriorly. A brown band between eyes, bordering a more or less triangular beige patch which covers the head surface. Arms light brown without distinct dark crossbands. Hindlimbs light brown with indistinct dark crossbands. Head colouration very characteristic: a highly distinct white band along the upper lip from snout tip to the insertion of arms, sharply bordered by a black band from snout tip to the insertion of arms which is interrupted by the eye. Venter beige to yellowish, with small dark spots on the venter and a more reticulated pattern on the shanks. Brown mottling on the throat, with a thin blackish band along the lower jaw. Colouration in life (Figs 1-2) generally similar to that in preservative. However, the dorsal surface is more colourful in life, being more orange-brown. The ventral surface is more yellowish than in alcohol.

Paratypes. ZSM 587/1999 is morphologically very similar to the holotype. SVL 27.1 mm. Tympanum diameter (2.0 mm) is 51 % of eye diameter (3.9 mm). The dorsolateral folds are more distinct than in the holotype. Femoral glands very poorly delimited and very indistinct from both external and internal view. Webbing formula is identical to the holotype. The paratype from UADBA was not available for morphological comparison. The life colouration of the two male paratypes is shown in Figs 3-5. Morphology and colouration of MNHN 1973.931 is largely similar to ZFMK 59885 and ZSM

587/1999, except for its distinctly larger size (SVL 34.5 mm) and the fact that the head is as wide as the body (which may be due to a different mode of fixation). The skin in the femoral gland region of the shanks is similar to the male paratypes. Vomerine teeth present; tympanum diameter (2.3 mm) is 58 % of eye diameter (4.0 mm); dorsolateral folds distinct; tibiotarsal articulation reaches much beyond snout tip, webbing formula of the foot: 1(1), 2i(1.75), 2e(1), 3i(2.5), 3e(1.75), 4i(3), 4e(2.5), 5(1); lateral metatarsalia partially connected. Dorsal colouration light brown with black head sides and distinct white lips. Two very small black dots between the eyes. Ventral colouration whitish with vermiculated markings. The stomach contained one beetle of about 3 mm length. The dorsal colouration of MNHN 1973.931 closely resembles that of *Mantidactylus granulatus* and it was considered as such in Vences et al. (1999). However, a careful re-examination of this specimen revealed that is has much less webbing between the toes and partially connected lateral metatarsalia and therefore can not be a subadult *M. granulatus*. It is very probably a female of *M. schilfi* because of its general similarities in colouration and external morphology with the other type specimens and the fact that it was collected in the same area at virtually the same altitude as the other *schilfi* types. It must be emphasized, however, that the available *schilfi* males are distinctly smaller than MNHN 1973.931 (79-84 % of the female SVL) and that such distinct sexual size dimorphism is unusual in both the *M. granulatus* group and the *M. boulengeri* group (see “Relationships” below).

Distribution. *Mantidactylus schilfi* is only known from 1250-1300 m altitude of the Marojezy Reserve in northeastern Madagascar. Numerous amphibian and reptile species appear to be endemic to this massif, and the same may be true for the new species. Except for MNHN 1973.931, no addititional voucher specimens of *M. schilfi* were found in the MNHN collection which harbours a large collection from the Marojezy mountains. This may indicate that *M. schilfi* is a rare species. However, it appears more likely that it is simply difficult to discover by opportunistic searching, since all recently collected specimens were found only by locating calling males.

Habitat. Calling males were sitting at mid-day in bushes ca. 1-1.5 m above the bottom. No water body was recognized in the vicinity of the calling males. Therefore, it appears likely that *M. schilfi* has a reproductive mode which is independent from water bodies. It probably has direct development (without free swimming tadpoles) as is known for several species of the subgenus *Gephyromantis* (Blommers-Schlösser 1979, Glaw & Vences 1994).

Advertisement calls (Fig. 10. Vocalizations were recorded at the type locality in the Marojezy Reserve on 28 February 1995, 11:30 h, at 22.5 °C air temperature: Notes are unharmonious, distinctly pulsed and (generally) emitted in regular series. One completely analyzed note series consisted of 21 notes and had a duration of about 40 seconds. Temporal parameters (given as range, followed by mean ± standard deviation and number of measurements) are as follows: Note duration is 326-428 ms (404±27 ms, n=22), interval duration 974-3607 ms (1625±743 ms, n=21). Intervals between the first notes of a note series are the longest and become successively shorter until they reach a constant value (about 1000-1500 ms). Notes consist of 48-61 pulses (56±4, n=8), the pulse rate is 136-155/s (142±7/s, n=7). Frequency range is 2400-3900 Hz (dominant frequency 2800-3300 Hz).

Etymology. *Mantidactylus schilfi*, spec. nov. is dedicated from Mrs. Margot Schilf (Augsburg) to her son Prof. Dr. Wolfgang Schilf on the occasion of his 50th birthday.

Relationships. The relationships of *M. schilfi* are of special interest, because it shows a mosaic of characters which are typical either for the *Mantidactylus granulatus* group of the subgenus *Phylacomantis* or for the *Mantidactylus boulengeri* group of the subgenus *Gephyromantis*. Other characters are intermediate between both groups. *M. schilfi* therefore seems to represent a connecting link between both species groups that may indicate close phylogenetic relationships between them.

- The contrasting colouration of the head sides with a distinct white band along the upper lip and a black band from the snout tip to the insertion of arms is very typical for *Mantidactylus (Phylacomantis) granulatus*. However, most species of the *Mantidactylus boulengeri* group (subgenus *Gephyromantis*) can also have a blackish temporal region and a light band along the upper lip, although this band is less distinct and often disrupted by small dark spots.
- The lateral metatarsalia are largely or completely connected in all species of the *Mantidactylus boulengeri* group and partially or completely separated in the species of *Phylacomantis*.

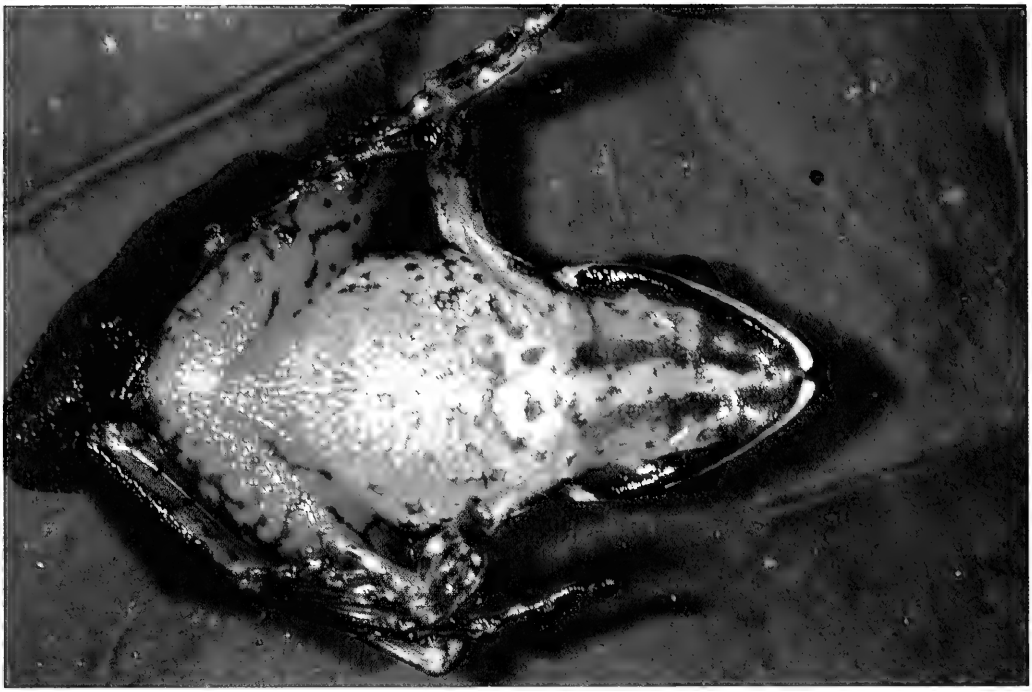

Fig. 4. Paratype of *Mantidactylus schilfi*, spec. nov. (ZSM 587/1999) in ventral view.

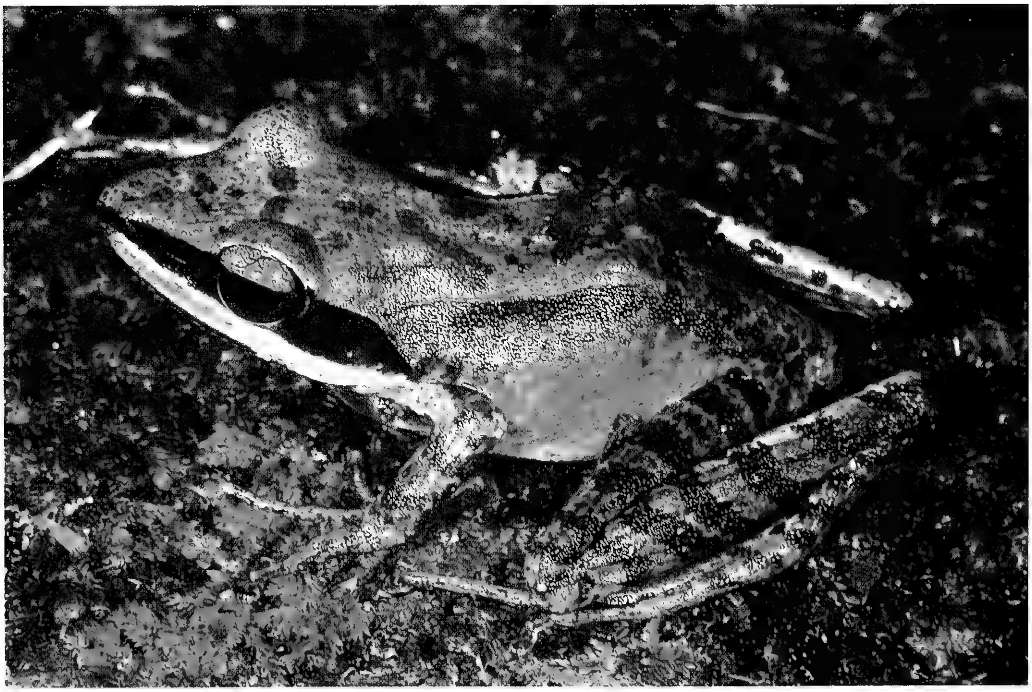

Fig. 5. Paratype of *Mantidactylus schilfi*, spec. nov. (UADBA) in dorsolateral view.

Fig. 6. *Mantidactylus blanci* (Guibé) from the Andringitra massif (male in dorsolateral view).

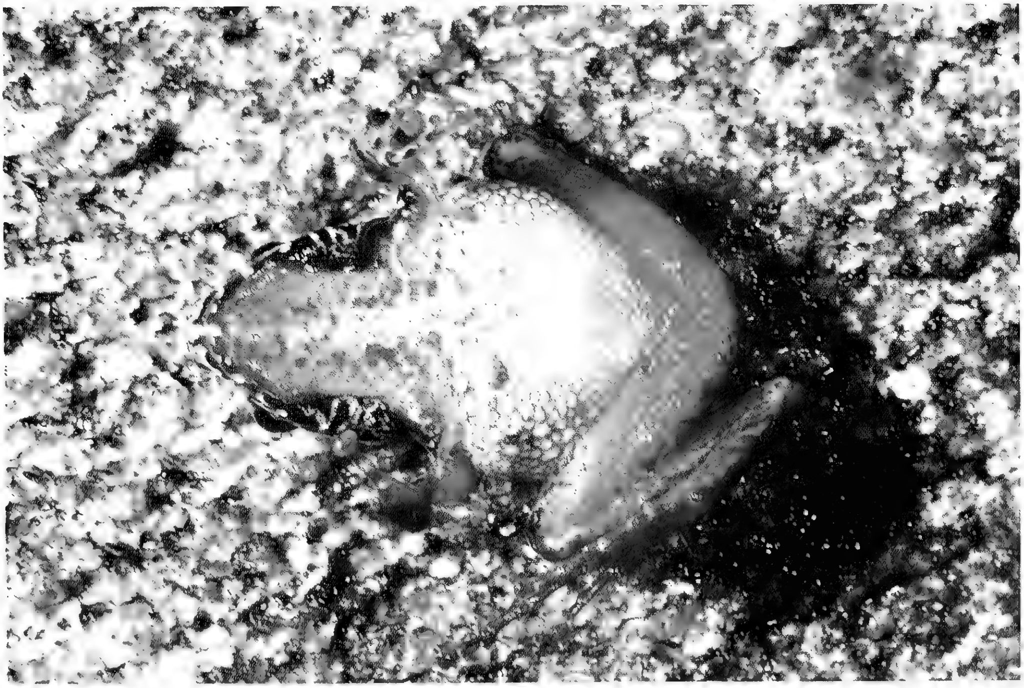

Fig. 7. *Mantidactylus blanci* (Guibé) from the Andringitra massif (male in ventral view).

- Accordingly, webbing on the fourth toe is generally absent in the *Mantidactylus boulengeri* group, but present in all *Phylacomantis* species.
- The range of SVL is 20-33 mm in the *Mantidactylus boulengeri* group and 31-50 mm in the subgenus *Phylacomantis*. The size of *M. schilfi* (27-34.5 mm) is therefore intermediate between the *M. boulengeri* group and the subgenus *Phylacomantis*.
- Black spots between the eyes occur in species of both the *M. boulengeri* group *(M. boulengeri)* and the subgenus *Phylacomantis (M. redimitus, M. cornutus)*.
- Indistinct femoral glands of males (from external view) occur in species of the *M. boulengeri* group *(M. eiselti, M. thelenae)* and the subgenus *Phylacomantis (M. granulatus)*.
- The distinct sexual size dimorphism of *M. schilfi* is neither typical for the *Mantidactylus boulengeri* group nor for *Phylacomantis* species.
- Diurnal calling activity far away from water bodies is typical for the species of the *M. boulengeri* group, whereas calling activity is mainly nocturnal in *Phylacomantis* and – if diurnal – concentrated along brooks. The calling activity of *M. schilfi* is therefore in agreement with the *M. boulengeri* group.
- A limited series of regularly repeated notes is a typical call structure of numerous *Mantidactylus* species with diurnal calling activity (including the species of the *M. boulengeri* group) whereas *Phylacomantis* species tend to produce long series of notes.

Summarizing, the available data do not allow an unambiguous attribution of *Mantidactylus schilfi* either to *Gephyromantis* or *Phylacomantis*. The main argument to erect the subgenus *Phylacomantis* was the observation of free-swimming and feeding tadpoles in *Mantidactylus corvus* and *M. pseudoasper*, whereas *Gephyromantis* was thought to have direct development (Glaw & Vences 1994). Unfortunately, nothing is known about the reproduction of *M. schilfi*. However, the calling activity far away from water bodies may indicate that direct development is much more likely in this species than reproduction with free swimming larvae. We therefore consider *Mantidactylus schilfi* tentatively as a member of the *Mantidactylus boulengeri* group (sensu Vences et al. 1997) in the subgenus *Gephyromantis*.

Available names. All valid *Mantidactylus* species can be clearly distinguished from *M. schilfi* by the character combination given in the diagnosis. However, synonyms of valid taxa are to be excluded as earlier available names. Among others, *M. schilfi* is characterized by a small SVL, by very long hindlegs, and by largely, but not completely connected lateral metatarsalia. Two available names which may fit into the description of *M. schilfi* are *M. decaryi* and *M. blanci*, the latter being considered as a junior synonym of the former. However, as will be demonstrated below, both taxa are referable to valid species which are clearly different from *M. schilfi*.

Identity of *Mantidactylus blanci* (Guibé, 1974) and *M. decaryi* (Angel, 1930)

Mantidactylus blanci was originally described as *Gephyromantis blanci* from the Andringitra mountains without providing any explicit characters to distinguish it from other *Mantidactylus* species. In his monograph on Madagascan frogs, Guibé (1978) considered the species again, largely repeating the original description, but provided an identification key. In 1991 Blommers-Schlösser & Blanc designated a lectotype of *Gephyromantis decaryi* and synonymized *G. blanci* with *Mantidactylus decaryi* without any discussion, although these authors obviously studied the type material of both taxa.

In his identification key Guibé (1978: 46) characterized *M. blanci* by: "(1) Une barre sombre entre les yeux. (2) Lèvre supérieure nettement marquée de blanc. (3) Un fin repli dorso-latéral. (4) Face ventrale blanche avec un semi plus ou moins dense de petites taches sombres." *M. decaryi* was characterized by: "(1) Pas de barre sombre entre les yeux. (2) Lèvre supérieure sans marque blanche. (3) Pas trace de repli dorso-latéral. (4) Téguments irrégulierèment granuleux, surtout sur l'abdomen. (5) Canthus net. (6) Dents vomériennes en deux groupes distincts. (7) Deux barres sombres sous l'oeil. (8) Dessous du corps clair, légèrement ponctué de sombre." Characters 1-3 to identify *M. blanci* agree with our material from near Ambalamarina in the Andringitra mountains (ZFMK 57426, 57427, 59829, 59830, see also Figs 6-7) whereas character 4 is less well recognizable. Characters 1, 2, 4, 5, 7 and 8 to identify *M. decaryi* agree well with our material of an unidentified and recently collected species from the Ranomafana region (ZFMK 62294 and 62279, see also Figs 8-9), although character 1 approaches the state of *M. blanci* in ZFMK 62294. Character 3 is less clear since partial dorso-lateral folds are recognizable in both specimens. Character 6 can not be confirmed at all since vomerine teeth are virtually absent in ZFMK

62294 and 62279. Summarizing, according to the key of Guibé (1978), there remains little doubt that our material from the Ranomafana region is referable to *M. decaryi,* whereas the specimens from Andringitra belong to the taxon *M. blanci.*

Mantidactylus blanci (Guibé, 1974), bona species

Figs 6-7

Identity. A recent re-examination of the *M. blanci* type specimens confirmed that this taxon is referable to specimens collected in the Andringitra mountains which were described and figured under the name *M. decaryi* (Glaw & Vences 1994). On the other hand, the type material of *M. decaryi* closely resembles the species from the Ranomafana region, which is clearly different from *M. blanci* in morphology, colouration and advertisement calls. *Mantidactylus blanci* must therefore be considered as a valid species.

Diagnosis. *M. blanci* is characterized as a species of the subgenus *Gephyromantis* by completely connected lateral metatarsalia, virtually no webbing between toes, rather smooth skin, small snout-vent length, calling habitat (independent from water bodies), and its similarity with the other species of the *Mantidactylus boulengeri* group. It differs from the other species of this group as follows: From *M. boulengeri, M. silvanus, M. eiselti,* and *M. thelenae* by longer hindlegs (tibiotarsal-articulation reaches beyond snout tip); from *M. decaryi, M. boulengeri, M. eiselti, M. thelenae, M. klemmeri, M. webbi* and *M. schilfi* by advertisement calls and colouration; and from *M. rivicola* by colouration and terrestrial habits. Males of *M. blanci* differ from those of *M. eiselti, M. thelenae,* and *M. schilfi* by the presence of distinct and well delimited femoral glands which are easily visible from external view. *M. blanci* differs from *M. decaryi* by the characters mentioned in the key of Guibé (1978) as discussed above, and in addition by smaller snout-vent length (males 21.9-22.8 mm versus 26.3-26.5 mm in the ZFMK material), shorter hindlimbs (tibiotarsal articulation reaches slightly beyond snout tip versus far beyond snout tip), life colouration (see Figs. 6-9) and by advertisement calls (see Figs. 11-12). The only available female of *M. blanci* (ZFMK 57427) is similar to the three males, but slightly larger (SVL 24.5 mm) and without blackish vocal sac folds.

Distribution. *M. blanci* is known from two localities in the Andringitra mountains, the forest of Ambalamarovandana at 1500 m altitude (Guibé 1974) and the rain forest around Ambalamarina at similar altitude (Glaw & Vences 1994). In addition, a specimen from the Ranomafana area (photographed by J. Köhler in 1995) should be considered as *M. blanci* as well, since it has distinct femoral glands and recognizable blackish vocal sac folds. The calls here referred to *M. blanci* were recorded at Vohiparara (ca. 1000 m altitude). The four localities (1) Iorantjatsy, (2) Andrianony, (3) Fivahona, and (4) Chaines Anosyennes, listed in Blommers-Schlösser & Blanc (1991), may refer either to *M. decaryi* or to *M. blanci.*

Habitat. Calling males were found during the day on the ground in primary rainforest of the Andringitra massif (in January) and heard in secondary fern scrub at Vohiparara (in February). In both cases, calling males were not found around water bodies.

Advertisement calls (Fig 11). Vocalizations from Andringitra have been shortly described by Glaw & Vences (1994) under the name *M. decaryi.* New recordings from Vohiparara (Ranomafana region), recorded 28 February 1996 at 18:15 h were similar to those from Andringitra, but unfortunately the calling specimens could not be located in the dense fern scrub. Since *M. blanci* was already recorded from the Ranomafana region by photographs (see above) it is nevertheless likely that the following description refers to the calls of *M. blanci*: Vocalizations were emitted in series of 11-14 (12.7±1.0, n=7) melodious notes. Interval duration between two note series was up to several minutes. The duration of note series was 1034-1325 ms (1215±99.9, n=7), the note repetition rate 9.8-11.1/s. Note duration was 21-28 ms (24±2 ms, n=13), duration of intervals between two notes 58-103 ms (73±11 ms, n=12). The interval between the two last notes of a series was longer than between the other notes. Fundamental frequency was between 2000-2300 Hz and dominant frequency between 4150-4700 Hz. The note series from Vohiparara are similar to *M. boulengeri* (especially in the number of notes per series) but the note repetition rate is higher in *M. blanci.* The note series from Vohiparara differ from those of Andringitra by a higher number of notes.

Fig. 8. *Mantidactylus decaryi* (Angel) from Ranomafana (male in dorsolateral view).

Fig. 9. *Mantidactylus decaryi* (Angel) from Ranomafana (male in ventral view).

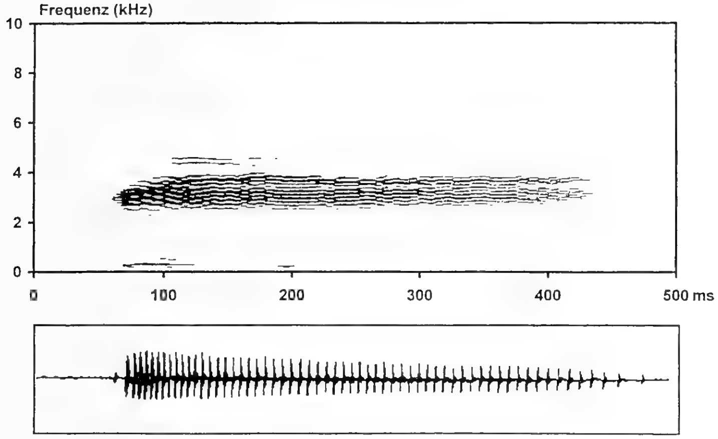

Fig. 10. Sonagram and oscillogram of one note of *Mantidactylus schilfi,* spec. nov. from the type locality.

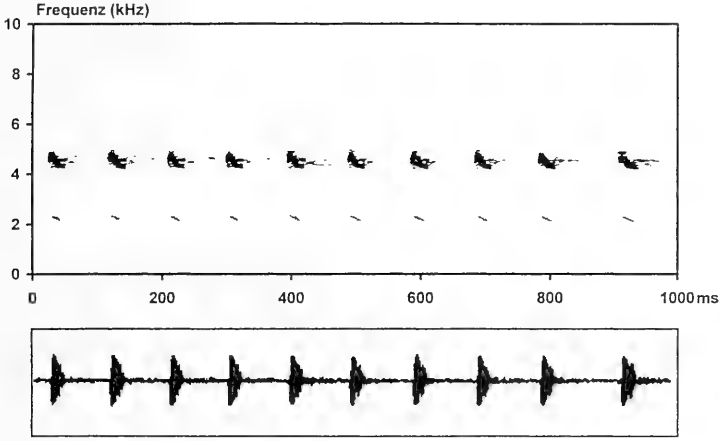

Fig. 11. Sonagram and oscillogram of a section of a note series of *Mantidactylus blanci* (Guibé) from Vohiparara.

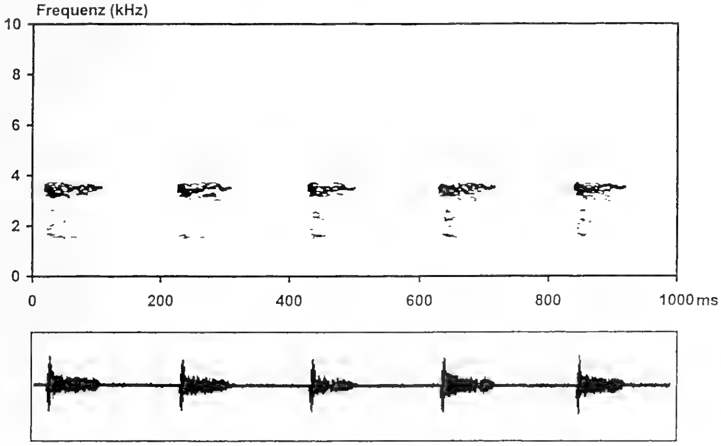

Fig. 12. Sonagram and oscillogram of a section of a note series of *Mantidactylus decaryi* (Angel) from Ranomafana.

Mantidactylus decaryi (Angel, 1930)
Figs 8-9

Identity. The type material of *M. decaryi* is in a bad state of conservation. In the lectotype MNHN 1930.435 (designated by Blommers-Schlösser & Blanc 1991) the left hindleg is completely separated from the body and the right hindleg is only loosely linked with the body (foot and tarsus are completely lacking from the right limb). The SVL is 22.5 mm. Although the original colouration is largely faded and the condition of the lectotype is very bad, several characters agree with that of the unidentified species from the Ranomafana region. (1) There is a slightly converging, dark-bordered ridge on each side of the neck, that is followed dorsolaterally by a further ridge. (2) A brown spot is present below the canthus rostralis between eye and nostril. (3) Two further brown spots are present between eye and nostril. About four brown irregularly dispersed spots on a light background are recognizable on each side of the lower jaw. A brown bar is present between the eyes. (4) In contrast to the original description (Angel 1930) vomerine teeth are rather indistinct. These characters of the lectotype are nearly identical in our specimens from the Ranomafana region, except that the colour of the spots in life is black instead of brown. Only the black tympanic region of the living specimens is not (no longer?) recognizable in the lectotype. Paralectotype MNHN 1930.438 is a juvenile of about 14.5 mm SVL. Paralectotype MNHN 1930.437 is an adult male of 23.4 mm SVL with very long limbs (exact measurements were not taken because of the poor conservational state), with distinct elongated femoral glands (5.0-5.5 mm × 1.5 mm), and with distinct skin folds along the lower jaw (vocal sac). In contrast to the lectotype brown spots on the head or folds on the back are less or not recognizable. Paralectotype MNHN 1930.436 was not received from the MNHN. It may represent the specimen that was exchanged with the Museum of Comparative Zoology in 1932 and probably corresponds to MCZ 17459 (Barbour & Loveridge 1946).

Angel (1930) mentioned four specimens collected 500-1100 m above sea level. Our records are virtually in the same altitudinal range and from the same region (southern half of eastern Madagascar). Regarding the amount of morphological similarity between the type material of *M. decaryi* and our specimens from the Ranomafana region we conclude that both are conspecific.

Distribution. Reliable records of *M. decaryi* sensu stricto are Midongy du Sud, 500-700 m altitude (lectotype MNHN 1930.435) and Pic d'Ivohibe, 1100 m altitude (MNHN 1930.436 to 438, paralectotypes). Personal records are from Ranomafana (21°14'S, 47°26'E, 500-600 m alt., ZFMK 62294), from above Vohiparara (ca. 1050 m alt., ZFMK 62279), and from several places along the street between both localities (no voucher specimens). The four localities (1) Iorantjatsy, (2) Andrianony, (3) Fivahona, and (4) Chaines Anosyennes, listed in Blommers-Schlösser & Blanc (1991), may refer either to *M. decaryi* or to *M. blanci*. Near Vohiparara *M. decaryi* apparently occurs in sympatry with *M. blanci*.

Habitat. Calling males were found in February and March during the day. They were sitting on or near the ground in primary rain forest and in secondary vegetation, far away from water bodies.

Advertisement calls (Fig 12). Calls were recorded on 26 February 1996 at Ranomafana during the day. The frogs emitted rather long series of notes. The duration of a note series with 44 notes was 9470 ms. Note duration was 65-120 ms (85 ± 14 ms, n = 44), interval duration 114-178 ms (131 ± 13 ms, n = 43). Both note duration and interval duration did tend to become shorter from the first to the last note of a series. Fundamental frequency was 1450-1650 Hz, dominant frequency 2950-3600 Hz. The intensity of each note had a peak at its beginning, decreasing toward its end.

Acknowledgements

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Es hat ja lange gedauert – wie nicht anders zu erwarten bei der ungeheuren Fülle an Daten – aber jetzt ist er da! Nämlich ein vollkommen neu überarbeiteter, vor allem kritisch überarbeiteter Katalog der existierenden Carabiden der Welt inklusive der Cicindeliden und Rhysodiden. Er ist in (bisher) zwei Teilen angeordnet, nämlich die alphabetische Auflistung sämtlicher jemals für Laufkäfer und Sandlaufkäfer gebrauchter Namen und die systematische Liste aller dieser Namen.

Natürlich ist bereits der Mut und das Durchhaltevermögen des Autors zu loben, aber insbesondere ist hervorzuheben, daß der Autor eben nicht einfach den Csiki-Katalog oder irgendeinen anderen Katalog ergänzt hat, sondern daß er etwas Neues geschaffen hat, nämlich auf der Basis der Durchsicht aller (oder fast) aller Literatur und auf der Grundlage guter eigener Kenntnis der Laufkäfer-Systematik eine eigene Konzeption zu entwickeln.

Der Rezensent hat die Entstehung dieses Werks begleitet – zunächst sehr skeptisch, wie er offen bekennt, dann mit immer besserem Gefühl – und hat natürlich auch nicht versäumt, noch vor dem Erscheinen der endgültigen Fassung eine vorläufige Version durchzusehen und in der täglichen Arbeit zu benutzen. Er hat es ebenso gemacht wie alle jene, die eine derartige Knochenarbeit anderen überlassen, das fertige Produkt aber gern benutzen! Er hat natürlich auch versucht, Fehler darin zu finden. Während die Benutzung sehr erfolgreich verlief, kann man das für die Fehlersuche nicht behaupten. Und von den wenigen Unstimmigkeiten, die ihm auffielen, ist noch ein gewisser Teil auf unterschiedliche systematische oder taxonomische Anschauungen zurückzuführen. Schon allein dies ist natürlich ein ganz bedeutender Fortschritt gegenüber dem Csiki-Katalog und es zeigt, wie sorgfältig der Autor gearbeitet hat. Der wichtigste Fortschritt ist selbstverständlich, daß jetzt endlich eine Lücke geschlossen wurde, die jegliche taxonomisch-systematische Arbeit an außereuropäischen Carabiden enorm erschwert hat.

Im ersten, alphabetischen Teil werden alle jemals benutzen Namen von der Unterfamile bis zur Unterart aufgeführt. Das ist eine sehr hilfreiche Anordnung, gibt es doch dem Benutzer endlich einmal die Chance, Arten auch dann noch schnell zu finden, wenn sie mehrfach in verschiedenen Gattungen herumgeschoben worden sind. Insbesondere angesichts der Divergenzen zwischen "anglophoner" und "frankophoner" Systematik ist dieser alphabetische Teil enorm hilfreich.

Dem zweiten, systematischen Teil liegt ein semikonservatives Verständnis der Laufkäfersystematik zugrunde. Das System ist modern, aber nicht mit dem ausufernden Gebrauch von Gattungen und höheren Kategorien belastet, den unsere frankophonen Kollegen zur Zeit so pflegen. Und für einen Katalog ist eine konservative Systematik ja ohnehin weitaus günstiger. Schließlich dient ein Katalog nicht dazu, die systematischen Anschauungen des Autors zu demonstrieren, sondern er dient ausschließlich dem schnellen Auffinden von Information. Sicher läßt sich über manche systematischen Entscheidungen des Autors im supraspezifischen Bereich streiten, aber das mindert keineswegs den Wert dieses Katalogs. Bei der Einteilung in Untergattungen bzw. Artengruppen hat der Autor überdies recht große Vorsicht walten lassen und ist nicht der Versuchung erlegen, Arten unsicherer Verwandtschaft in eine Untergattung zu pressen, sondern hat sie als *incert.* stehen lassen. Die Benutzung wird auch dadurch erleichtert, daß auch im systematischen Teil innerhalb der Gattungen und Untergattungen die alphabetischen Reihenfolge eingehalten wird. In großen monotypischen Gattungen (z.B. *Clivina, Trechus, Agra* u.a.) mit Hunderten von Arten würde die systematische Anordnung das Finden ungemein erschweren, ganz abgesehen davon, daß sich über Systematik immer streiten läßt!

Soweit der Rezensent das beurteilen kann, nähert sich die Vollständigkeit der angeführten Namen, inklusive von Synonymen, nicht verfügbaren Namen u.a., der 100%-Grenze – das ist schon ein Meilenstein! Das ganze Werk ist ein Meilenstein für die Carabidologen, insbesondere wenn man bedenkt, daß diese Information bald auch auf elektronischen Wege zugänglich sein wird. Das wird vor allem den Gebrauch des alphabetischen Teiles noch weiter erleichtern. Es sei aber gesagt, daß die Benutzung auch jetzt schon sehr einfach und zeitsparend ist, trotz des Umfanges der Bände! Im Augenblick wird der Benutzer noch die Angaben zur Verbreitung vermissen und ist dann manchmal noch auf andere Kataloge angewiesen. Aber es sei an dieser Stelle schon darauf hingewiesen, daß eine CD-ROM in Vorbereitung ist, die diese Lücke schließen wird, und mit der man über eine Datenbank auch Faunenlisten von Ländern oder zoogeographischen Regionen wird zusammenstellen können. Und wenn dann noch die abschließenden Literatur- und Systematik-Bände erschienen sind, bleibt dem Benutzer eigentlich nichts mehr zu wünschen übrig – lediglich, daß der Autor, wie versprochen, die Arbeit weiterführen wird mit – hoffentlich – jährlichen Updates. Daher an dieser Stelle schon die Bitte von einem Benutzer an die übrigen Benutzer: Gebt dem Autor auch weiterhin Informationen über Eure Arbeit, dann haben wir alles etwas davon!

Eigentlich überflüssig zu bemerken, daß natürlich! sowohl die gedruckte wie die elektronische Version – und zwar die aller vier Bände – in die Bibliothek eines jeden gehören, der sich mit Laufkäfern bzw. Sandlaufkäfern beschäftigt, gleich ob er sich taxonomisch, systematisch, phylogenetisch, faunistisch oder ökologisch betätigt.

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Larvae of the subfamily Trechinae from the Southern Hemisphere

(Insecta, Coleoptera, Carabidae)

Erik Arndt

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The larvae of *Trechisibus antarcticus* (Trechini) and *Oopterus soledadinus* (Zolini), two carabid species introduced to the sub-Antarctic island South Georgia, are described and distinguished. The larva of *Trechisibus* is very similar to those of known *Trechus* but has a wider posterior part of frontale, larger and more distinctive stemmata, stronger sclerotized thoracic and abdominal sclerites, and longer urogomphi. The larval characters of *Oopterus* come close to the ground plan of the subfamily Trechinae. A derived character of *Oopterus* is the very thin and slender last maxillary palpomeres. *Oopterus* has bulging, constricted sides of head as in larvae of Patrobini. The larval ground plan characters of Trechinae are considered to be: (a) nasale serrate, protruding in the middle, adnasale angles more or less prominent; (b) lacinia absent; (c) only one claw with short seta at base present; (d) several pores of the carabid ground plan pattern reduced; (e) setae TA_3, TA_4, TA_5, TA_6 on tarsus absent; (f) number of setae on urogomphi in second and third instars reduced, seta URβ always lacking.

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Introduction

Trechisibus antarcticus (Dejean), a representative of the carabid tribe Trechini, and *Oopterus soledadinus* (Guérin-Méneville), a species of the tribe Zolini, were introduced by man to the sub-Antarctic island South Georgia (Brandjes et al. 1999). Since their first recognition in 1963 and 1982 respectively, both species have been subject of many ecological studies which show that they have increased their colonized area on the island, are able to coexist, and were well adapted to the low temperature and extreme climate compared with their probable country of origin – the Falkland islands (Ernsting 1993, Ernsting et al. 1995, Block & Sømme 1983, Ottesen 1990, Todd & Block 1997). Despite these numerous works, the larva of *Trechisibius* has not been described previously, and that of *Oopterus* indeed was described by Jeannel (1940), but this description is very cursory and quite unsatisfactory. However, larval knowledge of both genera would be important for several reasons.

Representatives of the tribes Trechini and Zolini are widespread in the Southern hemisphere. The Zolini, with eight described genera including about 50 species, are restricted to the southern part of South America, New Zealand, southeastern Australia, Tasmania and adjacent islands. The Trechini are distributed worldwide but a large number of endemic genera occur in the Australian and Neotropical regions. Whereas most of these genera include only a few species, the Neotropical genus *Trechisibus* Motschulsky with about 100 known species is one of the larger groups of the tribe. Only the works of Jeannel (1940), Johns (1974), May (1963) and Townsend (1978) regard larvae of Trechinae from these regions, which means that larval knowledge is still basic.

The present study gives the first description of a larva of the genus *Trechisibus* and a detailed description of a larva of Zolini which makes phylogenetic interpretation of larval characters possible. A larval diagnosis of the subfamily Trechinae (= supertribe Trechitae in the sense of Kryzhanovsky 1976 and Erwin 1991 respectively) including Zolini is given. Larval differences of both carabids introduced on South Georgia are described which will allow the recognition and separation of the larval stages of these species in future ecological studies.

Material and Methods

The description is based on the following material (L_2, L_3 refers to the second and third instars respectively):

Zolini: 1L_2, 3L_3 *Oopterus soledadinus*, collected at Grytviken, King Edward Cove, Cumberland Bay, South Georgia, by W. Block, January/February 1982 together with adults. No other carabid species occured at this collecting site.

Trechini: 1L_2, 2L_3 *Trechisibus antarcticus*, collected at Harbour Point, South Georgia, by G. Ernsting, February 23, 1994 in tussac litter together with adults. No other carabid species occured at this collecting site.

For comparative purpose, larvae of 40 carabid tribes including following representatives of Trechinae were studied: Trechini: *Trechus* Clairville; Bembidiini: *Bembidion* Latreille s. l., *Asaphidion* Des Gozis, *Tachys* Dejean, *Elaphropus* Motschulsky, *Meotachys* Erwin, *Typhlocharis* Dieck; Pogonini: *Pogonus* Dejean. All larvae are deposited in the collection of the author.

The larvae were mounted in Euparal or Canada balsam on microscope slides and studied at magnifications up to 400×. The notation of setae and pores follows Bousquet & Goulet (1984) and Bousquet (1985). Following Bousquet & Goulet (1984), "primary" setae and pores are ground plan structures of the first larval instar and their homologous structures in the later instars, "secondary" setae (coded with Greek letters) and pores are ground plan structures of second and third instars.

Description of second and third instar larvae

Trechisibus antarcticus (Dejean)

Fig. 1

Description

Colouration. Head and urogomphi reddish brown, other sclerites brown, comparatively strong sclerotized.

Head width. L_2 – 0.60 mm (n=1), L_3 – 0.90, 093 mm (n=2).

Microsculpture. Sides of head capsule (parietale) with transverse meshes, abdominal tergite IX isolated multipointed, urogomphi basally and mesally pointed, pygopod pointed. Other sclerites without regular microsculpture.

Chaetotaxy. Primary setae present except TA_3, TA_4, TA_5 and TA_6 apically on tarsus. Frontale, parietale, prementum, thoracic and abdominal sclerites, in part pro-, meso-, and metathorax as well as abdominal tergites I-VIII with many additional setae. Antenna with all pores and setae of the ground plan, including five pores $AN_{a\text{-}e}$ on antennomere I. Maxilla with group gMX consisting of about 15-20 setae; setae MX_5 and MX_6 long, subequal in length; setae MX_{11} and MX_{12} pore-like. Ligula with a pair of one long (LA_6) and one short (LA_4 or LA_7 respectively) setae. Seta UN_1 of single claw shorter than basal diameter of claw; seta TA_1 in middle of tarsus; tibia with TI_2, TI_3, TI_4, TI_5, TI_6 and TI_7 bristle shaped; a ring of secondary setae in the middle of tibia and femur, in the course of this ring ventrally on tibia two setae, ventrally on femur four setae. Abdominal tergite IX with long secondary seta $UR\alpha$; urogomphi with seven long setae $UR_{4\text{-}8}$, $UR\beta$ and $UR\varepsilon$.

Head. Head capsule (Fig. 1) with sides parallel. Cervical groove indicated but not distinctive. Frontale slender, V-shaped posteriorly (=pars), coronal suture about as long as antennomere I. Six stemmata present, ocular groove absent. Nasale serrate, protruded in the middle. Antenna four-segmented, about as long as mandible; antennomeres I and II subequal in length; penultimate antennomere about 1.2 times longer than basal with bulb-like sensorial appendage, ultimate antennomere

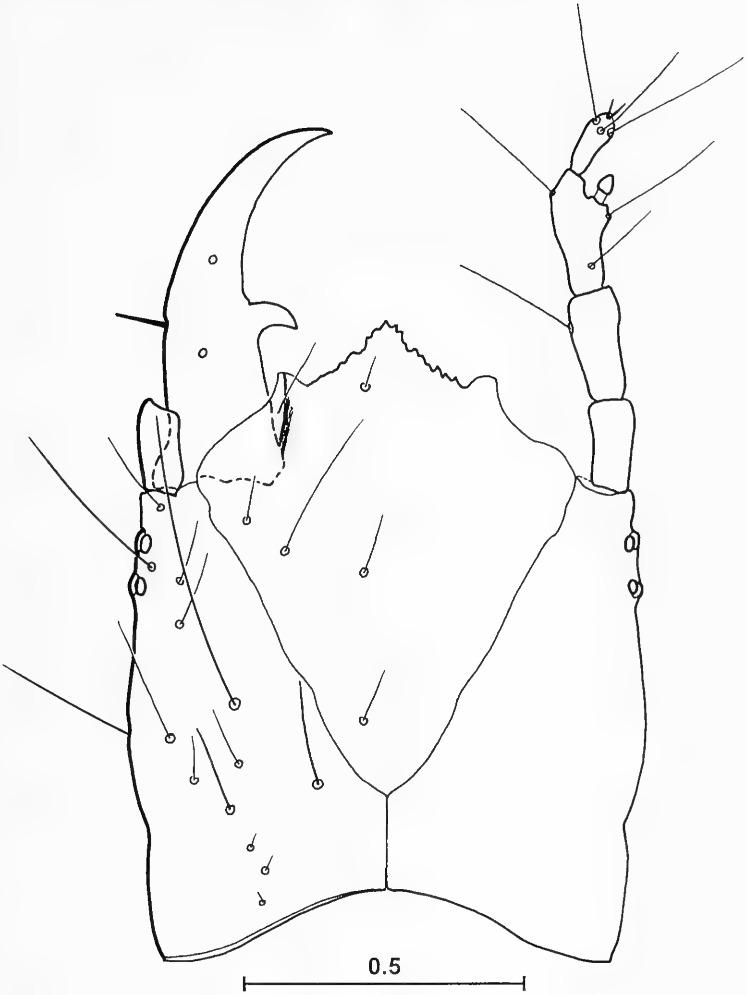
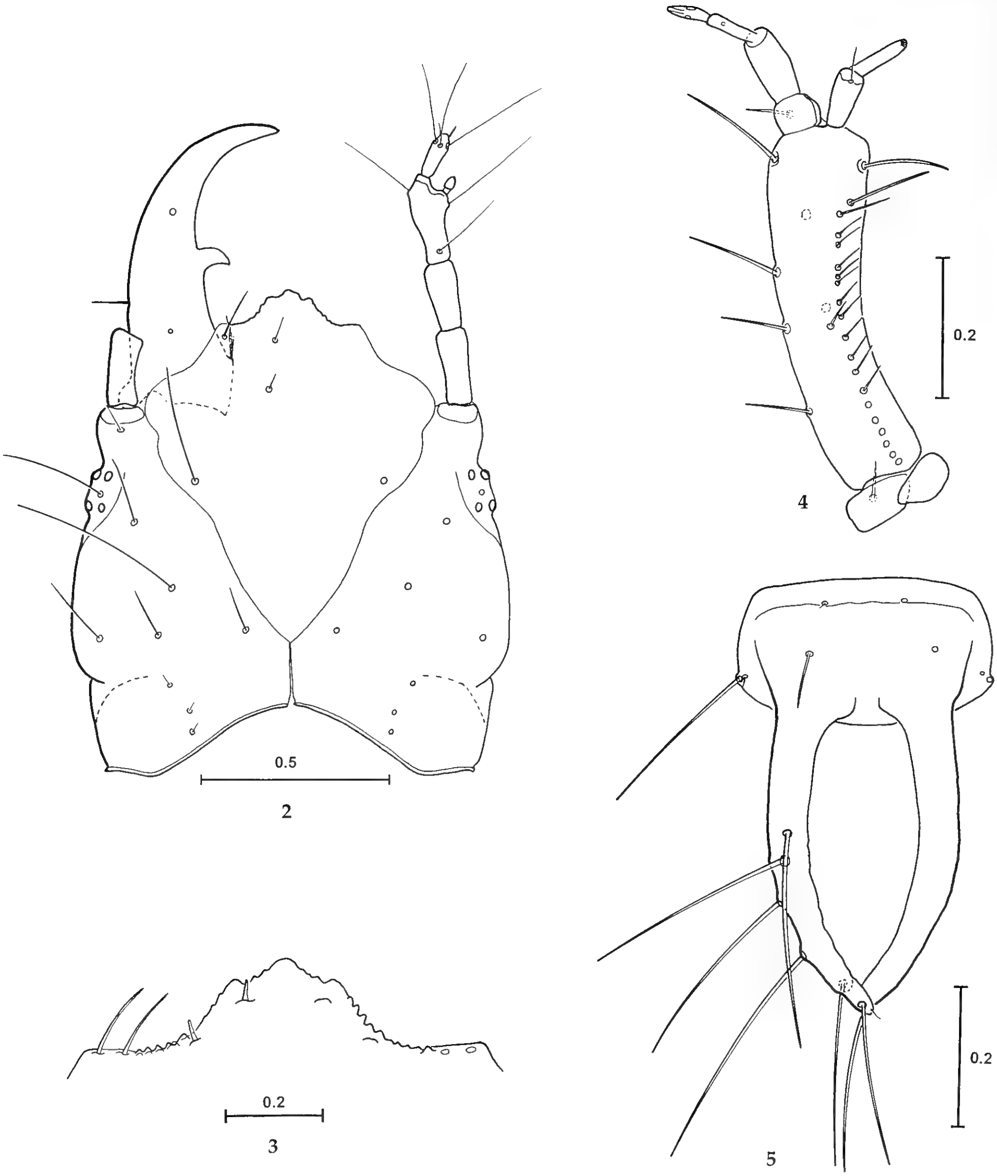


Fig. 1. *Trechisibus antarcticus* (Dejean), L_3, head.

shortest. Mandible straight with smooth terebrum; penicillus present; retinaculum about in the middle of inner side of mandible. Maxilla without lacinia; stipes long and slender, palpifer wider than maxillary palpomeres, about as wide as long; palpomere I largest, ultimate palpomere divided in two segments, therefore maxillary palpus (without palpifer) apparently four-segmented. First galeomere about 1.3 times longer than second, palpus including palpifer about 2.1 times longer than galea. Hypopharynx large with lateral sides bearing numerous long setae. Labium with short ligula; apical palpomere about as long as basal, divided in two segments.

Thorax and abdomen. Legs with single, simple claw; relation of femur:tibia:tarsus about 1.5 : 1 : 1.2. Anterior keel and median suture of mesothorax, metathorax, and abdominal tergites present. Urogomphi with branches almost parallel, about 1.3 times longer than pygopod.

Remarks. The larva of *Trechisibus* is very similar to those of known *Trechus* Clairville. Compared with that of *Trechus*, the larva of *Trechisibus* has a wider posterior part of frontale, larger and more distinctive stemmata, more strongly sclerotized thoracic and abdominal sclerites, and longer urogomphi. The increased numbers of setae on the parietale, thorax and abdomen are characteristic not only of second and third instar larvae of *Trechisibus* but also for some species of *Trechus*.



Figs 2-5. *Oopterus soledadinus* (Guérin-Méneville), L_3. **2.** Head. **3.** Nasale and adnasale. **4.** Maxilla. **5.** Urogomphi. All scales im mm.

Oopterus soledadinus (Guérin-Méneville)
Figs 2-5

Description

Colouration. Sclerites reddish brown to brown with head slightly darker than other sclerites.

Head width. L_2 – 0.72 mm (n=1), L_3 – 1.05-1.19 (aver. 1.13) mm (n=3).

Microsculpture. Sides of head capsule (parietale) with transverse to isodiametral meshes, abdominal tergite IX pointed to multipointed, urogomphi and pygopod pointed. Other sclerites without regular microsculpture.

Chaetotaxy. Primary setae present except TA_3, TA_4, TA_5 and TA_6 apically on tarsus. Parietale and frontale without additional setae even in last instar. Antenna with all pores and setae of the ground plan, including five pores AN_{a-e} on antennomere I. Maxilla with group gMX consisting of 20-35 setae, setae arranged in a simple row (see Fig. 4) or in a double row; setae MX_5 and MX_6 long, subequal in length; setae MX_8, MX_{11} and MX_{12} apically on galeomere I and palpomere II pore-like. Ligula with only one pair of long setae (LA_6), LA_4 (or LA_7 respectively) pore-like. Seta UN_1 of single claw small, much shorter than basal diameter of claw; seta TA_1 in middle of tarsus; tibia with TI_{1-7} bristle shaped; no secondary setae ventrally on tibia and femur. Abdominal tergites I-VIII with ground plan pattern of setae plus two small additional setae (additional setae between ground plan setae $TE_{1/6}$ and $TE_{9/10}$). Abdominal tergite IX with long seta UR_2, very small seta UR_3 and long secondary seta $UR\alpha$; urogomphi (Fig. 5) with seven long setae UR_{4-8}, $UR\beta$ and $UR\varepsilon$.

Head. Head capsule (Fig. 2) with sides bulging. Cervical groove lacking, but head at level of cervical groove constricted. Frontale slender, V-shaped posteriorly (=pars), coronal suture slightly longer than antennomere IV. Six stemmata present in two rows, the stemmata of anterior row larger than those of posterior row; ocular groove present. Nasale serrate, protruded in the middle (Fig. 3.). Antenna four-segmented, about as long as mandible; antennomeres I and II subequal in length; penultimate antennomere about 1.2 times longer than basal with bulb-like sensorial appendage, ultimate antennomere shortest. Mandible straight with smooth terebrum; penicillus present; retinaculum about in the middle of inner side of mandible. Maxilla (Fig. 4) without lacinia; stipes long and slender, 3.8 times longer than wide; palpifer wider than long and wider than maxillary palpomeres; palpomere I largest, nearly as long as palpomeres II and III together; last two palpomeres remarkably thin and slender; last palpomere not divided into two segments. Segments of galea subequal in length, palpus including palpifer about 1.7 times longer than galea. Hypopharynx large with lateral sides bearing numerous long setae. Labium with short ligula; labial palpomere I about 1.75 times longer than palpomere II, the latter not divided in two segments.

Thorax and abdomen. Legs with single claw; femur, tibia, and tarsus of about equal length. Anterior keel and median suture of mesothorax, metathorax, and abdominal tergites present. Urogomphi (Fig. 5) with branches curved, about 1.3 times longer than pygopod.

Remarks. The larva of *O. soledadinus* (as *Merizodus*) was described first by Jeannel (1940). Jeannel's verbal description is very short but his figure of the head capsule remembers a larva of Trechini. It does not show the constricted head capsule with bulging sides as the larva here described. The first instar larva of *Oopterus* spec. according to Johns (1974) has one pointed egg-burster on the parietale on each side of the coronal suture near the posterior margin of the head capsule.

Tab. 1. Morphological differences between larvae of *Trechisibus antarcticus* and *Oopterus soledadinus.*

Character	*Trechisibus antarcticus*	*Oopterus soledadinus*
Last segments of palpomeres	Divided in two segments: labial palpomere apparently 3-segmented, maxillary palpomere (incl. palpifer) apparently 5-segmented.	Not divided, labial palpomere consisting of 2 segments, maxillary palpomere (incl. palpifer) of 4 segments.
Sides of head capsule	Parallel, not constricted; ocular groove absent.	Bulging, constricted at level of cervical groove; ocular groove present.
Number of setae on parietale (second and third instars only)	Parietale dorso-posteriorly of eyes with more than 6 long setae.	Parietale dorso-posteriorly of eyes with 5 long setae.
Setae on tibia (second and third instars only)	6 bristles apically, 1 bristle dorso-basally AND a row of setae in the middle.	6 bristles apically, 1 bristle dorso-basally.
Number of setae on abdominal tergites I-VIII (second and third instars only)	Tergite halves with 5 long and much more than 10 middle long or short setae.	Tergite halves with 5 long and at most 9 short setae.

Discussion of general characters of larvae of the subfamily Trechinae (including Trechini, Zolini, Bembidiini and Pogonini)

Larvae of Trechinae are characterized by the following character states (see also Arndt 1991, pp. 80-84, Arndt et al. 1999, Grebennikov 1996):

1. nasale serrate, protruding in the middle, adnasale angles more or less prominent
2. lacinia absent
3. only one claw with short seta at base present
4. pores PR_c, PR_e, PR_i, PR_j on prothorax, pores ME_d and ME_e on meso- and metathorax, pore TE_b on abdominal tergites I-VIII absent
5. setae TA_3, TA_4, TA_5, TA_6 on tarsus absent
6. number of setae on urogomphi in second and third instars reduced, seta URβ always lacking.

Only (5) the absence of setae TA_{3-6} is an autapomorphic character state of Trechinae in present knowledge. The larvae of Trechinae share characters (1, 2, and 6) with those of Patrobini. The possible sister-group relationship between Trechinae and Patrobini was already mentioned in Arndt (1993: 32) based on larval and adult characters. Character (4), the reduction of ground plan pores, is difficult to examine and data on these pores are lacking from the majority of carabid groups. Possibly this character supports the relationship between Patrobini and Trechinae too, as the pores could not be found in larvae of *Patrobus* Stephens. This result has to be confirmed with further patrobine taxa however.

The serration of nasale region is lacking in known Anillini (Arndt et al. 1999) with extremely adapted cephalic characters. The majority of larvae of Trechinae have only one claw on each leg, however the presence of two claws is known from three peculiar genera of Trechini (all representatives of the subtribes Perileptina and Trechodina known in the larval stage). Two claws are described from larvae of *Perileptus* Schaum (Luff 1985), *Amblystogenium* Enderlein (Womersley 1937) and *Thalassophilus* Wollaston (Grebennikov 1996). This character state can be interpreted as plesiomorphic. Two claws are the ground plan state of Carabidae (Arndt 1993), reduced to one claw in carabids several times independently.

The tribes Trechini, Zolini, and Pogonini as well as the subtribe Bembidiina of the tribe Bembidiini have seven long urogomphi setae in second and third instars, their secondary setae URβ and URγ are reduced. The subtribe Tachyina (Bembidiini) has six setae, URβ,γ,ε being reduced, whereas in Anillina with seven setae, URβ and URε seem to be reduced (Arndt et al. 1999). The phylogenetic interpretation of these reductions is difficult.

The described larva of *Oopterus* (Zolini) fits well the characters of Trechinae. The larval characters of *Oopterus* come probably very close to the ground plan of the subfamily or to a monophyletic unit comprising Trechinae without Perileptina and Trechodina respectively. A derived (autapomorphic) character of *Oopterus* is probably only the small last maxillary palpomeres. The bulging, constricted sides of head are very similar to Patrobini.

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Buchbesprechungen

12. Fritz-Köhler, W. Blatt- und Rüsselkäfer an Ackerunkräutern. Ökologie und Biogeographie in Mitteleuropa und Untersuchungen an ungespritzten Ackerrandstreifen. – Agrarökologie Bd. 19. 138 S., 18 Abb. Verlag Paul Haupt, bern, Stuttgart, Wien. ISBN 3-258-05439-8.

Dieser schmale Band beruht eigentlich auf einer Untersuchung von Ackerunkräutern oder besser Ackerwildkräutern, und ihren Besiedlern, die von der Autorin im Raum Euskirchen in Nordrhein-Westfalen durchgeführt wurde. Demgemäß nimmt auch dieser Teil den breitesten Raum im vorliegenden Band ein. Das Buch beginnt jedoch mit einer kurzen, aber informativen Einführung in die mitteleuropäischen Ackerunkräuter, die von ihnen dominierten Pflanzengesellschaften, sowie in die phytophagen Käfer, die sich an ihnen finden. Das sind vor allem die Blattkäfer (Familie Chrysomelidae) und Rüsselkäfer (Familie Curculionidae). Die ausführliche Zusammenstellung der mitteleuropäischen Ackerwildkräuter und der daran lebenden phytophagen Käfer in dieser Einführung ist sehr hilfreich. Einige Bemerkungen zur Ökologie, Herkunft, Einwanderung der Käfer und zu den Gründen für die Verarmung der Fauna schließen diesen Teil ab. Im Hauptteil wird die Phytophagen-Fauna des Untersuchungsgebietes behandelt und es werden vor llem die Einflüsse der biotischen Faktoren und der landwirtschaftlichen Bearbeitungsmaßnahmen auf die Käferbesiedlung untersucht. Empfehlungen zur Weiterführung des Ackerrandstreifenprogramms, ein recht umfangreiches Literaturverzeichnis, sowie Auflistungen der rheinischen Ackerwildkräuter sowie der auf ihnen lebenden phytophagen Käfer, außerdem der im Beobachtungsgebiet festgestellten Wildkräuter und Käfer schließen den Band ab. Insgesamt ein gut lesbarer, informativer Abriß der Ackerrandstreifenproblematik, der Botaniker, Entomologen, Ökologen und Naturschützer gleichermaßen interessieren sollte. M. Baehr

13. Gerstmeier, R. Buntkäfer. Illustrierter Schlüssel zu den Cleridae und Thanerocleridae der West-Paläarktis. – Margraf Verlag, Weikersheim, 1998. 241 S., 8 Tafeln mit je 16 Farbabb. ISBN 3-8236-1175-5.

Hier liegt ein weiterer Band aus der Reihe des Margraf Verlages vor, die wichtige Käfergruppen in europäischem Kontext, oder wie im vorliegenden Band sogar für die gesamte Westpaläarktis darstellen soll. Die Bände dieser Reihe sind in erster Linie als Bestimmungsbücher gedacht und die meisten der bisher erschienen Bände erfüllen ihren Zweck auch in hervorragender Weise. Das gilt auch für den vorliegenden Band, der darüber hinaus noch durch die reiche Bebilderung besticht. Denn sehr viele der behandelten Arten sind im Tafelteil farbig abgebildet, außerdem ist in der Regel von jeder Gattung mindestens ein Vertreter als Schwarzweißabbildung im Text aufgeführt. Vor allem diese Abbildungen sind durchweg sehr gelungen und tragen erheblich zum Wert des Buches bei.

Eine kurze Einführung in Geschichte, Lebensweise und Systematik der Buntkäfer ist vorangestellt, den Hauptteil machen aber die Bestimmungsschlüssel für die Gattungen und Arten und die kurzen Artbeschreibungen aus. In manchen kleineren Gattungen ist auf einen Schlüssel verzichtet worden, dort muß man die Beschreibungen vergleichen. Der Sinn dieses Vorgehens ist nicht ganz klar, denn es finden sich durchaus auch sehr kleine Gattungen, für die ein Schlüssel beigefügt ist. Die Beschreibungen enthalten eine kurze allgemeine Charakteristik, im allgemeinen die Beschreibung der Genitalorgane, Angaben zur Verbreitung und, besonders wichtig, auch einige wichtige Literaturangaben. Fast jeder Art ist außerdem eine Verbreitungskarte beigefügt. Ein sehr ausführliches Literaturverzeichnis, ein Arten- und Gattungsregister, sowie die bereits erwähnten sehr informativen Farbtafeln beschießen dieses schöne, sehr gut benutzbare Buch.

Wie bei den anderen Bänden dieser Reihe würde die Benutzbarkeit aber erheblich gesteigert, wenn der Band nur einsprachig – entweder englisch oder deutsch – gehalten wäre. Der Rezensent hält in der Tat die Zweisprachigkeit für überflüssig, ja sogar für störend. Außerdem könnte dadurch der Preis natürlich deutlich gesenkt werden. Aber dies ist selbstverständlich nicht dem Autor anzulasten, der eine sehr schöne, eigentlich seit langem überfällige Arbeit abgeliefert hat. M. Baehr

14. Löbl, I. Catalogue of the Scaphidiinae (Coleoptera: Staphylinidae). – Instrumenta Biodiversitatis 1, Muséum d'histoire naturelle, Génève, 1997. 190 p. ISBN 2-881139-004-8.

Scaphidiinae is a rather little known subfamily (or family) of staphyliniform beetles well known for their mycophagous habits. Here a world catalogue of that group is presented by the leading scientist for this beetle group (and some related families). Certainly for I. Löbl work on this fine catalogue was not so hard as it seems to have been, because a good part of the included species has been described by himself! Anyway, this catalogue is a fine exemple of the accuracy with which such work should be done. Within tribes genera and species are arranged in alphabetical order (very helpful!), the species citations inlude type localities, depository of type(s), lectotype designations where necessary, and distribution of the species. An extensive bibliography and an alphabetical index of all names finish the book. Indeed, this work may be used as a model for further catalogues.

M. Baehr

15. Hansen, M. Hydraenidae (Coleoptera). World Catalogue of Insects Vol. 1. – Apollo Books, Stenstrup, 1998. 168 p. ISBN 87-88757-27-7.

Apollo Books has been very courageous in beginning to produce a world catalogue of insects. Certainly such a general catalogue would be an extremely desired goal for the scientific community, but the reviewer doubts whether this will be possible within the next decades. Not, because he doubts the spirit of the publisher, but because he does not believe that there are enough workers to fulfil the requirements of such ample work. However, even the beginning is meritorious and the opening has been made by a world catalogue of one of the minor beetles families, namely the Hydraenidae. The last catalogue of this family dates from 1924 and in the menatime the number of described species has almost tripled. This matches well the necessarity of catalogues like the present one. After a short introduction into history and systematics of Hydraenidae the catalogue is arranged in systematic order for subfamilies, but in alphabetic order for genera and species. Species citations include type localities, lectotype and neotype designations where necessary, and distribution, but, unfortunately no indications of whether a holotype was designated, nor the type depository. The catalogue is followed by a very extensive bibliography and an alphabetical index. A very useful catalogue that is easy to use, because arrangement of the species and layout is very clear. It is to be hoped that this first volume soon will be followed by additional volumes of the same high standard. M. Baehr

16. Jolivet, P. Biologie des Coléoptères Chrysomelides. – Société nouvelle des Éditions Boubée, Paris, 1997. 279 p., 58 figs, 9 colour plates. ISBN 2-85004-089-4.

One of the leading workers on the huge phytophagous beetle family Chrysomelidae has compiled in this book all what is known about many aspects of behaviour, ecology, reproduction, development, parasitism and even more specialized items of Chrysomelidae. Certainly it is a compilation of the rich literature on this important beetle family that includes several noxious insects. However, in many different chapters the large and widespread experience of the author is to be observed. Whatever subject the reader wants to be informed about, he will find something. There are chapters about colour changing, gregarious behaviour, thanatosis, stridulation, adaptation to the alpine life, the canopy fauna, cannibalism and so on, to note some more remote subjects. The first two chapters cover evolution and taxonomy of Chrysomelidae, the third chapter is devoted to food choice, then follows a chapter about the eggs and the biology of larvae. A biogeographic chapter is followed by a genetic one, chapter 7 is devoted to mechanisms of defense, chapter 8 to reproduction, chapter 9 to symbionts and predators and all those organisms that use chrysomelids in one or another way, and the book is finshed by a chapter about ecology and ethology. A very extensive bibliographie (24 pages long) and indices to insects and to plants make this book a treasury for information about all aspects of chrysomelid biology. M. Baehr

17. Stansfield, G., J. Mathias & G. Reid (ed.). Manual of Natural History Curatorship. – HMSO Publications Centre, London, 1994. 306 S. ISBN 0-11-290513-7.

Dies ist wirklich ein Handbuch für den Museumskurator, gleich, ob er in einer großen wissenschaftlichen Sammlung von internationaler Reputation oder in einem Heimatmuseum beschäftigt ist. In 14 Kapiteln werden alle Aspekte der Kuratorentätigkeit abgehandelt. Das reicht von der Beschaffung von Sammlungen über Präparation, Dokumentation, Sicherheits- und Gesundheitsprobleme zu Museumspädagogik, Ausstellungswesen, Anfragen, Veröffentlichungen, um nur einige wenige Bereiche zu nennen. Zahlreiche andere Themen, die in irgendeiner Weise mit naturwissenschaftlichen Sammlungen, Ausstellungen und Museen zu tun haben, werden in eigenen Kapiteln oder Unterkapiteln behandelt. Eine wirklich erschöpfende und sehr ausführliche Darstellung, in der man Informationen zu allen Problemen finden kann, zumal jedes Kapitel noch mit einem eigenen Literaturverzeichnis ausgestattet ist. Ein wahres Nachschlagewerk für den Kurator, zu dem er greifen kann, wenn er in seiner Arbeit nicht weiter weiß. Aus dem er aber auch ohne derartige Anlässe enorm viele Anregungen beziehen kann. Das Buch gehört sicher in die Bibliothek jeder naturhistorischen Sammlung und jedes Museums, genaugenommen aber auch in die Handbibliothek jedes Kurators. M. Baehr

18. Sabella, G. Pselafidi di Sicilia. – Monografie XXV. Museo regionale di Scienze Naturali, Torino, 1998. 415 p., 189 figs, 38 colour fotos. ISBN 88-86041-21-7.

This is a complete modern systematic and faunistic review of the Pselaphidae of Sicily, written by the leading author of the Italian pselaphid fauna. In view of the ample faunistic data it becomes immediately evident that the author devoted over 15 years to the research on the Sicilian Pselaphidae. This monography contains keys to all taxonomic categories from subfamilies down to species and vast chorological and faunistic information. For all species distribution in Sicily is documented in 10 km graticulated UTM maps and for many species figures of the male genitalia or of the habitus are added. The faunistic data are very accurate and occupy a large amount of the available space. A short biogeographic chapter, an extensive bibliography, an alphabetical index, and 38 impressive coloured habitat fotos finish the book. Certainly this extensive account will be of much value to all those studying the beetle family Pselaphidae and also to those generally interested in entomology and biogeography of Sicily.

M. Baehr

19. Bowestead, S. A revision of the Corylophidae (Coleoptera) of the West Palaearctic Region. – Instrumenta Biodiversitatis III. Muséum d'histoire naturelle, Génève, 1999. 203 pp. 426 figs. ISBN 2-88139-006-4.

As a second issue of a new series of catalogues and revisions of insects edited by the Muséum d'histoire naturelle, Génève, this revision again covers a small family of very small beetles that normally escape the attention of collectors and determinators. The author devoted 11 years to this study and examined almost 13 000 specimens. The result of this remarkably intense engagement is more than a full page of new synonymies which considerably reduce the number of valid species, besides the description of only five new species. It follows from this that the main goal of a revision is fulfilled in this work, namely not to describe primarily as many new species as possible, but to settle the taxonomy of a given group and to facilitate the work of collegues and later users. In the West Palearctic Region this primarily means the search for synonymies. Indeed, such work is much more laboureous and probably also less rewarding than revisions of extra-Palearctic insects in which lots of new species commonly are to be described, but where the historical impact generally is far less.

After a short historical review a chapter on preparation technics follows which is very important concerning the very small size of these beetles. Short accounts on the most important historical collections and on natural history are followed by an introduction to morphology and phylogeny. The systematic part includes extensive descriptions of all genera and species, keys to subfamilies, genera, and species, a checklist, and a large number of figures that include male and female genitalia, body shape of the beetles, details of different body parts, and details of microstructure of the surface.

This is altogether a taxonomic revision at the uppermost level, certainly a must for all those being interested in these beetles, but also a good example how to prepare a revision. It is to be hoped that this revision will find similarly qualified imitators.

M. Baehr

20. Ryabukhin, A. S. A Catalogue of Rove beetles (Coleoptera: Staphylinidae exclusive of Aleocharinae) of the Northeast of Asia. – Russian Academy of Sciences. Pensoft Series Faunistica No 16. Pensoft, Sofia – Moscow, 1999. 137 pp. ISBN 954-642-079-4.

Certainly the large and very diverse beetle family Staphylinidae would merit more attention than it receives at present. Hence, any work on it, be it revisions or catalogues like the present one, are highly welcome, even when the covered area is rather far from the main interest of most European staphylinid workers. The area covered in this catalogue is the northeasternmost part of Siberia including Kamchatka. But, on the other hand, the catalogue might be of more interest for workers dealing with the Nearctic fauna because of the ample Beringian affinities of both continents.

For each species the catalogue gives the citation of the description, later citations, and synonymies. Then follows a note on "distribution" and one on "habitats and observations" in which a short ecological characterization of the respective species is given. Unfortunately, no type localities nor type depositories are included. A bibliography and a checklist of all names finishes the book. Although the bibliography is very extensive, it includes some citations lacking the title of the paper which probably indicates that the respective papers were not at hand.

Altogether a nice piece of work on a rather remote subject. Though certainly it will be of much value to everybody interested in the East Palearctic and the Nearctic staphylinid faunas.

M. Baehr

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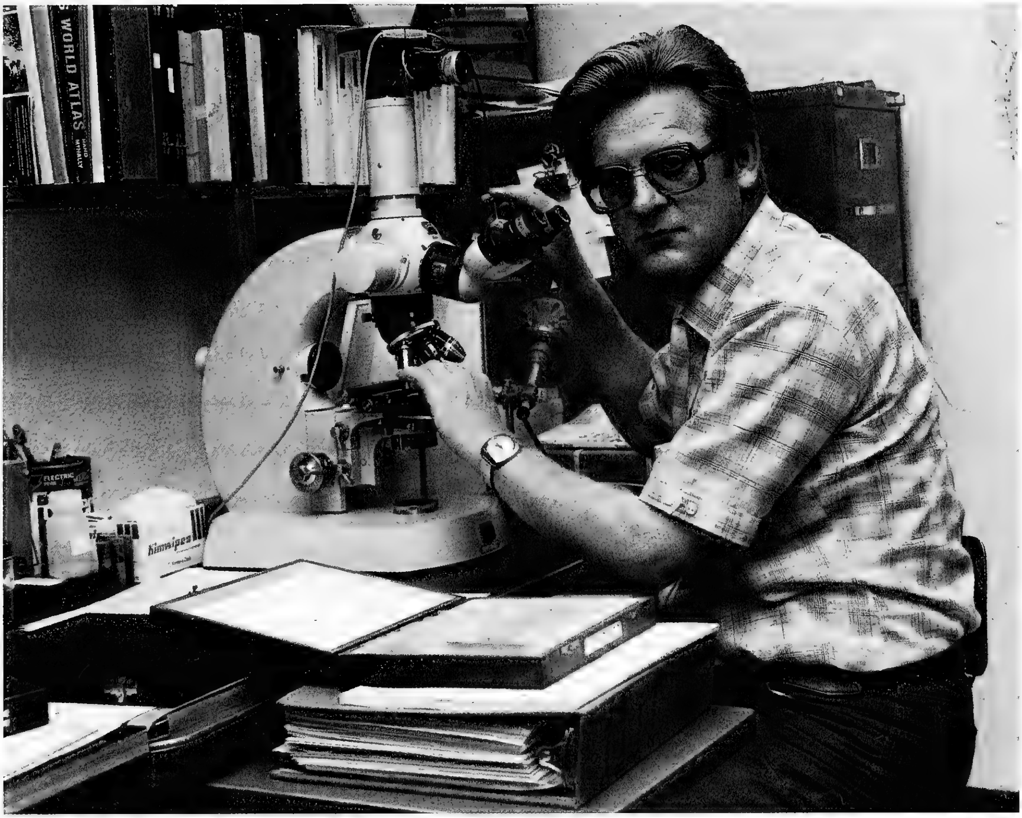

Dr. Friedrich Reiss in Portales, New Mexico, 1980. (Photo courtesy of Mary and Jim Sublette)

In Memory of Friedrich Reiss

(24 December 1937 – 17 August 1999)*

On 17 August 1999, Friedrich ("Frieder") Reiss – dear friend, colleague and advisor to many in our profession – died, in his 62nd year, from a recurrence of heart problems. Although the latter had been cause for concern for some years, this sudden end to Frieder's central presence in our circle has come as an unexpected shock. He had hoped to still solve many taxonomic puzzles in the three years until his retirement, and surely would have continued to do so afterwards.

Frieder is survived by Annemarie Reiss, his wife for 37 years, and their son Peter. On their behalf we would like to express our sincere gratitude for the kind thoughts of all who responded to the sad news of Frieder's passing with condolence letters and e-mails.

In Friedrich Reiss, chironomid research has lost a scientist who had for decades set the highest standards in this field of aquatic entomology. He was fortunate in being able to concentrate exclusively on the midges ever since the completion of his academic education. He took full advantage of this opportunity, not only for himself, but also with his constant efforts to make his achievements available to colleagues and aspiring biologists becoming interested in taxonomy and the Chironomidae. All who

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* Slightly modified after Fittkau, E. J. & M. Spies 1999. CHIRONOMUS newsletter of chironomid research **12**: 17-19.

have known him deeply appreciate not only Frieder's knowledge in our specialty, but equally so his wide-ranging interests in the natural sciences, and intellectual openness in general. From discussions with him, on any subject, one always walked away with something gained.

Born 24 December 1937 in Stuttgart, Frieder grew up in Schorndorf in Baden-Württemberg state, where he completed school in 1957 with the Abitur, the high school diploma and general qualification for college. In the same year still he began taking courses in biology, chemistry, and geography at Stuttgart University. In 1965 he transferred to the University at nearby Hohenheim, from which he graduated in 1966 with both a doctorate degree and the scientific part of a high school teaching certificate.

Following his interests in zoology/entomology and aquatic ecology – the latter developed during limnological lectures by Prof. J. Grim – he had turned to Prof. O. Pflugfelder of Hohenheim University to find an appropriate topic for his doctoral thesis. Under this guidance, Frieder was able to secure a grant from the German Academic Society's aquatic research program for a dissertation entitled "Ecological and systematic studies on the Chironomidae (Diptera) of Lake Constance. A contribution to the chironomid lake fauna of the northern prealpine area". This was carried out beginning in 1961, at the laboratories of the Lake Constance public water works in Sipplingen, whose director was Prof. Grim.

During his time as a doctoral candidate, Frieder managed several times to visit and use the extensive chironomid resource collection established by Thienemann and curated by Fittkau at the Max-Planck-Institute for Limnology in Plön. These contacts led to a post-doctoral research grant to Frieder from the Max Planck Society to continue his chironomid studies at Plön, and in 1967 to his employment there as a research associate. His duties then were to help develop the chironomid center in continuation of the tradition of Thienemann and his school. The goals were to advance the taxonomy and diagnostics of Chironomidae through revisionary work, the international coordination of information and documentation, and not least through creating opportunities for basic and more in-depth studies by outside colleagues some of whom were then still working under rather isolated conditions. Frieder took an integral part in producing the new "Chironomus. Newsletter of chironomid research" as well as the first bibliography of all publications on chironomids, incorporating 7000 titles at the time. He also took care of the colleagues visiting the Plön collections of specimens and literature. It was back in those days, too, when the idea was first conceived to gather the knowledge of competent researchers worldwide for the development of definitive generic concepts in the Chironomidae, and of keys to the genera of the Holarctic fauna.

When it became apparent that a taxonomic research focus like the chironomid center would not have a lasting future within an ecology-oriented institution, Frieder did not hesitate to accompany the first author to Munich, in 1976, to continue chironomid science in a museum environment at the Zoologische Staatssammlung (ZSM).

Thanks to the courtesy of the directorate at Plön, both the Thienemann collections and the library could be transferred to ZSM. In Munich, Frieder became responsible for the Diptera Section, and in 1998 was appointed head of the entire Department of Entomology.

His enthusiasm and drive for chironomid research were not in the least affected by the change to comparatively poor work conditions at ZSM which was then insufficiently housed in the north wing of the Nymphenburg castle. However, it was not until ZSM had moved to its new building that Frieder was given the means to make the ever growing chironomid collections completely accessible, and to provide comfortable work conditions to visiting guests.

Next to his personal scientific projects Frieder gave high priority also to the continuous taxonomic analysis, incorporation, and availability to others of the already present and newly incoming collection materials. We all owe it to his diligent, persistent efforts in these regards, and to his thorough, determined style of work, that the chironomid collections at ZSM have reached the internationally renowned value they represent today.

Friedrich Reiss has been among the most influential people in the development of chironomid science from the beginning of his dissertation work. As one of the youngest participants of the first International Symposium on Chironomidae at Plön in 1964, he was able early on to establish contacts, soon developing into friendship, with most colleagues who were active then. One quick reward for his achievements was the invitation from Prof. Lars Brundin to accompany him on a three-month expedition in 1969/70 to southern Chile and Patagonia. With his critical analysis of the species from Lake Constance Frieder had started out by gaining comprehensive knowledge of the central European fauna. Later, he focussed especially on the taxonomy and systematics of the Chironomini and Tanytarsini, and on issues of chironomid faunistics and biogeography in general.

The chironomid center at Plön was part of the institute's Department for Tropical Ecology. In this context, Frieder was given the opportunity to work out of Manaus, Brazil, from 1971 to 1972 to apply and compare his lake-ecological field experience to central Amazon habitats, and to gain further knowledge of the South American biota. After the move to Munich, the Neotropics continued to be one of his major research interests, next to European (especially Mediterranean) material and the previously poorly known local southern German fauna. Of special value among the results of Frieder's work, apart from his revisions and new descriptions of many genera and species, is his part in the compilation of the first comprehensive catalog of Neotropical Chironomidae. In 1997, Frieder was honored by the invitation to the second Brazilian chironomid congress at São Carlos, where for several days he conducted a course on taxonomy. Having enjoyed this trip without problems he gained new trust in his health, and renewed motivation to help develop chironomid research in Brazil.

Friedrich Reiss was a great gift to our science. His untimely death filled us all with deep sorrow. Whoever had the good fortune to work with Frieder will continue to sorely miss his competence, advice and friendship.

Prof. Dr. Ernst Josef Fittkau   Martin Spies

A word from the editors

When our good friend, treasured colleague and advisor, Dr. Friedrich Reiss, unexpectedly died last year, we were very grateful for the numerous expressions of sympathy we received and were asked to pass on to the family. Hence, we quickly developed the idea to produce a publication as a tribute to the memory of Frieder from his many friends and colleagues. Thanks to the generosity of Prof. Dr. G. Haszprunar, director of Zoologische Staatssammlung München, it has become possible to employ a regular issue of the journal SPIXIANA for this purpose. Aside from providing a frame befitting the occasion, this was extremely helpful by ensuring the financing and rapid appearance of the printed work.

Unfortunately the capacity of this volume is restricted, even though it has been expanded to more pages than usual. Therefore, to our regret, it was not possible to include all manuscripts received. Additional papers will appear in the following issue of SPIXIANA.

The volume of contributions submitted widely exceeded our expectations. This clearly reflects that Frieder was highly esteemed not only as a chironomid scientist, but also as a great and kind teacher, and – last but not least – as a favoured friend to many colleagues, a fact which to us seems worthy of the most particular praise.

A complete list of publications by Dr. Reiss is available from the ZSM homepage under http://www.zsm.mwn.de/wiss_start.htm, select ‘Diptera’, then ‘Mitarbeiter’.

We know that we have made many colleagues’ already busy work schedules even tighter in order to carry out our plan within a year of Frieder’s death. We want to thank all colleagues who decided so readily to contribute to this volume, and also those who wanted to but could not manage within the short time limit we had set. Special thanks go to those who helped us review the manuscripts: Trond Andersen, Bohdan Bilyj, Pete Cranston, Mauri Hirvenoja, Jon Martin, Ole Sæther, Jim Sublette, Endre Willassen, some of them already burdened with writing a paper of their own. We are also grateful for the general acceptance of editorial requests which this time were more rigorous than usual. During the making of this issue, we constantly asked ourselves and our contributors: what would Frieder have done here, or thought of that? But wherever this publication may reach close to the level of the scientist we are trying to honour, that is by far in the largest part the merit of the authors, not ours.

With the present volume we hope to keep the memory of Frieder and his work alive in daily chironomid research, and to further this science by reminding it of one of its great proponents. But we also wish that he himself would have enjoyed reading and working with it.

Martin Baehr Martin Spies

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Austrobrillia Freeman: immature stages, and new species from the Neotropics

(Insecta, Diptera, Chironomidae, Orthocladiinae)

Peter S. Cranston

Cranston, P. S. (2000): *Austrobrillia* Freeman: immature stages, and new species from the Neotropics (Insecta, Diptera, Chironomidae, Orthocladiinae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 101-111.

Austrobrillia Freeman is redescribed in the adult stage, and described for the first time as larva and pupa, for the type-species *A. longipes* Freeman from Australia. Two new species based on pupal exuviae are described from Ecuador and Chile, as *Austrobrillia valereissia*, spec. nov. and *A. chilensis*, spec. nov. Phylogenetic analysis links *Austrobrillia* in a clade with *Eurycnemus* and *Euryhapsis,* within a probable monophyletic *Brillia*-group clade at the base of the Orthocladiinae.

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Introduction

Ideas concerning the age of Chironomidae clades derived from their extant distributions (i.e. Brundin 1966, Cranston & Edward 1992, Cranston et al. 1989) conflict with ideas of species formation associated with Pleistocene glaciations. The over-arching effects of range disruption of these glaciations imply that it is in the southern hemisphere, on the land masses that comprised Gondwana in the Jurassic/ Cretaceous, that distributions may retain the signal of deeper history – as understood particularly by Freeman (1961: 613-4) and Brundin (1966: 452).

Brundin (1966) stressed the Gondwanan distributions in the subfamilies Podonominae and Aphroteniinae, and in the tribe Heptagyiini of the Diamesinae, but similar patterns in the Tanypodinae, Orthocladiinae and Chironominae increasingly are being revealed. Although Freeman (1961) allocated *Austrobrillia* Freeman to his category "peculiarly Australian genera", the extensive Neotropical chironomid collections at the Zoologische Staatssammlung Munich (Germany) reveal that this genus joins an expanding list of Gondwanan-connected orthocladiine taxa linking Australia to South America.

In this contribution, in commemoration of Dr Reiss's global perspective on chironomid studies, the immature stages of *Austrobrillia* are described formally, thereby allowing recognition of two pupal taxa from the Neotropics. That the Neotropical material consists solely of pupal exuviae does not deter description, since the stage is distinctive and creation of synonymy is precluded, because the one putative adult congener described from the region, based on a female, is unlikely (see below).

Methods and morphology

The association between larva, pupa and adult necessary for full taxonomic descriptions was attempted by rearing live larvae individually through to the adult, but as with many other wood-mining taxa, success was elusive. Associations have been made through fortuitous larval head capsules retained attached to pupae, and from pharate adult pupae, recovered predominantly from drift net samples. Morphological terminology and abbreviations follow Sæther (1980) and Cranston (1994) with Langton's (1994) term taenia (adjective taeniate) used for "filamentous" or "lamelliform" (LS) pupal setae. In pupal descriptions the conjunctive is numbered as belonging to the segment anterior to it. Some larval measurements are of exuviae, but length and head capsule measurements are based on complete fourth-instar larvae. Measurements of larval antennal features and subsequent calculations of the antennal ratio are based on sclerotised antennal parts, disregarding the sometimes variably distended membranous intersegmental regions. Unless indicated otherwise, measurements are in μm, rounded to the nearest 5 μm except in cases where measurement at maximum magnification provided accuracy to 1 μm. Material is preserved in the Australian National Insect Collection (ANIC), CSIRO Entomology, Canberra, or Zoologische Staatssammlung, Munich, Germany (ZSM). Abbreviations for geographic features: Ck = Creek, L. = Lake, Mt = Mount(ain), N.P. = National Park, R. = River, S.F. = State Forest.

Austrobrillia Freeman, 1961

Type-species: *A. longipes* Freeman, 1961, by monotypy.

Diagnosis

Adult male, female and larva – see description of *A. longipes*.

Pupa medium-sized, 5.0-7.8 mm long, pale yellow to medium brown with darker dorsal transverse apophyses, lateral apophyses scarcely indicated.

Cephalothorax: frontal setae on weakly crenulate frontal apotome. Ocular field with 1 postorbital, without vertical seta. Thorax with 1-2 median antepronotals, 1 LAps (may be reduced to peg); 3 precorneals, their thickness and relative lengths variable; 4 stout dorsocentrals, Dc_3 and Dc_4 longer and closer together. Thoracic horn elongate cylindrical, may broaden subapically, micro-spinose. Dorsum of thorax smooth. Prealar area triangular, bare. Wing sheath without pearls.

Abdomen: Tergites I, VIII bare, II-IV may have some pleural shagreen; tergites II-V(-VII) evenly spinose, T II-V(VI) with posterior transverse row of short blunt spines; T II without hook row. Posterior borders of tergites I-III with bands of pigment polygons extending onto conjunctives, conjunctives II-IV spinose, bands can be medially interrupted, notably on IV, and on V-VI(VII) with few very fine spinules laterally. Anterior sternites with shagreen, II with or without multiserial transverse band of long, thin, hyaline spines, II-VII with variably distributed shagreen, IV posteriorly with patch of spinules medial-posteromedial to pedes spurii A, the latter comprising whorl of fine spinules. Pedes spurii B absent. Anal lobe oval, with sparse anterior shagreen and multiserial fringe taeniae, with translucent spines interspersed amongst taeniae, lacking macrosetae. Male genital sac tapering to point, extending beyond anal lobe apex; female sac shorter, rectangular, with postero-lateral tubercle. Setation: 5 D, 4 V; 2 minute L on I, 3 on II-V, 4 on VI-VII, 5 on VIII, becoming increasingly taeniate on posterior segments. 0 dorsal O-setae, 1 ventral pair on conjunctive margin of segments II-VII.

Recognition

Austrobrillia is distinctive in the larva by the mentum construction with large paired median teeth and only two laterals, but otherwise bears a close resemblance to that of *Eurycnemus*. In the pupa the lack of a hook row on tergite II, the transverse bands of posterior tubercles and absence of anal macrosetae on a fringed anal lobe is a distinctive combination. In the adult the bare wing cells and restriction of antepronotal setae to the lateral area are unusual amongst the *Brillia*-group; in the male genitalia the presence of an anal point and the deeply bifid gonostylus without megaseta or taeniate seta are distinctive, and the narrowed and anteriorly projecting transverse sternapodeme appears to be of some phylogenetic significance, being shared uniquely in the clade with *Euryhapsis* + *Eurycnemus*. The female genitalia provide a combination of features seen in related taxa: 3 seminal capsules, with a reduction in size of the median, each with microtrichia; spermathecal ducts with separate openings; labia microtrichiose.

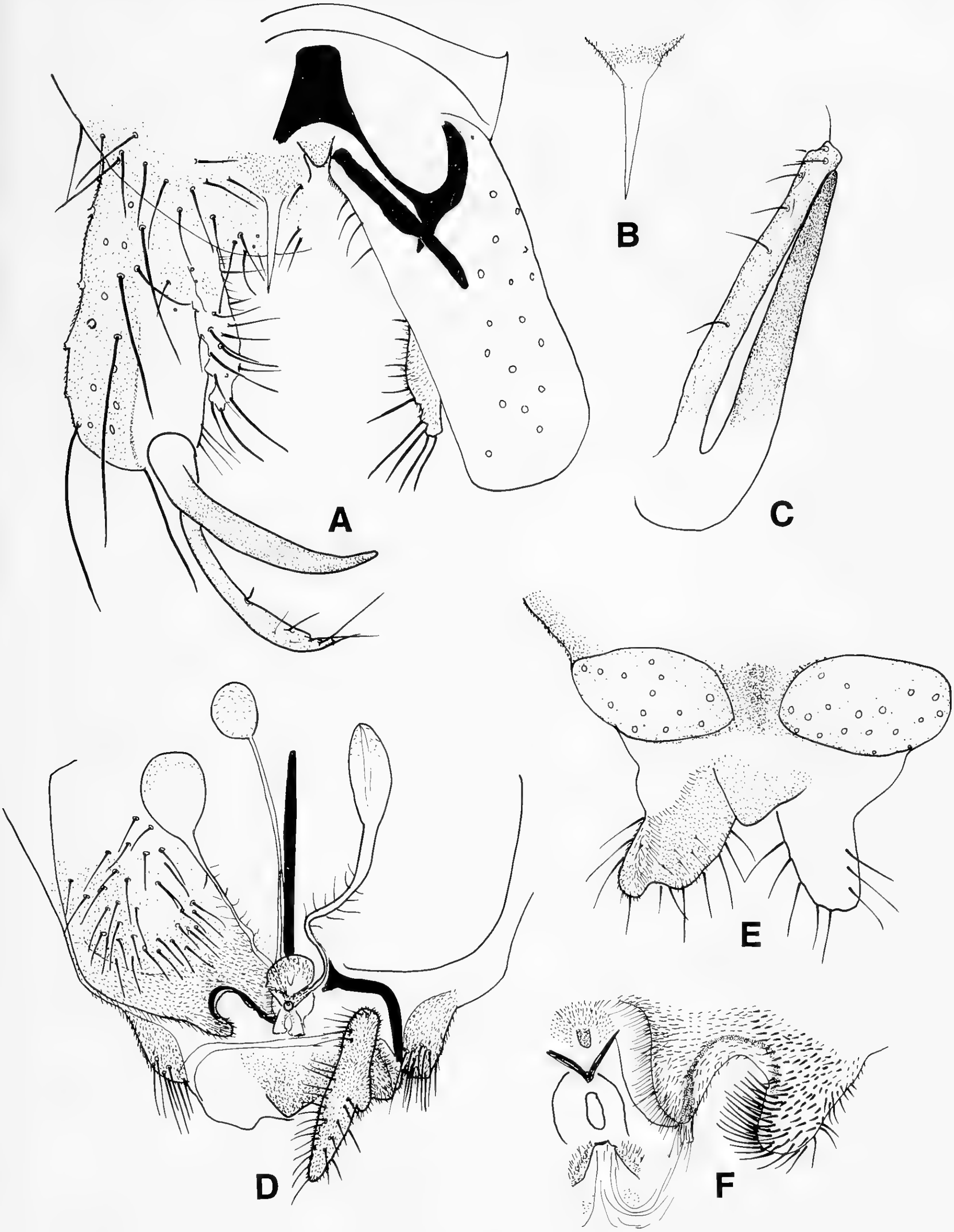

Fig. 1. *Austrobrillia longipes* Freeman: adults. **A-C.** Male. **A.** Hypopygium, left: dorsal, right: ventral. **B.** Anal point. **C.** Gonostylus. **D-F.** Female. **D.** Genitalia, ventral. **E.** Genitalia, dorsal. **F.** Gonapophysis VIII, vagina, and labia.

Austrobrillia longipes Freeman

Figs 1, 2A, 3B-I

A. longipes Freeman, 1961: 640.

Material. Holotype: Adult ♂, pinned, genitalia on celluloid mount, AUSTRALIA, Tasmania, Harz Mts, xii.1922, leg. A. L. Tonnoir (ANIC).

Other (all slide mounted; AUSTRALIA, leg. P. S. Cranston unless stated): New South Wales: Pe, nr Dorrigo, Eve Ck, 30°16'S 152°50'E, 9.X.1996; 3L, Le/P, Barrington Tops, Manning R., 31°53'S 151°29'E, ex-wood, 8.X.1996; Pe, Belmore Falls, Barrengarry R., 34°38'S 150°33'E, 3.IV.1991; 2 Pe, Mongarlowe R., Monga S.F., 35°23'S 149°55'E, 2.II.1991; 4 Pe, Rutherford Ck, Brown Mountain, 36°36'S 149°47'E, 16.X.1990; 2 Pe, Albury Wodonga, Murray R., Union Bridge, 12.XI.1990 (R. Cook).

Australian Capital Territory: 2♂♂, 1♀, Brindabellas, Blundells Ck, 35°22'S 148°50'E, IX.1988.

Victoria: Pe, Mitta Mitta, Snowy Ck, 36°33'S 147°23'E, 3.XII.1991 (MDFRC); Pe, Pigs Point, XII.1991 (MDFRC); 2 Pe, 1♂, Buckland R., 36°48'S 146°51'E,1.VII.1991 (Cook); Pe, Buckland R., 36°48'S 146°51'E, 6.V.1991 (Cook); 1♂ ("holotype" of *Austrobrillia collessi* of Hergstrom, 1974, see "Comments" below), Mt Beauty, 21.X.1961 (Colless); Le/P ♂, 2 L, Tambo R., Bindi, 37°08'S 147°51'E, 23.III.1991 (Hortle); Le/P ♂, Woori Yallock, Yarra R., 37°48'S 145°32'E, 21.II.1978 (Glaister).

Tasmania: 2♂♂ (one paratype *A. longipes*), Burnie, 20.X.1922 (Tonnoir); 1♀, Burnie, 1 Feb 1923, (Tonnoir); Pe, Gladstone, Ringarooma R., 40°56'S 148°00'E, 21.II.1993; 2 Pe, Peters Link Ck, 41°09'S 148°07'E, 24.II.1993; 2 Pe, Cradle Mt – L. St Clair N.P., Douglas Ck, Ranger Hut, 41°50'S 146°02'E, 25.I.1990; Pe, Lyall Highway Crossing, Franklin R., 42°12'S 146°02'E, 17.I.1990; 1♂, Bothwell, Clyde R., 13.II.1964 (Dyce & Murray).

Redescription

Adult male (n=5).

Thorax yellow-brown, with indistinct vittae and postnotum darker brown, scutellum paler; legs yellow, unbanded; abdomen yellow, each anterior half of tergites and sternites II-VI with dark transverse band, T VII, VIII and hypopygium all dark.

Body length 4.7-5.2 mm; wing length 2.6-3.1 mm, width 720-750, ratio length/width 3.5-4.1. Antenna with 13 cylindrical, densely microtrichiose flagellomeres; well-developed plume extending to apex lacking strong subapical seta; groove extending from Fm 3 to 13; sensilla chaetica on Fm 2-4, 13; Fm 1-12: 425-505, 13: 740-905, AR 1.66-2.12. Eye bare, with long parallel-sided extension. Temporal setation: 5-8 inner verticals amongst 14-16 continuous temporals, double medially, uniserial otherwise; Tentorium parallel-sided apically, broad basally, without sieve plate, cibarial pump dilate with short cornua. Clypeus small, with 9-12 setae. Palp long, with 5 segments, 4th and 5th elongate, 2nd short, 3rd with 4 subapical sensilla chaetica, without pit.

Thoracic setation: 6-13 lateral antepronotals; acrostichals absent, 17-20 biserial dorsocentrals, 5-7 uniserial prealars, 0 supraalars, 13-15 biserial scutellars. Pleurae bare.

Wing membrane bare, with coarse punctation. R_{4+5} ending far distal to M_{3+4}; costa extended toward wing apex; R_{2+3} running and ending about midway between R_1 and R_{4+5}. RM long, gently curved at obtuse angle to direction of R. 19-20 R setae, 11-21 R_1, 0-20 R_{4+5}; Squama with 12-30 uniserial setae. Anal lobe gently rounded. FCu distal to RM (VR 1.14-1.28). Cu_1 straight, with slight curve near wing margin. Vannal fold, An_1 and An_2 strong.

Leg ratios: LR_1 1.04-1.08, LR_2 0.51-0.59, LR_3 0.53-0.56. Fore tibial spur length subequal to tibial apex width; mid tibia with two spurs subequal in length to tibial apex width; hind tibia with one spur longer than, the other subequal to tibial apex width; spur lengths: p_1 63-87, p_2 52-60, 40-49, p_3 53-60, 66-94. Comb present; pseudospurs on mid tarsomeres 1 and 2, and hind ta_1. Sensilla chaetica absent. Pulvilli very short, not extending to claw base; empodium trifid; all claws toothed apically.

Tergites brown anteriorly, paler caudally with dense, rather evenly distributed setae.

Hypopygium (Figs 1A-C). Tergite IX with dense marginal and submarginal long setae. Anal point 56-66 long, inserted subapically, narrow, with needle-like pointed apex, without microtrichia, projecting beyond apex of tergite. Anteromedian part of sternapodeme elongate, parallel-sided, without oral projections; phallapodeme well developed. Virga absent. Superior volsella absent; inferior volsella a posteriorly-directed, elongate lobe. Gonocoxite 245-650 long, gonostylus double, inner branch 133-160, outer branch 150-160, with slender megaseta on inner branch.

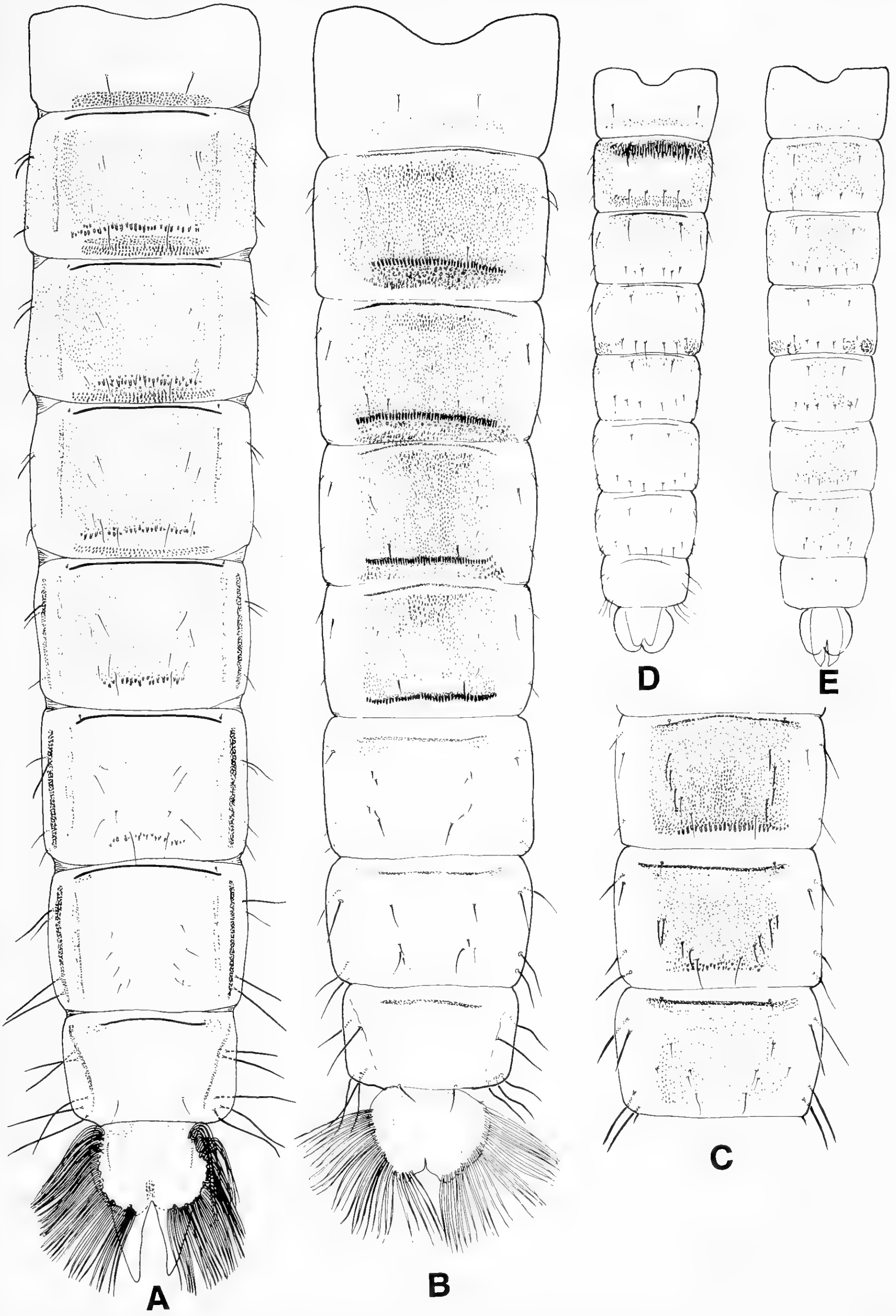

Fig. 2. *Austrobrillia* Freeman: pupal abdomina. **A-C.** Abdominal tergites. **A.** *A. longipes* Freeman. **B.** *A. chilensis*, spec. nov. **C.** T V-VII, *A. valereissia*, spec. nov. **D-E.** Sternites. **D.** *A. chilensis*, spec. nov. **E.** *A. valereissia*, spec. nov.

Adult female (n=5).

As male, except body length 3.6-5.7 mm; wing length 2.5-3.5 mm, width 78-105, length:width ratio 3.1-3.3. Antenna with 6 flagellomeres each with sensilla chaetica, lengths 60-70, 63-77, 66-88, 60-108, 63-105, 105-133; AR 0.27-0.36. Head setation: 11-19 temporals including 6-11 inner verticals; 14-24 clypeals. Thorax: 6-13 lateral antepronotals; 19-46 dorsocentrals, 5-6 prealars, 15-37 scutellars. Wing: 11-34 squamals, 19-38 R setae, 22-32 R_1, 38-41 R_{4+5}; VR 1.19-1.22. LR_1 1.00-1.05, LR_2 0.53-0.57, LR_3 0.53-0.59. Spur lengths: p_1 60-80, p_2 49-73, 52-71, p_3 70-105, 56-80.

Genitalia as in Figs 1D-F, with sternite VIII not forming floor under vagina, with numerous setae each side; tergite IX short, clearly divided into two parts with 27- 36 setae each side; gonocoxite IX with 5-17 setae, not bulging; gonapophysis VIII divided, well developed rectangular ventrolateral lobe (vll) separated from strong dorsomesal lobe (dml); slender apodeme lobe (al) distinctly visible beneath dml, partially beneath vll; notum moderately developed; 3 seminal capsules: the median spherical, 80-90 x 71-80, the two lateral elongate ovoid 98-125 × 70-75; lateral seminal capsules weakly microtrichiose, with tapering necks, spermathecal ducts straight to slightly curved, dilated anteriorly, bearing special secretory cells medially; median spermathecal duct strongly microtrichiose, without neck; ducts end without bulbs at three separate opening. Labia microtrichiose. Tergite X broad, cerci well developed 205-230 long, postgenital plate distinct.

Pupa (n=5).

Length 5.0-7.8 mm. Pale yellow, with strongly pigmented transverse apophyses and dark brown tergal tubercles in transverse bands. All cephalic and thoracic setae strong, but non-taeniate: frontal setae 90-160 long; antepronotal setae – $MAps_1$ 220-320, $MAps_2$ 168-315, LAps 30-115; precorneals – Pc_1 160-240, Pc_2 180-260, Pc_3 85-125 (missing in 1 specimen); dorsocentrals – Dc_1 35-90, Dc_2 35-50, Dc_3 70-105, Dc_4 70-120; distances: Dc_{1-2} 87-230, Dc_{2-3} 56-98, Dc_{3-4} 7-14. Thoracic horn (Fig. 3B) 190-415, slightly broadened medially, somewhat clubbed apically, with apical 75 % densely covered in fine spines.

Abdominal tergites (Fig. 2A): T I bare, with weak to strong pattern of pigment polygons on posterior; T II-VI with dense spinules, posteriorly with transverse band of irregularly-arranged, approximately biserial tubercles, weaker on more posterior tergites, with polygonal patterns on conjunctives II-IV associated with variably developed anteriorly-directed spinules; T VII-VIII bare. Pleurae II-III or IV (anteriorly) spinulose. Sternites much as in *A. chilensis* (Fig. 2D), with strong hyaline spines on II. Anal lobe with 74-99 taeniae.

Larva (n=6).

Length 7.5-9.2 mm. Body pale, usually with distinctive wood fibre-filled gut. Head capsule 580-790 long, golden yellow with slightly darker postoccipital margin, black mandibles, and dark brown mentum. Dorsal surface of head (Fig. 3C) comprising frontal apotome, fragmented clypeus (bearing S3) separated from more anterior sclerite (bearing S1 & 2) by golden-brown fragmentary pattern on clypeus; sclerites 1-5 otherwise indistinguishable from clypeus. Antenna (Fig. 3D) 4-segmented, lengths: 53-62, 11-14, 2-3, 3-4, AR 3.1-3.6, blade simple 33-42, annulate, extending well beyond antennal apex; style/peg sensillum 8-10 placed subapically on 2nd segment. Lauterborn organs absent. Ring organ in basal ⅓ of segment 1, with 1 or 2 (2nd minute) subsidiary pits adjacent.

Labrum (Fig. 3E) with SI simple, lanceolate; SII simple, SIII apically bifid; all S setae arranged transversely across labrum, with short SIVa & b lateral to SIII base. Premandible *Cardiocladius*-like, dark, broad and blunt. with one apical and one inner tooth, without brush. Spinulae and chaetulae simple spines. Labral lamellae of 5-6 fine, thin spines just anterior to SI setae. Epipharynx (Fig. 3F) with medially fissured tormal bar, with "comb" of 3 rounded lobes on each side; pecten epipharyngis apparently absent, or indistinguishable from 6 robust simple chaetulae; very small chaetulae basales may be present.

Mandible (Fig. 3G) 120-170, unusually shaped (though aspect-dependent), somewhat conical/triangular and heavily sclerotised, with outer and inner margins smooth, with short outer (dorsal) tooth, "true" apical tooth subequal to width of first of 2 inner teeth, innermost tooth with notch. Seta subdentalis very narrow. Seta interna with 4-5 narrowly serrate branches.

Mentum (Fig. 3H) 100-115 wide, unique, with broad, medially indented area and 3 pairs of lateral teeth; no evidence of ventromental plates, beard absent.

Body not setose. Anterior parapods separate, with crown of elongate, simple, pale spines and claws. Posterior parapods separate, with apical group of simple claws. Procercus 45-60 long, 25-30

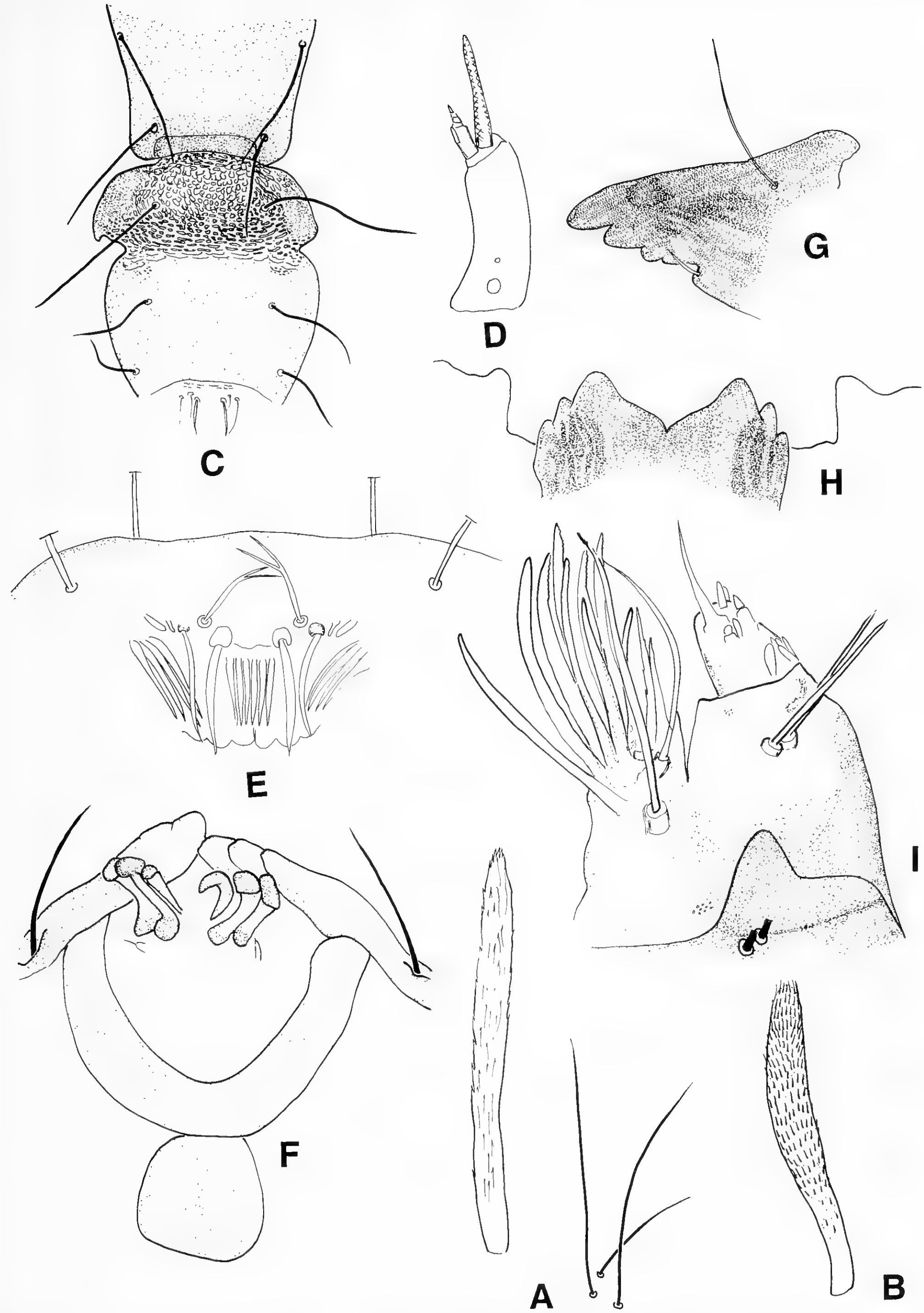

Fig. 3. *Austrobrillia* Freeman; immatures. **A, B.** Pupae: Thoracic horn. **A.** *A. chilensis,* spec. nov. **B.** *A. longipes* Freeman. **C-I.** Larva, *A. longipes* Freeman. **C.** Antero-dorsal head sclerites. **D.** Antenna. **E.** Labrum. **F.** Epipharynx. **G.** Mandible. **H.** Mentum. **I.** Maxilla.

wide, lightly pigmented, bearing 2 strong median setae and 7-8 anal setae of maximum length 480-580. Anal tubules short, cylindrical.

Comments

The larva of *Austrobrillia* has been reported in Australia as "nr *Eurycnemus*" by the Museum of Victoria (MV), a very appropriate code given the phylogenetic position (see below). This taxon, coded as MV69E, and that coded MV118E or "nr. *Eurycnemus* sp. 2", appear identical (Richard Marchant, Museum of Victoria, pers. comm.)

In an unpublished thesis, Hergstrom (1974) recognised on adults two species of Australian *Austrobrillia*, splitting *"A. collessi"* (a not formally published, therefore unavailable name!) from the genotype by a narrower wing in both sexes, in the male by the degree of appression of the inner lobe (= inferior volsella) to the gonocoxite, and in the female by the "egg guide (= dorsomesal lobe of gonapophysis VIII) ending in a knob" (v. pointed). Although there is substantial variation, examination of material available to Hergstrom and additional specimens shows that the range of wing length:width ratios is less than described and does not fall into two groups. Furthermore, the assessment of genitalic features in both sexes seems to be due to distortions in some preparations. Examination of a large number of pupal exuviae shows that the species varies markedly in size, and consequently in allometric features, with thoracic horn length and density of anal lobe taeniae most variable. However, the reared material is still inadequate to assess how pupal relates to adult morphological variation, and at present the evidence is for a single, polymorphic species with clinal (Hergstrom 1974) or ecophenotypic variation.

Austrobrillia chilensis, spec. nov.

Figs 2B,D, 3A

Types. Holotype: Pe, slide-mounted in Euparal; Chile, Prov. Cautin, Rio Pirén, 4km o. (above) R. Queule, (Nr 17), 3.II.1986, M. Spies (ZSM).

Description

Pupa (n=1).

Length 6.5 mm. Pale, with brown transverse apophyses and dark brown tergal tubercles in transverse bands. Cephalic and thoracic setae weak, non-taeniate: frontal setae 50 long; antepronotal setae – $MAps_1$ 73, $Maps_2$ missing, $Laps_3$ 66; precorneals – Pc_1 165, Pc_2 75, Pc_3 155; dorsocentrals stubby – Dc_1 20, Dc_2 20, Dc_3 50, Dc_4 45; distances: Dc_{1-2} 160, Dc_{2-3} 125, Dc_{3-4} 5. Thoracic horn (Fig. 3A) 245, cylindrical, of even width, almost completely adorned with slender spines with elongate bases.

Abdominal tergites (Fig. 2B): T I bare, with faint polygonal pattern on posterior; T II-IV with dense spinules, posteriorly with transverse band of regularly-arranged and near-contiguous tubercles, anterior to broad conjunctival band of spinules arising from polygonal areas, on IV this band restricted to small lateral patches with wide median interruption; T V with posteromedially interrupted shagreen, anterior to monoserial even band of contiguous tubercles; T VI-VIII at most with weak shagreen. Pleurae with spinules on anterior of II and III. Sternites (Fig. 2D): I with posterior transverse band of shagreen, II with broad anterior band of elongate, translucent spines flanked by dense (pleural) spinules, and with posterior transverse band of shagreen; S III-V with sparser anterior spinules; IV also with pedes spurii A and nearby more medial patches (small); S VI with small anterolateral patches, VII-VIII bare. Anal lobe with 80 taeniae.

Etymology. Named for the country of provenance; adjectival.

Austrobrillia valereissia, spec. nov.

Figs 2C,E

Types. Holotype: Pe, slide-mounted in Euparal; ECU66 (Ecuador), NA (Napo), Sumaco, Cosanga, Bach mit Wasserfall (stream with waterfall), NÖ der Siedlung (NE of settlement), 2000m, (01-81/99-37), 13.I.1995, R. Gerecke (ZSM).

Description

Pupa (n=1).

Length 5.2 mm. Pale yellow, with tergal brown pigment associated with rectangular spinule patches, transverse apophyses and dark brown tergal tubercles in transverse bands. Cephalic and thoracic setae strong, near taeniate: frontal setae 80 long; antepronotal setae – $MAps_1$ 130, $MAps_2$ 170, $LAps_3$ 70; precorneals subequal about 140; dorsocentrals stout – Dc_1 35, Dc_2 28, Dc_3 50, Dc_4 55; distances: $Dc_{1\text{-}2}$ 85, $Dc_{2\text{-}3}$ 115, $Dc_{3\text{-}4}$ 10. Thoracic horn 215, cylindrical, slightly tapering to apex, covered with slender spines with elongate bases.

Abdominal tergites (Fig. 2C): T I bare, with faint polygonal pattern on posterior; T II-VI with square patches of spinules, posteriorly with transverse band of irregularly-arranged, approximately biserial tubercles, weaker on VI, with polygonal patterns on anterior conjunctives,with broad transverse band of spinules on II-IV; T VII densely spinulose, VIII bare. Pleurae spinulose only on ventral (parasternae) of I-III. Sternites (Fig. 2E): SI with posterior and lateral bands of shagreen, II-III densely spinulose without long spines; IV with weak anterior shagreen, pedes spurii A and nearby more medial patches; S V-VII with median spinule patches, VI, VII also with anterolateral shagreen; SVIII bare. Anal lobe with 52 taeniae.

Etymology. Named to farewell (Latin: vale) my late, lamented colleague, Frieder Reiss; to be used as an adjective.

Key to pupae of *Austrobrillia* Freeman

1. Abdominal tergite VII spinulose (Fig. 2C). Sternite II without anterior transverse band of elongate hyaline spines, S V-VII extensively spinulose (Fig. 2E) .... *A. valereissia*, spec. nov.
– T VII virtually bare (Figs 2A, B). S II with anterior transverse band of elongate hyaline spines, posterior sternites virtually bare (Fig. 2D) 2

2. T V with transverse band of closely approximated, uniserial tubercles, T VI without tubercles; conjunctival band on V medially interrupted (Fig. 2B) .... *A. chilensis*, spec. nov.
– T V with transverse band of basally separated, unevenly biserial tubercles, T VI with tubercle band; conjunctival band on V continuous (Fig. 2A) .... *A. longipes* Freeman

Systematic discussion

A data matrix derived to assess the phylogenetic position of *Parapsectrocladius* Cranston (Cranston 2000) has been expanded to include the *Brillia*-group (sensu Sæther & Wang 1992), in a first step limited to only those members known in all life history stages. This neglect of some taxa (*Irisobrillia* Oliver, *Tokyobrillia* Kobayashi & Sasa) is consistent with previously expressed views that combined data from all stages provide more robust phylogenetic estimation (e.g. Cranston & Edward 1998). The matrix (available from the author upon request) comprises 68 phylogenetically informative characters for larvae, pupae and adults of both sexes scored for 40 terminal taxa. It was analysed under parsimony with *Prodiamesa* Kieffer as outgroup, using Hennig86 (Farris 1988) operating within a Microsoft Windows shell of Tree Gardener 1.0 (Ramos 1996), employing the heuristic option mhennig* followed by bb*. Resultant trees (of low consistency and retention) are susceptible to variation in ordering multistate characters, although all have *Austrobrillia* either as sister to *Euryhapsis* Oliver + *Eurycnemus* v.d.Wulp, or the three in an unresolved trichotomy. The three other *Brillia*-group genera known in all stages, *Xylotopus*, *Brillia* and *Pseudobrillia*, lie as sister to the previous trio, or are unresolved, basal. Analyses adding pupal and adult characters for *Plhudsonia* Sæther, and adult characters for *Irisobrillia* and *Tokyobrillia*, demonstrate that these, too, are members of the clade, but the monophyly of *Austrobrillia* + *Euryhapsis* + *Eurycnemus* is not affected. Monophyly and internal relationships within the *Brillia*-group continue to depend upon nuances of weighting (additivity). Notably, in "all-additive" trees *Brillia* and *Pseudobrillia* cluster with *Irisobrillia* and *Tokyobrillia* as proposed by Sæther & Wang (1992). The *Brillia*-group is basal in all analyses, followed by *"Psectrocladius"* (Cranston 1996) followed by *Propsilocerus* Kieffer, then *Diplocladius* Kieffer as successive clades – congruent with relationships found in several of Sæther & Wang's (1992) analyses. Further progress in elucidating the relationships within the *Brillia*-group, and the basal Orthocladiinae in general, appears to require wider knowledge of the immature stages, and perhaps better micromorphological documentation of the female genitalia, including especially circum-vaginal morphology (number of openings of ducts, microtrichiation of labia, etc). Drift-collected pharate female pupae can provide much evidence as demonstrated by Reiss for *Plhudsonia* (Sæther 1992).

On balance, analyses provide evidence for the *Brillia*-group lying at the base of the Orthocladiinae phylogeny, with the autapomorphic direction (oblique), curvature, and length of wing vein RM providing strong evidence for monophyly, as noted by Sæther & Wang (1992), but less obviously developed in *Plhudsonia*.

The female genitalia are instructive also in identifying the relationship of *Spaniotoma (Orthocladius) eurycnemoides* Edwards, described from a distinctively patterned female adult from Patagonia (Edwards 1931: 284). As redescribed by Sæther (1979) it was transferred to *Psectrocladius*, but re-evaluation by Sæther & Wang (1992) showed it to be a member of the *Brillia* group, probably within *Eurycnemus*. The bare wing and the genitalia resemble *Plhudsonia* and also *Austrobrillia longipes*, suggesting a possible association of *eurycnemoides* Edwards with one of the two pupal exuviae described above. However, the strong development of the pulvilli, which caused Edwards confusion and initially led Sæther (1979) to place the taxon in *Psectrocladius*, does not debar its inclusion in the *Brillia*-group, but presently precludes it from congenericity with *Austrobrillia*.

Ecology and biogeography

The larvae of *Austrobrillia longipes* are found on wood and leaves, and within wood immersed in streams in the southeast of Australia, and their guts contain predominantly fibres of wood (McKie & Cranston 1998). This appears to be a mode of living common to many, if not most, members of the *Brillia*-group. For example, the larvae of *Xylotopus par* (Coquillett) mine in decaying, water-logged hardwood in North American streams (Kaufman 1983, Oliver 1985). The larvae of *Pseudobrillia komorii* Niitsuma were found on fallen leaves in Japanese streams as early instars, and as miners in decomposing wood in later instars (Niitsuma 1991). Species of *Brillia* include both grazers in leafpacks and wood miners in the northern hemisphere. It may be surmised that the immature stages of additional taxa whose larvae are unknown may be found in similar habitats. Furthermore, given the basal phylogenetic position of the *Brillia*-group in the subfamily (see above), it might be inferred that grazing on leaves and mining in wood forms a plesiotypic behaviour in the orthoclads.

The discovery of another taxon with a specialised immature biology that occurs in both South America and Australia adds further weight to arguments that the radiation of the Chironomidae at the taxonomic level of still extant monophyletic clades (genera) predates the fragmentation of Gondwana, followed by great stasis in biology and pupal morphology over a period in excess of 38 million years since Australia and South America were contiguous through Antarctica. The current distribution of the *Brillia*-clade suggests an even more ancient, Pangaeic origin.

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The Australian Academy of Sciences generously provided financial support to visit and examine the ZSM collections where Martin Spies and the late Friedrich Reiss retrieved and loaned material. Wendy Lee databased all specimens.

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SPIXIANA	**23**	2	112	München, 01. Juli 2000	ISSN 0341-8391

Reissmesa, nom. nov., a replacement name for *Reissia* Brundin

(Insecta, Diptera, Chironomidae, Diamesinae)

Patrick Ashe

Ashe, P. (2000): *Reissmesa,* nom. nov., a replacement name for *Reissia* Brundin (Insecta, Diptera, Chironomidae, Diamesinae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 112.

The genus name *Reissmesa,* nom. nov. is proposed as a replacement for *Reissia* Brundin, 1981 (Insecta, Diptera), a junior homonym of *Reissia* Loeblich & Tappan, 1964 (Protozoa, Rhizopoda).

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Introduction

It has recently come to my notice that *Reissia* Brundin, 1981, a genus name in the Chironomidae subfamily Diamesinae, is preoccupied by *Reissia* Loeblich & Tappan, 1964 which was erected for a fossil Protozoan of the Class Rhizopoda (family Islandiellidae).

Reissmesa, nom. nov.

Reissia Brundin was named in honour of Dr. Friedrich Reiss. It was itself a replacement name for *Araucania* Brundin, 1966 nec Pate, 1947.

Dr. Reiss, 'Frieder' to his friends, became ill unexpectedly and died during the summer of 1999. I take this opportunity to express my appreciation for all the kindness and friendship Frieder has shown me. To honour his memory, the replacement name *Reissmesa* is formed by retaining the prefix "Reiss" and adding "mesa", the ending of many genus names in the Diamesinae.

The type species becomes *Reissmesa antiqua* (Brundin, 1966), comb. nov., and the two other included species: *Reissmesa gelida* (Brundin, 1966), comb. nov., and *Reissmesa valdesiana* (Brundin, 1966), comb. nov.

The genus is only known at present from the southern Neotropical Region.

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Cricotopus (Cricotopus) reissi, spec. nov. from Chukchi Peninsula, northeastern Russia

(Insecta, Diptera, Chironomidae)

Eugenyi A. Makarchenko

Makarchenko, E. A. (2000): *Cricotopus (Cricotopus) reissi,* spec. nov. from Chukchi Peninsula, northeastern Russia (Insecta, Diptera, Chironomidae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23**/**2**: 113-116.

The male adult of *Cricotopus (Cricotopus) reissi,* spec. nov. is described from northeastern Russia and identified as a member of the *pilosellus* group. The new species is characterised by the structures of intermedian paramere and basal lobe of the gonocoxite, and by the shape of the gonostylus.

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Introduction

Taxonomy and systematics of the genus *Cricotopus* van der Wulp, 1874, of the Russian Far East are very poorly investigated. Up to the present time, only 13 species have been recorded in this region, namely *C. (Cricotopus) algarum* (Kieffer), *C. (C.) bicinctus* (Meigen), *C. (C.) fuscus* (Kieffer), *C. (C.) trifascia* Edwards, *C. (C.)* gr. *tremulus, C. (Isocladius) brevipalpis* Kieffer, *C. (I.)* gr. *intersectus, C. (I.)* gr. *obnixus, C. (I.) sylvestris* (Fabricius), *C. (I.) trifasciatus* (Meigen), *C. (Nostococladius)* sp., *C. (Pseudocricotopus) montanus* Tokunaga, and *C. maritimus* Tshernovskij (Konstantinov 1950, Levanidov 1969, Makarchenko & Makarchenko 1994, Makarchenko et al. 1997, 1999, and original data). Most of these findings were based on larvae, and therefore the Far Eastern members of this genus of Orthocladiinae are still in need of considerable study.

In this paper, a new species is presented belonging to the *pilosellus* group within the subgenus *Cricotopus (Cricotopus)*. It has been found on the Chukchi Peninsula, one of the least accessible and most insufficiently investigated regions of the Russian Far East.

Terminology

Morphological terminology and abbreviations follow those of Sæther (1980), except for hypopygium structures, for which is used terminology of Hirvenoja (1973).

Cricotopus (Cricotopus) reissi, spec. nov.

Figs 1A-E

Types. Holotype: adult ♂ (slide-mounted in Euparal), Russian Far East, Magadan Territory, Chukchi Peninsula, Kresta Bay, Seutakan Lake, 12.07.1976, leg. E. Makarchenko. – Paratypes: 12♂♂ (in either Fora-Berleze or Euparal), as holotype, except 12.-14.07.1976 (All deposited in the Institute of Biology and Soil Sciences, FEB RAS, Vladivostok, Russia).

Etymology. The new species is named in honour of Dr. Friedrich Reiss who supported my taxonomic investigations of the Far Eastern Chironomidae and always helped me.

Differential diagnosis. *Cricotopus (C.) reissi*, spec. nov. belongs to the *pilosellus* group of Hirvenoja (1973), along with *C. (C.) pilosellus* Brundin, *C. (C.) pilidorsum* Hirvenoja, and *C. (C.) villosus* Hirvenoja. The new species is well separated from the other known members of this group by the shape of the gonostylus with a subtriangular outer projection, by the simple, finger-shaped basal lobe of the gonocoxite, and by the relatively strongly developed intermedian paramere with long microtrichia. The other species have simple gonostyli without lateral projections, double basal lobes, and no noticeable intermedian parameres.

Description

Male imago (n=3). Colour dark brown. Total length 3.3-3.6 mm; total length/wing length 1.28-1.43 mm.

Head. Eye hairy (seta length about 1.5-2 times facet height), with moderate dorsomedian extension. Temporal setae 24-26, bi- to multiserial, not clearly separated into inner and outer verticals and postorbitals; coronal setae 4 (length about 13-17 µm); clypeus with 13-25 setae; palpomere lengths 2-5 (µm): 69-96, 109-145, 116-129, 158-185. Palp length (Pm 1-5)/head width 0.74-0.96. Antennal plume well developed, length of setae on flagellomeres 2-12: 310-432 µm; subapical seta length 53-54 µm; AR 0.97-1.30 (n=5). Frontal tubercles absent.

Thorax (Fig. 1A). Coloration dark brown, scutal stripes brown. Antepronotals 23-27 (length 50-66 µm); acrostichals 17-21, biserial (length 36-50 µm), beginning near antepronotum; dorsocentrals 107-118, (length 56-60 µm), multiserial, converging medially behind scutum; prealars 56-71 (length 40-110 µm), multiserial, with an anterior and a posterior group distinguishable; anterior prealars extending to near parapsidal suture; supraalars 7-10 (length 43-50 µm); scutellars 72-120 (length 59.4-79.2 µm), multiserial. Postnotum with 4-5 setae (length 40-67 µm), posterior anepisternum II with 2 setae, preepisternum without setae.

Wing. Length 2.3-2.8 mm, width 0.6-0.7 mm; membrane with fine punctation of microtrichia; anal lobe well developed and rounded; squama with 13-18 setae; costa not produced or slightly produced beyond R_{4+5}; R_{2+3} ending closer to R_1 than to R_{4+5}; Cu_1 slightly curved; R with 13-16 short setae; R_1 and R_{4+5} without setae.

Legs. Coloration dark brown or brown, tibiae without light rings. Fore tibia with 1 spur, mid and hind tibiae each with 2 spurs; length of spurs (µm): P_1 60-70; P_2 both 36-43; P_3 79-90 and 36-43; comb on hind tibia with 9-10 setae (length 33-56 µm). Pulvilli vestigial, like small spines. Lengths (µm) and proportions of leg segments (n=3):

	fe	ti	ta$_1$	ta$_2$	ta$_3$	ta$_4$	ta$_5$
P_1	788-959	959-1150	554-639	320-383	234-277	170-192	149-170
P_2	852-1001	895-1065	405-511	234-320	192-234	128-170	128-170
P_3	895-1065	1044-1235	533-639	341-405	256-320	149-192	149-192

	LR	BV	SV	BR
P_1	0.56-0.58	2.64-2.75	3.13-3.30	1.8-1.9
P_2	0.45-0.50	2.86-3.16	3.96-4.31	1.5-1.7
P_3	0.50-0.53	2.68-2.76	3.57-3.72	1.7-1.8

Abdomen. Tergites dark brown, with numerous setae. Setal distribution on the abdominal tergites is uniform, as in *C. (C.) pilosellus* Brundin (Oliver & Dillon 1988: fig. 4).

Hypopygium (Figs 1B-E). Tergite IX without anal point, with 23-26 setae (length 16-33 µm),

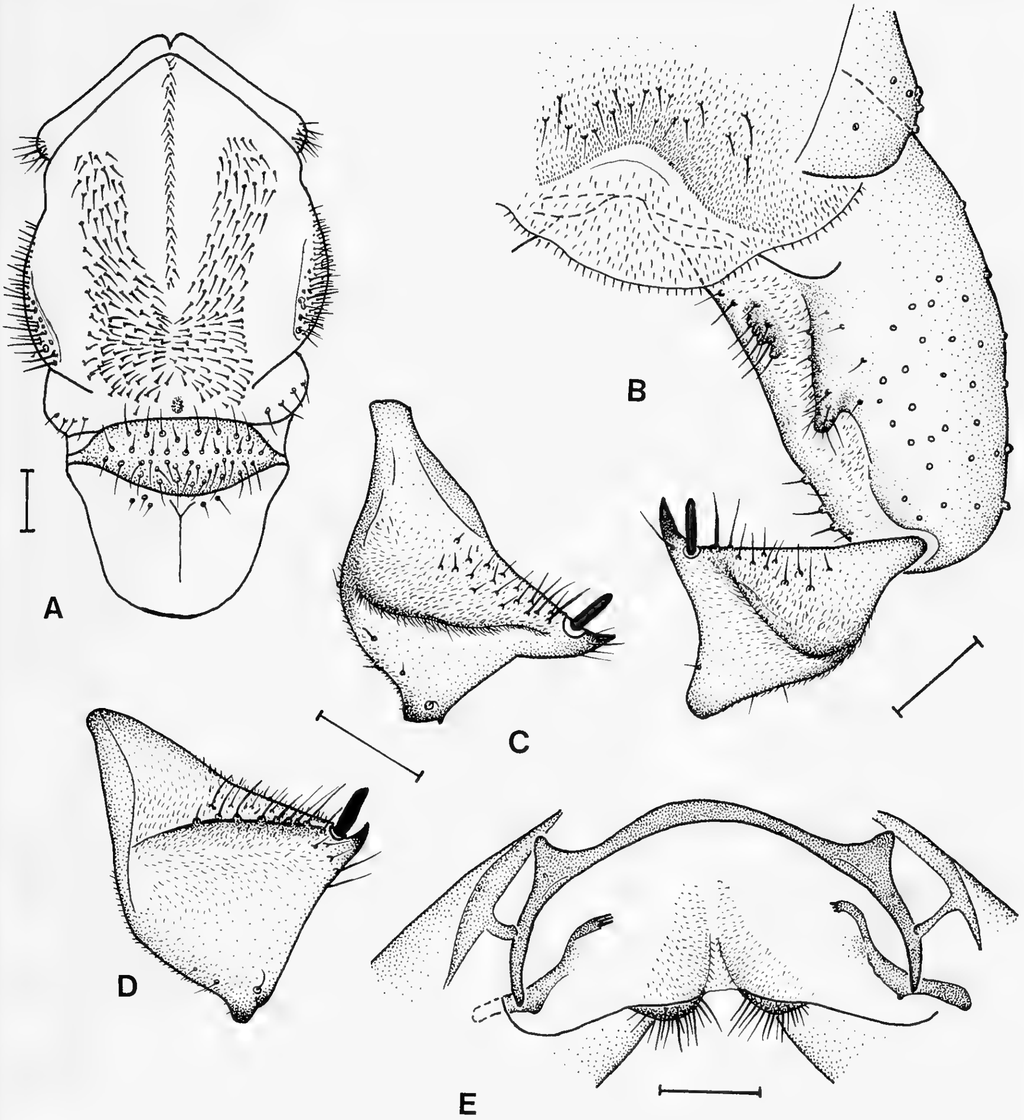

Fig. 1. *Cricotopus (Cricotopus) reissi,* spec. nov. Adult male. **A.** Thorax. **B.** Hypopygium. **C.-D.** Gonostylus in different aspects. **E.** Detail of terminal segment showing internal apodemes and intermedian parameres. Scale: 50 μm.

posterior margin concave; laterosternite IX with 6-7 setae (length 66-99 μm). Inner margin of gonocoxite in middle part with group of 8 setae. Intermedian paramere of gonocoxite small and rounded, with numerous elongate microtrichia (length 16-30 μm) (Fig. 1E); basal lobe simple and finger-shaped, covered with short setae. Gonostylus (Fig. 1B-D) wide, medio-laterally with subtriangular projection, apically with claw-like tooth (length 20 μm) and strong megaseta (length 26-28 μm), subapically with 2-3 strong setae (length 33-39 μm), inner margin lined with short setae; HR 1.7-1.8.

Female imago, pupa and larva. Unknown.

Distribution. *C. (C.) reissi,* spec. nov. is known only from the type locality on Chukchi Peninsula in the Russian Far East.

Acknowledgements

I am very grateful to Dr. M. Hirvenoja for editorial comments, and to M. Spies for editing my Russian English and discussing morphology and systematics of the genus *Cricotopus*.

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A new, non-marine species of the genus *Thalassomya* Schiner, 1856

(Insecta, Diptera, Chironomidae, Telmatogetoninae)

Sebastião José de Oliveira

Oliveira, S. J. de (2000): A new, non-marine species of the genus *Thalassomya* Schiner, 1856 (Insecta, Diptera, Chironomidae, Telmatogetoninae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 117-120.

The adult male of *Thalassomya reissi*, spec. nov. is described from inland Kenya, Africa. This is the first non-marine species of the genus.

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Introduction

The genus *Thalassomya* Schiner, 1856 is cosmopolitan and includes the following species: *T. africana* Edwards, 1926, *T. bureni* Wirth, 1949, *T. cocosensis* Hashimoto, 1979, *T. frauenfeldi* Schiner, 1856, *T. japonica* Tokunaga & Etsuko in Tokunaga & Komyo, 1955, *T. longipes* (Johnson, 1924), *T. maritima* Wirth, 1947, *T. pilipes* Edwards, 1926, *T. sabroskyi* Tokunaga, 1964, and *T. setosipennis* Wirth, 1947. The present author is currently preparing descriptions of two new species from Brazilian coasts. All the above-mentioned species have marine habitats, living on rocks in the intertidal zone. In contrast, the new species described below was collected in Amboseli National Park, continental Kenya, a long way from the Indian Ocean. Some species of *Thalassomya* live in relatively low-salinity conditions near river estuaries, and the otherwise marine genus *Telmatogeton* Schiner, 1866 has members endemic to Hawaiian mountain torrents. But so far no *Thalassomya* has ever been proven to live in inland saline or even fresh water. Therefore, further collections near the type locality of the new species are needed to evaluate its ecology.

The descriptive terminology used follows Sæther (1980) for general morphology, and Cranston (1989) for the hypopygium.

Thalassomya reissi, spec. nov.

Figs 1a-g

Type material. Holotype: adult ♂, slide-mounted in Canada balsam; Kenya, Amboseli Natl Park, Amboseli Lodge, 27.IV.1980, leg. E. G. Burmeister; deposited at Zoologische Staatssammlung München, Munich, Germany.

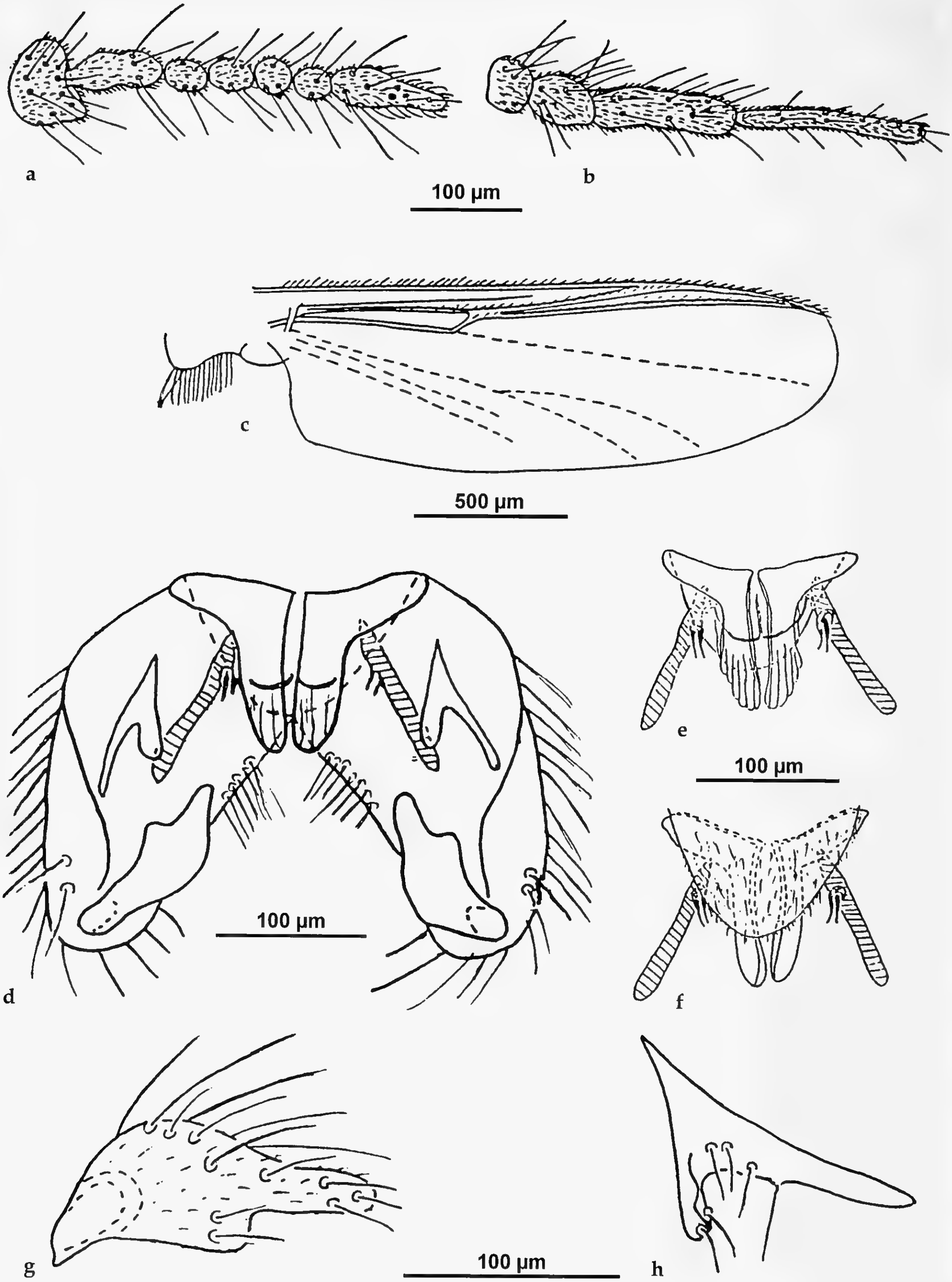

Fig. 1. *Thalassomya reissi,* spec. nov.; adult male. **a.** Antenna. **b.** Palpus. **c.** Wing. **d.** Hypopygium. **e.** Aedeagus, endomere and phallapodeme, ventral view. **f.** Aedeagus, endomere and phallapodeme, dorsal view. **g.** Gonostylus. **h.** Dorso-basal lobe of gonocoxite.

Diagnosis. *Thalassomya reissi*, spec. nov. differs from all species of the genus by the following character combination: wing veins M_{1+2}, M_{3+4}, Cu_1 and An scarcely discernible; shape of dorso-basal lobe of gonocoxite; shape and 2 strong, dorsal black spines of phallapodeme; rounded tip of gonostylus; low number of scutellar setae. is closest to *T. africana* Edwards, originally of Dar-es-Salaam, Tanzania, but differs by the antenna being as long as the palpus, by the more slender gonocoxite dorsal lobe with different setation, and by the gonostylus being distinctly widened medially. *T. reissi*, spec. nov. differs from all other species of the genus because it has two black spines in the basal third of the phallapodeme.

Etymology. Named after the late Dr Friedrich Reiss, colleague and friend, in honour of his fine studies on Chironomidae.

Description

Adult male (n=1).

Median-sized species, body length 4.11 mm, wing length 1.94 mm.

General colour brown.

Head. Antenna (Fig. 1a). Pedicel large with 10 long setae; flagellum with six flagellomeres, lengths (in μm): 90, 40, 45, 35, 35, 110; AR = 0.44; fm 1 about twice as long as broad, with median constriction and 4 long setae in distal third; fm 2-5 subspherical, with three sensorial pits in distal portion, 4 long setae each; fm 6 about three times as long as wide, bottle-shaped, with 4 long setae in proximal portion and 1 short seta subapically. Temporal setae 70, multiserial. Palp (Fig. 1b) 5-segmented, basal pm indistinct, lengths of palpomeres 2-5 (in μm): 40, 70, 150, 200; pm 2 bulbous, with 4 long setae; pm 3 with long setae and one sensillum capitatum near the apex; pm 4 elongate with long setae, pm 5 slender with about 10 short setae.

Thorax brown. All thoracic setae arising from light-colored, ocellate spots; 3 humerals, 18 dorsocentrals, 12 prealars (arrangement and number of achrostichals not visible in the lateral mount). Scutellum light brown, with 5+5 setae. Postnotum bare.

Wing (Fig. 1c) covered with fine punctation due to microtrichia visible at 20× magnification; pale brown except for darker area delimited by veins C, M, and R_{4+5}; VR = 1.45; C, R, R_1 and R_{4+5} with strong setae; M_{1+2}, M_{3+4}, Cu_1 and An scarcely discernible, bare; squama with 18 marginal setae; anal lobe rounded. Halteres light brown.

Legs slender, brown, covered with short, brown setae; tarsomere 4 cordiform, ta_5 cylindrical. P_1 and P_2 with pectinate outer and simple inner claws; P_3 with both claws simple.

Segment lengths (in μm) and proportions:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV
P_1	1300	1800	1000	400	200	60	120	0.55	5.25	3.10
P_2	2000	1900	800	300	200	60	120	0.42	6.91	4.87
P_3	1840	2400	1240	600	340	80	140	0.51	4.72	3.41

Abdomen. Light brown, covered with small setae.

Hypopygium (Figs 1d-h). Apex of endomere (Figs 1d-f) not setose. Phallapodeme with 2 strong, black dorsal spines proximo-medially. Dorso-basal lobe of gonocoxite (Fig. 1h) slender, with peculiar shape, with 2 small setae on a finger-like protuberance and 4 setae (1 of them larger) at base. Gonostylus (Fig. 1g) broadest medially; tapering distally to a rounded tip, bearing some large setae on dorsal margin and three subapical small ones.

Female, pupa and larva unknown.

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Chironomids of small Alpine water bodies (springs, spring brooks, pools, small lakes) of the northern Calcareous Alps

(Insecta, Diptera, Chironomidae)

Claus Orendt

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30 small Alpine water bodies (springs, spring brooks, pools, small lakes) of the northern Calcareous Alps (Berchtesgaden National Park, Germany, and adjacent regions in Austria) were surveyed for their chironomid communities in 1997 and 1998. Mainly, pupal exuviae were sampled. 94 taxa are recorded and listed. Three are new for Germany (*Diamesa wuelkeri* Serra-Tosio, *Corynoneura arctica* Kieffer, *Parakiefferiella fennica* Tuiskunen), five for Bavaria (the former, *Heterotrissocladius grimshawi* (Edwards), and *Limnophes asquamatus* Andersen), and one for Austria (*Chironomus nuditarsis* Keyl). No statistically significant correlations could be found between the occurrence of any taxon and altitude (m a.s.l.). This may be due to the small data set. 71 % of all taxa recorded could be determined on species level. Taxonomic diversity ranged from 10 (a lake) to 0 (hygropetric habitats). Compared to some earlier chironomid studies from the Calcareous Alps, the present survey achieved a higher proportion of determinations to species level. It is concluded that this is an effect of sampling pupal exuviae rather than larvae.

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Introduction

This paper is dedicated to F. Reiss. Some years ago he encouraged me to collect in the Alpine region. He was convinced that, if there is still anything faunistically interesting left to discover concerning the chironomids in central Europe, it will be found in the Alps. Remembering this I was happy to join a project in 1997 and 1998 surveying the macroinvertebrate and algal communities of springs in Berchtesgaden National Park. For chironomids, only few investigations on this small ecosystem are published (e.g. Crema et al. 1996, Thienemann 1936, 1942, Weigand & Tockner 1996). Moreover, as those were based on larval material, the taxonomic resolution is not as high as possible when using pupal exuviae or adults. Therefore, the available knowledge on chironomid communities in Alpine habitats is relatively meagre. On the other hand, new species were recorded or described in all investigations. Following that, further studies are urgently needed. In the Berchtesgaden project mentioned, chironomids were collected in springs as well as in brooks, meltwater pools and small lakes. Nearly all water bodies are situated higher than 1000 m a.s.l. The paper presented follows two aims: (1) to survey the chironomid communities of the various habitats by collecting mainly pupal exuviae in order to achieve

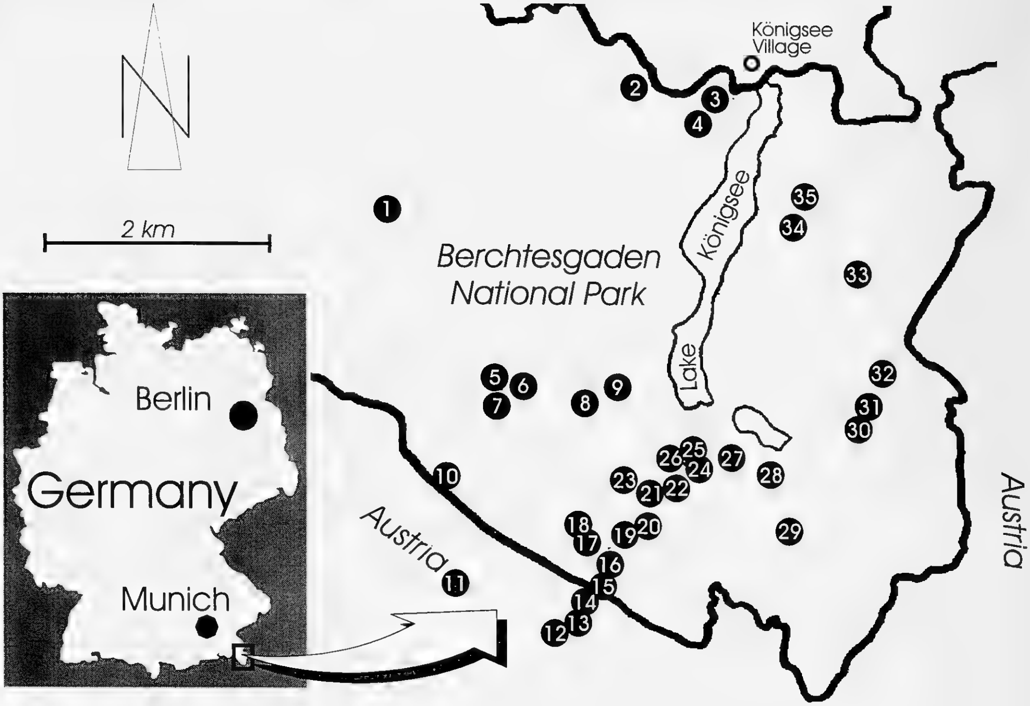

Fig. 1. Locations of sample sites (numbered as in tab. 1).

as many species-level identifications as possible, and (2) to compare the results with earlier studies sampling mainly larvae, and evaluate the methods used.

Sample sites

Four of the waters bodies investigated are situated in Austria, but the great majority of them are in Berchtesgaden National Park in the northern Calcareous Alps, around Lake Königsee (Upper Bavaria, Germany), between the Watzmann, Steinernes Meer, and Hagen mountains (Fig. 1). The rocks are often karstic and derive almost exclusively from marine sediments, mainly from the Triassic period. The area is characterized by steep slopes, plateaus and valleys. The vegetation is dominated by woods which decrease upward of about 2000 m a.s.l. Among the 35 sites on 30 waters studied, there are springs (rheocrenes, rheohelocrenes, hygropetric zones), spring brooks, meltwater pools and small lakes, located between 960 m and 2150 m a.s.l. An overview of their characteristics is given in Tab. 1.

Material and methods

As a survey of high taxonomic resolution was one of the main goals of the study, I sampled mainly the surface drift for pupal exuviae which can be determined at species level in most cases.

Sampling was performed with a hand net ("Thienemann-Kesher", mesh size 250 μm). The net was pulled across the surface of the water for 15 to 20 min at each sample site, in running waters in a certain stretch, in pools and small lakes in the littoral zone. As far as possible without damaging the habitat, this technique was used also in springs. In very small springs or hygropetric habitats, the chironomids were picked up with tweezers. Using these methods, I obtained pupal exuviae, larvae and, in small numbers, adults.

The sampling periods were from 25 to 30 June 1997 and from 16 to 19 July 1998, chosen to find all waters free of snow cover.

Tab. 1. Sample sites and their characteristics; . = no measurement; *) refer to Fig. 1.

site nr.*)	site name	m a.s.l.	water type	date of sampling	sampled material	date of measurements	dis charge [l/s]	temperature [°C]	conduct. [µS/cm]	pH	oxygen [mg/l]
1	Mittergraben (Wimbachtal)	1300	brook	19.07.98	drift	.	.	.	.	.	.
2	Schapbach-Quelle	1120	rheocrene	25.06.97	surface drift	.	.	.	.	.	.
3	Sommerbichl-Weide (spring)	1170	rheocrene	26.06.97	surface drift	.	.	.	.	.	.
4	Herrenroint "F"	1280	spring brook	25.-26.06.97	drift	.	.	.	.	.	.
5	Graskopf (upper spring)	1840	rheocrene	18.07.98	drift	18.07.98	0,25	4,5	209	8,12	10,8
6	Rauhe Köpfe	1860	lake	18.07.98	drift	18.07.98	0,10	3,8	150	8,56	11,8
7	Graskopf (pool)	1810	meltwater pool	18.07.98	drift	18.07.98.	.	24,0	.	.	.
8	Saugasse	1200	hygropetric	16.07.98	benthos	.	.	.	.	.	.
9	Schrainbachquelle	960	rheocrene	30.06.97	surface drift	15.07.98	200,00	5,5	156	8,33	11,7
10	A spring NE of Ingolstädter Haus ("Hundstodscharte")	2040	rheocrene	18.07.98	drift	18.07.98	0,10	.	.	.	.
11	Steinernes Meer (Wegscheid/Weißbachscharte)	2150	hygropetric	17.07.98	benthos	17.07.98	0,01	4,9	126	8,33	10,0
12	Wunderquelle	2000	hygropetric and small spring pool	17.07.98	benthos	17.07.98	0,02	5,2	124	8,41	10,5
13	Steinernes Meer, a lake NE of Wunderquelle	2050	lake	17.07.98	drift	17.07.98	0,20	12,2	117	8,48	10,1
14	Steinernes Meer, pool SW of mark "1949"	1990	meltwater pool	17.07.98	drift	17.07.98	0,00	11,5	108	8,66	11,1
15	Stuhlgraben (100 m below trail, drift along a 50 m stretch)	1700	spring brook	16.07.98	drift	16.07.98	1,00	5,3	231	7,95	9,77
15	Stuhlgraben (200 m stretch below spring)	1800	spring brook	16.07.98	drift	16.07.98	0,4	3,8	270	7,885	10,36
16	Rennergraben	1660	spring brook	30.06.97	drift	16.07.98	2,50	4,9	290	7,61	9,1
17	Funtensee, near Teufelsmühle	1601	lake	16.07.98	drift	16.07.98	10,00	10,1	226	8,47	9,9
18	Funtensee, southern shore	1601	lake	30.06.97	drift	.	.	.	.	.	.
19	Feldalm (lower spring)	1760	rheocrene	16.07.98	drift	.	.	.	.	.	.
20	Feldalm (upper spring)	1780	rheocrene	16.07.98	drift	.	.	.	.	.	.
21	Grünsee-Alm, meltwater pool	1600	meltwater pool	29.06.97	drift	.	.	.	.	.	.
22	Grünsee-Alm, spring	1600	rheocrene	29.06.97	drift	16.07.98	15,00	2,9	158	8,23	11,2
23	Grünsee, SE shore	1474	lake	29.06.97	drift	.	.	.	.	.	.
24	Schwarzensee (around the spring region)	1560	lake	29.06.97	drift	.	.	.	.	.	.
25	Schwarzensee (near outlet)	1560	lake	29.06.97	drift	.	.	.	.	.	.
26	Schwarzensee (mud in the littoral)	1560	lake	29.06.97	benthos	.	.	.	.	.	.
27	Halsköpfl (moss, stone, mud)	1680	hygropetric	29.06.97	benthos	.	.	.	.	.	.
28	Hüttau	1500	meltwater pool	29.06.97	drift	.	.	.	.	.	.
29	Wasseralm	1416	spring brook	29.06.97	drift	.	.	.	.	.	.
30	Landtal (30 m downstream from spring)	1540	spring brook	27.06.97	drift	.	.	.	.	.	.
31	Landtal-Quelle	1540	rheocrene	29.06.97	drift	.	.	.	.	.	.
32	Mitterhüttenalm	1630	meltwater pool	29.06.97	drift	.	.	.	.	.	.
33	Abwärtsgraben	1450	spring brook	27.06.97	drift	.	.	.	.	.	.
34	Priesberg-Alm, below a cottage	1470	rheocrene	27.06.97	drift	.	.	.	.	.	.
35	Priesberger Moos (above "Branntweinbrennhütte")	1360	meltwater pool	27.06.97	drift	.	.	.	.	.	.

In selected water bodies, temperature, conductivity, oxygen, and pH were measured with field instruments of WTW. The measurements were performed by Harald Haseke and Elmar Pröll of Calcareous Alps National Park in Upper Austria, who joined the excursions in 1998.

Results

a. General

A total of 94 chironomid taxa were recorded (see Tab. 2): 7 Tanypodinae, 9 Diamesinae, 1 Prodiamesinae, 56 Orthocladiinae, 21 Chironominae (9 Chironomini, 12 Tanytarsini). Taxonomic diversity ranged from 10 (Lake Grünsee, site nr. 23) to 0 (hygropetric springs, sites nr. 8 and 11).

Compared to the lists of Samietz (1996, 1999), three species are documented from Germany for the first time (*Diamesa wuelkeri* Serra-Tosio, *Corynoneura arctica* Kieffer, and *Parakiefferiella fennica* Tuiskunen). Samietz (1996) listed *D. wuelkeri* as "possible or likely" in Germany, and regarded the record of *C. arctica* by Dettinger-Klemm (1994) as doubtful. The present investigation has now proved the presence of *C. arctica* in Germany. *P. fennica* Tuiskunen had been recorded only from northern Palaearctic lakes (Langton 1991) and the Iberian Peninsula (Soriano et al. 1997). In Bavaria, compared to Reiss & Reiff (1995), five species were recorded for the first time: the former three plus *Heterotrissocladius grimshawi* (Edwards) and *Limnophes asquamatus* Andersen. For Austria, comparing to Janecek & Contreras (1995), *Chironomus nuditarsis* Keyl is recorded for the first time.

A mathematical evaluation of the faunistic data did not lead to significant results. Taxonomic diversity did not correlate with altitude (m a.s.l.). A definite pattern of the distribution of species in the various waters could not be shown, as the numbers and abundances of the taxa were too low for statistical analysis.

However, some typical communities can be demonstrated with the species found.

- In the two **hygropetric habitats** investigated, only taxa from other dipteran families were found (*Thaumalea* spec., *Oxycera* spec., *Tipula* spec.), but no chironomids.
- In both **springs** (represented here by rheocrenes) and **spring brooks**, forms not strictly limited to spring areas (crenobiontic) were recorded. The communities were formed from cold-stenothermic, crenophilic (e.g. *Heleniella serratosioi, Diamesa wuelkeri, Metriocnemus eurynotus, Parakiefferiella fennica*), and epirhithral taxa. Additionally, members of *Limnophyes, Thienemanniella, Corynoneura* and *Eukiefferiella* were recorded regularly.
- In **small lakes**, species known from littoral zones of cold lakes were characteristic (e.g. *Tanytarsus sinuatus, Paratanytarsus* spp., *Corynoneura arctica, Cricotopus albiforceps, C. reversus*).
- In **meltwater pools** with moderate to heavy organic pollution, *Chironomus nuditarsis* and *C. cingulatus* were found regularly.

In Tab. 2, the occurrences and abundances of the taxa are given, sorted according to water body type.

b. Taxonomic resolution

The distribution of identifications among taxonomic precision levels was as follows:

taxonomic level	number	% of all taxa
defined species	57	71
"cf."	4	
between two species*	6	
sp. 1, spec. A, Pe 2a, b	8	26
species group	2	
genus ("spec.")	14	
lower than "sp." **	3	3

* e.g. *Eukiefferiella minor/fittkaui*; ** e.g. Orthocladiinae gen. spec.

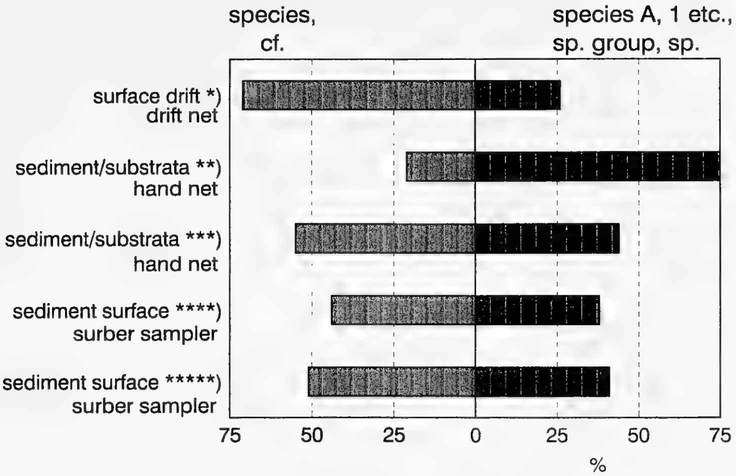

Fig. 2. Comparison of taxonomic determination levels achieved (in % of N = total number of taxa recorded) from different substrates, collecting methods, and studies. *) present study (N=94); **) Crema et al. (1996) (N=53 and 55, resp.); ***) Weigand & Tockner (1996) (N=63); ****) Janecek et al. (1991) (N=70); *****) Moog & Heinisch (1991) (N=150).

The different developmental stages were identified as follows:

taxonomic level	adults	pupal exuviae	larvae
defined species "cf." between two species*)	7	46	25
sp. 1, spec. A, Pe 2a, b species group genus ("spec.")	2	6	17
lower than "spec." **)	–	–	3

In summary, more than ⅔ of the taxa recorded could be determined to a level at least close to a defined species name. Most of these were based on pupal exuviae.

Comparing this distribution of taxonomic levels to earlier studies from Berchtesgaden National Park (Crema et al. 1996) and from the Austrian Calcareous Alps (Weigand & Tockner 1996, Janecek et al. 1991, Moog & Heinisch 1991), the present survey achieved the highest proportion of taxa determined to defined species (Fig. 2).

Discussion

The numbers of new records for Bavaria and Germany indicate the need for further study to gain a comprehensive overview of communities in Alpine habitats. Among the pupal exuviae collected there are forms of *Micropsectra* and *Smittia* that are probably new. F. Reiss had the opinion that it is very near to *M. seguyi* (*attenuata* group) from the Sierra Nevada. Sadly, his much too early death has made a description impossible at this time. From other invertebrate groups, new records and descriptions from Alpine spring ecosystems have also been reported recently (e.g. Hydracarina: Crema et al. 1996, Mollusca: Weigand & Tockner 1996). Thus, further new discoveries can be expected.

Most of the taxa recorded in this study can be found at lower altitudes as well. However, it is important to know up to what altitudes a species can occur (e.g. 2050 m for *Procladius choreus, Dicrotendipes modestus*, and *Tanytarsus sinuatus*, see tab. 2).

The lack of strictly crenobiontic species in the family Chironomidae has been noted by Lindegaard (1995) and can be confirmed from lowland springs (Orendt, in press). It seems also to be true for the habitats studied here. This pattern was also found by Weigand & Tockner (1996) in macroinvertebrate communities of karstic springs in Austria, where the species reported were distributed in both springs and spring brooks. In contrast, for other invertebrate groups such as molluscs and water mites, the existence of certain species exclusively limited to the spring region is reported (e.g. Weigand & Tockner, l.c., Gerecke 1991). In the Berchtesgaden lakes and pools, the communities differed clearly

Tab. 2. List of chironomid taxa found in small water bodies of Berchtesgaden National Park (Germany) and adjacent regions, and the numbers of specimens collected (o = < 20; x = >20; no precise data available on sites nr. 13 and 17); *) developmental stage collected; **) hygropetric habitats, rocks with patches of algae and mosses; ***) site numbers refer to Fig. 1; ****) COP = *Cricotopus/Orthocladius/Paratrichocladius* group (taxa not discernible based on juvenile larval material).

water type		hygro- petric			rheocrenes										spring brooks									meltwater pools						lakes							
site no. ***)		8	11	27	2	3	5	9	10	19	20	22	31	34	1	4	12	15	15	16	29	30	33	7	14	21	28	32	35	6	13	17	18	23	24	25	26
name of site		Saugasse*)	Steinernes Meer (Wegscheid)	Halsköpfl (moss, stone, mud)	Schappach	Sommerbichl-Weide (spring)	Graskopf (upper spring)	Schrainbach	Ingolstädter Haus	Feldalm (lower spring)	Feldalm (upper spring)	Grünsee-Alm, spring	Landtal-Quelle	Priesbergalm, below a cottage	Mittergraben (Wimbachtal)	Herrenroint F	Wunderquelle	Stuhlgraben (below the spring)	Stuhlgraben (below trail)	Rennergraben	Wasseralm	Landtal (spring brook)	Abwärtsgraben	Graskopf (pool)	Steinernes Meer, pool "1949"	Grünsee-Alm, pool	Hüttau	Mitterhüttenalm	Priesberger Moos	Rauhe Köpfe	Steinernes Meer, lake	Funtensee, near Teufelsmühle	Funtensee, southern shore	Grünsee, SE shore	Schwarzensee (spring region)	Schwarzensee (near outlet)	Schwarzensee (littoral)
m a.s.l.		1200	2150	1680	1120	1170	1840	960	2040	1760	1780	1600	1540	1470	1300	1280	2000	1800	1700	1660	1416	1540	1450	1810	1990	1600	1500	1630	1360	1860	2050	1601	1601	1474	1560	1560	1560
Tanypodinae	**)																																				
Macropelopia sp.	L			2		4								1																							
Macropelopia notata (Mg.)/*adaucta* K.	L						4			3																											
Procladius choreus (Mg.)	P																														o						
Psectrotanypus varius (Fab.)	P																												2								
Trissopelopia longimana (Staeger)	P					4																															
Trissopelopia sp.	L					9																															
Zavrelimyia barbatipes (Kieffer)	P																																1				
Diamesinae																																					
Diamesa insignipes K.	L											1																									
Diamesa starmachii Kow. & Kow.	L																																1				
Diamesa cf. *steinboecki* Goetgh.	L														1																						
Diamesa wuelkeri Serra-Tosio	P																						1														
Diamesa zernyi gr.	L																			1																	
Diamesa sp. 1	L																	1	1																		
Diamesa sp.	L										2				1																						
Pseudodiamesa branickii (Nowicki)	LP									2			8	1							15	3				1											
Pseudokiefferiella parva (Edw.)	L			3																																	
Prodiamesinae																																					
Prodiamesa olivacea (Mg.)	P													1																							
Orthocladiinae																																					
Brillia bifida (K.)	P											2																									
Bryophaenocladius muscicola (K.)	P																									1											
Chaetocladius sp. A	L									1																											
Chaetocladius piger gr.	L								1																												
Chaetocladius sp. *piger* (G.)/*dentiforceps*	L										11																										
COP****)	L								1				1								1																
Corynoneura arctica K.	P																														o	x		12			
Corynoneura lobata Edw.	PI				1							1	1																				30	1	1	18	
Corynoneura lobata Edw./*edwardsi* Br.	I																																			2	
Corynoneura sp.	L				3																	1	1														
Cricotopus (C.) albiforceps (K.)	P																																	2			
Cricotopus (C.) curtus Hirv.	L				1																																
Cricotopus (I.) cf. *laricomalis* Edw.	P																														x						
Cricotopus (I.) reversus Hirv.	P																																	1			
Cricotopus (I.) sylvestris (Fab.)	P																																1				
Cricotopus (I.) sp.	P																															1					
Cricotopus sp.	L																																	1			
Cricotopus/Orthocladius juv.	L																														x						
Eukiefferiella brevicalcar (K.)	LP				1										1						1					1											
Eukiefferiella coerulescens (K.)	P														2																						
Eukiefferiella gracei (Edw.)	L														1																						
Eukiefferiella cf. *gracei*	L							1													1																
Eukiefferiella lobifera Goetgh.	L							6											2		4																
Eukiefferiella minor (Edw.)/*fittkaui* Lehm.	LP							8								2			1		3																
Heleniella ornaticollis (Edw.)	L			2																																	
Heleniella serratosioi Ringe	P																	2	1				2														
Heterotrissocladius grimshawi (Edw.)	P						2																														
Heterotrissocladius marcidus (Walk.)	L									3				10																							

from those of the running waters. However, *Pseudodiamesa branickii* was found both in a spring and a pool fed by melting snow, obviously responding to cold temperature more than to higher flow velocities. *Paratanytarsus laccophilus* was collected in lakes, but also in a steep brook with stones and gravel. This is unusual, as the species was previously known only from standing waters (e.g. Fittkau & Reiss 1978, Langton 1991, Janecek & Contreras 1995).

Compared to the faunistic results from other Alpine water bodies (Crema et al. 1996, Weigand & Tockner 1996, Janecek et al. 1991, Moog & Heinisch 1991), the present survey showed both the highest number and proportion of taxa identified on species level. In contrast, the proportion of taxa deter-

Tab. 2. (continued).

water type		hygro-petric			rheocrenes										spring brooks									meltwater pools						lakes							
site no. *)**		8	11	27	2	3	5	9	10	19	20	22	31	34	1	4	12	15	15	16	29	30	33	7	14	21	28	32	35	6	13	17	18	23	24	25	26
name of site		Saugasse*)	Steinernes Meer (Wegscheid)	Halsköpfl (moss, stone, mud)	Schappach	Sommerbichl-Weide (spring)	Graskopf (upper spring)	Schrainbach	Ingolstädter Haus	Feldalm (lower spring)	Feldalm (upper spring)	Grünsee-Alm, spring	Landtal-Quelle	Priesbergalm, below a cottage	Mittergraben (Wimbachtal)	Herrenroint F	Wunderquelle	Stuhlgraben (below the spring)	Stuhlgraben (below trail)	Rennergraben	Wasseralm	Landtal (spring brook)	Abwärtsgraben	Graskopf (pool)	Steinernes Meer, pool "1949"	Grünsee-Alm, pool	Hüttau	Mitterhüttenalm	Priesberger Moos	Rauhe Köpfe	Steinernes Meer, lake	Funtensee, near Teufelsmühle	Funtensee, southern shore	Grünsee, SE shore	Schwarzensee (spring region)	Schwarzensee (near outlet)	Schwarzensee (littoral)
m a.s.l.		1200	2150	1680	1120	1170	1840	960	2040	1760	1780	1600	1540	1470	1300	1280	2000	1800	1700	1660	1416	1540	1450	1810	1990	1600	1500	1630	1360	1860	2050	1601	1601	1474	1560	1560	1560
Limnophyes asquamatus (And.)	I												1																							1	
Limnophyes edwardsi S th.	P																															2					
Limnophyes minimus (Mg.)	P																								1												
Limnophyes natalensis (K.)	I																													5							
Limnophyes pumilio (Holm.)	I													1																							
Limnophyes sp.	PI								5								4															2					
Metriocnemus eurynotus (Holm.)	L													1																							
Metriocnemus fuscipes (Mg.)	P																							1													
cf. *Orthocladius* sp.	L																9																				
Orthocladius (Eudactyl.) fuscimanus (K.)	P																							1													
Orthocladius (Eu.) frigidus (Z.)	L														2																						
Orthocladius (Eu.) luteipes Goetgh.	L												1																								
Orthocladius (Eu.) cf. *thienemanni* K.	L																	1																			
Parakiefferiella bathophila (K.)/*scandica* Br.	P																															x					
Parakiefferiella fennica Tuisk.	P																		3																		
Parametriocnemus stylatus (K.)	LP														2	3							2														
Parorthocladius nudipennis (K.)	P											17																									
Psectrocladius (Ps.) brehmi K.	P																																		1	5	
Psectrocladius (Ps.) sordidell. (Z.)/*ventricos.* K.	P																		1													x					
Psectrocladius (Ps.) schlienzi W lk.	P																																	2			
Pseudorthocladius filiformis (K.)	P																									1											
Rheocricotopus (Rh.) effusus (Walk.)	P																									1											
Smittia sp.	I											1						1						1						3							
Thienemanniella cf. sp. D	L						1											5																			
Thienemanniella Pe2b	L						1												15																		
Thienemanniella Pe2a	P																	4					1														
Tvetenia bavarica (Goetgh.)	P				1																																
Tvetenia sp.	L															1																					
Chironominae																																					
Chironomus cingulatus Mg.	P																										5	5	8								
Chironomus nuditarsis Keyl	P																								1		11		13			x					
Chironomus obtusidens Goetgh.	P																																	2			
Dicrotendipes lobiger (K.)	P																															x					
Dicrotendipes modestus (Say)	PI																							1							x						
Dicrotendipes sp.	L							1													1												1				
Einfeldia pagana (Mg.)	P																															1					
Endochironomus (Endot.) Pe1	P																												1								
Micropsectra pharetrophora Fitt.& Reiss	P			3								2																									
Micropsectra fusca (Mg.)	P						1																														
Micropsectra cf. *junci* (Mg.)	I						1																														
Micropsectra cf. Pe4	P																	1																			
Micropsectra sp.	L																				5																
Paratanytarsus austriacus (K.)	P																															x	16	5		1	
Paratanytarsus laccophilus (Edw.)	P																		1												x	x					
Paratanytarsus penicillatus (Goetgh.)	P																																	6	1	7	1
Paratanytarsus sp.	L																																				
Polypedilum sp.	L					1								1																							1
Tanytarsus niger And.	P																																	6	1	5	
Tanytarsus sinuatus Goetgh.	P																							4	x						o						
Tanytarsus sp.	L				1				2																												

mined as "spec.", "spec. group", "agg.", "spec. A, B ..." or "spec. 1, 2 ..." is higher in all the studies mentioned. In the work of Crema et al. (1996), this type of taxa is dominating. The present relative improvement is, of course, not a result of a better sampling strategy than was used by my esteemed collegues, but rather a consequence of including pupal exuviae.

18 out of 38 taxa (47 %) determined from larval material could be identified to species level. This means that 20 % of all chironomid taxa recorded could be based on larvae. This proportion is too low to get a comprehensive overview of the communities. The situation can be improved by collecting pupal exuviae, which provides us with both a sufficient number of specimens and a higher taxonomic determination level, because identification of species from pupal exuviae is further developed than for larvae. Consequently, for further investigations I recommend to include the collection of pupal exuviae.

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A review of *Beardius* Reiss & Sublette, with description of a new species from Everglades National Park, Florida

(Insecta, Diptera, Chironomidae)

Richard E. Jacobsen & Sue A. Perry

Jacobsen, R. E. & S. A. Perry (2000): A review of *Beardius* Reiss & Sublette, with description of a new species from Everglades National Park, Florida (Insecta, Diptera, Chironomidae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 129-144.

Beardius reissi, spec. nov. from Everglades National Park, Florida, USA, is described in the larval, pupal, and adult stages. The female of *B. aciculatus* Andersen & Sæther, and the pupae of *B. truncatus* Reiss & Sublette and an unassociated species designated as *Beardius* sp. B are described for the first time. Unassociated larvae from Brazil, designated *Beardius* sp. C, are also newly described, and the larval description of *Beardius parcus* Reiss & Sublette is emended. The generic description for *Beardius* is emended, and keys to males, females, pupae and larvae are updated or offered for the first time. Two species groups based upon adult morphology are proposed: the *parcus* group, comprising *B. parcus, reissi,* and *aciculatus,* and the *truncatus* group, including *B. truncatus, breviculus* Reiss & Sublette, *lingulatus* Andersen & Sæther, and *triangulatus* Andersen & Sæther. Comments are presented on systematics of the genus, as well as on ecology of the species found in Everglades National Park.

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Introduction

Reiss & Sublette (1985) erected the genus *Beardius* for three species, *B. parcus, breviculus* and *truncatus,* from South America, Panama, and the southwestern United States, respectively. Andersen & Sæther (1996) described an additional three species, *B. aciculatus, triangulatus* and *lingulatus,* from adults collected in Central America. Based upon adult material, Epler (1992, 1995) reported *B. truncatus* and *breviculus* from Florida. He provided illustrations for larvae of *B. truncatus* and an unassociated species called *Beardius* sp. A that he thought might be the larva of *B. breviculus.*

Very little information exists on the Chironomidae of the southern Everglades and Everglades National Park (ENP), even though they are the predominant aquatic insect family there. We are currently inventorying the nematoceran Diptera fauna in ENP, primarily through collections of pupal exuviae, and examining how its composition changes among sites with different hydropatterns within the Rocky Glades, the higher Rockland marshes in the eastern portions of ENP. Larval exuviae of both species illustrated by Epler were collected during this program. Reared associations of his *B.* sp. A showed that it is distinct from all established congeners.

This paper provides descriptions for all life stages of the new species, as well as notes on its systematics and ecology. In addition, previously unkown pupal stages are characterized for two other

Beardius found in ENP. Upon comparing material of described species, two paratype larvae of *B. parcus* were found to represent a different, presently unassociated form. The first description for the female of *B. aciculatus*, collected in Mexico, could be added to this review through courtesy of Drs A. Contreras Ramos and T. Andersen.

Methods

Adults, pupae, and fourth instar larvae for rearing were collected while sampling for pupal exuviae at the water surface with a dipping pot and 125 μm-opening sieve, preserved in 95 % ethanol, and mounted in Euparal. All material listed was collected by the senior author and is kept in the ENP museum or in his personal collection unless indicated otherwise. Morphological terminology and abbreviations follow Sæther (1980) and Langton (1995), except 'taeniae' and 'taeniate' are used as suggested by Langton (1994) to describe flattened L, D, Dc, and anal lobe fringe setae of pupae. Measurements follow Soponis (1977), where applicable. Inferior and superior volsella lengths were measured from their junction to the respective apices. Lateral spines on tergite VIII were measured from the posterior margin of their base. Mentum width is the distance between the outer margins of the fifth laterals, not the width at the base. Postmentum length is the distance from the apex of the pale median tooth to the post-occipital margin. Measurements are reported as a range, followed by the mean when sample size n>3, followed by n in parentheses. All measurements are in μm unless stated otherwise. Abbreviations of life stages: L = larva, P = pupa, ex = exuviae.

Abbreviations of names and institutions: ERCC = Everglades Region Collection Center, Everglades National Park; JHE = J. H. Epler; REJ = R. E. Jacobsen; ZMBN = Zoological Museum, University of Bergen, Norway; ZSM = Zoologische Staatssammlung, Munich, Germany.

Beardius Reiss & Sublette 1985, emended

Beardius Reiss & Sublette, 1985: 179; Andersen & Sæther 1996: 34.

Type-species: *Beardius parcus* Reiss & Sublette, 1985: 183, by original designation.

Description

The description by Reiss & Sublette (1985) and emendation of Andersen & Sæther (1996) can be further emended as follows:

Acrostichal setae of normal length, reduced, or lacking. Male inferior volsella upright or inturned; median volsella acicular, narrowly conical to truncate-conical, cylindrical-coronate, triangular, or tongue-shaped.

Female gonocoxite IX small, bare or with 1 seta. Seminal capsule with or without microtrichia; spermathecal duct wide, straight, bare or with thorn-like special secretory cells along proximal half.

Thoracic horn of pupa with 6 strong, smooth branches, or with anterior branch notably larger and beset with fine spinules. Tergites II-VI each with conspicuous anterior band of strong spinules continuous with median field of finer shagreen, or T II with uniform strong shagreen and T III-VI with anterior points only slightly larger than posterior points. Conjunctives glabrous except IV/V which has a continuous wide band of anteriorly directed strong spinules, and I/II which may have a median patch of fine spinules. Paratergite V with fine spinules in small posterior patch or as band extending half to nearly full length of segment. Posterolateral corner of segment VIII with wide, short, single or double spur usually bearing basal hair-fine spinules [bare on some *B.* sp. B]; anteriorly contiguous to spur are small to large, straight to posteriorly-curved spines or clusters of spinules. Segment V with 3-4 pairs of taeniate L setae. Anal lobe with few (<25) uniserial fringe taeniae.

Larval head with labral sclerite 2 present; clypeus separate or fused into frontoclypeal apotome. Antenna with 5, 6, or 7 segments; basal segment somewhat shorter to slightly longer than flagellum. Mola of mandible with 0-2 spines. Mentum with first lateral tooth notched; ventromental plates separated by 1-2 times width of median tooth of mentum, each about ⅔ to full width of mentum.

Key to adult males of *Beardius* Reiss & Sublette

The key in Andersen & Sæther (1996) is modified with the following changes to couplets 1 and 2:

1. Superior volsella pediform, with basal and median microtrichia; inferior volsella with thick stem and spine-like, apically dissected sensilla chaetica. HR > 0.89 .... *parcus* group, 2.
– Superior volsella digitiform, at most with a few basal microtrichia; inferior volsella slender, slightly clavate, without spine-like sensilla chaetica: HR < 0.84 .... *truncatus* group, 3.

2. Median volsella spine-like; with one seta, otherwise bare. Scutal tubercle prominent. (Andersen & Sæther 1996: fig. 3) .... *aciculatus* Andersen & Sæther
– Median volsella short, triangular to cylindrical-coronate, with apical cluster of microtrichia or setae. Scutal tubercle absent or vestigial .... 2a.

2a. Median volsella triangular, with about 10-15 long apical microtrichia or setae; inferior volsella with thick stem and lacking knob-like apex, sensilla chaetica slender. Wing vein R without setae. Acrostichals absent. (Reiss & Sublette 1985: figs 1-14) .... *parcus* Reiss & Sublette
– Median volsella short, cylindrical to coronate, with 4-6 apical setae; inferior volsella with slender stem and enlarged knob-like apex, sensilla chaetica stout. Vein R with 4-8 setae. 3-6 acrostichal setae. (Figs 1a-c, e) .... *reissi*, spec. nov.

Tentative key to adult females of *Beardius* Reiss & Sublette

(*B. breviculus, lingulatus, triangulatus, truncatus* extrapolated from males, not yet collected)

1. Scutum without a tubercle or broad anterior hump .... 2.
– Scutum with a tubercle or broad anterior hump .... 3.

2. Acrostichals present. Palpomere 5 length <120 mm .... *reissi*, spec. nov.
– Acrostichals absent. Palpomere 5 length >120 mm .... *triangulatus* Andersen & Sæther

3. Acrostichals present .... *truncatus* Reiss & Sublette
– Acrostichals absent .... 4.

4. Scutum with small tubercle with strong anterior and posterior sloping so that it clearly projects above surrounding surfaces .... 5.
– Scutum with broad anterior hump that projects clearly above only the posterior scutum surface .... 6.

5. Clypeus with 16-24 setae, abdomen and legs with color patterns ... *aciculatus* Andersen & Sæther
– Clypeus with less than 16 setae, abdomen and legs pale .... *lingulatus* Andersen & Sæther

6. Wing with setae on R .... *breviculus* Reiss & Sublette
– Wing without setae on R .... *parcus* Reiss & Sublette

Key to pupae of *Beardius* Reiss & Sublette

(*B. aciculatus, breviculus, lingulatus, triangulatus* unknown)

1. Tergite II with shagreen points distinctly stronger in anterior transverse band; paratergite V with fine spinules extending over at least half segment length; T III-VI each with 4 pairs of D setae; (Fig. 2d; Reiss & Sublette 1985: fig. 15) .... 2.
– Tergite II shagreen points strong and uniform throughout; paratergite V with fine spinules confined to small posterior patch; T III-VI each with 5 pairs of D setae; (Fig. 3g) .... 3.

2. Abdominal segment VIII with 1-8 strong spines along lateral margin anterior to spur (Fig. 2c). Frontal apotome length/ width about 0.9, apex acute (Fig. 2a) .... *reissi*, spec. nov.

– Abdominal segment VIII with at most only tiny spinules along lateral margin anterior to spur (Reiss & Sublette 1985: fig. 19). Frontal apotome length/ width about 0.5-0.6 .... *parcus* Reiss & Sublette

3. Abdominal segment V with 3 taeniate L setae. Thoracic cuticle with unpigmented area along the oblique hinge line near the median suture (Fig. 3d). Conjunctive I/II bare; pigmentation within shagreen on tergite II diffusely spread between points (Fig. 3f); hook row of 30-44 hooklets .... sp. B

– Abdominal segment V with 4 taeniate L setae. Thoracic cuticle pigmented along the oblique hinge line near the median suture (Fig. 3c). Conjunctive I/II with median patch of fine spinules (Fig. 3g); pigmentation within shagreen on tergite II confined to discrete blotches at point bases (Fig. 3e); hook row of 46-73 hooklets......... .... *truncatus* Reiss & Sublette

Key to larvae of *Beardius* Reiss & Sublette

(*B. aciculatus, breviculus, lingulatus, triangulatus* unknown)

1. Antenna with 7 segments (Fig. 5b), but segments 2-4 may be only partially separated .... 2.

– Antenna with 5 or 6 segments .... 3.

2. Clypeus distinct from frontal apotome (Fig. 6a). Ventromental plates separated by about width of pale median tooth of mentum. Procercus with 8 anal setae. AR 0.87-1.05. (Reiss & Sublette 1985: figs 21-25) .... *parcus* Reiss & Sublette

– Clypeus fused into frontoclypeal apotome (Fig. 6d). Ventromental plates separated by about twice width of pale median tooth of mentum (Fig. 5a). Procercus with 7 anal setae. AR 0.70-0.79 (Fig. 5b) .... sp. C

3. Antenna with 5 segments (Epler 1992, 1995: 7.27). Surface of frontoclypeal apotome granular from anterior margin to S4 setae (Fig. 6c) .... *truncatus* Reiss & Sublette

– Antenna with 6 segments (Fig. 2e). Surface of frontoclypeal apotome granular from anterior margin to about ⅔ distance to S4 setae (Fig. 6b) .... *reissi*, spec. nov.

Beardius reissi Jacobsen, spec. nov.

(Figs 1, 2, 6b)

Beardius sp. A Epler, 1992: 7.27; 1995: 7.27.

Types. Holotype: ♂ (slide-mounted in Euparal); USA: Florida, Dade Co., Everglades National Park, marl prairie along road to Royal Palm, on water surface, 20.IX.1999, R. E. Jacobsen; deposited in Zoologische Staatsammlung, Munich, Germany. – Paratypes: Florida, Dade Co., Everglades Natl Park: marl prairie along FL 9336 1.5 mi. W. of Taylor Slough: 1♀, 1♂, both with Pex+Lex, reared from P and L collected 17.IX.1999, emerged 18.X and 27.X; 2♀+Pex+Lex, reared from P collected 6.IX.1999, emerged 8.IX; 2♀♀, 6.IX.1999, 1 Lex, 6.X.1998; as previous except 1 mi. W. of Taylor Slough: 2♂♂, 1 Lex, 28.VIII.1999; 1 L, 1 Lex, 1 female P+Lex, 1 Pex+Lex, 29.VIII.1999; 1♂, 1♂+Pex+Lex reared from P, collected 6.IX.1999, emerged 8.IX.1999; as previous except 400 m E. of Rock Reef Pass: 1 Pex, 7.X.1998, 3 L, 4.VI.1999, 1 L, 11.VI.1999, 1♂, 13.VI.1999, 10 Pex, 20.VI.1999; marl prairie along L-31W canal 400 m E. of Taylor Slough: 1♂+Pex+Lex, reared from L collected 17.IX.1999, emerged 27.IX; as previous except 1 mi. N. of Taylor Slough: 6 L, 7.X.1998, M. C. Bruno & R. Jacobsen; Long Pine Key, solution hole along Wilderness Road: 10 Pex, 16.+20.VII.1998, M. C. Bruno & R. Jacobsen, 1♂, 30.IX.1999; Chekika, marl prairie along SW 237 Avenue 1 mi. S. of Chekika entrance: 1♂, 27.IX.1999. Hardee Co., Big Slough at SR 72: 3 L, dipnet, 24.VIII.1999, J. Lancaster & D. Durbin. Paratypes deposited at ZSM, ZMBN, ERCC, and in colls JHE, REJ.

Diagnosis. Adults of *B. reissi*, spec. nov. are distinguished from other congeners by the presence of acrostichal setae and the lack of a median tubercle or anterior hump on the scutum. In males, the short, cylindrical-coronate median volsella with 4-6 apical setae, and the club-like inferior volsella bearing stout, apically dissected sensilla chaetica are also distinctive. The pupa is characterized by the anterior transverse band of stronger points on tergite II, the presence of spines along the lateral margin of VIII, and the apically acute frontal apotome with length/width about 0.9. The 6-segmented antenna and the

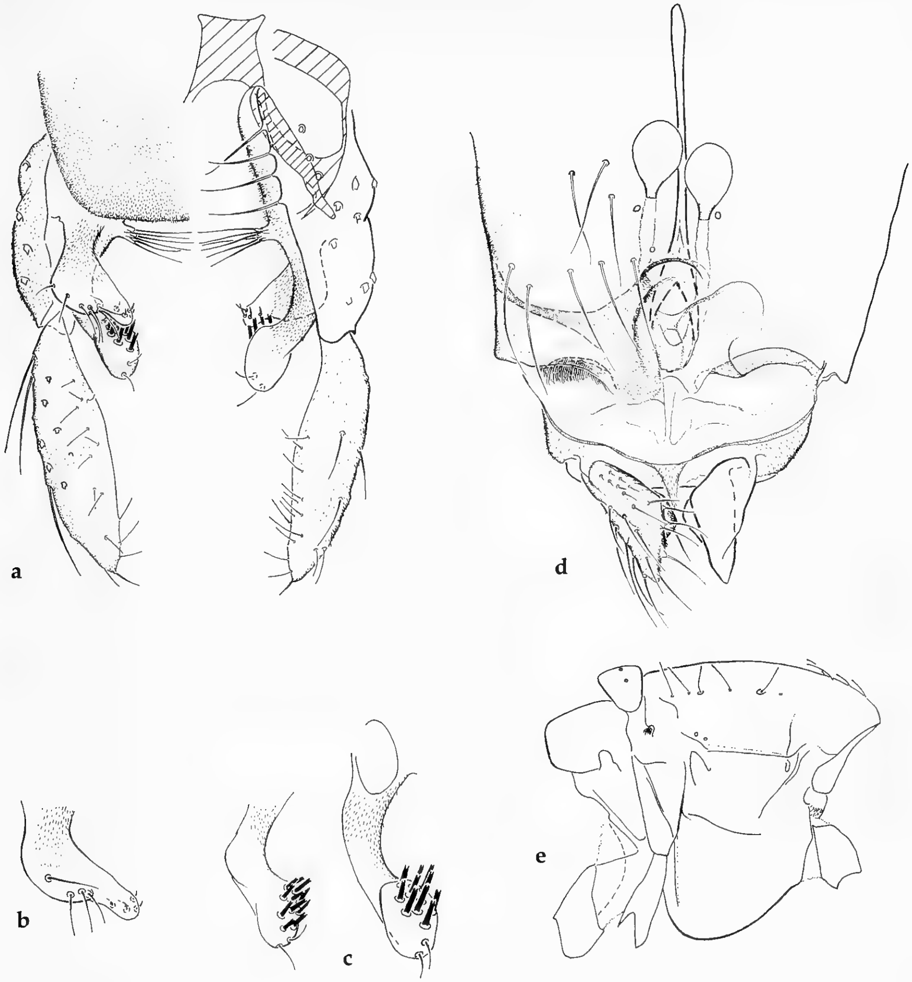

Fig. 1. *Beardius reissi*, spec. nov.; adults (male except d.). **a.** Hypopygium, left: dorsal, right: ventral. **b.** Superior volsella. **c.** Inferior volsella, two views. **d.** Female genitalia, ventral. **e.** Thorax.

frontoclypeal apotome with anterior granulation abruptly ending well anterior to the S4 setae are distinctive features of *B. reissi* larvae.

Etymology. Named in honor of Friedrich Reiss for his contributions to chironomidology, including erecting the genus *Beardius* with James Sublette.

Description

Adult male (n=8 unless stated otherwise).

Total length 2.28-2.67, 2.50 mm. Wing length 1.11-1.36, 1.19 mm. Total length/wing length 1.91-2.20, 2.11. Wing length/profemur length 1.64-1.99, 1.77. Alcohol-preserved specimens stramineous except vittae, median anepisternum II and postnotum brown; pedicel and legs light brown with apices of tibiae darker.

Head. AR 0.81-0.96, 0.88; terminal flagellomere 323-404, 357 long. Temporal setae 8-12, 10 in single row. Clypeus with 6-9, 7 setae. Interocular distance 115-132, 121. Tentorium 98-114, 109 long. Palpomere lengths 19-25, 22; 24-31, 28; 59-70, 65; 60-77, 70; 73-113, 93; Pm3 with 2-5, 3 lanceolate sensilla clavata.

Thorax (Fig. 1e). Scutal tubercle absent. Antepronotal setae absent; acrostichals 3-6, 5, not reduced; dorsocentrals 4-6, 5 in single row; prealars 1-2, 2; scutellars 2-4, 3 in single row.

Wing. VR 1.17-1.29, 1.21. Punctation visible at 200X. Squama bare. Brachiolum with 2 setae; R 4-8, 5; R$_1$ 0-2, 0; R$_{4+5}$ 1-2, 2.

Legs. Tibial spur lengths: fore 25-36, 30; mid 40-48, 44; hind 41-48, 45. Tibial apex widths: fore 43-53, 49; mid 44-50, 49; hind 49-55, 51. Mid ta$_1$ with 0-1, 0 sensilla chaetica positioned 0.78-0.87 length of ta$_1$ from base; sensilla chaetica absent on hind ta$_1$. Lengths and proportions of legs (n=7):

	fe	ti	ta$_1$	ta$_2$	ta$_3$	ta$_4$
p$_1$	602-750, 673	440-522, 484	642-764, 716	330-398, 361	287-343, 313	204-250, 225
p$_2$	529-603, 557	466-554, 500	259-289, 276	144-170, 157	117-141, 129	70-80, 76
p$_3$	630-735, 671	550-652, 597	427-487, 462	252-294, 270	197-228, 211	98-114, 109

	ta$_5$	LR	BV	SV	BR
p$_1$	91-95, 93	1.43-1.60, 1.49	1.83-1.94, 1.88	1.53-1.69, 1.61	2.5-3.3, 2.9
p$_2$	50-56, 54	0.52-0.57, 0.55	3.09-3.29, 3.21	3.75-4.02, 3.84	2.9-4.0, 3.3
p$_3$	62-69, 66	0.74-0.79, 0.77	2.59-2.70, 2.64	2.69-2.86, 2.75	3.4-4.9, 4.1

Abdomen. Number of setae on tergites I-VIII (n=6-7): 17-28, 20; 18-28, 24; 27-29, 28; 28-35, 31; 31-36, 33; 30-34, 33; 30-34, 32; 26-34, 29. Number of setae on sternites I-VIII (n=6-7): 0; 0; 3-7, 5; 7-10, 9; 10-13, 11; 11-19, 16; 12-23, 17; 23-25, 24.

Hypopygium (Fig. 1a). Tergite IX with posterior margin straight or slightly rounded, without anal point, tergal bands, and setae. Laterosternite IX without setae. Phallapodeme 58-74, 66 (7) long; transverse sternapodeme 21-29, 25 (7) long. Gonocoxite 110-128, 199 (7) long; superior volsella (Fig. 1b) pediform, bilobed, with 4-6, 5 long setae on dorsal lobe and 3-4, 4 short ventral setae on medial lobe; median volsella short, cylindrical-coronate, with fine microtrichia and 4-6, 5 long apical setae; inferior volsella (Fig. 1c) club-shaped, stem with prominent, elbow-like ventrolateral swelling, 56-62, 59 long with 10-12, 11 stout, apically-dissected sensilla chaetica and 2 slender apical setae. Gonostylus 108-127, 121 (7) long. HR 0.93-1.02, 0.98 (7); HV 1.94-2.23, 2.11 (7).

Adult female (n=5, unless stated otherwise).

Total length 2.02-2.44, 2.20 mm. Wing length 1.24-1.48, 1.32 mm. Total length/wing length 1.61-1.66, 1.64. Wing length/profemur length 2.03-2.22, 2.11. Coloration of alcohol-preserved specimens similar to male but slightly paler.

Head. AR 0.31-0.36, 0.33; flagellomere lengths 89-104, 97; 58-62, 60; 49-64, 56; 46-54, 50; 77-99, 86; Fm1 apparently representing two fused, subequal flagellomeres. Temporal setae 7-10, 8 in single row. Clypeus with 7-11, 9 setae. Interocular distance 124-154, 136. Tentorium 98-118 (3) long. Palpomere lengths 19-22, 21; 24-29, 27; 44-64, 56; 52-65, 60; 84-99, 92 (4); Pm3 with 3-5, 4 lanceolate sensilla clavata.

Thorax. Scutal tubercle absent. Antepronotal setae absent; acrostichals 4-8, 5; dorsocentrals 4-7, 5 in single row; prealars 1-2, 2; scutellars normally 2-4, 3 in single row, but 0 on one specimen.

Wing. VR 1.22-1.34, 1.28. Squama bare. Brachiolum with 1-2, 2 setae; R 4-6, 5; R$_1$ 0-3, 2; R$_{4+5}$ 3-10, 7.

Legs. Tibial spur lengths: fore 26-32, 29; mid 38-48, 44 (4); hind 38-53, 45. Tibial apex widths: fore 45-50, 48; mid 44-49, 47; hind 48-54, 52. Mid ta$_1$ with 2-3, 2 sensilla chaetica positioned 0.69-0.89 length of ta$_1$ from base; hind ta$_1$ with 2-4, 3 positioned 0.54-0.89 length of ta$_1$ from base. Lengths and proportions of legs:

	fe	ti	ta$_1$	ta$_2$	ta$_3$	ta$_4$
p$_1$	593-666, 629	392-466, 431	686-862, 748	319-407, 351	289-355, 314	214-245, 224
p$_2$	495-561, 523	455-556, 496	248-289, 266	139-158, 147	110-133, 122	65-76, 71
p$_3$	605-700, 641	542-657, 588	412-490, 445	240-282, 255	180-221, 198	97-114, 102

	ta$_5$	LR	BV	SV	BR
p$_1$	92-103, 96	1.66-1.85, 1.73	1.80-1.89, 1.84	1.31-1.47, 1.42	2.9-3.2, 3.1
p$_2$	50-60, 54	0.52-0.57, 0.54	3.15-3.33, 3.26	3.65-3.88, 3.82	2.8-3.2, 3.0
p$_3$	57-72, 64	0.74-0.77, 0.76	2.61-2.78, 2.70	2.72-2.80, 2.76	3.2-3.9, 3.5

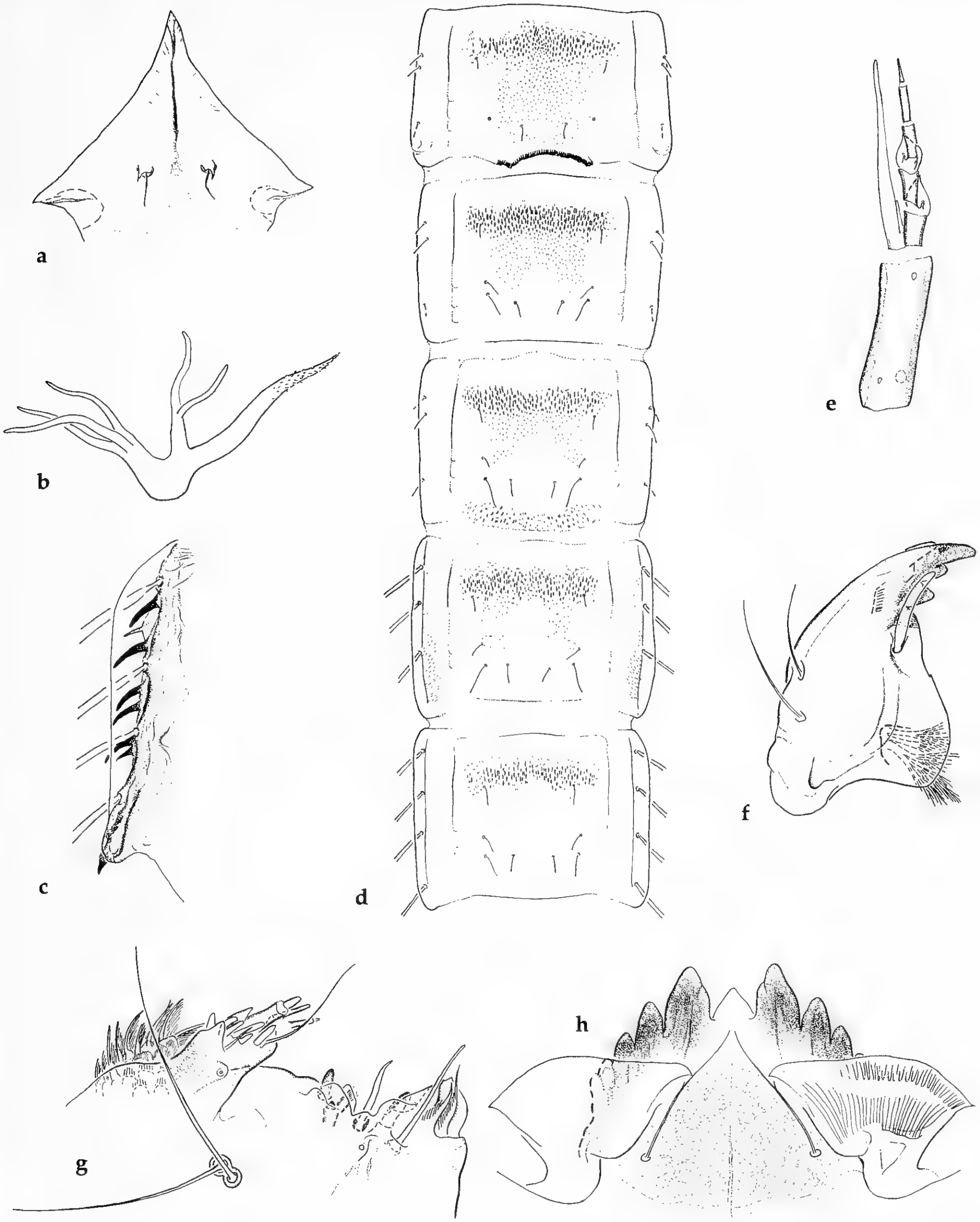

Fig. 2. *Beardius reissi*, spec. nov.; pupa and larva. **a-d.** Pupa. **a.** Frontal apotome. **b.** Thoracic horn, schematic. **c.** Abdominal segment VIII lateral margin, dorsal. **d.** Tergites II-VI. **e-h.** Larva. **e.** Antenna. **f.** Mandible. **g.** Maxilla. **h.** Mentum.

Abdomen. Number of setae on tergites I-VIII (n=3): 15-20, 12-19, 17-25, 18-25, 21-25, 19-25, 22-24, 11-18. Number of setae on sternites I-VIII (n=3): 0, 0, 2-3, 11-14, 18-21, 19-21, 21-24, 19-21.

Genitalia (Fig. 1d). Tergite IX with 18-24, 20 setae. Gonocoxite IX bare. Cercus 61-77, 68 long. Seminal capsule 24-33, 29 wide; 37-45, 42 long including 9 long neck; apparently without microtrichia. Spermathecal duct straight, without special secretory cells. Notum 132-146, 139 long.

Pupa (n=18, unless stated otherwise).

Total length 3.02-3.80, 3.44 mm (15). Cephalothorax light brown; darker at bases of antennae, leg and wing sheaths, on wing margins, post-occipital area, and median suture of frontal apotome; abdominal tergites clear with brown shagreen points; paratergites V-VIII with progressively wider, darker longitudinal pigment bands; anal lobes brown near bases of taeniae.

Cephalothorax. Antennal sheath usually with minute pearl row above pedicel. Frontal apotome apically acute (Fig. 2a), length/width about 0.9; frontal tubercle apically pointed, thorn-like, 12-23, 17 long, 10-18, 14 wide, with subapically inserted frontal seta 22-38, 28 long. Lateral antepronotum usually with vestigial seta and occasionally an additional setal alveolus. Thoracic horn (Fig. 2b, schematic) apparently with 6 branches: a stout anterior branch with small spinules near apex, a median arm with two slender, smooth branches, and a posterior arm with 3 slender, smooth branches; basal ring elliptical, 24-39, 31 long, with one tracheal branch 10-16, 13 wide. One precorneal seta, 28-47, 37 (13) long. Dorsocentral seta Dc_1 stiff, spine-like, alveolus weakly sclerotized; Dc_2 and Dc_3 slender, taeniate, alveoli strongly sclerotized; Dc_4 hair-like, alveolus unsclerotized; lengths: Dc_1 18-35, 26; Dc_2 30-52, 42; Dc_3 22-48, 34; Dc_4 8-14, 11; distance Dc_1 to Dc_2 5-23, 10; Dc_2 to Dc_3 114-143, 129; Dc_3 to Dc_4 4-10, 5. Usually with 1 vestigial prealar seta or sensilla and 1-2 setal scars.

Abdomen. Tergites I, VII, and VIII without shagreen; T II-VI (Fig. 2d) with anterior, transverse band of points distinctly stronger than posteriorly contiguous shagreen, the latter with increasing segment number progressively separating into 2 lobes and reduced until only few points present on VI. Conjunctive IV/V with 3-4 rows of anteriorly-directed points or 2-5-toothed point rows, point field extends ⅔ width of segment. Paratergite V with extensive field of fine points starting near base of L_1 and extending almost to posterior margin, all other pT bare. Hook row on II continuous, extending ⅓ width of segment, of 27-59, 39 hooklets. Sternites I, VII, and VIII bare; S II with median field and a few posterolateral fine points; III with anterior field; IV with lateral band; V and VI with scattered anterior fine points. Pedes spurii A on IV. Pedes spurii B weakly developed on II. Segment VIII lateral margin (Fig. 2c) with 2-7, 3 strong, straight or posteriorly-curved spines, longest spine 19-36, 27; also occasionally with isolated or clustered small spinules. Anal spur single or double, 8-17, 13 long, with hair-like spinules at base. Male genital sac extends 60-99 (3) beyond anal lobe. Setation: Segment I with 2 D, 0 L, and 1 V seta; II with 2 D, 3 L, and 2 V setae; III-IV with 4 D, 3 L, 3 V setae; V with 4 D, 3 taeniate L, 3 V setae; VI with 4 D, 4 taeniate L, 3 V setae; VII with 2-4 (usually 2) D, 4 taeniate L, 3 V setae; VIII with 0-1 D, 4 taeniate L, 1 V seta. D_3 seta on III-VI distinctly taeniate and longer than others. Anal lobe with 13-22, 17 fringe taeniae.

Larva (n=14-16, unless stated otherwise).

Body length 3.36-5.10, 4.30 mm (9). Head capsule length 0.28-0.39, 0.34 mm. Head light brown to brown, body red-orange with dark green markings on segments I-III and some light green markings on IV-V; specimens freshly removed from hollowed twigs and grass culms have head, posterior segments and anal tubules noticeably redder than other segments; alcohol preserved larvae are yellow with light brown to brown head capsules.

Head dorsum (Fig. 6b). With labral sclerite 2 and frontoclypeal apotome, the latter distinctly granular from anterior margin to approximately ⅔ distance to S4 setae.

Antenna (Fig. 2e). 6-segmented. AR 0.90-1.18, 0.98. Segment lengths 53-76, 63; 12-18, 14; 12-17, 14; 14-19, 16; 11-17, 14; 6-8, 7. Basal segment 16-27, 20 wide; distance from base to ring organ 12-17, 14, to basal setal mark 13-18, 14, to distal mark 46-65, 54. Blade 55-79, 65 long, subequal to or slightly longer than flagellum; accessory blade 8-12, 10 long. Lauterborn organs large, 12-14, 13 long; segment 3 apical style 7-10, 9 long.

Labrum. SI slender, tapering, only medially fimbriate, SII only apically fimbriate. Labral lamella with uniform fringe. 2 spinulae, and 4 long posterior and 5-6 short anterior chaetulae. Pecten epipharyngis composed of 3 separate plates, each with 3-5 apical teeth, with 8 chaetulae laterales and 2 apically notched chaetulae basales. Premandible 67-88, 80 long, bifid, with brush. Seta premandibularis simple.

Mentum (Fig. 2h). Width 87-104, 97 (12). With a pointed to worn-rounded pale median tooth and five pairs of dark lateral teeth. First lateral notched, fourth and fifth basally fused. Ventromental plate 62-86, 73 wide, with smooth anterior margin and approximately 20-30, 27 striae. Ventromental plate width / mentum width 0.65-0.84, 0.76. Postmentum 148-193, 172 long, with pebbled surface texture between ventromental plates. Seta submenti with 1-3 short, splinter-like branches.

Maxilla (Fig. 2g). With 3 scale-like lamellar and 2 fimbriate lacinial chaetae.

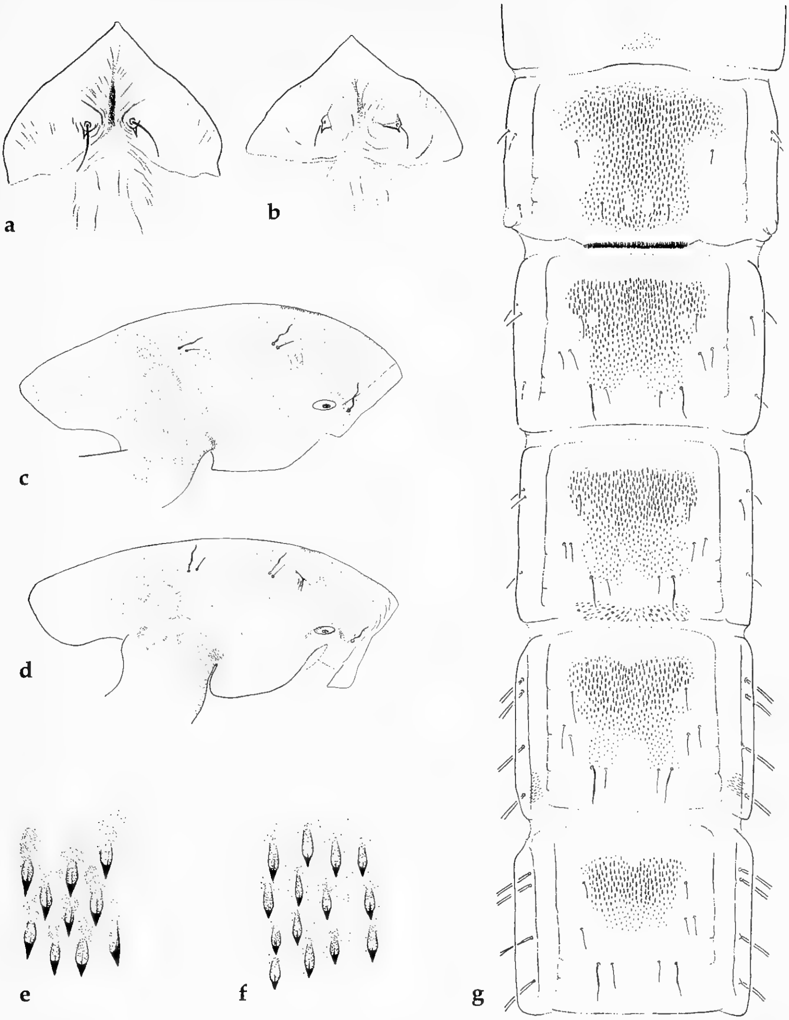

Fig. 3. *Beardius truncatus* Reiss & Sublette and *B.* sp. B; pupae. **a-b.** Frontal apotome. **c-d.** Thorax, lateral. **e-f.** Tergite II shagreen pigmentation pattern. **g.** Tergites I (posterior) to VI. **a,c,e,g.** *B. truncatus.* **b,d,f.** *B.* sp. B.

Mandible (Fig. 2f). Length 123-152, 141. Outer margin often with lightly pebbled or wrinkled surface. Pecten mandibularis of about 8-10 lamellae. Seta interna with 3 extensively branched arms, lowest arm with 2 major branches. Mola with 1-2 small spines.

Body. Anterior 3 segments with conspicuous setae, posterior segments without notable setae. Procercus 23-36, 31 (10) high, 30-38, 34 (10) wide, with 8 anal setae up to 397-490, 438 (11) long. Supraanal seta length 294-416, 338 (11). Supraanal/anal seta ratio 0.68-0.91, 0.77. Posterior parapod about 125-165, 145 (6) long. Anal tubules conical-digitiform; ventral 72-94, 83 long, 44-62, 52 (5) wide; dorsal 65-86, 76 long, 34-46, 38 (5) wide.

Comments. The 3 larvae from Big Slough, Hardee Co., differ from reared specimens from Everglades National Park in having a longer, darker, more sclerotized head capsule and a higher antennal ratio. The greater size and sclerotization of larvae from Big Slough may be due to lower ambient temperatures and/or nutrient enrichment from agriculture at this site.

Beardius truncatus Reiss & Sublette, emended
(Figs 3a,c,e,g, 6c)

Beardius truncatus Reiss & Sublette, 1985: 188 (male); Epler 1992: 7.27, 1995: 7.27 (larva).

Material examined. USA, Florida: Columbia Co., Santa Fe River at US 441 at High Springs, 1 male P+Lex, 1♂, 1♀ P, 13.XII.1990, Environmental Sciences and Permitting personnel (in coll. JHE). Dade Co., Everglades Natl Park, solution hole along L-31W canal 2 mi. N. of Taylor Slough, 2 Pex, 21.XI.1999; solution hole in Long Pine Key along Wilderness Rd, 4 Pex, 16.VII.1998, M. C. Bruno & R. Jacobsen; 1 mile W. of Taylor Slough along FL 9336, 3 Pex, 7.X.1998, 7 Pex, 5.II.1999, D. Levitis & R. Jacobsen; Taylor Slough 100 m downstream of L-31W canal, 1 Pex, 12.V.1999.

Description

Pupa (n=17-19, unless stated otherwise)

Total length 3.19-4.20, 3.62 mm (10). Cephalothorax light brown to gray, darker at bases of leg and wing sheaths, on wing margins, post-occipital area, and median suture of frontal apotome between cephalic tubercles; thoracic cuticle along oblique hinge line (Langton 1995: 184) with light brown pigmentation near median suture (Fig. 3c); tergites with pale yellow, brown or gray pigmentation; pigmentation strongest on T I, progressively diminishing on successive segments; pigmentation within shagreen fields confined to points and discrete patches at bases of points (Fig. 3e); paratergites V-VIII with increasingly wider, darker longitudinal bands of pigment.

Cephalothorax. Antennal sheath with or without minute pearl row above pedicel. Frontal tubercle arising from a low prominence (Fig. 3a), apically pointed, thorn-like, 17-28, 22 (10) long, 14-20, 17 (10) wide, with subapical-anteriorly inserted frontal seta 30-40, 35 (15) long. Antepronotum occasionally with alveolus or vestigial seta. Thoracic horn not clearly observable in available mounts, with a stout anterior branch with spinules on at least the distal half; and at least 3 other, smooth branches; basal ring elliptical, 34-56, 42 long, with 1 tracheal branch 12-20, 15 wide. 1 taeniate precorneal, 36-44, 41 (4) long. Dorsocentral seta Dc_1 stiff, hairlike, alveolus well sclerotized; Dc_2 and Dc_4 taeniate, alveoli strongly sclerotized; Dc_3 hairlike, alveolus lightly sclerotized; lengths Dc_1 28-43, 35; Dc_2 31-67, 48; Dc_3 48-65, 56 (16) ; Dc_4 18-31, 24; distance Dc_1 to Dc_2 6-17, 12; Dc_2 to Dc_3 150-248, 207; Dc_3 to Dc_4 9-20, 13. With or without prealar setal scars.

Abdomen. Tergites I, VII, and VIII without shagreen; T II (Fig. 3g) shagreen widest in anterior third, narrowing abruptly behind anterior muscle marks and widening over posterior half; central points strong, generally uniform in size, diminishing only at periphery; III to V with progressively smaller, more posteriorly-bilobed fields, with anterior points notably larger than posterior points; VI has anteromedian field with short posterior lobes of smaller points. Conjunctive I/II with a small median patch of very fine spinules; IV/V with 4-5 rows of anteriorly-directed points or pairs of points, point field extends about ⅔ width of segment. Paratergite V with posterior patch of fine spinules, VI usually with a few fine spinules near base of L_4. Hook row on II continuous, extending ⅓ width of segment, of 46-73, 59 hooklets. Sternites I, IV-VIII bare; II and III with posteromedian field of scattered fine points. Pedes spurii A on IV. Pedes spurii B present on II. Segment VIII lateral margin with 0-8, 3 straight or posteriorly-curved spines, longest spine 17-46, 25 long. Anal spur usually single, occasionally double, 7-14, 10 long, with hair-like spinules at base. Male genital sac extends 94-109, 104 (4) beyond anal lobe. Setation: Segment I with 2 D, 0 L, 1 V seta; II with 2 D, 3 L, 3 V setae; III-IV with 5 D, 3 L, 3 V setae; V-VI with 5 D, 4 taeniate L, 3 V setae; VII with 3D, 4 taeniate L, 3 V setae; VIII with 0 D, 4 taeniate L, 1 V seta. D_4 seta on III-VI distinctly taeniate and longer than others. Anal lobe with 12-18, 15 fringe taeniae.

Beardius sp. B
(Figs 3b,d,f)

Material examined. USA: Florida, Dade Co., Everglades Natl Park, Taylor Slough, alligator hole 1 mi. S. of FL 9336, 2 Pex, 12.II.1999; *Typha* stand 1 mi. S. of FL 9336, 1 Pex, 14.I.1999, 1 Pex 12.II.1999; *Cladium* stand 1 mi S. of FL 9336, 1 Pex, 12.II.1999, all D. Levitis & R. Jacobsen; 200 m W. of FL 9336 bridge, 1 Pex, 6.X.1998; 200 m E. of FL 9336 bridge, 1 Pex, 5.II.1999; upstream of FL 9336 bridge, 3 Pex, 5.II.1999.

Description

Pupa (n=9-10, unless stated otherwise)

Total length 2.62-3.48, 3.15 mm (7). Coloration similar to *B. truncatus* except thoracic cuticle along oblique hinge line (Langton 1995: 184) with unpigmented spot near median suture (Fig. 3d), and pigment within shagreen fields on points and diffusely spread between points (Fig 3f).

Cephalothorax. Antennal sheath with or without minute pearl row above pedicel. Frontal tubercle arising from low prominence (Fig. 3b), apically pointed, truncated cone- to thorn-like, length 12-17, 14 (3), width 18-26, 22 (4), with subapically inserted frontal seta 19-30, 25 (7) long. Antepronotum without setae. Thoracic horn with 6 branches: a stout anterior branch covered with small spinules in distal half, a median arm with two slender, smooth branches, and a posterior arm with 3 slender, smooth branches. Basal ring of thoracic horn elliptical, 34-43, 38 long, with one tracheal branch 12-15, 14 wide. One taeniate precorneal, length 31-68, 44 (3). Dorsocentral seta Dc_1 stiff, hairlike, alveolus well sclerotized; Dc_2 and Dc_4 taeniate, alveoli strongly sclerotized; Dc_3 hairlike, alveolus lightly sclerotized; lengths Dc_1 22-36, 28; Dc_2 34-48, 40; Dc_3 36-48, 41; Dc_4 19-25, 23; distance Dc_1 to Dc_2 8-17, 11; Dc_2 to Dc_3 117-163, 138 (8); Dc_3 to Dc_4 13-26, 18. Occasionally with a prealar setal scar.

Abdomen. Shagreen pattern on tergites similar to *B. truncatus* except T II shagreen not notably widened in posterior half of field behind anterior muscle marks. Conjunctive I/II bare, IV/V with 4-5 rows of anteriorly-directed points or pairs of points, point field extends more than half width of segment. Paratergite V with patch of fine spinules, VI with a few fine spinules near posterior margin. Hook row on II continuous, extending about ⅓ width of segment, of 30-44, 36 hooklets. All sternites bare. Pedes spurii A on IV. Pedes spurii B present on II. Segment VIII lateral margin with 0-4, 2 straight or posteriorly-curved spines, longest spine 24-31, 27. Anal spur single, length 10-13, 11, with or without fine hair-like spinules at base. Setation: Same as *B. truncatus* except segment V has 3 taeniate L setae. Anal lobe with 11-15, 13 fringe taeniae.

Comments. *Beardius* sp. B may be the pupa of *B. breviculus* an adult male of which has been collected in the northern Everglades (Epler 1992, 1995).

Beardius aciculatus Andersen & Sæther, emended

(Fig. 4)

Beardius aciculatus Andersen & Sæther, 1996: 40 (male).

Material examined. MEXICO: Campeche, Calakmul, Calakmul Biosphere Reserve, large lake in the "zona arqueología, aguada grande", 18°07'26.7"N, 89°48'56.7"W, 265 m a.s.l., 11♀♀, 15.XI.1998, light trap, A. Contreras Ramos et al. (ZSM, REJ).

Description

Adult female (n=10-11, unless stated otherwise).

Total length 2.03-2.56, 2.29 mm. Wing length 1.11-1.40 mm. Total length/wing length 1.68-1.91, 1.79. Wing length/profemur length 1.94-2.19, 2.07. Head pale; thorax brown; femora with distal ⅔ brown, front tibia brown, mid and hind ti with proximal ¾ brown, fore tarsomere 1 pale with light brown apex, successive ta increasingly darker, mid and hind ta_{1-4} pale, ta_5 light brown; abdomen with tergites I-IV or V brown with pale median area, T V or VI-VIII brown.

Head. AR 0.26-0.33, 0.29; flagellomere lengths 89-108, 97; 61-72, 64; 59-70, 65; 52-66, 59; 69-96, 83; Fm1 apparently represents two fused, subequal flagellomeres. Temporal setae 7-11, 10 in single, staggered row; including 2-3, 2 inner verticals; 2-5, 3 outer verticals; 3-5, 4 postorbitals. Clypeus with 16-24, 20 setae. Interocular distance 92-110, 100. Tentorium 116-146, 129 long, 18-23, 21 wide. Stipes 125-149, 135 long. Palpomere lengths 24-37, 31; 36-44, 38; 71-98, 88; 88-113, 101; 156-190, 170; Pm3 with 2-4, 4 lanceolate sensilla clavata.

Thorax (Fig. 4a). Scutal tubercle present. Antepronotal and acrostichal setae absent; dorsocentrals 6-10, 8 in single row; prealars 1-2, 2; scutellars 4-6, 5, uniserial or biserial.

Wing. VR 1.32-1.41, 1.37. Squama bare. Brachiolum with 2 setae; R 4-9, 7; R_1 3-8, 6; R_{4+5} 15-22, 18, longest apical seta length 55-76, 67.

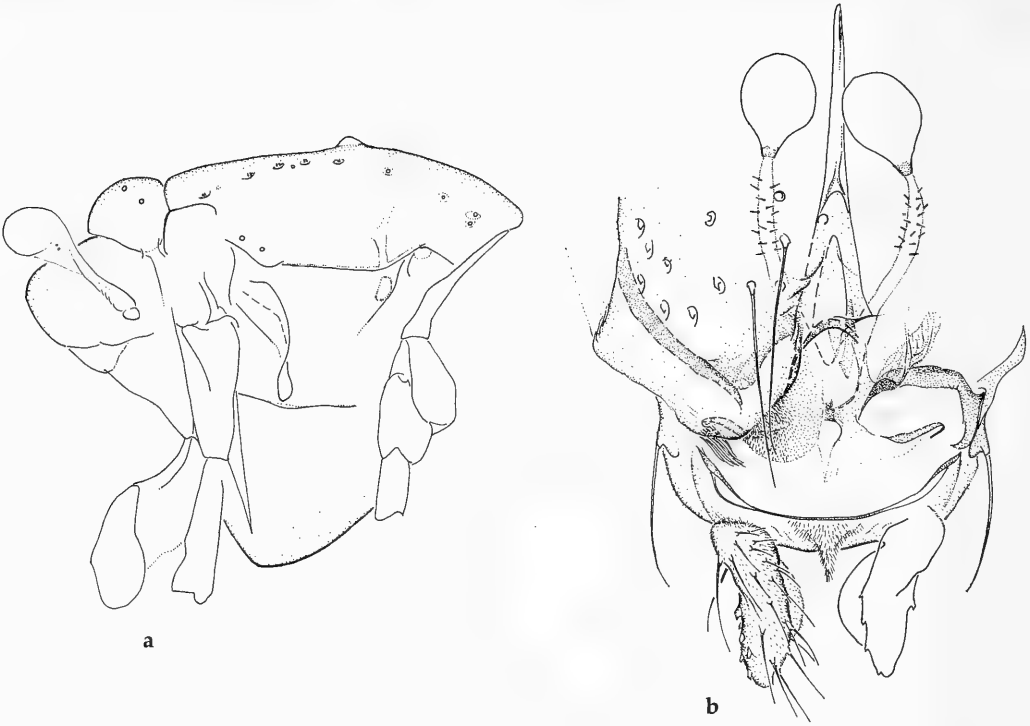

Fig. 4. *Beardius aciculatus* Andersen & Sæther; female. **a.** Thorax, lateral. **b.** Genitalia, ventral.

Legs. Tibial spur lengths: fore 34-41, 37; mid 33-42, 37; hind 41-50, 43. Tibial apex widths: fore 41-49, 45; mid 41-49, 45; hind 45-53, 50. Mid ta_1 with 8-11, 10 sensilla chaetica positioned 0.67-0.98 length of ta_1 from base; hind ta_1 with 8-13, 10 positioned 0.61-0.98 length of ta_1 from base. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4
p_1	564-676, 614	370-446, 406	588-760, 679 (7)	289-355, 321 (7)	218-284, 252 (7)	146-188, 171 (7)
p_2	554-691, 617	456-578, 513	269-348, 301 (9)	134-169, 152 (9)	101-130, 115 (9)	58-79, 70 (9)
p_3	632-821, 726	490-637, 554	401-497, 447	199-247, 221	158-186, 175	72-89, 81

	ta_5	LR	BV	SV	BR
p_1	74-96, 88 (7)	1.59-1.70, 1.64 (7)	2.02-2.10, 2.06 (7)	1.48-1.59, 1.52 (7)	2.9-3.8, 3.4 (7)
p_2	48-61, 55 (9)	0.57-0.60, 0.58 (9)	3.53-3.86, 3.67 (9)	3.65-3.89, 3.77 (9)	2.8-3.3, 3.0 (9)
p_3	55-68, 61	0.76-0.83, 0.80	3.11-3.40, 3.24	2.77-3.21, 2.90	3.0-4.4, 3.8

Abdomen. Number of setae on tergites I-VIII: 13-24, 19; 17-27, 23; 18-25, 22; 16-20, 19; 14-19, 16; 13-16, 14; 9-16, 13; 6-12, 9. Paratergites I-II bare, III-V with 1-3 setae. Number of setae on sternites I-VIII: 0; 0; 2-5, 3; 3-8, 5; 7-16, 11; 10-20, 14; 12-18, 15; 20-32, 25. Parasternites I-IV and VIII bare; V-VII with 1-3 setae.

Genitalia (Fig. 4b). Tergite IX with 16-22, 19 setae. Gonocoxite IX with 1 seta. Cercus 68-89, 78 long. Seminal capsule 28-35, 32 wide; 47-58, 50 long, including 9-13, 12 long neck with 5-12, 7 long sclerotized band at apex. Spermathecal duct straight, with spine-like special secretory cells in proximal half. Notum 96-110, 102 long.

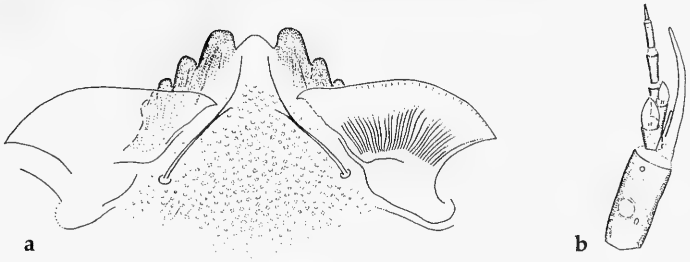

Fig. 5. *Beardius* sp. C, larva. **a.** Mentum. **b.** Antenna.

Beardius sp. C
(Figs 5, 6d)

Beardius parcus Reiss & Sublette, 1985: 183 (in part: 2 of the paratype larvae)

Material examined. BRAZIL: Paraiba state, Itaparica, 2 L, 25.I.1935, F. Lenz (ZSM).

Description

Larva (n=2)

Body length about 4.6 mm (1). Head capsule length 0.29-0.32 mm. Head light amber-brown.

Head dorsum (Fig. 6d). With labral sclerite 2 and frontoclypeal apotome, the latter with granularity that apparently extends past S4 setae and gradually weakens.

Antenna (Fig. 5b). 7-segmented, segments 2-4 may be incompletely separated. AR 0.70-0.79. Segment lengths 40-52, 12-13, 10, 10-12, 13, 12-13, 6. Basal segment 18-20 wide. Distance from base to ring organ 12-17, to basal setal mark 17, to distal mark 28-42. Blade 50-56 long, subequal to or slightly longer than flagellum; accessory blade length 10. Lauterborn organs large, length 11; segment 3 apical style length 9.

Mentum (Fig. 5a). Width 94 (1). Ventromental plates separated medially by distance about twice width of median tooth of mentum; each 89-98 wide, with smooth anterior margin and approximately 29 striae. Ventromental plate width / mentum width 0.95 (1). Postmentum 146-152 long, with pebbled surface texture between ventromental plates that extends beyond setae submenti about halfway to occipital margin. Seta submenti with 1 splinter-like branch.

Mandible. Length 124-151. Outer margin apparently smooth. Pecten mandibularis of about 12 lamellae. Mola without spines.

Body (n=1). Anterior 3 segments with conspicuous setae, posterior segments without notable setae. Procercus 29 high, 34 wide, with 7 anal setae up to 441 long. Supraanal seta length 295. Supraanal/anal seta ratio 0.67. Posterior parapods about 220 long. Anal tubules globose; ventral 103 long, 130 wide; dorsal 100 long, 132 wide.

Beardius parcus Reiss & Sublette, emended
(Fig. 6a)

Beardius parcus Reiss & Sublette, 1985: 183 (male, pupa, larva in part: see *B.* sp. C above); Andersen & Sæther 1996: 36 (female).

Material examined (all ZSM). BRAZIL: Rio Amazonas, Ilha do Careiro, Lago dos Passarinhos, 1 L from surface drift, 31.V.1971, F. Reiss; lower Rio Solimoes, Lago do Calado, 2 P+Lex, on floating meadows, 2.IX.1968, W. Junk.

Description

Larva (n=3). As in Reiss & Sublette (1985) with the following additions.

Head dorsum (Fig. 6a). With labral sclerite 2, clypeus, and frontal apotome. Clypeus with fine granularity, other sclerites smooth.

Antenna. 7-segmented, segments 2-4 may be incompletely separated. AR 0.87-1.05. Segment lengths 60-70, 12-14, 10-16, 9-10, 12-13, 13-14, 7. Basal segment 19 wide; distance from base to ring organ 12-15, to basal setal mark 13-20, to distal mark 48-60. Blade 55-62 long, reaching to apex of segment 6; accessory blade length 9-16. Lauterborn organs large, length 12-14; segment 3 apical style length 10.

Mentum. Width 98-101. First lateral tooth notched or smooth due to wear. Ventromental plates separated by about width of median tooth of mentum; each 86-93 wide, with smooth anterior margin and approximately 29-35 striae. Ventromental plate width / mentum width 0.85-0.95. Postmentum 163-173 long, with granular surface texture between ventromental plates anterior of setae submenti.

Mandible. Length 139-146. Outer margin lightly granular. Pecten mandibularis of about 12-15 lamellae. Mola without spines.

Abdomen (n=1). Procercus 39 high, 48 wide, with 8 anal setae up to 530 long. Supraanal seta length 407. Supraanal/anal seta ratio 0.77.

Systematics

Andersen & Sæther (1996) proposed a phylogeny and accompanying key for *Beardius* that split the genus into two distinct clades, here designated as the *parcus* group *(parcus+aciculatus)* and the *truncatus* group *(truncatus+lingulatus+breviculus+triangulatus)*, based upon character states of hypopygial features and the relative degree of anteromedial extension of the antepronotum. Within that phylogenetic concept, *B. reissi*, spec. nov. shows apomorphic character states for almost all traits leading up to Trend 8. The inferior volsella (stout stem; presence of spine-like, apically dissected sensilla chaetica), median volsella (reduced), superior volsella (pediform), gonostylus (robust), and hypopygium ratio (HR > 0.90) all indicate that *B. reissi* belongs within the *parcus* group. The presence of a frontoclypeal apotome in larval *B. reissi*, *truncatus* and sp. C indicates this character state is not autapomorphic in *Paratendipes*. The relative degree of anteromedial extension of the antepronotum in *B. reissi* is difficult to assign to one of Andersen & Sæther's categories and, considering the close similarity of opposite character states for *B. aciculatus* and *lingulatus* (Andersen & Sæther 1996: figs 3B and 5B), probably should not be considered a diagnostic synapomorphy for the *parcus* group. The absence of setae or long microtrichia on tergite IX in *B. reissi* males indicates that this character state is not synapomorphic for the *truncatus* group.

Resolving relationships between species within the *parcus* group is dependent upon how one interprets adult male characters such as the morphology of the inferior and median volsellae, the presence or absence of a scutal tubercle, the setation of R, R_1, and R_{4+5}, and the presence of setae on tergite IX. Apart from the inferior volsella, these either show considerable variation within species groups, or homoplasy within the genus. The incurved, laterally tapered stem of the inferior volsella with either a ventrolateral swelling or ridge, and the stout sensilla chaetica at the apex of the inferior volsella, are distinctive synapomorphies of *B. reissi* and *aciculatus*, suggesting that these species share common ancestry.

The pupal morphology of *B. parcus*, *reissi*, and *truncatus* lends support to Andersen & Sæther's (1996) proposed phylogeny based upon the adults. Both *B. parcus* and *reissi* have tergite shagreen with a distinct anterior band of stronger points, extensive fields of fine spinules on paratergite V, and normally only 4 pairs of D setae on T III-VI, character states not found in *B. truncatus* or sp. B. Though the identity of *B.* sp. B is presently unknown, it could be *B. breviculus*, another member of the *truncatus* group that is present in the Everglades (Epler 1992). No notable concordance in larval and adult morphology within species groups has been found so far, except that known larvae of *parcus* group species have more than 5 antennal segments, whereas B. *truncatus* larvae have only 5. The validity of the *parcus* and *truncatus* species groups will require further assessment when the immature stages of more species become known.

Ecology

Based upon our collection records from the Rocky Glades, *Beardius reissi*, spec. nov. is most abundant in higher elevation marl prairie habitats with relatively short (3-7 months), seasonal inundation periods. These sites in eastern Everglades National Park typically have shallow, patchy soils between

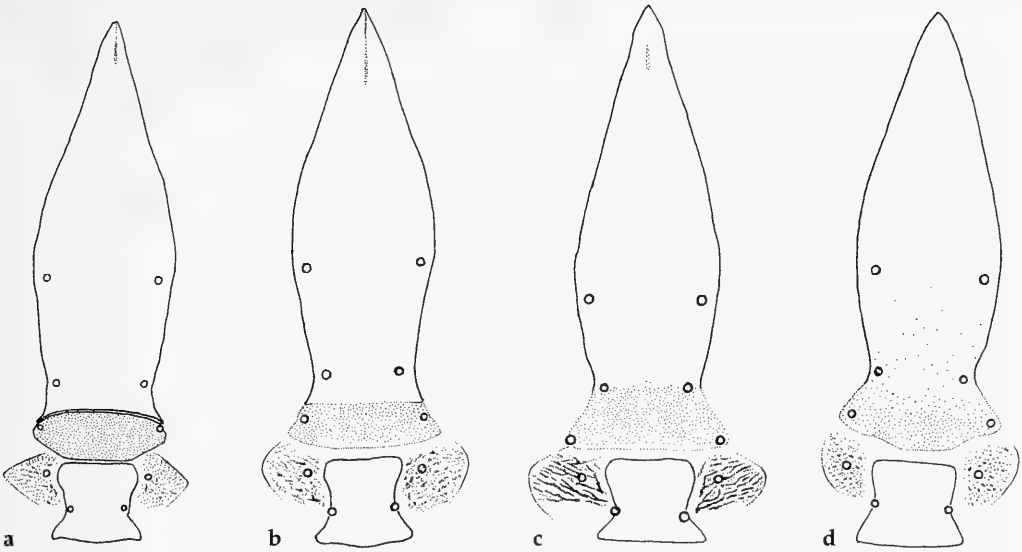

Fig. 6. *Beardius* spp., dorsal sclerites of larval head. **a.** *B. parcus* Reiss & Sublette. **b.** *B. reissi*, spec. nov. **c.** *B. truncatus* Reiss & Sublette. **d.** *B.* sp. C.

rock outcrops, and uneven soil elevation due to solution and weathering of the limestone bedrock. Their plant communities are consequently diverse and patchy, with *Cladium jamaicense* Crantz often a co-dominant with *Schoenus nigricans* L., *Panicum tenerum* Beyr., *Spartina bakerii* Merrill, *Schizachyrium rhizomatum* (Swallen), and *Muhlenbergia filipes* M. A. Curtis (Gunderson & Loftus 1993). Bottom substrates and submerged plant stems develop a 1-2 cm thick periphyton growth comprising primarily calcareous, filamentous cyanobacteria. Ranges for select physical and chemical parameters at collection sites yielding *B. reissi* were as follows: temperature 21-39 °C, conductivity 137-526 μS/cm at 25 °C, pH 7.5-8.7 (in periphyton mats up to 9.2), dissolved oxygen 1.1-14.5 mg/l. Dissolved oxygen levels in unenriched Everglades marsh systems with extensive periphyton typically show strong diel fluctuations (e.g. 0-12 mg/l, McCormick et al. 1997).

Specimens from Big Slough were collected from an intermittent wetland peripheral to the main channel that floods during the rainy season.

Larvae of *B. reissi* in the Rocky Glades constructed tubes, often incorporating fragments of periphyton, within small, hollowed pieces of twigs and dead culms of *Muhlenbergia* and *Schizachyrium*. The guts of larvae contained fungal hyphae and spores, plant fragments and periphyton, suggesting a generalist, gathering-collector mode of feeding. Pupation occurred in these fragments of vegetation within tubes with pore plates. The pupa fills the entire length of tube between these plates, sometimes with the terminal abdominal segments folded underneath the rest of the abdomen.

Development and emergence patterns of *B. reissi* appear to be highly dependent upon seasonal hydropatterns. Third and fourth instar larvae were common inside fragments of plant stems and twigs in samples collected 4.VI.1999 from marl prairie sites only a few days after rewetting. Within two weeks of rewetting, emergence had greatly exceeded that of all other species at short-hydroperiod marl prairie sites with large populations of *Muhlenbergia* and *Schizachyrium*, and at one site (400 m east of Rock Reef Pass) even exceeded the concurrent total chironomid emergence at longer-hydroperiod wet prairie and slough sites. Cursory examinations of the gut contents of fish (*Gambusia holbrooki*) incidentally captured during sample collection indicated that *B. reissi* pharate adults and emerged adults were an important prey item for fish at short-hydroperiod sites after rewetting.

Emergence peaks were observed at the Rock Reef Pass site in mid-June, mid-July, and in early September after a brief dry-down in mid August. Exuviae were rare after September, even though this site remained inundated until late December. These observations suggest *B. reissi* completed at least 2, most likely 3 generations over the year at Rock Reef Pass: 1 or 2 during the first three months of the rainy season and another over the remainder of the year ending with eclosion shortly after the onset of the next rainy season in late-May to early-June. *B. reissi* may have physiological and/or behavioral adaptations such as seasonal aestivation of larvae, and perhaps pupae, in drought-resistant cocoons for surviving desiccation in these habitats during the dry season (see Tokeshi 1995, Pinder 1995, Williams 1996 for reviews). Further work is needed to resolve the dry season habits, adaptations, and life history strategies that enable *B. reissi* to thrive in this seasonal habitat.

Beardius truncatus exuviae were collected in low numbers mainly from marl prairie solution holes and depressions and also from the main channel of Taylor Slough. Unlike *B. reissi*, *B. truncatus* does not show a seasonal pattern of emergence, and exuviae were collected from wetted sites throughout the year.

Exuviae of *B.* sp. B were collected primarily from the main channel of Taylor Slough and from adjacent marl prairie sites within approximately 400 m of the main channel. Though relatively few exuviae of this species have been observed, they have been collected from July to February, suggesting emergence is not seasonal. The larval habits of this species, nor those of *B. truncatus*, have not been determined.

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Chironomus strenzkei Fittkau – a new Pan-American distribution, with a review of recent similar additions to the Nearctic midges

(Insecta, Diptera, Chironomidae)

James E. Sublette & Mir S. Mulla

Sublette, J. E. & M. S. Mulla (2000). *Chironomus strenzkei* Fittkau – a new Pan-American distribution, with a review of recent similar additions to the Nearctic midges (Insecta, Diptera, Chironomidae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr Friedrich Reiss. – Spixiana **23/2:** 145-149.

Chironomus strenzkei Fittkau, described from the Neotropics, is for the first time recorded from the Nearctic region (southern California). It is speculated that it is a recent aircraft introduction, with possibly high potential as a nuisance species. A brief review is given of other chironomid species with similar distributions.

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Dedication

This paper is dedicated to a cherished colleague and good friend, the late Frieder Reiss. We remember many professionally rewarding and hospitable days in his company.

Jim and Mary Sublette

Introduction

The chironomid fauna of North America is predominantly indigenous, but most of the genera are shared with the Palaearctic region. However, the Nearctic also has several members in common with or derived from the Neotropical region (e.g. Reiss & Sublette 1985, Wülker et al. 1989, Sublette & Mulla 1991, Sublette et al. 1998, Spies 2000a, b in press). This paper reports on another such species recently discovered in southern California.

Material and methods

Eight adult males of *Chironomus strenzkei* Fittkau were collected with aspirator and sweepnet at the Hyperion wastewater treatment plant, El Segundo, Los Angeles Co., CA, 13.X.1999, leg. M. S. Mulla. These were slide-mounted and analyzed using a modification of the method by Schlee (1966). Voucher specimens are retained by both authors.

Chironomus (Chironomus) strenzkei Fittkau

Fittkau, 1968: 240.

Background. After Fittkau had discovered the species in Brazil, he sent live larvae to Europe, from which continuous cultures were developed in several laboratories. The earliest authors publishing Fittkau's manuscript name concerned themselves with various aspects of the species' biology, not taxonomy. Consequently, all publications prior to Fittkau (1968) did not formally validate the species name, but instead produced nomina nuda, one (Platzer 1967) even with an erroneous spelling (see Spies & Reiss 1996).

Chironomus strenzkei Sasa, 1978 is a junior homonym which has been replaced by *C. nippodorsalis* Sasa, 1979.

The following is a summary of published information on *C. strenzkei* Fittkau.

Morphology. Platzer-Schultz & Welsch (1969: larval digestive tract ultrastructure); Fittkau (1968: external descriptions for all life stages); Wülker & Morath (1989: larval chromosome banding pattern).

Physiology. Platzer (1967: larval temperature adaptation); Platzer-Schultz (1968a, b, 1970: respiration).
Behavior. Syrjämäki (1965, 1967: swarming).

The holotype of *C. strenzkei* Fittkau is deposited at INPA, Manaus, Brazil (Adis et al. 1985). For a list of institutions holding some of the many paratypes see Fittkau (1968: 246).

Identification. The adult male can be readily recognized among Nearctic *Chironomus* by the uniquely marked wings (Fittkau 1968: fig. 1). Members of the *decorus*-group have wings with some dusky veins (Townes 1945), but none with an intensity or distribution as the membrane markings of *C. strenzkei.* A second morphological feature, an anal point that is narrow at the base, is shared in the Nearctic fauna only by *Chironomus riparius* Meigen (Townes 1945) and *Chironomus calligraphus* Goeldi. The male genitalia of the new specimens are in close agreement with the detailed original description (Fittkau 1968, figs 2, 3).

The following compares selected morphometric data from the California population to those given for the type material (Fittkau 1968), with numbers of observations given in parentheses.

	Fittkau (1968)	Present study
Wing length	1.56-2.0 mm (78)	2.04-2.18 (5)
Antennal ratio	2.1-2.6 (60)	2.71-2.95 (5)
Fore leg ratio	1.76 [mean] (40)	1.69-1.78 (4)
Dorsocentral setae	8-14 (29)	12-17 (5)
Prealar setae	4-5 (26)	4-5 (5)
Scutellar setae	[12-26] (31)	16-28 (5)
TIX setae	7-16 (36)	2-6 (5)
Superior volsella setae	7-11 (24)	12-15 (5)
Inferior volsella setae	13-19 (23)	22-24 (5)

Although in many characters the two value ranges do not overlap, nearly all results are consistent with the difference in overall body size (see wing length). Even the notable exception, the low count of TIX setae in the larger California males, is variation to be expected among two widely separated populations from different habitats. The shared genitalic features and wing pattern are considered diagnostic for the species.

Distribution. Amazon lowlands from Pucallpa, Peru to Belém, Brazil (Fittkau 1968); U.S.A., southern California (present paper).

Ecology. Fittkau (1968) found *C. strenzkei* only in small, artificial water bodies with high nutrient levels, e.g. in mud and algae accumulating in the bilge water of dugout canoes. The original habitat was interpreted to be stagnant, eutrophic small waters as are common in the periodically inundated lower Amazon. The larvae are able to survive very high temperatures and low oxygen levels by aggregating at the water-air interface. The life cycle can be completed in as short a time as 10-12 days (Fittkau 1968).

Discussion

With its ecological preferences and adaptations as outlined above, *C. strenzkei* has the potential to survive throughout the southern United States and other lower temperate and subtropical areas where, for example, sewage oxidation ponds make potentially productive breeding sites. One possible consequence is that it causes significant pest swarm problems around these facilities. Since the species' vagility would be aided by the numerous small water bodies available in urban areas (pet watering dishes, flower pot basins, ornamental pools, empty containers, etc.) *C. strenzkei* could eventually become a nuisance around human settlements as well.

The present new record is the second case (see Sublette & Mulla 1991) of a Chironomini species that, in light of the major airports and ship docking facilities in southern California, has probably been introduced via ship or aircraft within the past decade. There it has joined an assemblage of eurythermic, eutrophic species including others which arrived, also from Neotropical regions, at an earlier time. Examples are *Chironomus anonymus* Williston (Wülker et al. 1989) and *C. calligraphus* Goeldi, known from southern California since the 1960's as *Chironomus* sp. 51 and 52, respectively. Recent introduction is likely because intensive collecting in southern California failed to turn up *C. strenzkei* until the last decade. *Goeldichironomus amazonicus* (Fittkau), a species that probably has a comparable mode of origin, has also been reported for the first time from the Nearctic Region within the past decade (Sublette & Mulla 1991. These earlier studies included year-round monitoring of several experimental ponds with different trophic levels on the campus of the University of California at Riverside, as well as research on various urban water bodies including flood control and waste water disposal systems. Representative publications include Anderson et al. (1965), Bay et al.(1966), Bath & Anderson (1969), Grodhaus (1963a, b; 1967), Mulla (1974), and Mulla et al. (1971). A recent account of nuisance species in urban southern California is given by Spies (2000b) whose collections also did not include *C. strenzkei*.

Several chironomid genera have been biogeographically classified as 'Pan-American' (Reiss & Sublette 1985), because representatives of theirs occur in at least parts of each of the New World subregions. Most such distributions are probably due to primarily Neotropical species whose natural ranges extend to include marginal populations in the southern Nearctic. Two recently added examples are *Rheotanytarsus hamatus* Sublette & Sasa (U.S.A.: AZ), and *Polypedilum obelos* Sublette & Sasa (U.S.A.: AZ, NM) (Sublette et al. 1998, first author's unpublished records). The latter species is of interest as one of several *Polypedilum* from the southern U.S. with pictured wings (Townes 1945), a feature abundantly represented in the Neotropical region (Sublette & Sasa 1994, Bidawid & Fittkau 1995, Bidawid-Kafka 1996). An additional four new pictured-wing species of *Polypedilum* are known to the first author, one each from Texas and Arizona, and two from New Mexico. As these occur in rather remote areas none is interpreted as being a recent immigrant.

Parachironomus is a genus abundantly represented in the Neotropical region, and moderately abundant in the Nearctic. Several of its members from across the southern U.S. are clearly related to similar Neotropical species described by Spies et al. (1994). Some synonymies may result when more material becomes available. Spies (2000a) lists several new records for the Nearctic region, including new Pan-American distributions. An additional record is: *P. supparilis* Edwards, var. *centralis* Spies et al. – U.S.A., FL, W. Palm Beach, Morrison Field, 3 males, 1.-3.I1943 (USNM, JES collections).

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Microtendipes schuecki Reiss. Hypopygium dorsal.
Original drawing by Frieder Reiss (in SPIXIANA 20/3, 1997).

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Northernmost *Chironomus* karyotypes

(Insecta, Diptera, Chironomidae)

Wolfgang F. Wülker & Jon Martin

Wülker, W. F. & J. Martin (2000): Northernmost *Chironomus* karyotypes (Insecta, Diptera, Chironomidae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 151-156.

In the extremely high latitude of Ellesmere Island, the karyotypes of *Chironomus* spec. Le1 (sensu Kiknadze), *C.* spec. w Martin*, and *C. hyperboreus* Staeger, 1845 could be identified. The first two species have relations to Alaska and the Russian Arctic, the third to Greenland.

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Introduction

Chironomus species from the High Arctic are scarcely known. Initially, expeditions to Greenland, Spitsbergen, Bear Islands, northern Canada etc. (data e.g. in Edwards 1935, Thienemann 1954, Brundin 1949, Oliver 1964) collected some adults, but not many of them were identified to species. Later on, data on metamorphoses were included in the investigations (e.g. Andersen 1937). Karyological studies (e.g. Kiknadze et al. 1996) have shown the presence of a large number of *Chironomus* species in the High Arctic. Zelentsov & Shilova (1996) estimated 15-20 *Chironomus* species to be expected just in the delta of the river Lena in Siberia.

Many of the species identified by chromosome investigations were new for science. Most of them have a salinarius larval type, i.e. lack tubuli ventrales and laterales. Many have remarkable heterochromatic blocks at the centromeres and show "basic" (Wülker 1980, 1991) chromosome banding patterns.

In the Nearctic, besides the investigations of Butler (1982) on *Chironomus prior* and *C. tardus* from arctic Alaska, material suitable for karyological studies was collected in Ellesmere Island, N.W.T., 81°49'N, by Corbet and Parker (for locality data see Oliver & Corbet 1966). This latter material was given to the second author who recognized the presence of five species on the basis of the karyotypes.

Comparison with larvae from Greenland and the Russian Arctic revealed three known karyotypes of the *thummi*-complex: spec. Le1 (Kiknadze et al. 1996), *C.* spec. w Martin, and *C. hyperboreus* Staeger, 1845. The other two karyotypes, one of them belonging to the *pseudothummi*-complex, are not clear enough for description.

In the present paper, we demonstrate and discuss our results on Ellesmere material, including some unpublished data on northern Alaska (leg. M. G. Butler). It should be considered that chromosomes in arctic species are often very much contracted, and conclusions on the banding pattern therefore sometimes approximations.

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* See unpublished list of North American *Chironomus* species under internet URL: http://www.genetics.unimelb.edu.au/Martin/NACytfiles/NAChiron.html.
The species will soon be described by Shobanov, Wülker & Kiknadze.

Results

1. *Chironomus* spec. Le1 sensu Kiknadze et al. (1996)

Material used: Canada, N.W.T., Ellesmere Island, Hazen Camp, permanent pool no.78, leg. P. S. Corbet & J. Parkes, 14.vi.1988, 1 chrom. squ. – U.S.A., Alaska, Point Barrow, pond B.R., leg. M. G. Butler, 1.vii.1980, 5 chrom. squ. – Russia: delta of river Lena, leg. T. A. Salova, 5 chrom. squ.

This karyotype belongs to the *riihimakiensis*-group (Kiknadze et al. 1994), but it cannot yet be decided whether it is a separate species or simply a northern variant of *C. riihimakiensis* Wülker 1973.

Kiknadze et al. (1996) described the larval morphology ("*bathophilus*-type" = short tubuli ventrales, no tubuli laterales) and karyotype, the latter with a photographic plate. The karyotype shows four chromosomes (2n=8) with arm combination AB, CD, EF, G (*thummi*-complex), large heterochromatic blocks at centromeres, frequent lack of pairing of homologues even in the homozygous state. There are nucleoli in arms C and D as is typical for the group (Fig. 1b), as well as Balbiani rings in arms F and B. The short chromosome G has a typical spindle form with a subterminal nucleolus and one Balbiani ring.

The arms are said to be monomorphic, but we found polymorphism in A and F. In A, the pattern shown by Kiknadze et al. is supplemented by the basic *holomelas* 1 pattern. In F, the pattern of *aberratus* is supplemented by the same second pattern as in *C. riihimakiensis*:

A1   1–2c   10–12   3-2d   9 – 4   13-19   as *holomelas*

A2   1–2c   10   8d–9   2d–3   12-11   8c–4   13–19   corrected from

Kiknadze et al. (1996) by Kiknadze (personal communication), and

F1   1   –   10   17   –   11   18–23   as *aberratus*

F2   1 – 8c   12–17   10–8d   11   18–23   as *riihimakiensis.*

The polymorphism in A was present in the material of Ust Lena Natural Reserve in Russia and in Alaska, while the single slide from Ellesmere is a homozygote A1.1 (Fig. 1a).

The distribution of spec. Le1 seems to be circumpolar: Novaja Semlya, Dikson (det. I. I. Kiknadze), Lena delta in Russia, Alaska and Ellesmere Island in North America.

2. *Chironomus* spec. w Martin

Material used: Canada, N.W.T., Ellesmere Island, Hazen, inland marsh of Skeleton Lake, leg. P. Corbet & J. Parker, 15.vi.1966, 1 chrom. squ. – U.S.A., Alaska, west shore of Prudhoe Bay, EWD1, tundra pond east of West Doc pad, 70°23'N, 148°31'W, leg. M. G. Butler, 7.vii.1980, 2 chrom. squ. – Russia: delta of river Lena, leg. N. A. Shobanov, 1990, 4 chrom. squ.

This species has larvae of the *salinarius*-type (= no tubuli ventrales and laterales). It has 4 chromosomes (2n=8) with chromosome arm combination AB, CD, EF, G (*thummi*-complex), no heterochromatic blocks at centromeres; nucleoli in arms A and D.

Arm A of the single slide from Ellesmere Island has the pattern of *C. holomelas* 2 (Keyl 1962). The Lena delta specimens have an arm A differing by one inversion from *holomelas* 2, but this karyotype occurs also in Alaska, where it shows heterozygosity between both patterns (Fig. 2a), with the typical nucleolus in region 14.

A1   1–2c   10–12   3i–d   13f–a   4   –   9   2d–3c   14–19   as *holomelas* 2

A2   1–2c   10–12   3ih   8d–4   13a–f   3d–g   8e–9   2d–3c   14–19

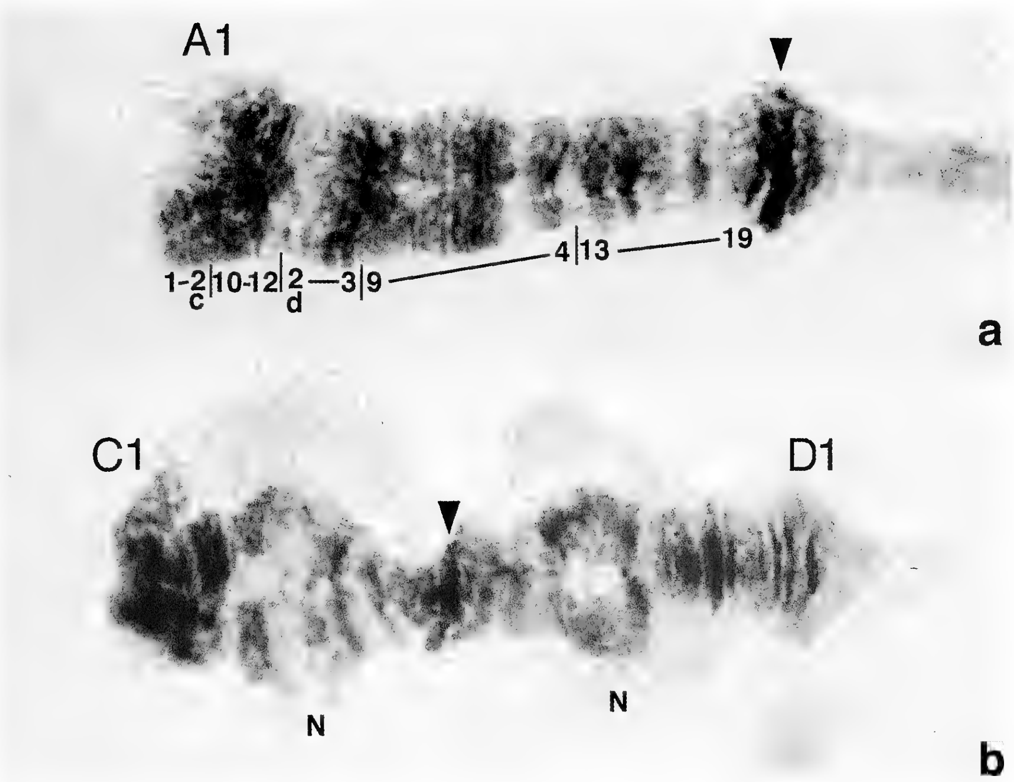

Fig. 1. *Chironomus* spec. Le1. Chromosome arms. **a.** A1. **b.** C1 and D1. N = nucleolus; arrowhead = centromere.

Arm B: with the typical position of groups 8-9 in the middle of the arm, flanked distally by dark band groups. The Ellesmere specimen has B1.1.

Arm C: shows the typical group 6b-2 in the middle of the arm and group 15 far distal.

Arm D: can be identified by the nucleolus in the middle of the arm flanked proximally by groups 4-8d.

Arm E: has the typical insertion of group 2d-1d in the middle of the arm.

Arm F (Fig. 2b): is one inversion from *C. aberratus*:

1 – 10 17 – 11 18–23 as *aberratus*

1 – 9 11h–i 12 – 17 10d–a 11g–a 18 – 23

Arm G: (Fig. 2c) is the most problematic in the Ellesmere slide. It is much shorter than in the material from the Lena delta, but shows the typical 3 Balbiani rings. The individuals from Alaska vary in the length of arm G.

The distribution of *C.* spec. w Martin seems to be circumpolar: Archangelsk, Dikson (det. I. I. Kiknadze) and Lena delta in Russia, Alaska and Ellesmere Island in North America.

3. *Chironomus hyperboreus* Staeger, 1845

Material used: Canada, N.W.T., Ellesmere Island, Hazen, Hazen Camp pond, 2 chrom. squ.; permanent pond No. 33, 1 chrom squ.; inlet marsh of Skeleton Lake, 1 chrom. squ.; Skeleton Lake, 2 chrom. squ., all leg. J. Corbet, 1966. – Denmark, Greenland, Lake 517 Stoe Kvaneso, leg. J. Skriver, 11.viii.81, 4 chrom. squ.

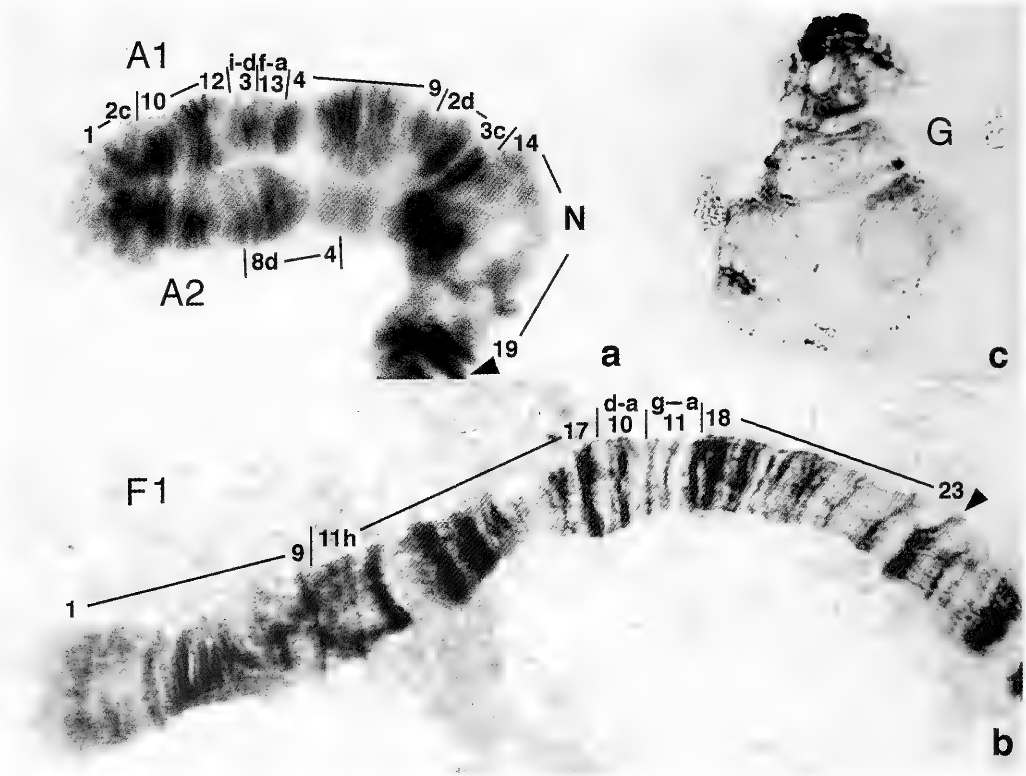

Fig. 2. *Chironomus* spec. w. Chromosome arms. **a.** A1.2. **b.** F1. **c.** G. Symbols as in Fig. 1.

Preliminary data on the karyotype and larva were given in Wülker & Butler (1983). Larva of *salinarius*-type. 4 chromosomes (2n=8), chromosome arm combination AB, CD, EF, G (*thummi*-complex), heterochromatin blocks at centromeres. Inversion polymorphism in arms A and F, one pattern as in *holomelas* A1, arm C with dumbbell structure at distal end, and in arm F one pattern is standard *C. piger*.

In Arm A (Fig. 3a) the basic pattern of *C. holomelas* occurs in the heterozygous condition with a different alternative pattern on Greenland (A2) and on Ellesmere (A3):

A1 1–2c 10–12 3–2d 9 – 4 13–19 as *holomelas*

A2 1–2c 10–12 7–9 2d–3 6–4 13–19 Greenland

A3 1–2c 3–2d 9–7 12–10 6–4 13–19 Ellesmere

Arm B: Identical with *C. riihimakiensis* (Wülker 1973), also having the same polymorphism in the most distal part of the arm.

Arm C: has the "basic" pattern (= pattern present in at least 14 *Chironomus* species (Wülker 1980, 1991): 1-6c 11-7c 15-12 7b-6d 16-22.

Kiknadze et al. (1996, e.g. photo 13, C. spec. A11), have suggested another preferable version of the same pattern: 1-6b 11c-8 15-11d 6gh 17a 16h-a 7d-a 6f-c 17b-22.

Arm D: has also a "basic" pattern, present in at least 10 *Chironomus* species (Wülker 1980, 1991): 1-3 11-18f 7d-4 10-7e 18g-24.

Arm E (Fig. 3b): is 1-3e 7-5 8-10b 4-3f 10c-13, one inversion from *aberratus*.

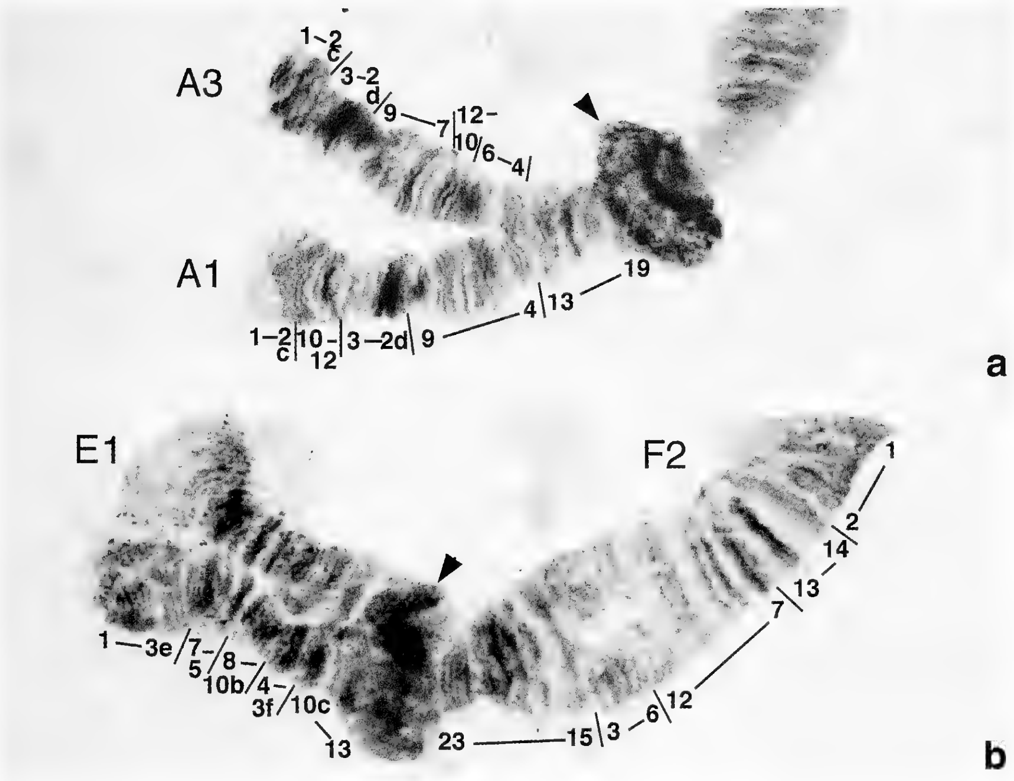

Fig. 3. *Chironomus hyperboreus* Staeger. Chromosome arms. **a.** A.1.3. **b.** E1 and F2. Symbols as in Fig. 1.

Arm F: the statement of a standard pattern like *piger* by Wülker & Butler (1983) was wrong. The two existing patterns are two and three inversion steps from that pattern:

F1 1 – 6 12 – 7 13 – 23

F2 1–2 14–13 7–12 6–3 15 – 23 (Fig. 3b)

Only in Greenland have heterozygotes for F1.2 been found, all Ellesmere specimens are F2.2.

Arm G: unpaired, cone-shaped, homologues often connected at their ends by a heterochromatic block.

The species seems to be dominant on Ellesmere Island (4 sampling stations).

Beside the cytotaxonomically proven occurrence on Ellesmere and Greenland, *C. hyperboreus* has been reported from Bear Island, Spitsbergen, and northern Fennoscandia on the basis of male adults. However, the first author could not find any *C. hyperboreus* karyotype in northern Fennoscandia. Instead, in some lakes a very closely related karyotype occurs, but without heterochromatic blocks at the centromeres. This form will be compared with *C. hyperboreus* in a separate paper. The Fennoscandian occurrence of *C. hyperboreus* has to be reexamined.

Discussion

Ellesmere Island is at an extremely high latitude, comparable with the north of Spitsbergen or with Franz Josef Land (Russia), but from these places no karyotypes of *Chironomus* have ever been investigated.

Species of the genus *Chironomus* are known to be dependent on a good trophic situation. Thus it is remarkable that they occur in the rough conditions of so high latitudes. The experience of the first author in Fennoscandia is that, indeed, at latitudes north of the arctic circle *Chironomus* disappears from the deeper lakes if they are not artificially eutrophied as, for example, Prestvatnet near Tromsø, Norway. However, in small pools the number of *Chironomus* species can be very high (in pools near Abisko, Sweden, 7 species were found: *pseudothummi, acidophilus, fundatus, wulkeri, riihimakiensis, storai,* and *pseudomendax*). The input of allochthonous material, e.g. leaves of tundra plants or feces of birds, seems sufficient for their existence.

Another point is the dependence of the high arctic species on the very short ice-free period. Oliver (1964) cited as adaptations: flexibility of the length of larval stages, possible maturation of a second egg batch in the female, synchronous emergence pattern as in the spring emergence in temperate regions. Butler (1982) found a 7-year cycle as a consequence of slow growth. Unfortunately, intensive ecological investigations are becoming more and more difficult in arctic field stations, even access to such stations is being reduced for financial reasons.

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Chironomidae (Insecta, Diptera) from Hungary 2. New records of *Lipiniella moderata* Kalugina, 1970

Kalman Biró

Biró, K. (2000): Chironomidae (Insecta, Diptera) from Hungary 2. New records of *Lipiniella moderata* Kalugina, 1970. – In Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 157-158.

Larvae of *Lipiniella moderata* Kalugina have been collected for the first time in Hungary and Yugoslavia. A summary is given of the western European distribution of the genus.

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The genus *Lipiniella* Shilova, 1961 is reportedly distributed across the Palaearctic region and in Canada, the larvae occur on sandy sediments in the litoral of lakes, in lentic habitats and the potamal of rivers, and in estuaries (Pinder & Reiss 1983, Becker 1995).

Two of the four described species have been recorded in Europe: *L. araenicola* Shilova, 1961 from ?Norway (Schnell & Aagaard 1996), The Netherlands (e.g. Smit et al. 1993), France (Laville & Serra-Tosio 1996), and Germany (Becker 1995); and *L. moderata* Kalugina, 1970 from Norway (Schnell & Aagaard 1996) and The Netherlands (Klink et al. 1995).

Material (slide mounted in Euparal; leg. + in coll. K. Biró). 1 larva, Hungary, Szigetköz, Old-Danube river near Dunaremete, in sandy mud, 2.XI.1998; 1 larva, Yugoslavia, Pancevo, canal at oil refinery, in mud, 25.VIII.1999.

These are the first records of *L. moderata* from Hungary and the Carpathian basin, and the southernmost of any *Lipiniella* from Europe.

The species determinations are based on a combination of larval features so far described in the genus only from *L. moderata* Kalugina: an extensive frontoclypeus depression with granular surface; a premandible with 5 teeth plus another, more proximal knob (Fig. 1); and abdominal segment VIII with postero-ventral tubules about as long as the anal tubules (see Kiknadze et al. 1989, Kiknadze et al. 1991, Shilova et al. 1993, Shilova & Proviz 1997).

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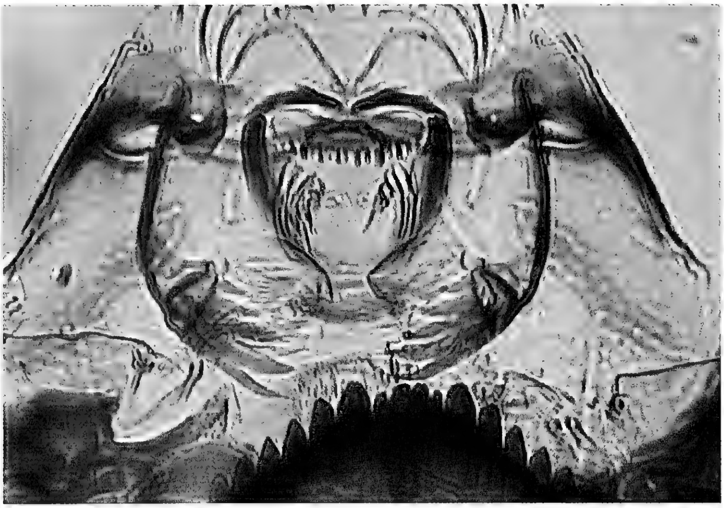

Fig. 1. *Lipiniella moderata;* larva: epipharynx and mentum.

Fig. 2. *Lipiniella moderata;* larva: mandible and antenna.

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Oukuriella reissi, a new species of the genus *Oukuriella* Epler, 1986

(Insecta, Diptera, Chironomidae)

Maria Conceição Messias

Messias, M. C. (2000): *Oukuriella reissi*, a new species of the genus *Oukuriella* Epler, 1986 (Insecta, Diptera, Chironomidae). – In Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 159-161.

Oukuriella reissi, spec. nov. is described from adult male specimens collected in Brazil. Apart from characteristic hypopygial features, this species is distinguished by a strong scutal tubercle, and distinctive markings on the thorax and abdominal tergites.

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Introduction

Messias et al. (2000) divide the genus *Oukuriella* Epler into three species groups. *Oukuriella reissi*, spec. nov. is a member of the second group which is characterized by wings without markings, abdominal tergites with setal tufts, and a broad gonostylus 1.5 times as long as the gonocoxite.

Methodology

All measurements follow Epler (1988) unless otherwise stated. Morphological terminology follows Sæther (1980) where applicable. Abbreviations for institutions: ZSM = Zoologische Staatssammlung München (Munich, Germany); IOC/FIOCRUZ = Instituto Oswaldo Cruz / Fundação Oswaldo Cruz (Rio de Janeiro, Brazil).

Oukuriella reissi, spec. nov.

Figs 1a-c

Type material (all Brazil, leg. E. J. Fittkau). Holotype: adult ♂, slide-mounted in Canada balsam, Pará, Rio Cururu, Missão Cururu, at light, 20.I.1961 (ZSM). – Paratypes: 2♂♂, as holotype except 12.I.1961 (ZSM); 1♂, as holotype except 6.II.1961 (IOC/FIOCRUZ); 1♂, 24.VIII.1961, 1♂, 19.I.1961, Mato Grosso, Rio Sete de Setembro, Igarapé Garapu (ZSM); 1♂, Amazonas, Rio Branquinho, at light, 21.IV.1961 (ZSM).

Diagnosis. *Oukuriella reissi*, spec. nov. differs from other members of the second species group sensu Messias et al. (2000) by the strong scutal tubercle and distinctive markings of the thorax and abdominal tergites. In addition, the hypopygium has the unique combination of 10-15 dorsomedian setae, a broadly pediform superior volsella with 5 setae (1 dorso-lateral and 4 lateral) at the bend, a slender

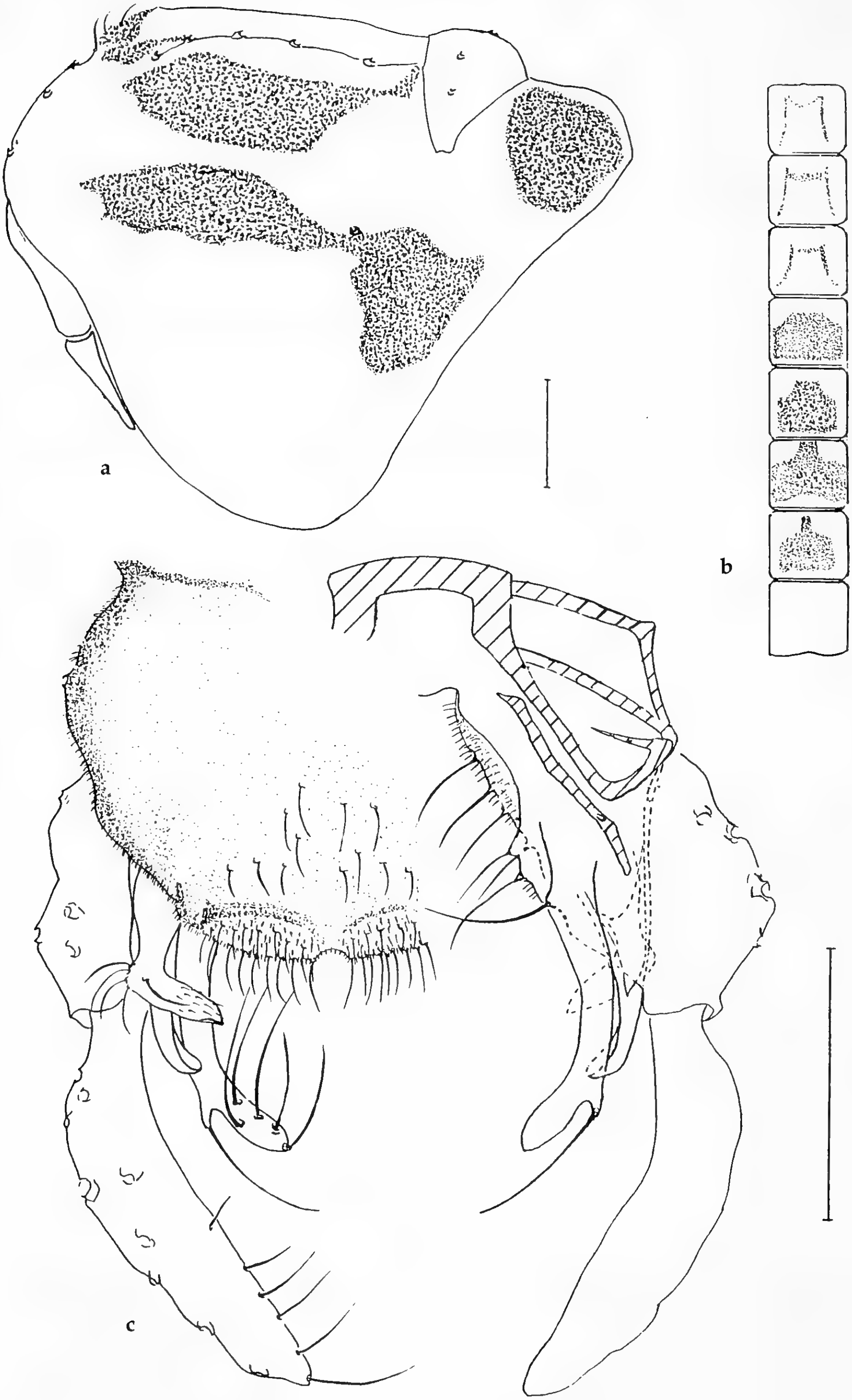

Fig. 1. *Oukuriella reissi*, spec. nov.; adult male. **a.** Thorax. **b.** Abdominal terga I-VIII. **c.** Hypopygium, left: dorsal, right: ventral. Scales: 100 μm.

digitus, and an inferior volsella with 2 medio-basal setae, 5-6 dorsal setae, and 1 on a ventro-lateral tubercular projection.

Etymology. Named after the late Dr. Friedrich Reiss, for all his help and hospitality during my studies at ZSM.

Description

Adult male (n=7).

Colour (in slide mounts). Thorax brownish with dark brown markings as in fig. 1a, midline of postnotum not dark. Legs brownish with brown rings: apically on fore femur and tibia, apical ⅔ of mid tibia, and apical ⅓ of hind tibia. Abdominal terga (Fig. 1b) I-III each with a brown marking resembling the letter 'M', T IV-VII extensively pigmented.

Total length 3.50-3.65 mm.

Head. Temporals 8-10. AR (n=4) 1.75-1.91. Clypeus with approximately 50 setae. Palpomere lengths in μm (n=4): 31-35, 46-50, 93-125, 155-200, 186-250.

Thorax (Fig. 1a; n=1) with a strong scutal tubercle. Acrostichals 7, dorsocentrals 5, scutellars 3, prealars 1.

Wing (n=3). Length 1.83-1.95 mm. Width 0.42-0.50 mm. VR 0.72-0.78. R with 6-8 setae, R_1 with approximately 20, R_{4+5} with approximately 30.

Legs. Segment lengths (in μm) and proportions (n=4):

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV
p_1	1700-1875	1090-1160	1600-1800	1240-1350	740-900	600-675	190-200	1.37-1.65	0.62-0.64	0.85-0.87
p_2	1260-1440	1050-1080	660-700	300-380	240-270	150-160	80-90	1.53	3.45-3.66	2.75-2.59
p_3	1410-1540	1050-1100	810-940	510-600	420-440	240-300	90-120	1.64	3.50	2.77-3.03

Abdomen. Sternite VIII with a proximal circular mound bearing a cluster of 60 setae. Paratergites I-II each with 2 pairs of setae, Pt III with 4 pairs, Pt IV-VII with 7 pairs, Pt VIII with a mound bearing 5 setae.

Hypopygium (Fig. 1c). Tergite IX with 10-15 dorsomedian setae, posterior margin with median notch flanked by transverse fields of setae. Superior volsella broadly pediform, at its bend with 1 dorso-lateral and 4 lateral setae; digitus slender. Inferior volsella with 2 medio-basal setae, 5-6 dorsal setae, and 1 on a ventro-lateral tubercular projection. Gonocoxite with 4+1 basal-median setae. Gonostylus broad, 1.5 times as long as gonocoxite, slightly curving to median, with 4-5 medio-distal setae and 1 dorsal-apical seta.

Female and immature stages unknown.

Acknowledgments

I would like to thank Dr. Sebastião José de Oliveira, curator of the entomological collections of IOC, for valuable discussions, and Mr. Martin Spies for comments on the draft manuscript.

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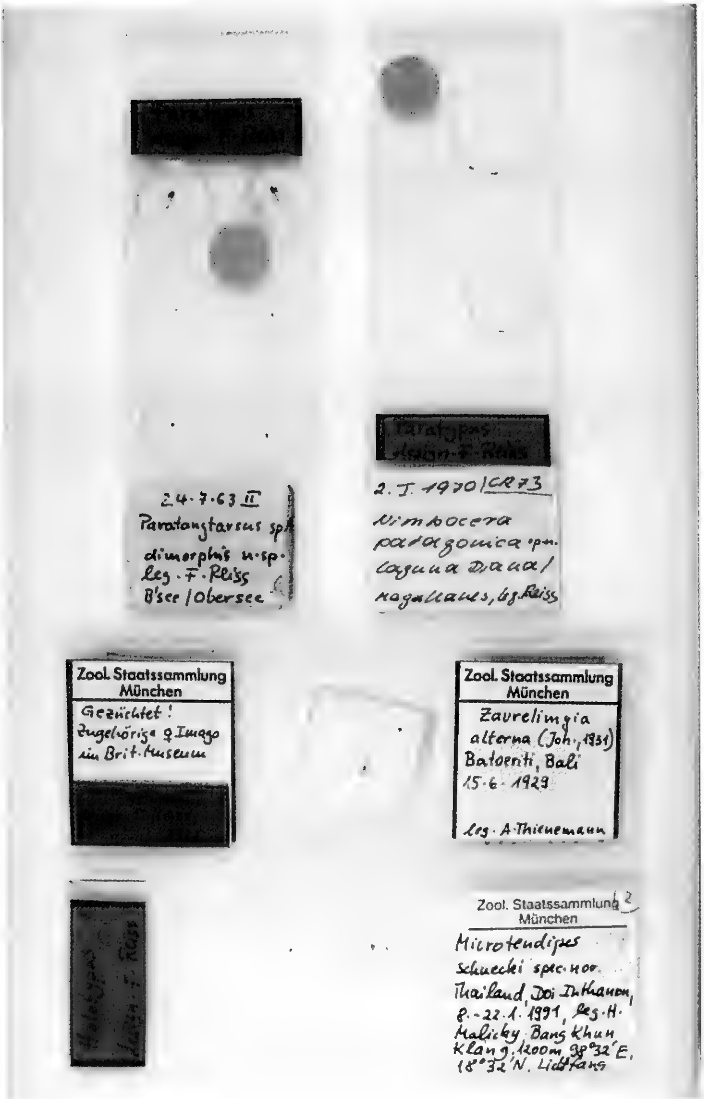

Samples of Frieder Reiss' handwriting from different periods.

SPIXIANA	**23**	2	163–166	München, 01. Juli 2000	ISSN 0341-8391

First Nearctic record of *Neostempellina* Reiss, with description of a new species

(Insecta, Diptera, Chironomidae)

Broughton A. Caldwell

Caldwell, B. A. (2000): First Nearctic record of *Neostempellina* Reiss, with description of a new species (Insecta, Diptera, Chironomidae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 163-166.

Neostempellina reissi, spec. nov. is described based upon an adult male from north-central Maine, USA. The specimen represents the first Nearctic record for the genus. The diagnosis for *Neostempellina* is emended to include all described species. The new species is easily recognized by characters of the antenna and hypopygium.

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Introduction

Neostempellina was established by Reiss (1984) to accommodate the European species, *N. thienemanni,* with *N. pilosa* subsequently described from Turkey (Reiss 1987). A third species from central Africa, *N. abnormis* (Lehmann, 1981), was recently transferred from *Tanytarsus* by Ekrem & Reiss (1999). An additional African species, *Tanytarsus saetosus* Lehmann, 1981 also belongs to *Neostempellina* (Stur & Ekrem, this volume). A total of five species are now described for the genus. Initially regarded as a Palaearctic monotypic genus by Pinder & Reiss (1986), and as a Palaearctic endemic by Ashe et al. (1987), it now includes Palaearctic, Afrotropical, and Nearctic records. Additional unpublished records include other zoogeographical regions (M. Spies, T. Ekrem, pers. comm.).

The immature stages of the genus are known only for *N. thienemanni* which has been confused previously with *Stempellina montivaga* Goetghebuer, a junior synonym of *S. bausei* (Kieffer) (Reiss 1984). The differential diagnoses given by Reiss (1984) should enable recognition of pupae and larvae of *N. thienemanni.*

Methods

Standard morphological terminology and methodology follow a combination of Epler (1988), Oliver & Dillon (1989), and Sæther (1980). Unless otherwise stated, measurements are given in μm.

Neostempellina Reiss, emended

Diagnosis. Antenna with 10-13 flagellomeres; AR 0.4-1.05. Acrostichals 8-14, dorsocentrals 5-8. Wing length 0.76-1.50 mm. Anal tergal bands of V- or T-type; median longitudinal band of "T" long, or short and thin, connected to transverse bands. Anal point moderately long to long, relatively slender, rounded posteriorly; or relatively short, tapered to a point; or basally and medially widened, and distally constricted to a point. Anal crests dorsally somewhat U-, Y-, or more or less V-shaped. Digitus present or absent. Median volsella absent; or short and with several apical, broadened setae. Gonostylus tapering to a point, or with rounded apex. Otherwise as in Cranston et al. (1989).

Neostempellina reissi, spec. nov.

Fig. 1

Types. Holotype: adult ♂ (on slide, in Canada balsam), USA, Maine, Piscataquis County, Baxter State Park, Abol Pond and outlet stream, 6.VI.1987, leg. B. A. Caldwell; deposited in Florida State Collection of Arthropods (FSCA) at Florida A&M University, Tallahassee, Florida, USA.

Etymology. Named in honor of the late Dr. Friedrich Reiss, acknowledging his distinguished career in the study of chironomids, and his helpful nature. Since he could not carry out his intention to describe this new species himself, it is here established in his name.

Diagnosis. The male of *Neostempellina reissi*, spec. nov. is recognizable by the following combination of characters: Antenna with 10 flagellomeres, AR 1.05; T-type anal tergal bands present; anal point relatively short, abruptly narrowed distally to a sharp point; anal crests well developed, forming a Y-shape on anal tergite and anal point; superior volsella elliptical, digitus present; gonostylus straight, somewhat club-shaped, with rounded apex.

Description

Adult male.

Coloration (in Canada balsam). Thorax brown, with a noticeably lighter brown latero-central area, including the anterior anepisternum II and part of the area dorsal of prescuto-scutal suture; the lighter area appears somewhat circular, except for the median anepisternum II. Head, legs, and abdomen light brown.

Head. Eyes hairy. Temporal setae 5, inner and outer verticals not separable. Antenna with 10 flagellomeres, fm 2 apparently composed of 2-3 fused flagellomeres; AR 1.05. Terminal flagellomere with subapical seta. Clypeus with 5 setae. Third palpomere longest, lengths pm 2-5: 46, 127, 97, 111.

Thorax. Antepronotal lobes short, scutum overreaching antepronotum; 7 uniserial dorsocentrals, 9 acrostichals, 1 prealar seta; 2 scutellars.

Wing. Length 1.23 mm. Venarum ratio 1.33. Vein M without setae, R_{4+5} and M_{1+2} bare for about basal ⅓ of their respective lengths. Brachiolum with 1 seta.

Legs. Spur of front tibia extremely short, hard to discern. Leg lengths and proportions:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV
P_1	513	389	432	275	173	124	86	1.11	2.02	2.09
P_2	529	437	232	140	113	86	70	0.53	2.92	4.16
P_3	632	540	319	205	167	108	81	0.59	2.66	3.67

Abdomen. Setation of tergites, excluding I and IX, with long setae in two transverse rows, one more or less uniserial anterior, and one median; 10 or less setae per row. Sternite I bare; S II with at least 3 long median setae; other sternites with long anterior and median setae as follows: S III 2-4; S IV-VI 4-4; S VII 7-6; S VIII 14, median only.

Hypopygium (Fig. 1). Anal tergal bands of T-type, median longitudinal band thin. Anal point wide basally and medially, distally constricted into a point. Anal crests forming Y-shape, extending posteriorly from anal tergite to constriction of anal point. Anal tergite with 4 setae on each side of longitudinal anal tergal band, anteriormost pair longest and slightly more robust; caudal margin of anal tergite in dorsal aspect with long setae on each side of anal point. Superior volsella elliptical, with 1 proximo-

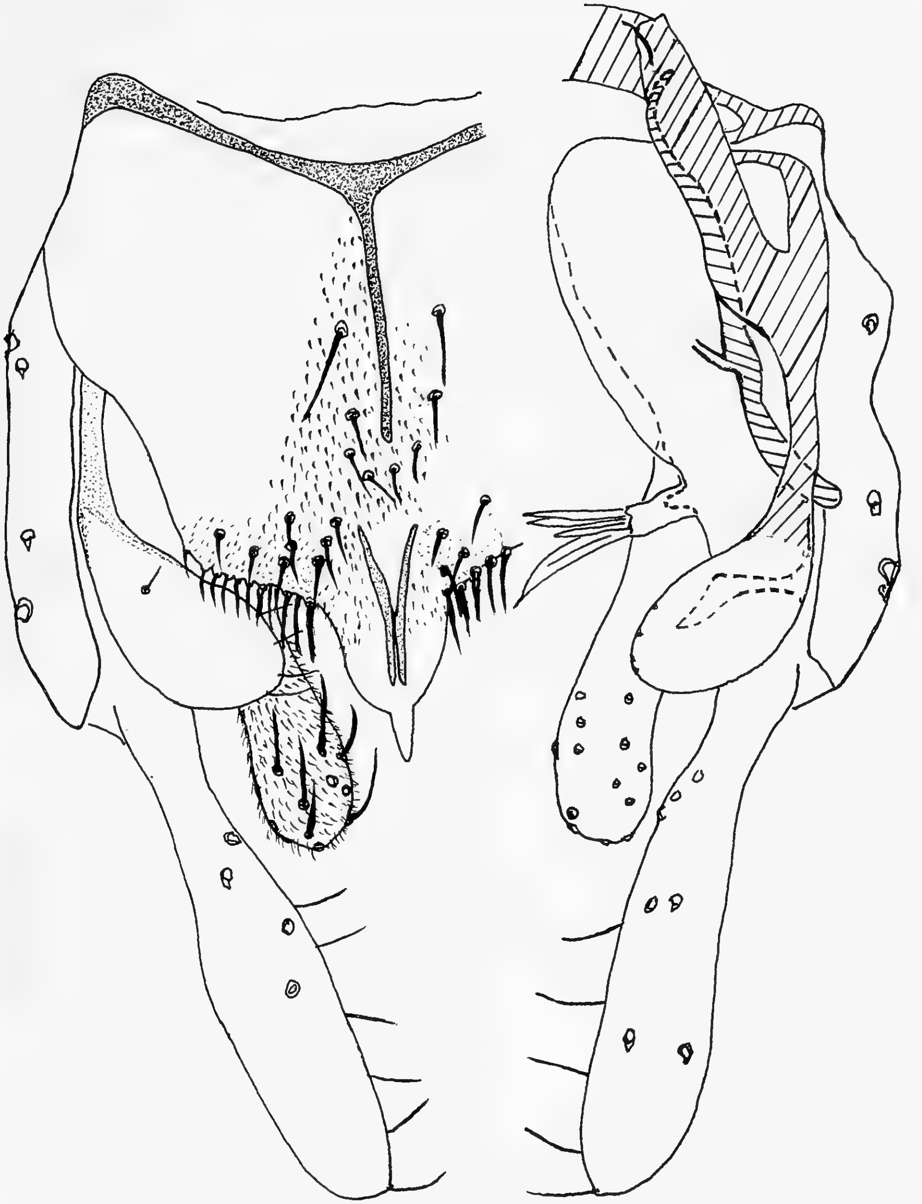

Fig. 1. *Neostempellina reissi*, spec. nov.; adult male genitalia, dorsal view.

dorsal and 4 distal-median setae; digitus present. Inferior volsella slightly expanded distally. Gonostylus straight, narrowed basally, somewhat club-shaped, with rounded apex.

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I am grateful to M. Spies, Munich (Germany), J. H. Epler, Crawfordville, Florida (USA), and T. Ekrem, Bergen (Norway) for information and/or comments on the manuscript. I also thank M. Spies for assistance in translation of some German language references.

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A new species of *Caladomyia* Säwedal, 1981, with description of the female and immature stages

(Insecta, Diptera, Chironomidae)

Susana Trivinho-Strixino & Giovanni Strixino

Trivinho-Strixino, S. & G. Strixino (2000): A new species of *Caladomyia* Säwedal, 1981, with description of the female and immature stages (Insecta, Diptera, Chironomidae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 167-173.

The immatures and adults of *Caladomyia friederi*, spec. nov. are described from the southeast of Brazil. Characterizations of the larva and adult female are the first for the genus. The larvae live on the aquatic macrophyte *Mayaca fluviatilis* Aublet. Phenology information about adults and larvae is presented.

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Introduction

The genus *Caladomyia* was erected by Säwedal (1981) from material collected by E. J. Fittkau and F. Reiss in the Amazon area. Säwedal proposed two species groups based on adult male morphology, but described 8 species from only the *spixi*-group. Sublette & Sasa (1994) added another species from Central America. Reiff (2000), in a review of the entire genus, is reevaluating Säwedal's *orellanai*-group. In the present paper a new species of the *spixi*-group is described, for the first time in *Caladomyia* including all life stages (larvae, pupae, male and female adults).

Methods

Larval and adult densities at the type locality were estimated from XII.1992 through XII.1993. Monthly, a pair of 150 ml samples of the aquatic macrophyte, *Mayaca fluviatilis* Aublet, 1775 were taken, chosen as similar in plant structure as possible. From the first sample of each pair, chironomid immatures were quantitatively removed under a stereoscope with transillumination. The second was maintained in a container with pond water and enclosed in nylon mesh; all emerged adults were collected daily for 30 days. Eventually, each macrophyte sample was dried for 24 hs at 60 °C, and weighed according to Cyr & Downing (1988). In parallel, to obtain immature/adult associations, some larvae were isolated in small vials covered with nylon screen.

All material described below has been mounted on slides. Measurements are given as means followed by ranges in parentheses. The morphological terminology follows Sæther (1980) and Säwedal (1981).

Caladomyia friederi, spec. nov.

Figs 1-16

Types. Holotype: ♂ (in Euparal), Brazil, São Paulo, São Carlos, Federal University of São Carlos (UFSCar) campus, Lagoa Mayaca, 21°59'S, 47°54'W, 20.X.1993, leg. S. Trivinho-Strixino. – Paratypes (mostly in Euparal, 2♀♀ and the pupa in Hoyer's): 4♂♂, 5♀♀, all fully emerged; 1 pupal exuviae + assoc. ♂ on same slide; 5 larvae; all as holotype. Holotype and most paratypes deposited in Laboratory of Aquatic Entomology collection at Federal University of São Carlos, São Paulo, Brazil; 1♂, 2♀♀, 1 larva in Zoologische Staatssammlung Munich, Germany.

Etymology. The species is named after Friedrich ('Frieder') Reiss for his contributions to the knowledge of Neotropical Tanytarsini.

Diagnosis. The male of *Caladomyia friederi*, spec. nov. resembles *C. mulleri* Säwedal, 1981, but differs by the coloration including distinctly darkened parts, by a lower AnPBR, a shorter ventromedian part of the anal point, and by the superior volsella lacking a pronounced distalmedian projection. The female keys to *Stempellinella* in Sæther (1977), from which it is most easily separated by the nearly straight GcaVIII and the v-shaped, not rounded posteromedian contour of SVIII. The pupa differs from the only other described species, *C. spixi* Säwedal, by the absence of spinule fields on the abdominal tergites. Instead, *C. friederi*, spec. nov. presents widespread shagreenation on T II-VI and VIII-IX. Another difference is in the number of anal comb teeth. The larval characteristics approach *Cladotanytarsus*, mainly in antenna design and the presence of serrate claws on the posterior parapods. In our genus guide to Chironomidae larvae of São Paulo state (Trivinho-Strixino & Strixino 1995), the larva described above was named "*Cladotanytarsus* (?)". However, *C. friederi*, spec. nov. differs from *Cladotanytarsus* larvae by the presence of a distinct apical tooth on the antennal pedestal, and by the lower numbers of teeth on the mandible and premandible.

Description

Adult male (n=5)

Size small, length about 2 mm.

Head. Pale yellowish green. 5-7 uniserial temporal setae. Frontal tubercle length 8, basal width 4 µm. Antennal flagellum yellowish, length 700 µm (692-712); AR=0.78 (0.73-0.82). Eye bare, without dorsomedian extension. About 10 clypeal setae. Palp yellowish, lengths Pm 2-5: 30 (28-32), 55 (52-64), 77 (68-84), 129 (116-136) µm.

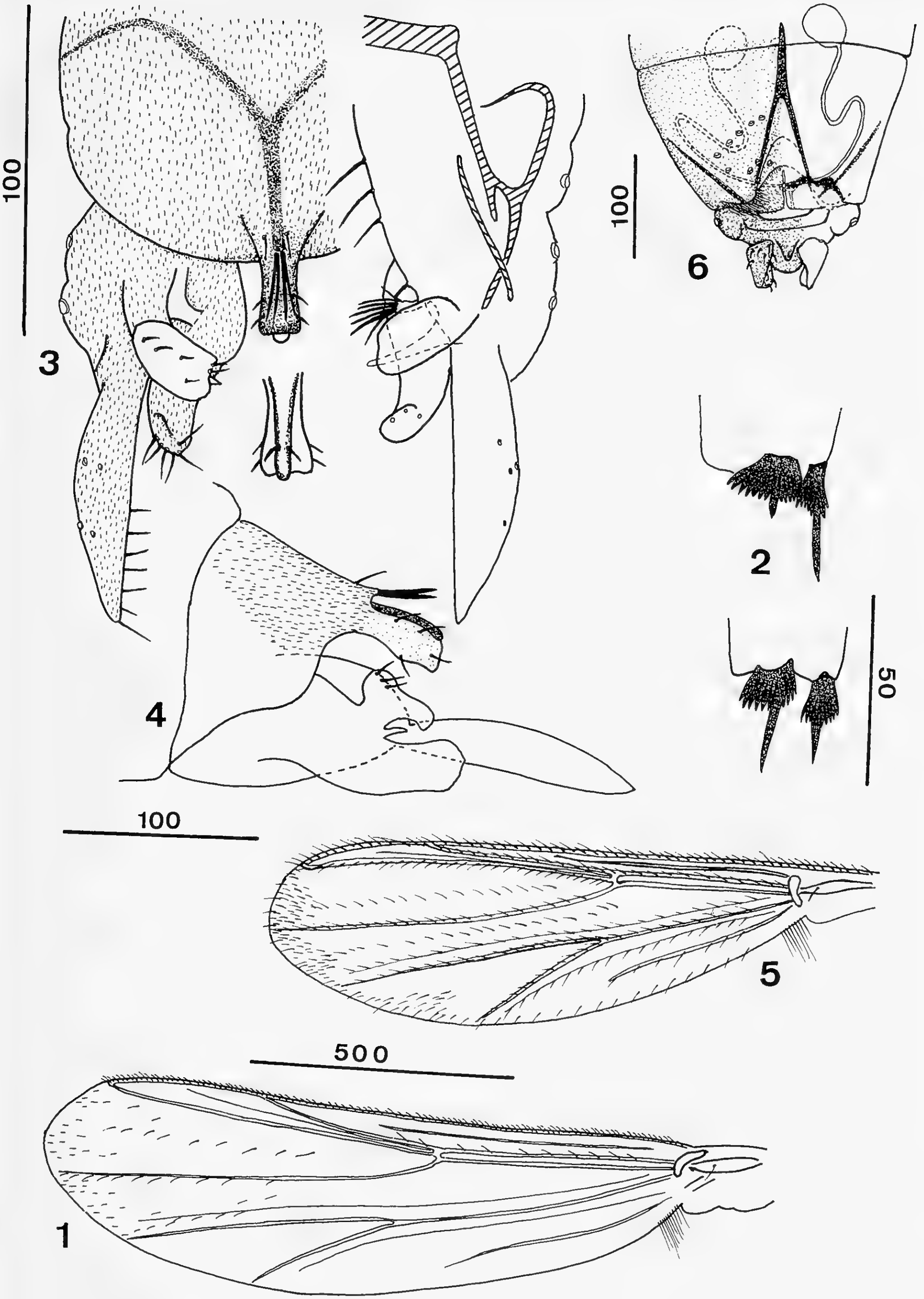
Thorax. Greenish with dark brown mesonotal stripes and postnotum, preepisternum brown. 0 acrostichal setae, 5-6 dorsocentrals, 1 prealar, 1-2 scutellars in central positions. Scutal tubercle absent.

Wing (Fig. 1). Length 1203 µm (1184-1216), width 339 µm (320-368); membrane transparent, veins yellowish; C ending close to R_{4+5}, before wing apex; R_{2+3} ends halfway between R_1 and R_{4+5}. VR=1.20 (1.17-1.25). Membrane macrotrichia restricted to cells r_{4+5} and distal m_{1+2}. Vein macrotrichia on R and M_{1+2}.

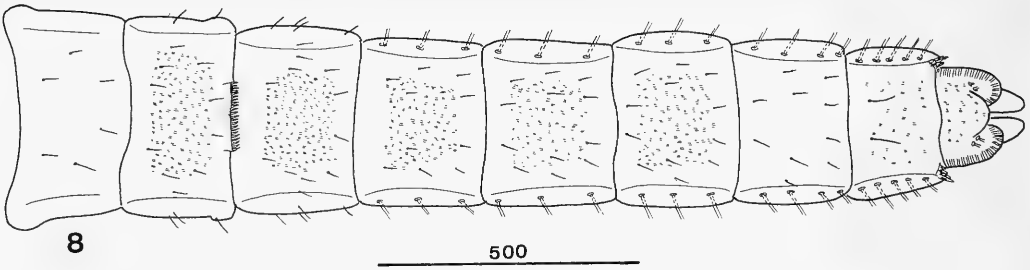
Legs. Yellowish brown, without transverse bands. Fore tibia with short, light-colored spur. Mid and hind tibiae each with two separate, dark combs; mid tibial spurs slightly, hind spurs strongly unequal in length (Fig. 2). Mid tarsus 1 with 2 sensilla chaetica. Segment lengths (in µm) and proportions:

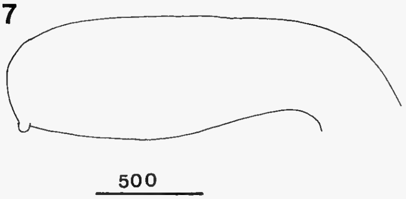
	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR
PI	518	237	637	318	269	191	95	2.69
	(512-532)	(228-244)	(628-640)	(304-328)	(260-280)	(184-196)	(88-100)	(2.62-2.75)
PII	521	399	231	113	86	59	48	0.58
	(500-540)	(396-400)	(220-240)	(104-124)	(84-88)	(56-60)	44-52	(0.56-0.60)
PIII	573	511	354	213	197	121	80	0.69
	(560-600)	(480-524)	(344-360)	(208-216)	(184-204)	(116-124)		(0.69-0.72)

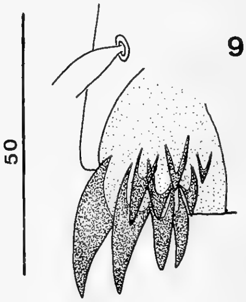
Abdomen yellowish green. Hypopygium (Figs 3, 4): Anal tergite with 2 far distal setae. Anal tergal bands Y-shaped, fused part about 40 µm long. Anal point brown with slightly concave margins; dorsolateral margin bearing 2 setae, vertical ventromedian part with 1 distal and 1 more proximal pair of setae. Anal point bars short, originating on anal point and not reaching beyond it (Figs 3, 4);



Figs 1-6. *Caladomyia friederi,* spec. nov. Adults. **1.** Wing of male. **2.** Hind (top) and mid tibial combs and spurs. **3.** Hypopygium, dorsal; detail: tip of anal point, ventral. **4.** Hypopygium, lateral. **5.** Wing of female. **6.** Female genitalia, ventral. Scales in μm.







Figs 7-9. *Caladomyia friederi*, spec. nov. Pupa. **7.** Wing sheath. **8.** Abdomen, dorsal. **9.** Anal comb. Scales in μm.

AnPBR=1.8. Superior volsella with 4 dorsal setae and 2 on anterior part of median margin. Digitus long, reaching beyond posteromedian corner of superior volsella. Inferior volsella bent in an S-shape, tip slightly folded to dorsal, with 6 long and 3 shorter setae. Median volsella short, with 2 lamelliform and 4 simple setae.

Adult female (n=3)

Total length about 1.5 mm. Coloration as male.

Head. 5-7 uniserial temporals. Frontal tubercles absent. Antennal flagellum about as long as palp, Fm lengths 1-4: 70-72, 40-43, 50-60, 97-105 μm; AR=0.57-0.66. Eye bare, without dorsomedian extension. 11-12 clypeals. Palpomere lengths 2-5=22-25, 42-68, 58-80, 104-130 μm.

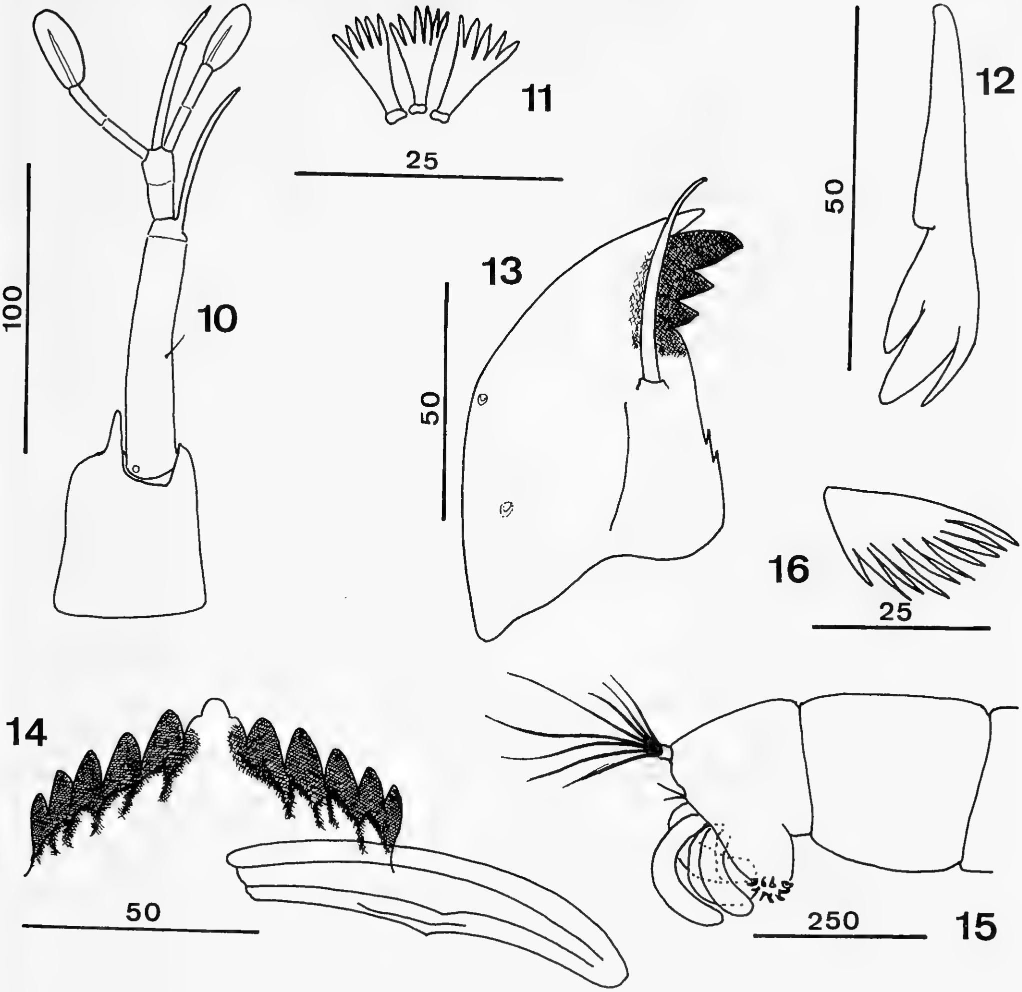
Thorax. 6-8 acrostichals, 4-6 dorsocentrals, 1 prealar, 4 scutellars (2 central, 2 lateral). Scutal tubercle absent.

Wing (Fig. 5). Length 1208 μm (1200-1216), width 412 μm (384-432); VR=1.27 (1.17-1.35). Macrotrichia on all veins except M, on posterior false veins, and in all cells posterior to R_{4+5} and M except cu, macrotrichia in cells more numerous toward wing tip.

Legs. Mid and hind tibiae each with two strongly unequal spurs. Mid tarsus 1 with 5-7 sensilla chaetica. Segment lengths (in μm) and proportions:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR
PI	512	240	640	320	256	192	96	2.67
	(508-524)	(228-244)	(628-640)	(312-328)	(248-260)	(184-196)	(88-100)	(2.62-2.75)
PII	560	432	240	112	80	48	48	0.55
	(524-572)	(416-440)	(220-244)	(104-120)	(84-88)	(44-52)	(44-52)	(0.53-0.55)
PIII	560	512	352	208	176	128	64	0.69
	(540-600)	(480-524)	(344-360)	(200-216)	(168-184)	(120-132)		(0.69-0.72)

Genitalia (Fig. 6). Sternite VIII bearing 12-15 setae in an irregular transverse row or band, and 2-5 slightly smaller setae at each side of posteromedian sternite emargination; floor under vagina large, posteromedian contour of SVIII more or less V-shaped, forming an angle medially. GpVIII simple, rounded, with long, lightly curved caudolateral microtrichia. Notum slightly longer than free rami, about 1.5 times as long as seminal capsule. 2 seminal capsules present, ovoid, length 35-45 μm, with narrow neck (10-15 μm); spermathecal duct with long loop. GcaVIII conspicuous, nearly straight, running diagonally to posteromedian corner of SVIII. GcIX with 1 seta. TIX with about 10 strong setae;



Figs 10-16. *Caladomyia friederi,* spec. nov. Larva. **10.** Antenna. **11.** Pecten epipharyngis. **12.** Premandible. **13.** Mandible. **14.** Mentum and ventromental plate. **15.** Posterior abdominal segments. **16.** Posterior parapod claw. Scales in μm.

near transition TIX to GcIX a projection often present appearing similar to lateral teeth known from many male Tanytarsini TIX. Postgenital plate triangular. Cercus about as large as seminal capsule.

Pupa (n = 1)

Cephalothorax. Frontal setae elongate; cephalic tubercles absent. Thoracic horn not discernible in slide mount. Weak granulation close to median suture; scutal tubercle absent. Wing sheath with prominent nose (Fig. 7), pearl row absent. 3 lateral antepronotals, LAps$_1$ situated in front of and at same level as precorneals, LAps$_{2-3}$ close together and more ventral; 3 precorneals, situated in front and ventral of thoracic horn basal ring; 4 dorsocentrals in two widely separated pairs.

Abdomen (Fig. 8). Length about 2.5 mm. Tergite I without shagreen; T II-IV with central field of fine shagreen; VII without shagreen; VIII and IX with central fields of shagreen. Hook row continuous, occupying ⅓ width of segment II. Pedes spurii B present on II. Segment VIII with posterolateral combs consisting of 4-5 marginal and 5-6 overlapping ventral teeth (Fig. 9).

Abdominal setation. Segments II and III with 3 L setae; IV-VI with 3 LS setae; VII with 4, VIII with 5 LS setae. Anal lobe with 14-16 fringe setae and 2 dorsal setae, all lamelliform.

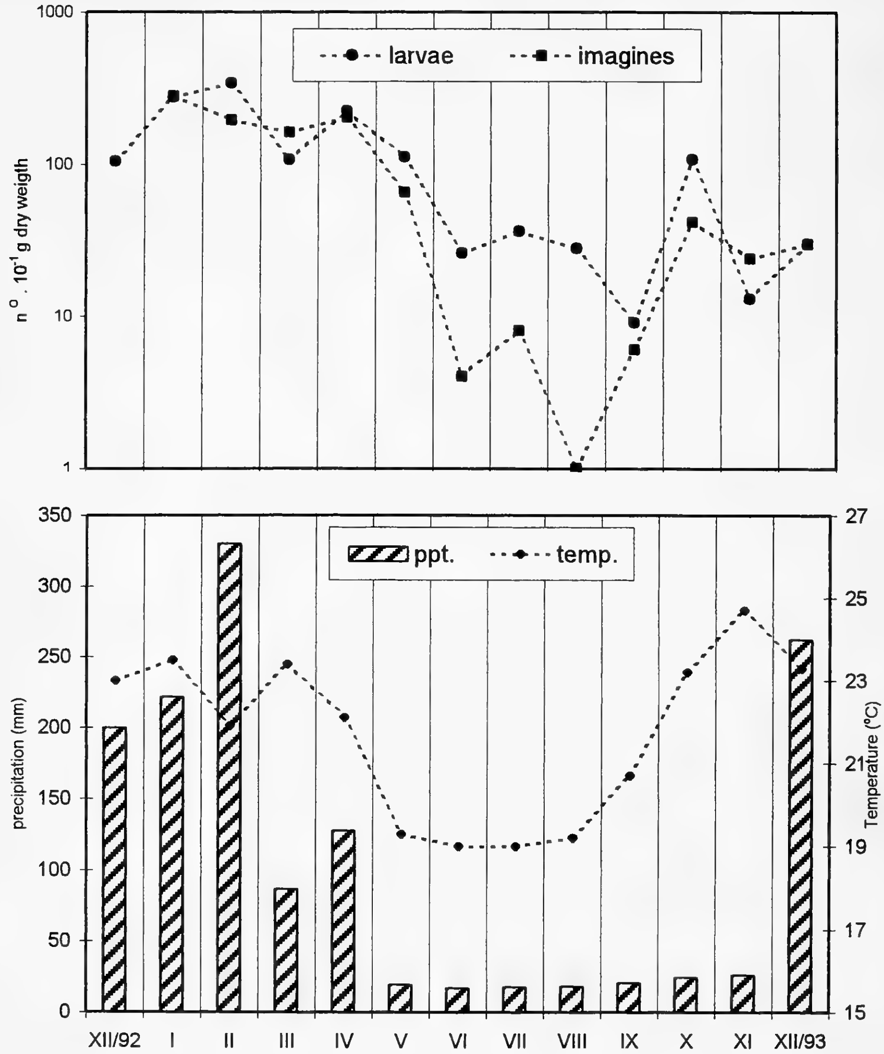


Fig. 17. Densities of *Caladomyia friederi*, spec. nov. on *Mayaca fluviatilis* from XII.1992 through XII.1993.

Fourth instar larva (n =5)

Size small, total length 3.74 mm (3.20-4.08).

Head. Width 197 μm (192-200), length 240 μm (232-248); IC=0.82. Antenna 5-segmented (Fig. 10), placed on pedestal bearing a distinct apical tooth; basal segment longer than flagellum, with basal ring organ and small seta in proximal ½; segment 2 unsclerotized distally, shorter than segment 3; Lauterborn organs large, pedicels 44 μm long, shorter than segment 3, their proximal half sclerotized. Pecten epipharyngis of 3 distally serrated scales (Fig. 11). Premandible with 3 teeth (Fig. 12). Mandible (Fig 13) with pale dorsal tooth; apical and two inner teeth brown. Mentum (Fig. 14) with pale median tooth slightly notched laterally, 5 pairs of lateral teeth brown, decreasing in size laterally. Ventromental plates close together medially.

Abdomen (Fig. 15) with anal tubules curved down. Posterior parapods, in addition to simple hooks, with some serrate claws (Fig. 16).

Ecology

The larvae of *Caladomyia friederi*, spec. nov. were found on submerged aquatic macrophytes, *Mayaca fluviatilis*, proliferating in a small lagoon (0.6 m mean depth, 0.17 ha surface area) with sandy bottom, situated in cerrado vegetation on the UFSCar campus. Population density showed the expected seasonal pattern following the region's climatic conditions (Fig. 17), with higher densities of both larvae and adults in the wet and warmest months of the year (max. 340 larvae per 10 g dry weight of the macrophyte in February 1992, and 280 adults per 10 g *Mayaca* dry weight in January 1992). During the cooler dry season (June-September), densities of larvae and adults decreased significantly.

Acknowledgments

We thank M. Spies, Munich, for a judicious review of the manuscript and for important suggestions.

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Frieder Reiss in the ZSM collection, 1992.

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Review of the mainly Neotropical genus *Caladomyia* Säwedal, 1981, with descriptions of seven new species

(Insecta, Diptera, Chironomidae, Tanytarsini)

Nicola Reiff

Reiff, N. (2000): Review of the mainly Neotropical genus *Caladomyia* Säwedal, 1981, with descriptions of seven new species (Insecta, Diptera, Chironomidae, Tanytarsini). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 175-198.

Neotropical *Caladomyia* Säwedal, 1981 are reviewed in the adult male stage, and the genus diagnosis is redefined. The distinction of two species groups (Säwedal 1981) is considered unwarranted. Seven new species are described: *Caladomyia erikae, fittkaui, hero, hoefleri, orellanai, reissi,* and *riotarumensis.* A key to all 18 known species is given, including one species being described elsewhere. New morphological characters and interpretations are discussed, based on SEM examinations.

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Introduction

In 1981, Säwedal erected the Tanytarsini genus *Caladomyia* and described eight species in one of two proposed species groups. Although its members are apparently quite common in the South American chironomid fauna, only two more *Caladomyia* species have since been described: *C. pistra* Sublette & Sasa, 1994, and *C. friederi* Trivinho-Strixino & Strixino, 2000 (this volume).

In the present paper the genus is reviewed in the light of new insight gained from SEM imaging and studies of Säwedal's material and additional specimens. This publication continues the investigations of Amazonian Tanytarsini collected by E. J. Fittkau in 1960-63, and by F. Reiss in 1969 and 1971-72.

Most of the species newly described here are named in honour of persons who have enabled me to complete this work.

Material, methods and terminology

Apart from the voluminous *Caladomyia* holdings at Zoologische Staatssammlung Munich (ZSM), the holotypes of all previously established species were examined, except for *C. friederi* of which only 2 males have been studied, one of them a paratype. The holotypes of Säwedal's (1981) species are deposited at the Instituto Nacional de Pesquisas da Amazônia (INPA) in Manaus, Brazil, that of *C. pistra* Sublette & Sasa is presently in the private collection of Prof. J. E. Sublette in Tucson, Arizona, USA.

About 80 % of the *Caladomyia* adults examined were infested with nematode parasites. It is a well-known fact that internal damage from such infestations can have effects on external morphology, e.g. on the male AR. The latter is sometimes difficult to measure in this genus, because boundaries between flagellomeres tend to become indistinct and even undetectable.

The terminology, where applicable, follows Sæther (1980) and the additions of Säwedal (1981). However, the "anal point bar ratio" (AnPBR) has to be computed in a way different from Säwedal's explanation (1981: 124) which was distorted by a typographic error. The AnPBR is the length ratio of the longitudinal anal tergal band (length "Y" in Säwedal 1981: fig. 4) to the anal point bars (length "A"). For this, length Y is measured as the distance from the junction of the three anal tergal bands to the beginning of the anal point bars, even though the longitudinal anal tergal band does not always extend that far posterior. In most species, the origin of the anal point bars is covered by a roof-like structure, best seen by SEM-imaging (e.g. Säwedal, 1981: fig. 3). As this structure is often barely recognizeable in slide-mounted specimens, the measurement of length A begins at the obvious origin of the anal point

Tab. 1. Character data for four new *Caladomyia* species. M = median; n = number of measurements.

character (adult male)	*orellanai*, spec. nov.	*reissi*, spec. nov.	*erikae*, spec. nov.	*hoefleri*, spec. nov.
wing length [mm]	0.92-0.96 (M=0.93; n=6)	0.88	0.74-0.78 (M=0.78; n=3)	0.92
temporal setae	4-6 in 1 row	6(?) in 1 row	4-5(?) in 1 row	6 in 1 row
frontal tubercle length [μm]	8	?	5-10	not available
AR	0.52-0.62 (n=6)	0.54/0.57	0.40-0.43 (n=2)	0.82
clypeus setae	8-13	10	9	10
palpomere lengths 2-5 [μm]	28,67,71,124	28,68,81,122	23,56,64,106	26,67,74,134
acrostichal setae	6(?) in 2 rows	?	3(?)-6(?) in 2 rows	10(?) in 2 rows
dorsocentral setae	4 in 1 row	3(?) in 1 row	3-4 in 1 row	3 in 1 row
prealar setae	1	1	1	1
scutellar setae	3-4 in a V-shaped row	2 apical (?)	2 apical	4 in a V-shaped row
wing macrotrichia	on all veins except Sc, R_{2+3}, RM	only on distal ½ of M_{1+2}	on all veins except Sc, R_{2+3}, RM, M, Cu	on all veins except $Sc, R_{2+3}, RM, M, Cu, An$
VR	1.20-1.31 (n=5)	1.38 / 1.44	1.39-1.45 (n=3)	1.24
brachiolum setae	1	1(?)	1	1
LR_1	3.23-3.49 (M=3.40; n=6)	3.38 (n=1)	2.78-3.00 (n=2)	–
LR_2	0.55-0.61 (M=0.59; n=6)	0.67 (n=1)	0.60-0.61 (M=0.60; n=3)	0.61
LR_3	0.66-0.72 (M=0.71; n=6)	–	0.66-0.68 (n=2)	0.66
mid ta_1 sensilla chaetica	0-1 in pos. 5	2 in pos. 5	2 in pos. 5	2 in pos. 5
pulvilli	absent (?)	present	absent	absent
tibial spurs	normal	normal	normal	normal
AnPR	2.9	4.9	2.5-3.8	4.6
Y [μm]	15-21 (M=17; n=7)	35	32-34 (n=2)	41
A [μm]	26-31 (M=29; n=7)	11	9-10 (M=10; n=3)	13
ALR	46.4-51.7 (M=48.7; n=6)	15.9	14.8-18.5 (M=16.7; n=3)	20.3
AnPBR	0.5-0.8 (M=0.6; n=7)	3.2	3.2-3.8 (n=2)	3.4
digitus length [μm]	30-31 (n=6)	4	?	27
median volsella length [μm]	25-27 (n=6)	18	20 (n=3)	27
Gc/Gs length ratio	1.20 (n=6)	0.96	0.91-1.20 (n=2)	1.03

bars. Where the distal bar ends are bent outwards, A is measured only to the bend.

A new term is here introduced: Anal point ratio (AnPR) means the ratio of anal point length (measured from its readily recognizeable beginning on the anal tergite to the distal end of its dorsal part) to anal point width (measured at its narrowest).

In the species descriptions, characters not specifically mentioned are as given for the genus (Säwedal 1981: 125, and emendation below). To facilitate direct species comparisons, the information on many characters is presented in Tables 1 and 2; data contained there are repeated in the individual descriptions only in special cases.

Tab. 2. Character data for three new *Caladomyia* species. M = median; n = number of measurements.

character (adult male)	*riotarumensis*, spec. nov.	*fittkaui*, spec. nov.	*hero*, spec. nov.
wing length [mm]	1.41-1.50 (n=2)	0.86-1.05 (M=1.01; n=4)	0.86-0.95 (M=0.9; n=5)
temporal setae	9 in 1 row	5-7 in 1 row	5-6(?) in 1 row
frontal tubercle length [μm]	7	6-9	4-5
AR	1.15-1.28 (n=2)	0.58-0.70 (n=3)	0.56-0.60 (n=5)
clypeus setae	11	12	10(?)-12
palpomere lengths 2-5 [μm]	40,104,101,198	27,82,83,145	23,64,78,119
acrostichal setae	?	7(?) in 2 rows	6(?) in 2 rows
dorsocentral setae	3-5 in 1 row (n=2)	3-4 in 1 row	3(?)-4 in 1 row
prealar setae	1	1	1
scutellar setae	4 in a V-shaped row	2 apical	2 apical (?) to 4 in a V-shaped row
wing macrotrichia	many, on all veins <u>except</u> Sc,R$_{2+3}$,RM,M,Cu	on all veins <u>except</u> Sc,R$_{2+3}$,RM,M,Cu	on all veins <u>except</u> Sc,R$_{2+3}$,RM
VR	1.18-1.25 (n=2)	1.28-1.30 (n=4)	1.29-1.34 (n=3)
brachiolum setae	1	1	1
LR$_1$	3.47 (n=1)	3.50-3.69 (n=3)	3.44-3.68 (n=3)
LR$_2$	0.70-0.73 (n=2)	0.49-0.61 (M=0.55; n=5)	0.57 (n=2)
LR$_3$	0.79-0.80 (n=2)	0.59-0.76 (M=0.67; n=5)	0.67-0.72 (n=3)
mid ta$_1$ sensilla chaetica	6-8 in pos. 5	2 in pos. 5	1-2 in pos. 5
pulvilli	present (minute)	present (?) (minute)	present (minute)
tibial spurs	on PII only slightly differing	normal	normal
AnPR	2.0-2.8 (n=5)	3.2-3.4 (n=2)	3.0-3.5 (n=2)
Y [μm]	37-45 (M=41; n=6)	23-38 (M=33; n=5)	24-29 (n=3)
A [μm]	31-39 (M=37; n=6)	36-46 (M=42; n=5)	19-21 (n=3)
ALR	50.7-55.7 (n=2)	59.0-84.0 (M=80.7; n=5)	33.3 (n=1)
AnPBR	1.1-1.5 (M=1.2; n=6)	0.6-1.0 (M=0.8; n=5)	1.1-1.4 (n=3)
digitus length [μm]	31-35 (n=6)	27-29 (n=2)	25-27 (n=2)
median volsella length [μm]	36-41 (n=6)	24-27 (n=2)	23-24 (n=2)
Gc/Gs length ratio	0.94-1.08 (n=6)	0.94-1.10 (n=4)	0.90-0.97 (n=3)

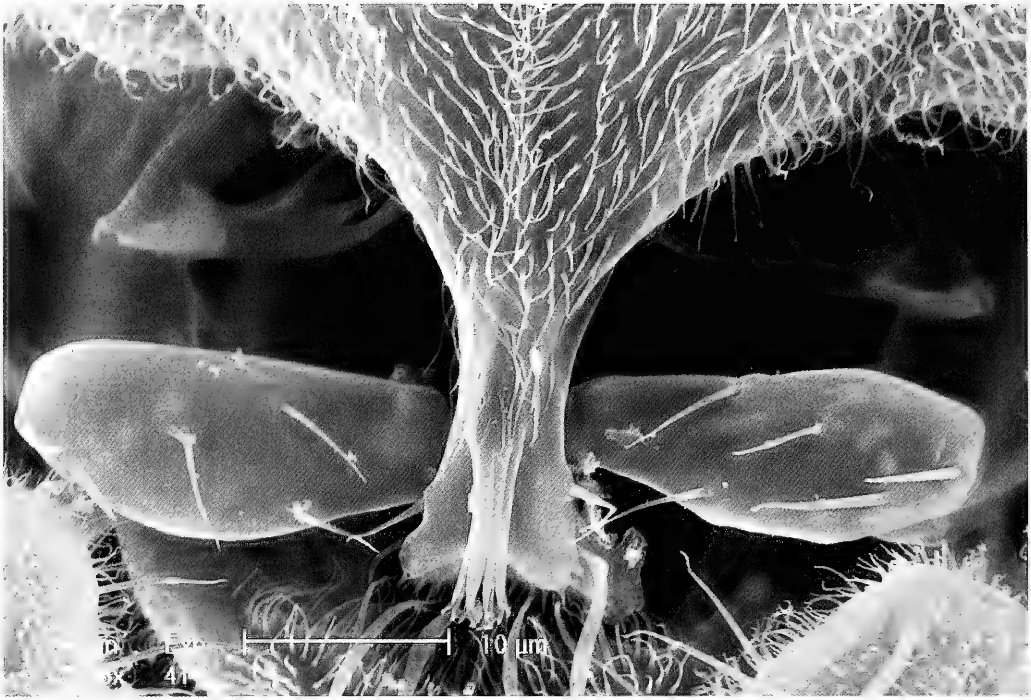

Fig. 1. *Caladomyia erikae,* spec. nov.; adult male anal point, etc., from anterodorsal angle. SEM.

Genus *Caladomyia* Säwedal, 1981: 124

Type species. *C. spixi* Säwedal, 1981: 127, by original designation.

The material collected by E. J. Fittkau also contains adult males of several species which possess very long projections of the anal tergite arranged similarly as in *Caladomyia*, but which lack an obvious anal point. These projections are very long and, contrary to the anal point bars of *Caladomyia*, rather broad and flattened. The superior volsellae also being of very different shape, these specimens are here considered to require a new genus.

Material collected in Brazil by S. Wiedenbrug contains males which closely resemble *Caladomyia* (esp. *C. reissi,* spec. nov.), but lack anal point bars. Instead, anal point crests are present. Säwedal states in his generic description (op. cit.: 125) that anal crests are always absent in *Caladomyia*.

Yet another specimen seen possesses an anal-point-bar-like projection resembling a stout seta, but also a superior volsella rather different from known *Caladomyia* species, and gonostyli with double ends.

None of the above forms are here included in the genus as emended below.

The material at ZSM contains several *Caladomyia* pharate male specimens inside their pupal exuviae. Unfortunately, nearly all are in too poor preservation condition to allow positive identification of the species and/or detailed description of the pupa. However, it has become evident that pupae in *Caladomyia* show wide variations in armament of abdominal terga and the anal comb, similar to those known from the genus *Tanytarsus* van der Wulp. Furthermore, two special characters described from the tentatively associated pupa of *C. spixi* Säwedal can not be confirmed as diagnostic for the genus: multiple spinules in the abdominal armament (Säwedal 1981: fig. 9) are not present on all *Caladomyia* pupae, and have been found outside of this genus as well (S. Wiedenbrug, pers. comm.); and the long, tubular projection reportedly arising anterior to the wing sheath of *C. spixi* (op. cit.: fig. 8) could not even be observed on all specimens of that species. No character can be given at this time to separate *Caladomyia* pupae from all similar Tanytarsini.

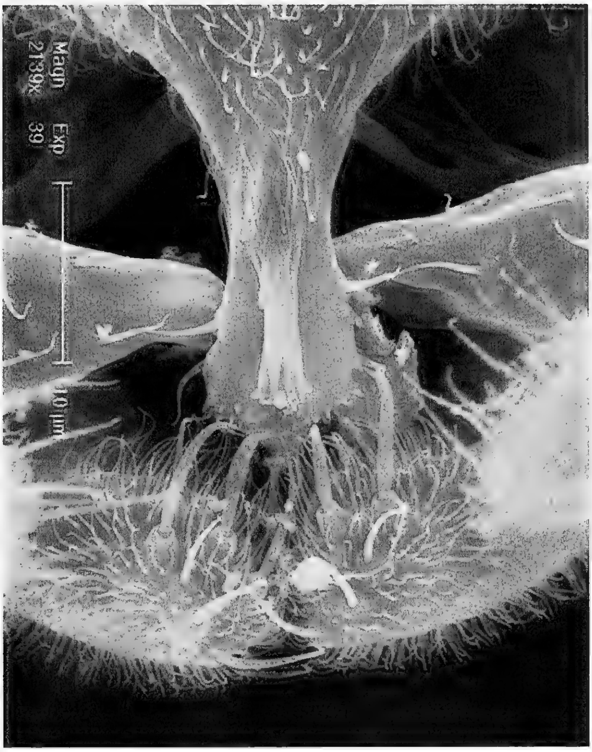

Fig. 2. *Caladomyia erikae,* spec. nov.; adult male anal point, etc., from posterodorsal angle (same specimen as in Fig. 1). SEM.

Emendation of diagnosis: Adult males in the genus *Caladomyia* differ from those of all other chironomid genera in having two pairs of posteriorly directed anal point bars (one pair on top of the other, the lower pair sometimes being hard to detect, e.g. Säwedal 1981: fig. 6), and an anal point characteristically combining two elements: a horizontally expanded dorsal part (in dorsal view a proximal, wide section) and a vertically expanded ventromedian part (in dorsal view a distal, narrow section).

Species groups: Säwedal (1981) divided the genus into the "*spixi*-" and the "*orellanai*-group", but in each already indicated one exceptional species respectively showing one of the two group-separating characters in the 'wrong' configuration for its group (op. cit.: key couplet 1.).

The main criterion was the length of the ventromedian part of the anal point relative to the tip(s) of the dorsal part, leading to the anal point in dorsal aspect showing either "one tip" (*spixi* group) or "three tips of nearly equal length" (*orellanai* group). The ventromedian part of the anal point is bent and directed downward (e.g. Säwedal 1981: fig. 7). Thus, its visible length is very much dependent on the overall slope and orientation of the hypopygium in the slide mount (op. cit.: figs 11 and 13), and on the pressure exerted on the coverslip during preparation. The same restriction applies to the dorsal parts of the anal point. Figs 1 and 2, made from the same specimen, show that depending on hypopygium slope the distal margin of the anal point may appear either as two tips beside a deep median emargination in the dorsal part, with the ventromedian part not visible (Fig. 1), or as a rounded contour with little emargination but a distinct ventromedian part underneath (Fig. 2).

Säwedal's second group-dividing character, the curvature in dorsal aspect of the anal point outer margins (convex, straight, or concave), obviously also varies with the treatment (maceration, compression) the specimen is subjected to.

Upon examination of specimens identified to either group by Säwedal, neither above criterion has proven to yield consistent, taxonomically meaningful separations. Therefore, the two species groups are here no longer employed.

Emended description of adult male

Characters likely correlated with body size: wing length range extended up to 2.13 mm, frontal tubercle length up to 18 μm, brachiolum setae up to 2 in number, prealars up to 3 (all observed in *C.* sp. Eisenbeis); mid tarsus 1 sensilla chaetica up to 8 (*C. riotarumensis,* spec. nov.).

Wing. macrotrichia may occur over more or less whole surface, increasing in numbers towards wing tip (*C. pistra* Sublette & Sasa, *riotarumensis,* spec. nov., sp. Eisenbeis); strong false veins present along M_{3+4}, Cu and Cu_1 (all species); anal lobe obsolete (all species); squama bare (all specimens with intact squamae).

Legs. pulvilli may be present (*C. reissi, riotarumensis, hero,* and possibly *fittkaui,* species novae).

Hypopygium. tergite IX lateral teeth, although often not visible in cleared slide mounts, appeared present on all specimens studied with SEM; the superior volsella may have microtrichia on its lateral margin (Fig. 10), its anteromedian corner up to 3 setae (*C. reissi,* spec. nov., *riotarumensis,* spec. nov.); median volsella length extended up to 41 μm (*C. riotarumensis,* spec. nov.).

Further taxonomic remarks. Säwedal (1981: 127), in the key couplet defining his "*orellanai*-group", gives a character as unique to only one species which is identified with an apparent scientific binomen. Although the publication contains no further information on this taxon, all criteria for the establishment of a valid species name by the standards of the International Code for Zoological Nomenclature (ICZN 1999) have been met. However, no specimen or notes under this name could be found among the voluminous material left by Säwedal at ZSM. Moreover, the supposedly identifying character in the present author's opinion does not define any single recognizable species.

Säwedal (1981) did not affix an expression such as "n. sp." to the name in question, did not list the latter in his abstract along with those of his newly described species, and repeatedly stated that the "*orellanai*-group" species "will be treated in a separate paper" (op. cit.: 123, 126). The nomenclatorial solution that is both formally correct and taxonomically meaningful thus is to consider the problematic name not "used as valid" (ICZN Article 11.5.) by Säwedal, and hence not available.

Distribution. The genus *Caladomyia* is distributed mainly in the Neotropical region, but also has members in the southern part of the Nearctic. According to J. E. Sublette (pers. comm.), the record of *C. pistra* from California (Lothrop & Mulla 1995, Spies & Reiss 1996) was a misidentification, but three undescribed species morphologically similar to *C. pistra* have been taken in several states of the southwestern and southern USA.

The material at ZSM contains many more *Caladomyia* specimens than are treated here, including some which probably represent still undescribed species. However, their poor state of preservation has precluded treatment in the present paper. Material collected by several colleagues (pers. comms. from A. Eisenbeis, H. W. Riss, S. Trivinho-Strixino) suggests the existence of further new species. It is thus assumed that at least 25 species of *Caladomyia* occur in the Neotropic and Nearctic regions.

Key to adult males of *Caladomyia* Säwedal, 1981

Note. *C.* sp. Eisenbeis from the Colombian Andes is being described by its collector in a separate paper.

1. Anal tergal setae flattened, with ridges, somewhat hyaline. Anal tergite with posterolateral corners roundly protruding to caudal. Anal point broad in basal ⅔. AnPBR about 0.7 .... *C. poppigi* Säwedal
– Not with above combination. Anal tergal setae stout and seta-like, not flattened .... 2.

2. Digitus reaching well beyond median margin of superior volsella .... 3.
– Digitus at most barely reaching beyond volsella .... 7.

3. Anteromedian corner of superior volsella drawn out into a marked point. Digitus very long and strong, tip broadly rounded. AR about 0.4 .... *C. adalberti* Säwedal
– Anteromedian corner of superior volsella not drawn out into a marked point, posteromedian corner either drawn out into a short tip or into a pronounced lobe .... 4.

4\. Superior volsella with posteromedian corner not projecting. Inferior volsella with tip slightly folded to dorsal. Hind tibial spurs strongly uneven in length. Wing macrotrichia restricted to veins R and M_{1+2}, cells r_{4+5} and distal m_{1+2}. Wing length about 1.2 mm. AR about 0.8. LR_1 about 2.7 .... *C. friederi* Trivinho-Strixino & Strixino

– Not with above combination (Posteromedian projection of superior volsella indistinct only in some *C. ortoni* Säwedal) .... 5.

5\. Tip of digitus very pointed. Wing length 1.31-1.49 mm. AR 1.03-1.29. AnPBR 1.4-2.3 .... *C. ortoni* Säwedal

– Tip of digitus bluntly rounded .... 6.

6\. Posteromedian corner of superior volsella drawn out into a distinct, more or less bluntly rounded lobe. Digitus with about ¼ of its length reaching beyond superior volsella. Anal point short. AnPBR 3.8-5.3. Large species: wing length 1.78-2.13 mm. AR 0.60-0.65 .... *C.* sp. Eisenbeis

– Posteromedian corner of superior volsella drawn out into a short pointed tip. Digitus with about ⅕ of its length reaching beyond volsella. Anal point long and slender, AnPR 2.88. AnPBR 0.5-0.8. Wing length 0.92-0.96 mm. AR 0.52-0.62 .... *C. orellanai,* spec. nov.

7\. Anal point bars very short (8 μm), not reaching middle of anal point. Junction of anal tergal bands on mid tergite. Anal tergal setae absent .... *C. kraussi* Säwedal

– Anal point bars short or long, but always reaching beyond middle of anal point. Anal tergal setae present or absent .... 8.

8\. AnPBR 1.5-2.0 **and** anal point bars rather short (< 20 μm). Digitus short, not reaching median margin of superior volsella, barely surpassing ⅔ of volsella length. Anal point bars in dorsal view curved like a pair of brackets .... *C. spixi* Säwedal

– AnPBR normally < or > 1.5-2.0. **If** AnPBR within range 1.5-2.0, then anal point bars longer than 20 μm **and/or**digitus almost reaching median margin of superior volsella .... 9.

9\. Anal point bars very short (< 15 μm) .... 10.

– Anal point bars relatively long (≥ 15 μm) .... 14.

10\. Digitus short, not reaching median margin of superior volsella, barely surpassing ⅔ of volsella length, or barely recognizeable .... 11.

– Digitus long, at least almost reaching median margin of superior volsella, longer than ⅔ volsella length .... 12.

11\. Anal point very long and slender, with parallel margins; AnPR 4.9. Anal tergal setae present, in asymmetrical lateral positions on anal point base. Anal point bars seta-like, extending over approximately middle ⅓ of anal point. Superior volsella almost rectangular, posterior and median margins nearly straight. Digitus clearly recognizeable .... *C. reissi,* spec. nov.

– Anal point more compact (AnPR < 4), with slightly concave margins. Anal tergal setae absent. Anal point bars stronger, extending from middle of anal point dorsal part to distal margin. Superior volsella elongate ovoid, posterior margin convex, median margin concave. Digitus not clearly recognizeable .... *C. erikae,* spec. nov.

12\. Superior volsella with angularly projecting posteromedian corner (Säwedal 1981: fig. 17), often resulting in indented posterior margin. Contrary to Säwedal's figure anal point dorsal part almost square (AnPR around 1.2) and anal point bar origins covered by a pointed, roof-like structure (Fig. 3; in cleared, slide-mounted specimens only visible by careful examination) .... *C. castelnaui* Säwedal

– Posteromedian corner of superior volsella not angular, but may be drawn out into a tip to median; distal margin of volsella without definite indentation. Anal point longer than wide. Origin of anal point bars covered by a rounded to truncated roof-like structure .... 13.

13\. Anal tergal setae present. Posteromedian corner of superior volsella drawn out into a rounded tip. Junction of anal tergal bands in anterior half of anal tergite .... *C. mulleri* Säwedal

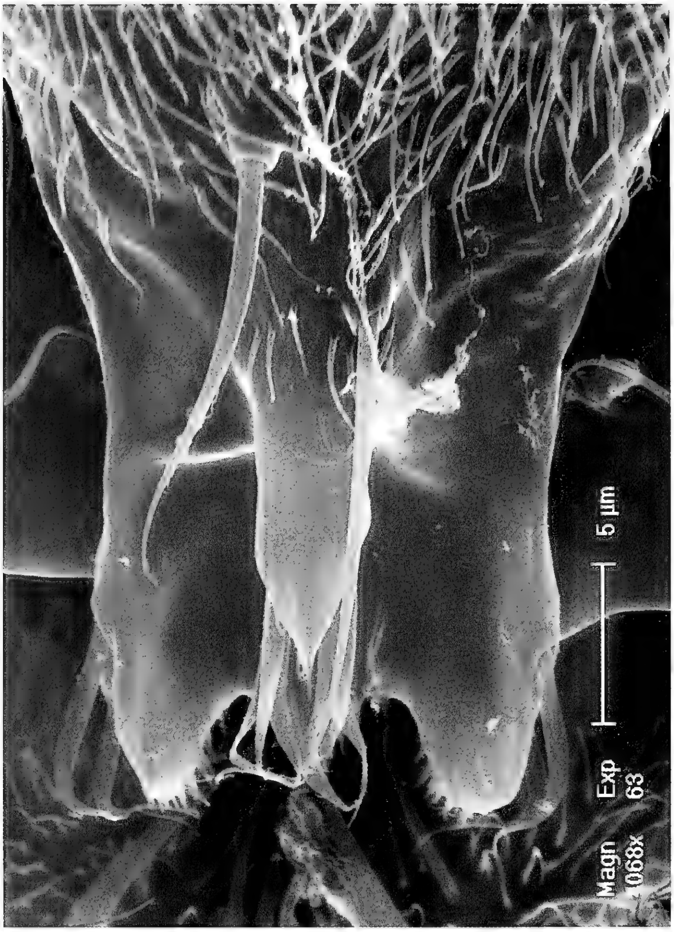

Fig. 3. *Caladomyia* cf. *castelnaui* Säwedal; adult male anal point. SEM.

- Anal tergal setae absent. Posteromedian corner of superior volsella ending in a broad, triangular extension. Junction of anal tergal bands in posterior half of tergite. Anal point elongate (31 μm long, AnPR 4.6) .... *C. hoefleri,* spec. nov.

14. Digitus short, reaching about middle of superior volsella **and** anal point trough-like with lateral margins bent upward (as in Fig. 4), the latter structure in light microscopy only visible with careful examination. Anal point bars long (31-37 μm). Junction of anal tergal bands in anterior part of anal tergite .... *C. humboldti* Säwedal

- Lateral margins of anal point not bent upward to form a trough-like structure. Digitus (except in *C. pistra*) longer, at least exceeding ⅔ of superior volsella length .... 15.

15. Anal point compact (AnPR < 3). Wing covered with many membrane macrotrichia. .... 16.

- Anal point more slender and elongate (AnPR ≥ 3). Wing with membrane macrotrichia only in distal ⅕ .... 17.

16. Anal point very compact (AnPR 2.0-2.8), with straight to slightly concave outer margins. Anal point bars reaching distinctly beyond distal margin of anal point dorsal part; ventromedian part of anal point very long. Superior volsella ovoid, with only slight posteromedian projection; 3 anteromedian setae on a ventral lobe, one of these inserting toward middle of volsella. Inferior volsella slightly twisted. Large species: wing length 1.41-1.50 mm. AR 1.14-1.30 .... *C. riotarumensis,* spec. nov.

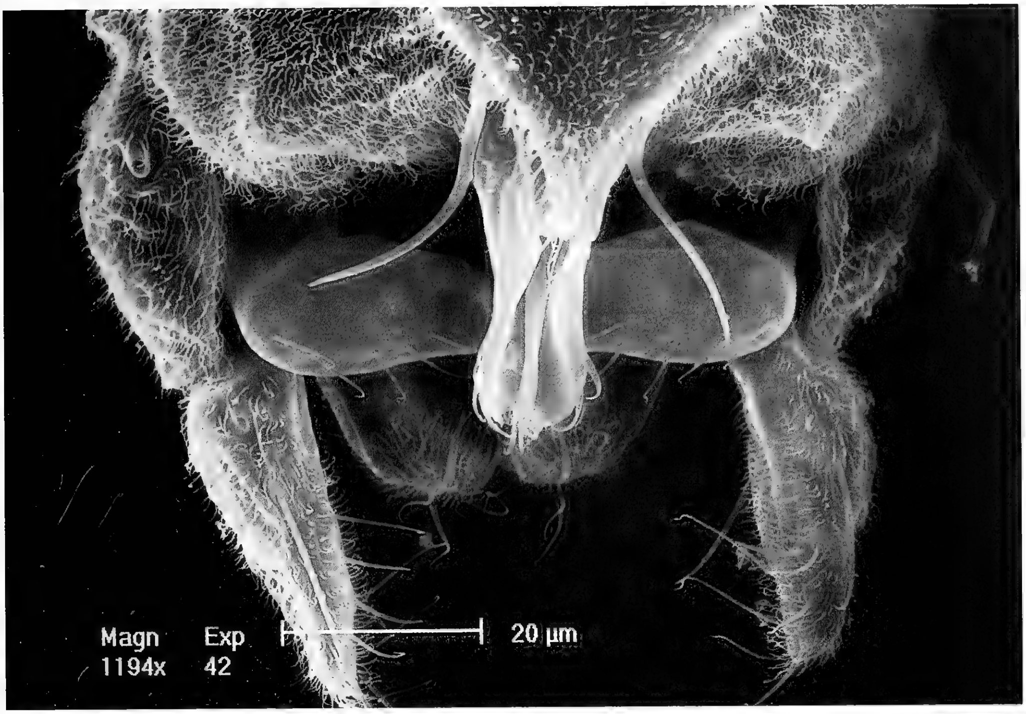

Fig. 4. *Caladomyia* spec.; adult male hypopygium. SEM. Note the trough-like anal point.

– Anal point somewhat rectangular. Anal point bars reaching at most slightly beyond distal margin of anal point dorsal part; ventromedian part of anal point not very long. Superior volsella almost square, with pronounced posteromedian lobe ending in blunt tip; 3 median setae evenly spaced along margin. Inferior volsella almost straight. Wing length 1.06 mm. AR 0.42 .... *C. pistra* Sublette & Sasa

17. Anal point bars very long (33-46 µm), reaching clearly beyond distal end of dorsal part of anal point .... *C. fittkaui*, spec. nov.

– Anal point bars shorter (19-23 µm), at most slightly reaching beyond dorsal part of anal point .. .. *C. hero*, spec. nov.

Caladomyia orellanai, spec. nov.

Fig. 5

Types. Holotype: adult ♂, slide mounted in Canada balsam; Brazil, Amazon area, Igarapé Cachoeira, 26.XI.1962, leg. E. J. Fittkau (sample A431). – Paratypes (Brazil, Amazon area, leg. E. J. Fittkau): 4♂♂ (labeled N5; U292; U296; U300), as holotype; 1♂ (K97), Igarapé Cachoeira (A413), 23.XI.1962; 1♂ (U997), Rio Cuieiras at outflow of Rio Branquinho (A307), 20.XII.1961 (All in ZSM, Munich, Germany).

Differential diagnosis. The male differs from all other *Caladomyia* by possessing an ovoid superior volsella with a pointed tip in its posteromedian corner, a long digitus ending in a blunt tip and with about ⅕ of its length reaching beyond the volsella, and a long and slender anal point (AnPR 2.88). Unique to this species is a tube-like structure – combining with the more common "roof" to cover the anal point bar origins – which has distinctive lateral margins that also extend proximal toward the bases of the anal tergal setae. AnPBR 0.5-0.8.

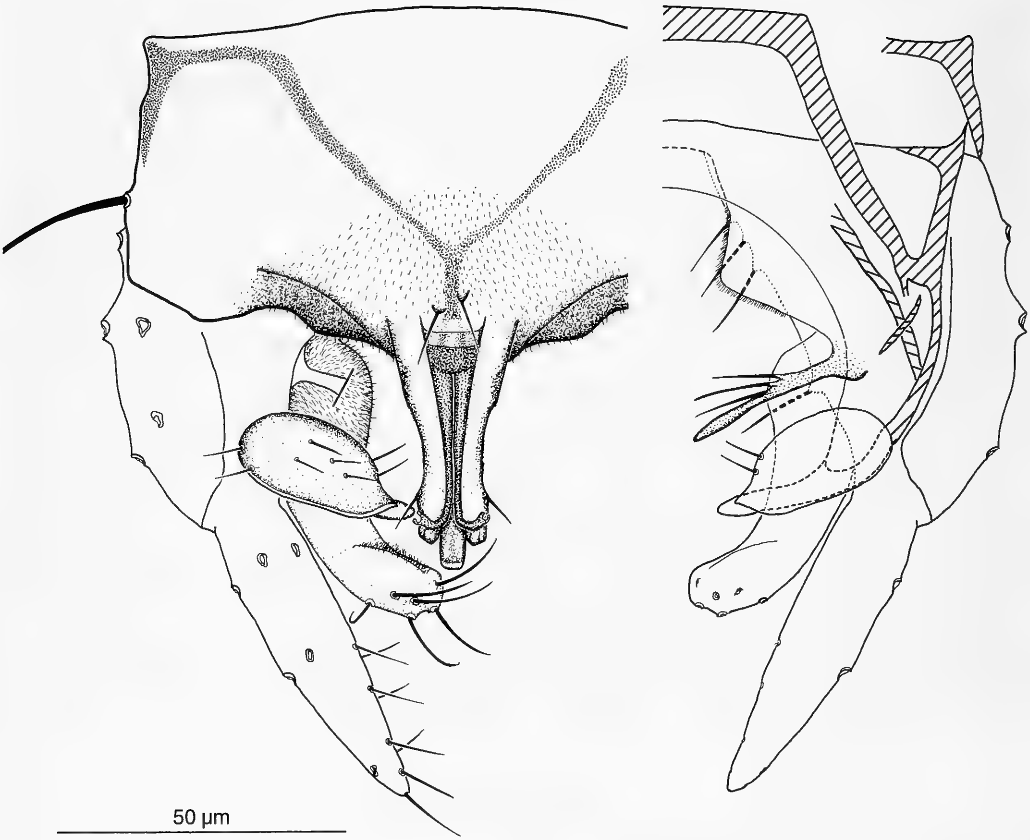

Fig. 5. *Caladomyia orellanai*, spec. nov.; adult male hypopygium.

Description

Adult male (see Tab. 1).

Size. Wing length 0.92-0.96 mm (n=6).

Colour (in Canada balsam). Whole body yellowish-green.

Wing. Membrane macrotrichia limited to a few on distal ⅕, except for a row between R_{4+5} and M. Vein macrotrichia absent from basal ⅕-⅓ of R_{4+5} and basal ⅓ of M_{1+2}, on M and Cu present only apically.

Legs. Lengths of segments in μm:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
P_1	498/494	195/195	650	326	258	204	100
P_2	462	362	–	–	–	–	–
P_3	485/476	435/444	313	186	168	104	59

Fore tibia with long spur (12-15 μm). Mid and hind tibiae each with two combs and two long spurs. Spurs on outer combs slightly longer (about 19 vs 18 μm).

Hypopygium (Fig. 5). Anal tergite with two setae in posteromedian part. Lateral teeth absent. Anal tergal bands Y-shaped, junction on mid tergite. Anal point bar apices claw-like, ending proximal of distal margins of anal point dorsal parts; origins of bars on base of anal point, covered by a roof-like and a more anterior tube-like structure, the latter with distinctive lateral margins which also extend proximal toward the bases of the anal tergal setae. Anal point slender, with nearly parallel to slightly concave margins; apex in dorsal view appearing trifid due to dorsal part with two pointed to truncated apices and a ventromedian part with truncated apex reaching a little beyond dorsal tips. Anal point with 1 pair of setae distolaterally on dorsal part, and 2 pairs ventrally on ventromedian part. Superior volsella rectangular to ovoid, with obliquely transverse orientation; distal margin more or less straight, more strongly chitinized; posteromedian corner with triangular tip to median, anteromedian corner rounded; 3-4 dorsal setae (often in a row parallel to proximal margin), 2 or 3 setae in anteromedian corner, 2 setae posterolaterally. Digitus long, about ⅕ of its length beyond posteromedian volsellar corner, about 2.5-3 μm wide, with rounded to weakly pointed tip, sometimes with nose-like apex. Inferior volsella bent in an S-shape, of about even width throughout, apex with an elongate, rectangular to ovoid swelling; setae on apex rather strong and long (about 15 μm). Median volsella with simple lamellar setae apically and 2-3 regular setae anteriorly. Gonostylus rather short, median margin nearly straight, lateral margin weakly convex; tip weakly pointed.

Etymology. Named after the Spanish captain Francisco de Orellana who was the first European to navigate the whole Amazon (Grabert 1991: 8).

Distribution and ecology. All collection sites are located in the region of the lower Rio Negro northwest of Manaus.

Caladomyia reissi, spec. nov.

Fig. 6

Types. Holotype: adult ♂, slide mounted in Euparal; Brazil, Amazonas, Lago Cabaliana, Drift S IV, 6.VI.1971, leg. F. Reiss (ZSM).

Differential diagnosis. The adult male differs from all other *Caladomyia* with short digitus (not longer than ⅔ of superior volsella), short anal point bars (< 15 μm) and high AnPBR (3.2) by the following characters: Anal point bars reaching beyond middle of anal point (*C. kraussi* Säwedal has very short anal point bars (8 μm) extending over less than proximal half of anal point, and also lacks anal tergal setae). Anal point very long and slender (AnPR 4.9), with parallel margins. Anal tergal setae present, in asymmetrical positions laterally on anal point base, not near junction of anal tergal bands. Anal point bars very thin, seta-like. Superior volsella in dorsal aspect almost rectangular, and with distinctive ventral part ending in an anteromedian lobe (almost as in sp. Eisenbeis).

Description

Adult male (see Tab. 1).

Size. Wing length 0.88 mm (n=1).

Colour (in Euparal). Whole body yellowish-green.

Head. Frontal tubercles not recognizeable.

Thorax. Acrostichals not recognizeable. Only 2 apical scutellars visible.

Wing. Membrane largely bare of macrotrichia, except for a row along distal margin, and a few scattered in distal ⅕ of r_{4+5}. Brachiolum seta not recognizeable.

Legs. Lengths of segments in μm:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
P_1	430	161	544	258	213	168	82
P_2	417	296	199	75	44	27	27
P_3	444	387	–	–	–	–	–

Fore tibia with long spur (about 12 μm).

Hypopygium (Fig. 6). Anal tergite with two setae in asymmetrical positions laterally on anal point base. Lateral teeth not recognizeable. Orolateral spines of laterosternite IX present. Anal tergal bands Y-shaped, junction on mid tergite, longitudinal band bifurcates and ends 8 μm proximal of anal point bars. Anal point bars short, seta-like, tips with bifid, pointed apices; bars extending from proximal ⅓ to distal ⅓ of anal point. Anal point very long and slender (width 5.6 μm), with parallel margins; in dorsal view with dorsal part truncated, ventromedian part slightly projecting, with pointed apex; dorsal part with 1 mediolateral and 2 more distal setae, ventromedian part with 1 pair of setae ventrally. Superior volsella almost rectangular, with slightly obliquely transverse orientation; distal margin straight to slightly convex; dorsomedian margin with one median seta; volsella with distinct ventral part leading to slightly projecting anteromedian corner bearing two setae directed to median;

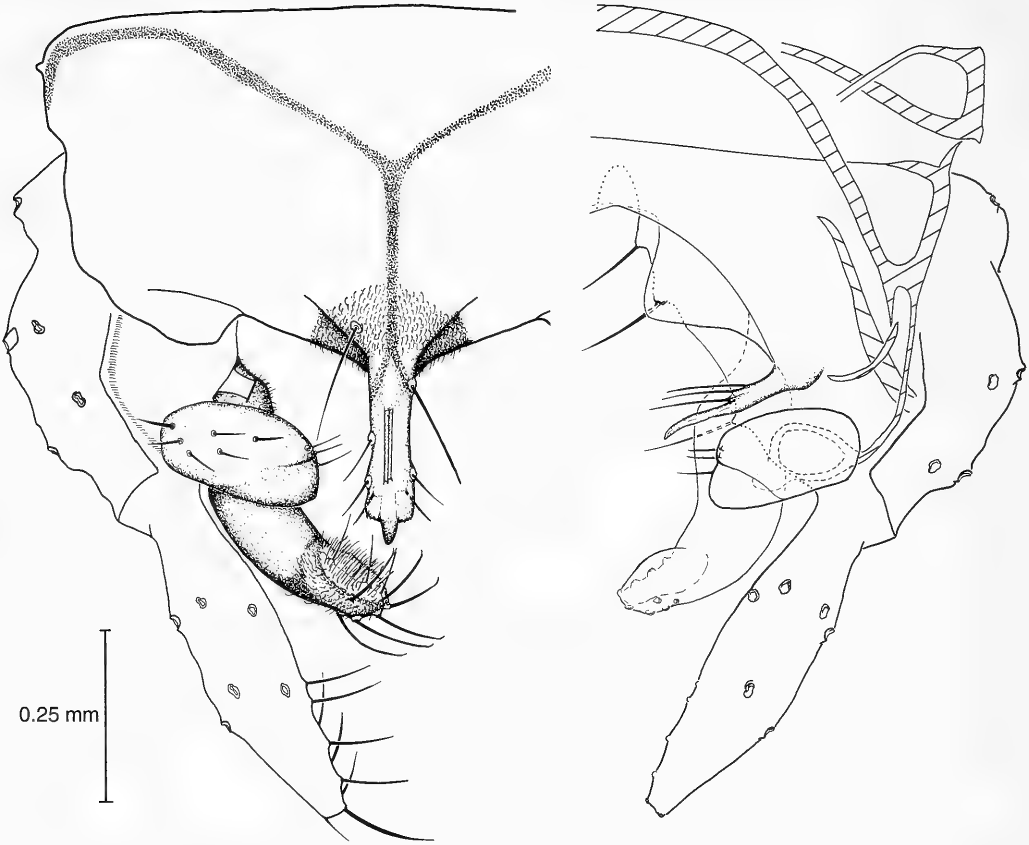

Fig. 6. *Caladomyia reissi,* spec. nov.; adult male hypopygium.

3-4 dorsal setae in two rows and 2 setae anterolaterally. Digitus very short, blunt, barely reaching distal ⅓ of superior volsella. Inferior volsella bent in an S-shape, basally rather wide, slightly tapering distally; apex with an elongate, ovoid swelling bearing numerous microtrichia; volsellar setae of normal strength. Median volsella with simple lamellar setae apically and about 3 regular setae anteriorly. Gonostylus rather short (55 μm) and relatively wide (13 μm), its median margin nearly straight, the lateral margin rather strongly convex; tip weakly pointed.

Etymology. Named in honour of Dr. Friedrich Reiss who initiated and supported my studies on the genus *Caladomyia.*

Distribution and ecology. The type locality is a large lake (surface area 103 km^2) near Rio Solimões, west of Manaus (Reiss 1976: 124).

Caladomyia erikae, spec. nov.
Figs 1, 2, 7

Types. Holotype: adult ♂, slide (U299) mounted in Canada balsam; Brazil, Amazon area, Igarapé Cachoeira, 26.XI.62, at light, leg. E. J. Fittkau (sample A431). – Paratypes (Brazil, Amazon area, leg. E. J. Fittkau): 1♂, Pará, Rio Cururu, at house at Missão Cururu, 6.II.61, at light (A88-11); 1♂, as holotype, except sample A426; hypopygium on SEM stub, rest on slide in Euparal (all ZSM).

Differential diagnosis. This species very much resembles both *Caladomyia mulleri* Säwedal and *C. hoefleri,* spec. nov. All three species are characterized by a medium-sized, relatively slender anal point with

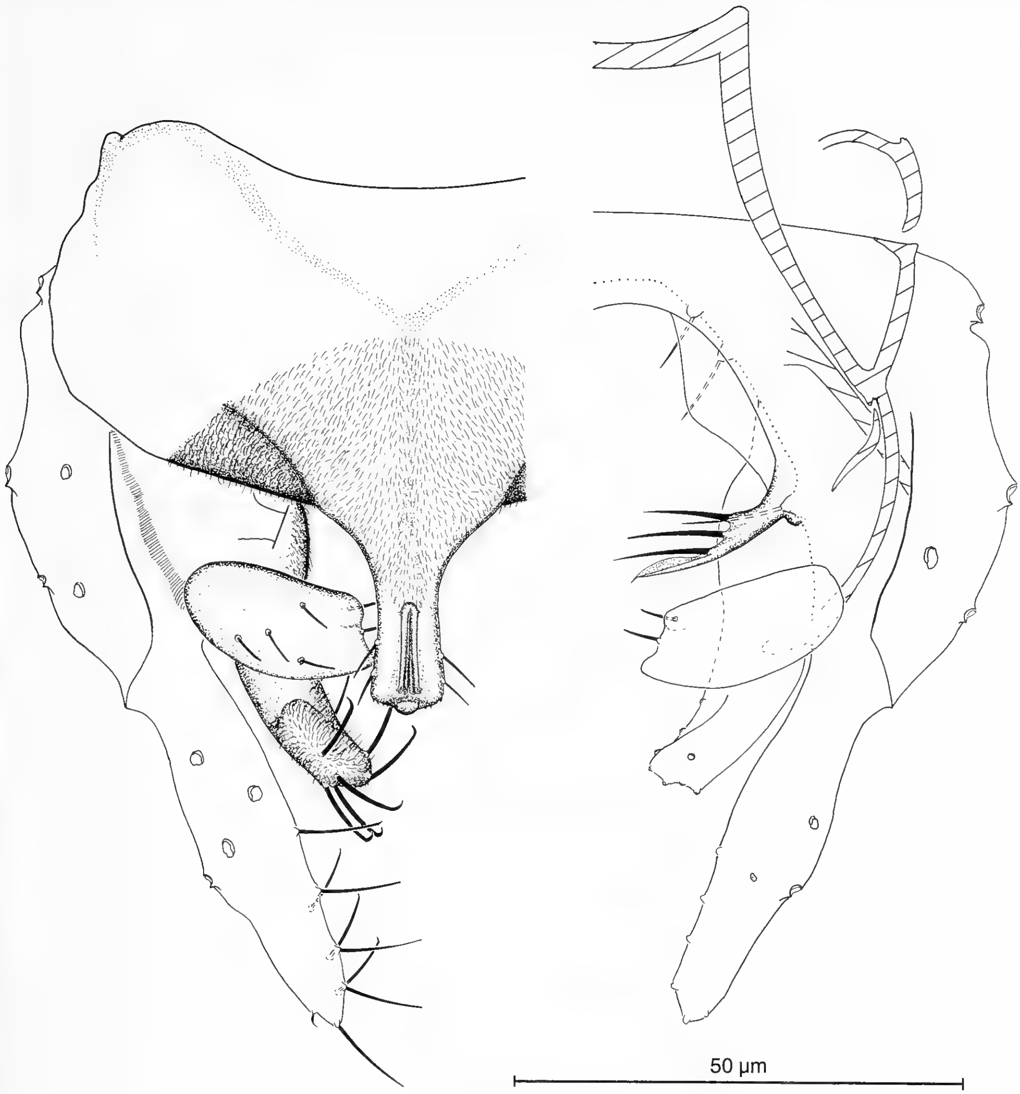

Fig. 7. *Caladomyia erikae,* spec. nov.; adult male hypopygium.

slightly concave margins (AnPR 2.5-4.6), very short, straight anal point bars that almost reach the distal end of the anal point dorsal part, AnPBR around 3, and a digitus at most reaching only slightly beyond the median margin of the superior volsella. Although it is conceivable that additional material may bridge the morphological gaps recognized here, the three species are at this time separated as follows: Anal tergal setae are absent in *C. erikae* and *C. hoefleri*, in *C. mulleri* two setae are present far posterior on the anal tergite. *C. erikae* differs from *C. mulleri* and *C. hoefleri* in having a very short digitus as well as a very long and ovoid superior volsella. *C. erikae* is also slightly smaller by wing length, and has a lower AR (that may correlate with lower body size).

Description

Adult male (see Tab. 1).

Size. Wing length 0.74-0.78 mm (n=3).

Colour (in Canada balsam). Whole body yellowish-green.

Thorax. Antepronotum broken. Acrostichals apparently only a few in two rows; dorsocentrals end near scutellum.

Wing. Membrane macrotrichia limited to few on distal ⅕, except for a row between R_{4+5} and M, and a short row between distal half of M_{1+2} and M_{3+4}. Vein macrotrichia absent from basal ⅓ of R_{4+5}, basal ⅓ of M_{1+2}, and basal ½ of M_{3+4}.

Legs. Lengths of segments in µm (Holotype):

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
P_1	371	159	442	222	186	140	72
P_2	392	274	164	65	38	28	27
P_3	401	351	231	127	124	72	43

Fore tibia with long spur (about 11 µm).

Hypopygium (Fig. 7). Anal tergite without setae. Lateral teeth present on on SEM specimen. Anal tergal bands Y-shaped, junction anterior of mid tergite, longitudinal band ending about 8 µm proximal of anal point bars. Anal point bars relatively short, bases situated near middle of anal point, apices forked, ending just before margin of anal point dorsal part. Anal point relatively long and slender, with slightly concave margins; in dorsal aspect not trifid, dorsal portion more or less broadly rounded, with numerous microtrichia at distal end; ventromedian part with slightly tapered apex, very little projecting beyond dorsal part. Anal point with 2 pairs of setae in distal half of dorsal part. Superior volsella elongate, with transverse orientation; posteromedian corner drawn out into triangular tip, median margin concave, anteromedian corner rounded; 4 dorsal setae in two rows, 1 median and 1 anteromedian seta, and 2 setae anterolaterally. Digitus not recognizeable. Inferior volsella rather wide, especially its base; apex with an ovoid swelling bearing numerous microtrichia. Median volsella with simple lamellar setae apically, and 3-4 regular setae anteriorly. Gonostylus rather short, inner margin nearly straight, lateral margin rather weakly convex; tip weakly pointed.

Etymology. The name is given to thank my mother-in-law, Erika Reiff, for her invaluable help with caring for my children.

Distribution and ecology. Two of the three specimens of *C. erikae* were collected in the region of the lower Rio Negro northwest of Manaus, the third in Pará near the border to Mato Grosso.

Caladomyia hoefleri, spec. nov.

Fig. 8

Types. Holotype: adult ♂, slide (U954) mounted in Canada balsam; Brazil, Amazonas, Lower Rio Solimões, Parana da Terra Nova, 15.III.1961, leg. E. J. Fittkau (sample A135) (ZSM).

Differential diagnosis. This species is one of several characterized by a medium-sized, relatively slender anal point with slightly concave margins (AnPR 2.5-4.6), very short and straight anal point bars almost reaching the distal end of the anal point dorsal part, AnPBR around 3, and a digitus reaching at most slightly beyond the median margin of the superior volsella (also see remarks under *C. erikae*, spec. nov.). *C. hoefleri*, spec. nov. differs from other such species by the following combination: Anal tergal setae absent (present in *C. mulleri* Säwedal); junction of anal tergal bands in posterior half of tergite (in anterior half in similar species); anal point longer (AnPR 4.6) and with margins more concave than in the other species; digitus distinctive, reaching median margin of superior volsella (contrary to *C. erikae*); larger than *C. erikae*; AR higher than in the other species (possibly body size related).

Description

Adult male (see Tab. 1).

Size. Wing length 0.92 mm (n=1).

Colour (in Canada balsam). Whole body yellowish-green.

Head. Frontal tubercles present, length not measurable.

Thorax. Acrostichals reaching antepronotum. Row of dorsocentrals ends near scutellum, does not reach antepronotum.

Wing. Membrane macrotrichia limited to few on distal ⅙, except for a row between R_{4+5} and M.

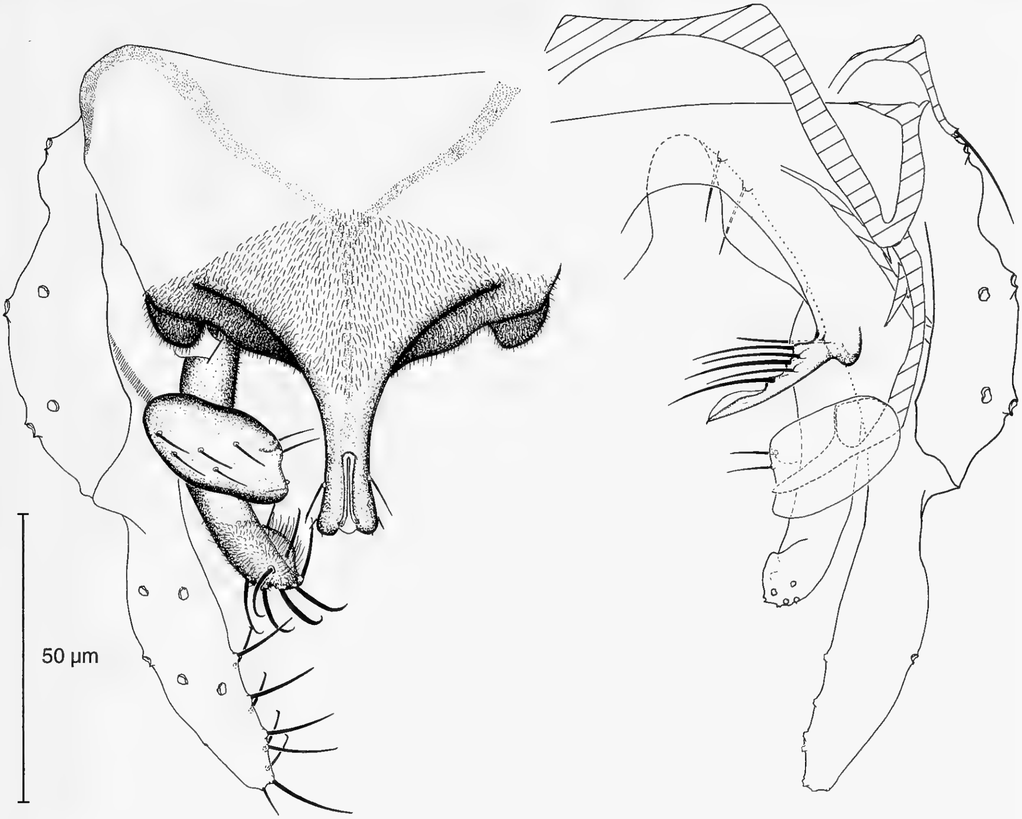

Fig. 8. *Caladomyia hoefleri,* spec. nov.; adult male hypopygium.

Vein macrotrichia absent from basal ½ of R_{4+5}, basal ½ of M_{1+2}, and basal ½ of M_{3+4}.

Legs. Lengths of segments in μm:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
P_1	439	195	–	–	–	–	–
P_2	444/448	342/344	208	91/95	63/66	39/41	34/36
P_3	453	430	283/285	163	145	95	50

Fore tibia with long spur (about 14 μm).

Hypopygium (Fig. 8). Anal tergal setae absent. Lateral teeth not recognizeable. Anal tergal bands Y-shaped, junction in posterior half of tergite, longitudinal band (length Y) about 41 μm long (n=1). Anal point bars short, apices split into two branches with rounded tips; bars extending from middle of anal point almost to distal margin of dorsal part. Anal point long and slender with concave margins, in dorsal aspect with three rounded apices; dorsal part with two microtrichiose tips, ventromedian part not projecting; one pair of setae at about ⅔ length of dorsal part, one to two pairs more ventrally and distally. Superior volsella almost rectangular, with obliquely transverse orientation; median margin concave, posteromedian corner broadly drawn out into a slightly pointed tip; 2 or 3 dorsal setae, 3 setae in anteromedian corner (1 very small, inserting dorsally; 2 larger, on a ventral lobe), and 2 setae posterolaterally. Digitus of medium length, barely reaching beyond volsellar margin, distal end tapering to a pointed tip. Inferior volsella slightly bent in an S-shape, long and slender, of almost even width throughout; apex with a rounded, microtrichiose swelling. Median volsella rather short and stout, with simple lamellar setae apically and 4-5 strong regular setae along entire anterior margin. Gonostylus rather short, its median margin nearly straight, the lateral weakly convex; tip weakly pointed to rounded.

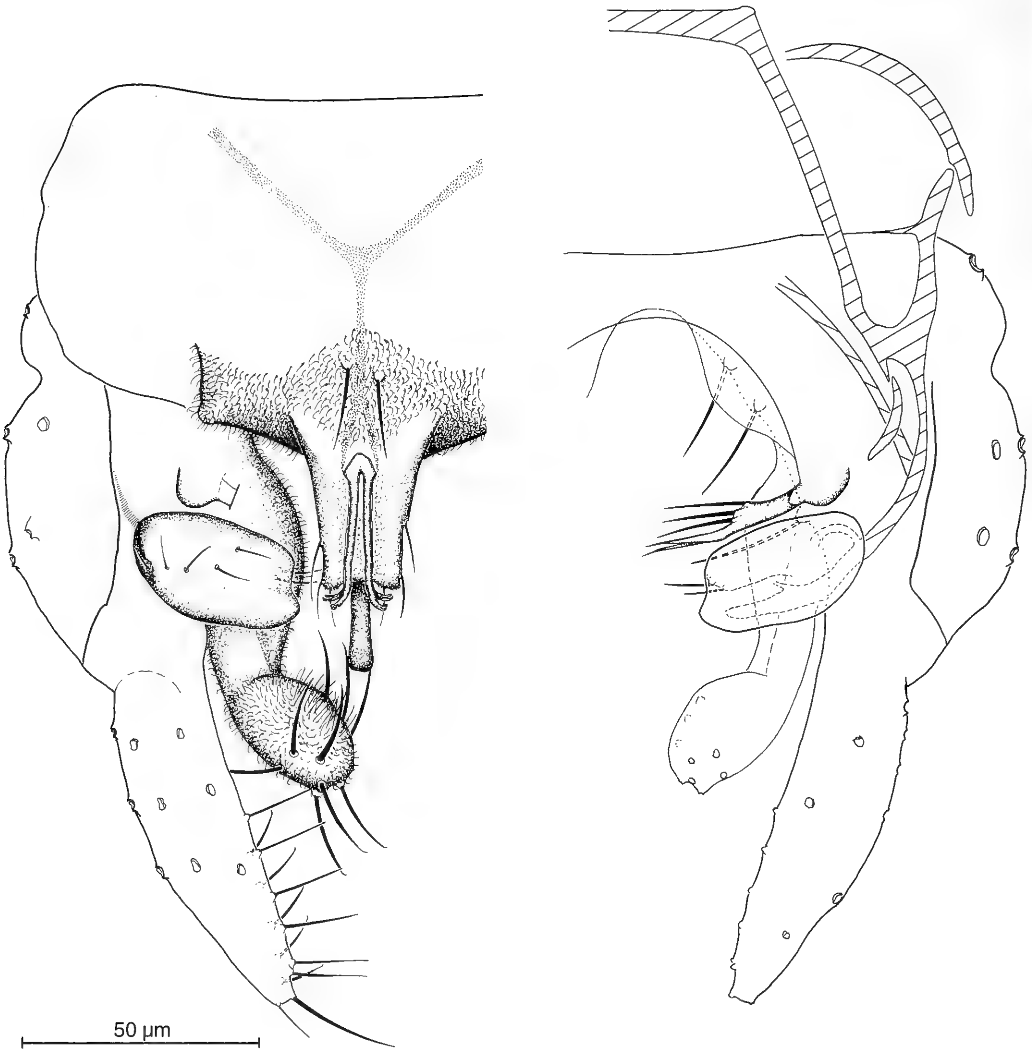

Fig. 9. *Caladomyia riotarumensis,* spec. nov.; adult male hypopygium.

Etymology. Dedicated to Mr. Franz Höfler, on the occasion of his 80th birthday and to thank him for his invaluable help with caring for my children.

Distribution and ecology. The type locality is located in the Amazon lowland on the lower Rio Solimões near Manaus.

Caladomyia riotarumensis, spec. nov.
Figs 9, 10

Types. Holotype: adult ♂, slide (U1042) mounted in Canada balsam; Brazil, Amazonas, lower Rio Negro, Rio Taruma, Sucuuba, Lancha-Endpunkt (endpoint), at light, 16.XI.1962, leg. E. J. Fittkau (sample A403). – Paratypes (Brazil, Amazonas): 3♂♂ (U1037, U1047, U1048), as holotype; 1♂, Calado, SXIII, reared, 30.I.1972, leg. F. Reiss; 1♂ as previous, except shore, 15.II.1972 (all ZSM)

Fig. 10. *Caladomyia riotarumensis,* spec. nov.; adult male hypopygium. SEM.

Differential diagnosis. The male very much resembles *Caladomyia pistra* Sublette & Sasa. Both species have two normal anal tergal setae, a rather compact anal point (AnPR around 2), long anal point bars reaching at least to the distal margin of the anal point dorsal part, and a digitus not projecting beyond the superior volsella. In both species, the wing membrane bears many macrotrichia, whereas in most other species membrane setation is sparse. The only existing specimen of *C. pistra* having been squashed during slide-making, the species' exact morphology can not be determined. As far as can be verified, the following differences exist: The ventromedian part of the anal point in *C. riotarumensis* is very long and bears only one pair of setae, whereas in *C. pistra* it is short with three pairs of setae. The superior volsella of *C. pistra* shows a definite nose-like lobe in the posteromedian corner, and rather stout setae evenly spaced on the median margin. In *C. riotarumensis* there is normally no indication of a posteromedian projection, and the median setae are smaller and projecting from an anteroventral lobe, two of them close together near the median volsellar margin, the third originating toward the middle of the volsella. The digitus appears smaller in *C. pistra*. The inferior volsella of *C. riotarumensis* is slender and slightly twisted, that of *C. pistra* wide and almost straight (possibly due to compression). Other differences could be functions of body size: *C. riotarumensis* wing length 1.41-1.50, AR 1.14-1.30, mid ta_1 sensilla chaetica 6-8; *C. pistra* wing length 1.06, AR 0.42, mid ta_1 sensilla chaetica 2.

C. pistra is known only from the Guatemalan holotype (regarding Nearctic records see above "Further taxonomic remarks" on the genus), *C. riotarumensis* from the Amazon lowlands. Collections from regions inbetween may lead to a different decision regarding synonymy.

Description

Adult male (see Tab. 2).

Size. Large species. Wing length 1.41-1.50 mm (n=2).

Colour (in Canada balsam). Whole body yellowish-green.

Thorax. Acrostichals not recognizeable.

Wing. Membrane with many macrotrichia on distal ½. Vein macrotrichia absent from basal ⅓ of R_{4+5}.

Legs. Lengths of segments in μm (SEM specimen / mean of two Calado paratypes):

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
P_1	761/835	298/336	1116/1227	482/549	400/465	330/394	140/170
P_2	685/747	507/562	342/399	146/171	101/117	63/66	51/56
P_3	729/817	653/732	–/579	–/324	–/288	–/184	–/93

Fore tibia with long spur (about 23 μm).

Hypopygium (Figs 9, 10). Anal tergite with two posteromedian setae. Lateral teeth present in SEM specimen. Anal tergal bands Y-shaped, junction on mid tergite or slightly more distal. Anal point bars originating on anal point base, their apices reaching beyond dorsal part of anal point, each bar tip split into 2 apices. Anal point wide with nearly straight margins; distal margin of dorsal part straight to concave; ventromedian part often very long with truncated apex, projecting beyond dorsal part by about 16 μm; dorsal part with one pair of setae at about ⅔ length, and two more distal and ventral pairs; ventromedian part with one pair of setae. Superior volsella rectangular to ovoid, with obliquely transverse orientation; median margin slightly concave, posterior corner with a low lobe; 4-6 dorsal setae, 3 anteromedian setae projecting from a ventral volsellar lobe (2 of these close together near median volsellar margin, the third originating toward middle of volsella), 2 lateral setae. Digitus not reaching median margin of volsella, gradually tapering to weakly pointed tip. Inferior volsella bent in a twisted S-shape, narrowest in middle; apex with a pad-like swelling bearing numerous microtrichia. Median volsella long, with simple lamellar setae apically, and about 3 regular setae anteriorly. Gonostylus rather short (96 μm), its median margin nearly straight, the outer weakly convex; tip weakly truncated.

Etymology. Named after the type locality.

Distribution and ecology. All collection sites are located near larger bodies of water within a limited central Amazon lowland area around Manaus.

Caladomyia fittkaui, spec. nov.

Figs 11, 12, 13

Types. Holotype: adult ♂, slide (U900) mounted in Canada balsam Brazil, Amazonas, Rio Preto, Tiririca, at light, 7.VII.1962, leg. E. J. Fittkau (sample A396). – Paratypes (Brazil, Amazonas, at light, leg. E. J. Fittkau): 1♂ (U903), as holotype; 2♂♂ (H116, H121), Rio Parú de Oeste, Igarapé Okueima, at light, 18.IV.1962 (A371-1); 1♂ (H382), region terminus Rio Marauiá, at light, 26.I.1963 (A498) (all ZSM).

Differential diagnosis. *C. fittkaui,* spec. nov. differs from all other *Caladomyia* with normal, seta-like anal tergal setae, long and slender anal point (AnPR ≥ 3), and medium-sized digitus (reaching at most slightly beyond median margin of superior volsella) in having very long anal point bars (33-46 μm).

Description

Adult male (see Tab. 2).

Size. Wing length 0.86-1.05 mm (M=1.01, n=5).

Colour (in Canada balsam). Whole body yellowish-green.

Thorax. Acrostichals almost reaching antepronotum. Dorsocentrals ending near scutellum, not reaching antepronotum.

Wing. Membrane macrotrichia limited to distal ⅕, except for one row each between R_{4+5} and M_{1+2}, M and Cu/M_{3+4}. Vein macrotrichia absent from basal ½ of R_{4+5}, basal ½ of M_{1+2}, basal ½ of M_{3+4}, and basal ¼ of Cu_1.

Fig. 11. *Caladomyia fittkaui,* spec. nov.; adult male hypopygium. SEM.

Legs. Lengths of segments in µm (holotype):

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
P_1	519	204	752	349	285	199	109
P_2	507	381	204	95	61	35	32
P_3	510	458	307	181	163	100	54

Fore tibia with long spur (about 12 µm).

Hypopygium (Figs 11-13). Anal tergite with two posteromedian setae. Lateral teeth present. Anal tergal bands Y-shaped, junction slightly anterior to mid tergite, longitudinal band with distal end forked. Anal point bars very long, originating at very base of anal point, their apices deeply split and reaching beyond anal point dorsal part. Anal point slender with slightly concave margins; distal margin of dorsal part slightly concave; one pair of setae laterally near middle of dorsal part, and two pairs ventrally at distal end; ventromedian part with rounded to truncated apex, projecting beyond dorsal part by a short distance. Superior volsella oval, slightly elongate, with obliquely transverse orientation; posterior margin more or less straight; posteromedian corner with a more or less projecting lobe (sometimes with nose inside); 3-4 dorsal setae, 3 anteromedian setae (2 arising from a ventral lobe, close together near median volsellar margin, 1 of these a little further to middle of volsella; the third median seta farther posterior on median volsellar margin); 2 lateral setae. Digitus medium-sized, at most only very slightly projecting beyond median margin of volsella, gradually tapering to weakly pointed tip. Inferior volsella bent in an S-shape, widest proximally; apex with a prominent triangular swelling bearing microtrichia. Median volsella relatively long, with simple lamellar setae apically, about 3 regular setae anteriorly. Gonostylus relatively long (about 77 µm) and slender, its inner margin straight, the outer slightly convex; tip rounded to truncated.

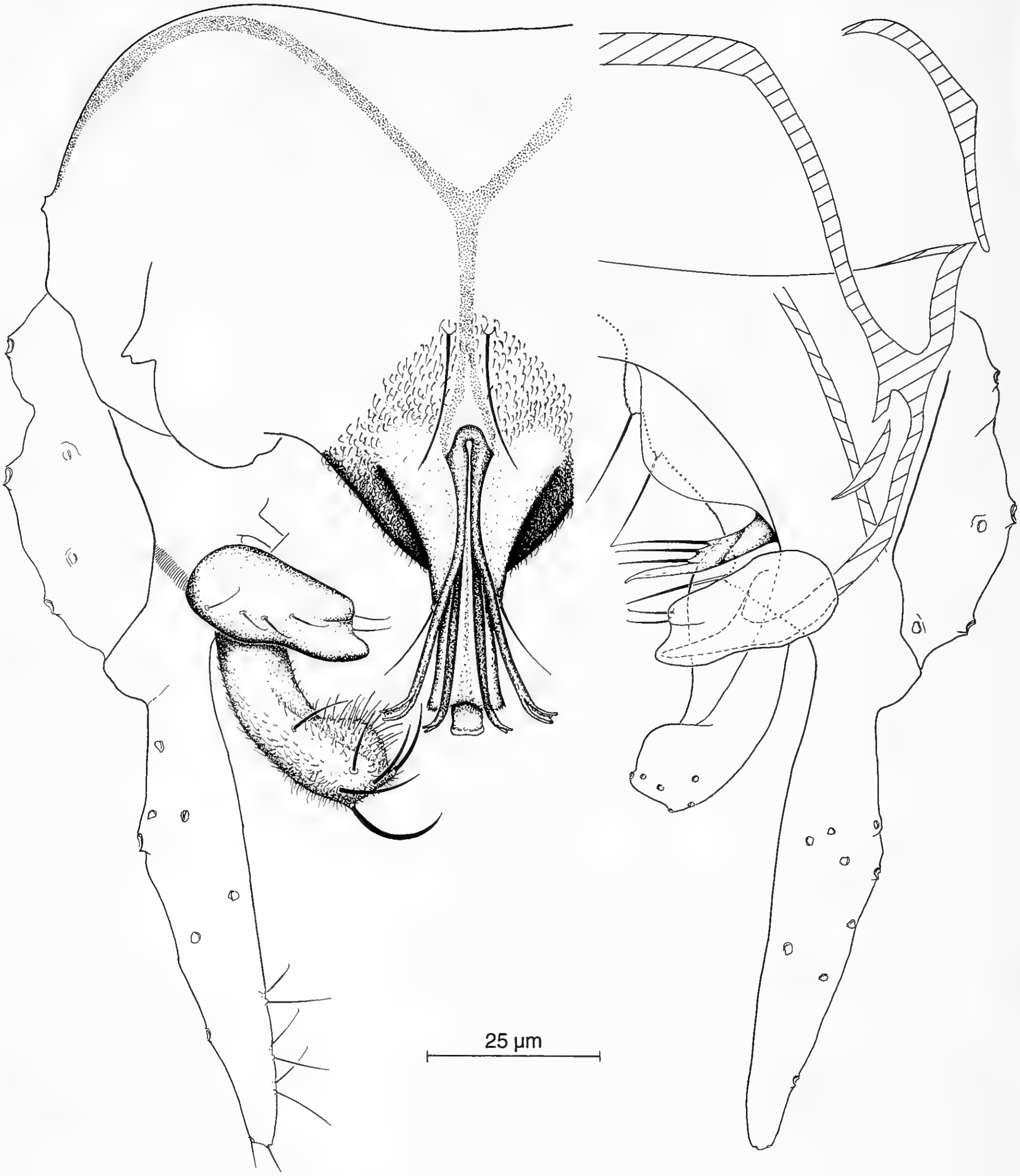

Fig. 12. *Caladomyia fittkaui*, spec. nov.; adult male hypopygium.

Variation. In most paratypes the superior volsella shows somewhat different shape, with the median margin almost straight and the posteromedian lobe less distinct (see Fig. 13). One paratype from a mountain brook in the upper Rio Negro region near Rio Marauiá (sample A498; slide H382) has shorter anal point bars ($A = 36\ \mu m$) which insert somewhat distal of the anal point base, and slightly higher LR_2 and LR_3 (0.61 and 0.76, respectively), therefore also a lower ALR (59.0). The paratypes from near a brook in the upper Rio Parú de Oeste region (A371-1; H116, H121) show slightly lower leg ratios (LR_1 3.50, LR_2 0.49, LR_3 0.60) than the holotype (LR_1 3.83, LR_2 0.55, LR_3 0.67).

Etymology. Named after Prof. Dr. Ernst Josef Fittkau who collected most of the *Caladomyia* material and introduced me into the study of chironomids.

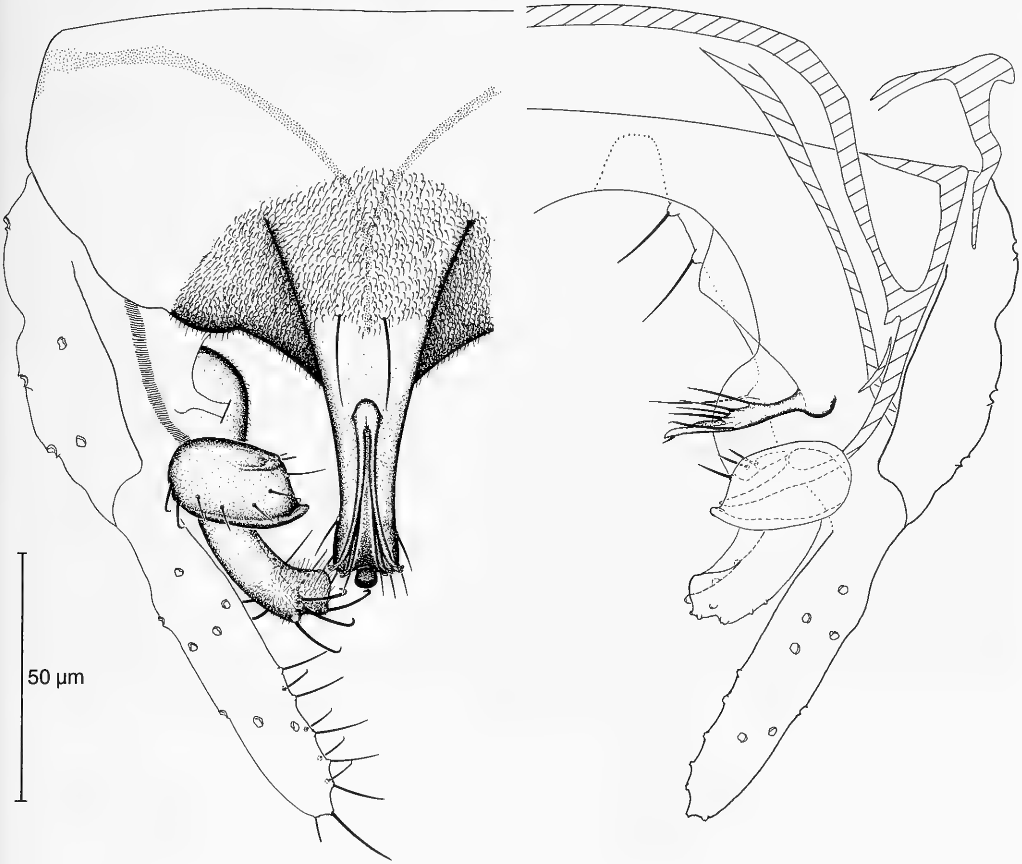

Fig. 13. *Caladomyia fittkaui*, spec. nov.; adult male hypopygium. Paratype, Rio Marauiá.

Distribution and ecology. This species has been collected mainly near flowing waters, in three different regions: at a river northwest of Manaus, and at different brooks at higher elevation (about 400 m a.s.l.) near the northern border of Brazil.

Caladomyia hero, spec. nov.
Fig. 14

Types. Holotype: adult ♂, slide (H253) mounted in Canada balsam; Brazil, Amazonas, Rio Parú, Mission Tiriyos, 21.IV.1962, at light, leg. E. J. Fittkau (sample A361-10). – Paratypes (Brazil, Amazonas, at light, leg. E. J. Fittkau): 1♂ (H263), as holotype; 1♂ (U1079), as holotype, except 31.III.1962 (A361-7); 1♂ (U291), Igarapé Cachoeira, 26.XI.1962 (A431); 1♂ (U916), Rio Preto, 7.VII. 1962, Tiririca (A396); 1♂, upper Rio Negro, Rio Marauiá, terminus, 25.I.1963 (A496) (all ZSM).

Differential diagnosis. *C. hero*, spec. nov. differs from all other *Caladomyia* species with normal, seta-like anal tergal setae, long and slender anal point ($AnPR \geq 3$), and medium-sized digitus (at most slightly reaching beyond volsella) in having medium-sized anal point bars (19-21 μm).

Description
Adult male (see Tab. 2).

Size. Wing length 0.86-0.95 mm (n=5).

Colour (in Canada balsam). Whole body yellowish-green.

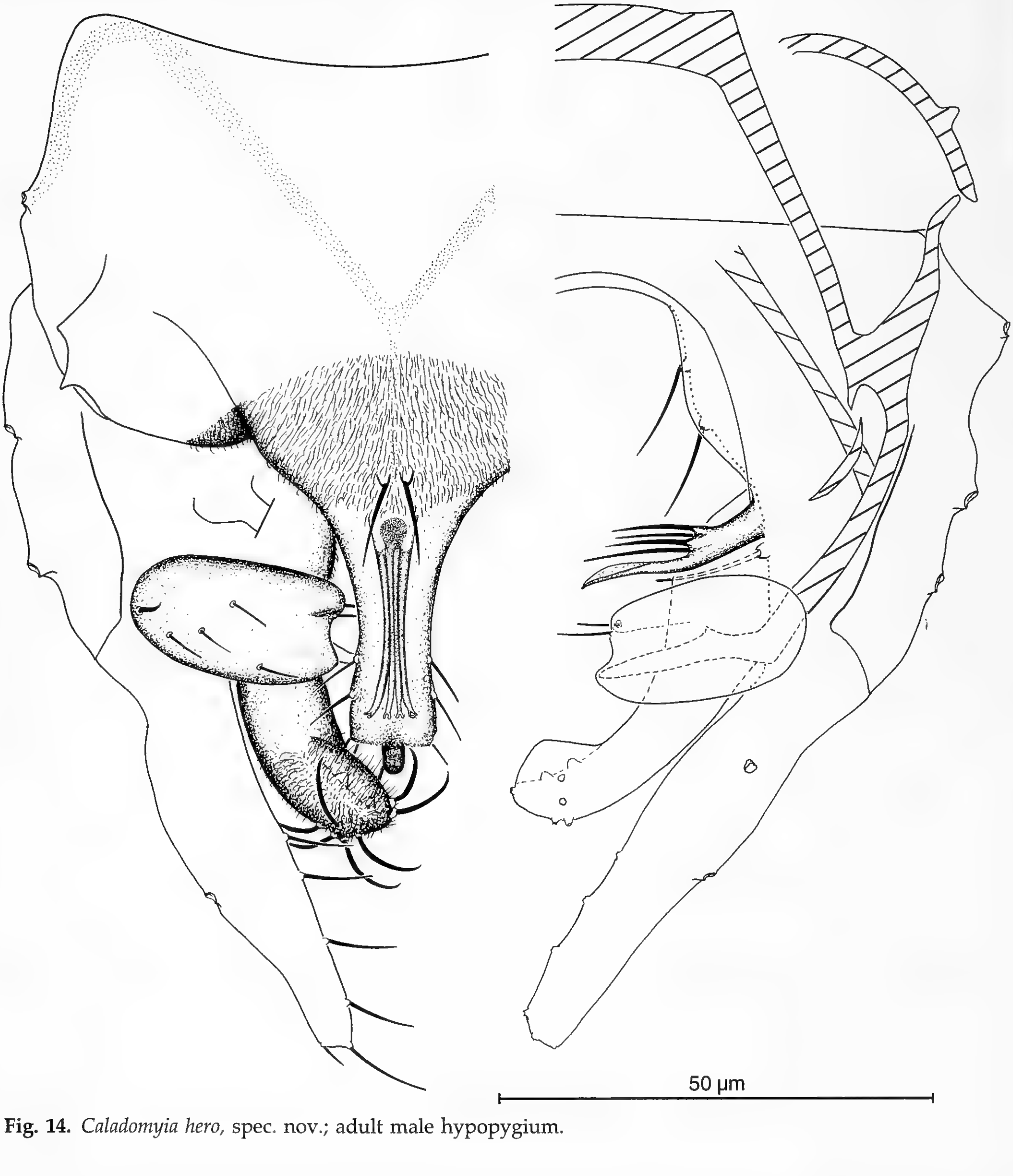

Fig. 14. *Caladomyia hero,* spec. nov.; adult male hypopygium.

Thorax. Acrostichals reaching antepronotum. Dorsocentrals ending near scutellum, not reaching antepronotum.

Wing. Membrane macrotrichia limited to a few on distal ⅕ to ⅙, except for a row between R_{4+5} and M. Vein macrotrichia absent from basal ½ of R_{4+5}, almost whole M, basal ½ of M_{1+2}, almost whole Cu.

Legs. Lengths of segments in μm:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
P_1	462(?)	181	634	281	245	177	86
P_2	456	340	–	–	–	–	–
P_3	460	409	–	–	–	–	–

Fore tibia with long spur (about 16 μm).

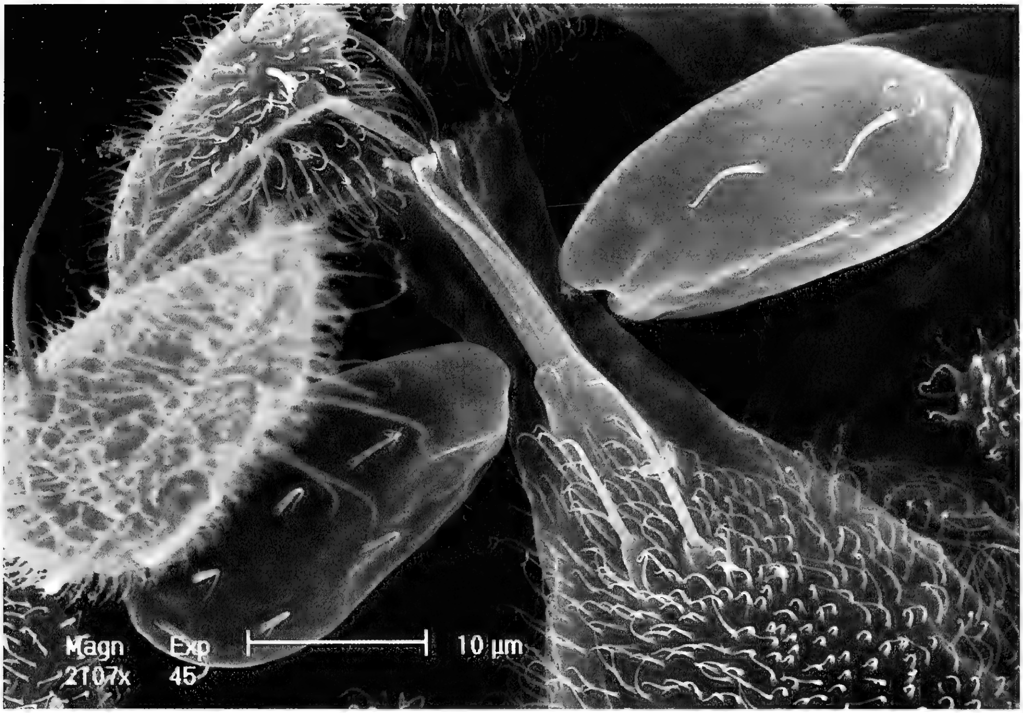

Fig. 15. *Caladomyia* cf. *hero*, spec. nov.; adult male hypopygium. SEM.

Hypopygium (Fig. 14). Anal tergite with two posteromedian setae. Lateral teeth present. Anal tergal bands Y-shaped, junction on mid tergite, longitudinal band ending about 3 μm proximal of anal point bars. Anal point bars of medium length, originating on base of anal point, apices with forked ends proximal of distal margin of anal point dorsal part. Anal point slender with nearly parallel to slightly concave margins; distal margin of dorsal part truncated, ventromedian part rounded, projecting beyond dorsal part by a short distance; 2 pairs of subapical dorsolateral setae, 1 pair more distally and ventrally. Superior volsella elongate ovoid, with transverse orientation; median margin slightly concave, posterior corner with a faint lobe; 4-5 dorsal setae, 2 setae on anteromedian corner (one of them on a ventral volsellar lobe); 2 posterolateral setae. Digitus medium-sized, at most only very slightly reaching beyond median volsellar margin, gradually tapering to weakly pointed tip. Inferior volsella bent in an S-shape, of about even width throughout; apex with a pad-like swelling bearing numerous microtrichia. Median volsella relatively short, with simple lamellar setae apically, about 3-4 regular setae anteriorly. Gonostylus rather short, somewhat conical, its inner margin weakly convex, the lateral convex; tip truncated to rounded.

Etymology. The species epithet is an abbreviation of the first names of my parents, Dr. med. Herbert Piskora and Maren-Veronika (Ronny) Piskora, to thank them for their invaluable help with caring for my children.

Distribution and ecology. *C. hero* was found in the same regions as *C. fittkaui*: at higher elevation (about 400 m a.s.l.) near the northern border of Brazil (regions of upper Parú de Oeste and upper Rio Negro), and along rivers in the Amazon lowlands northwest of Manaus.

Acknowledgements

I would like to thank first and foremost my two mentors, Prof. Dr. E. J. Fittkau and the late Dr. F. Reiss, who have introduced me to the study of chironomids and the genus *Caladomyia*, and always helped me with good advice and valuable discussions.

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A review of *Cladotanytarsus conversus* (Johannsen) with first records from Europe

(Insecta, Diptera, Chironomidae)

Peter H. Langton & Xavier-François Garcia

Langton, P. H. & X.-F. Garcia (2000). A review of *Cladotanytarsus conversus* (Johannsen) with first records from Europe (Insecta, Diptera, Chironomidae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 199-206.

The male, female, pupa and larva of *Cladotanytarsus conversus* (Johannsen) are redescribed including material from Europe and the Indian subcontinent. An account of the species' known biology is given and its biogeography discussed. Morphologically *C. conversus* appears to form a cline from the Far East to western Europe.

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Introduction

Among chironomids collected by X.-F.G. from the middle river Loire, France, were pupal exuviae which run to *Cladotanytarsus* Pe6 in Langton (1991). Bulk rearing from different substrata has provided pharate as well as partly and fully eclosed adult males and females. Initially the taxon was supposed a new species, but then Dr. F. Reiss (pers. comm. to P.H.L.) determined it as *Cladotanytarsus conversus* (Johannsen), described from specimens collected by A. Thienemann in Sumatra. Two adult male syntypes were borrowed from The Natural History Museum in London (BMNH). Further material from the Thienemann collections in Sumatra has been seen, together with specimens from the Orient and the West Palaearctic housed in the Zoologische Staatssammlung Munich (ZSM).

Standard morphological terminology is followed (Sæther 1980), with additions from Langton (1991), Langton & Armitage (1995), and Spies (1998).

Cladotanytarsus conversus (Johannsen)

Figs 1-6, Tab. 1

Tanytarsus conversus Johannsen, 1932: 543 (adults); Zavrel 1934: 161 (larva, pupa).
Cladotanytarsus conversus (Johannsen); Sublette & Sublette 1973: 416 (generic transfer); Chaudhuri & Chattopadhyay 1990: 167 (adult male).

Type material: 1♂ syntype, INDONESIA: S. Sumatra, Lake Ranau, 21.I.1929, leg. A. Thienemann, on slide labelled '*Tanytarsus (Cladotanytarsus) conversus* type', 'BMNH R4c = 105', and 'BM 1935-180 TYPE' (BMNH);

1 ♂ syntype, as previous except from outlet of Lake Ranau, 20.I.1929, on slide labelled '*Tanytarsus (Cladotanytarsus) conversus* paratype', 'R1f = 104', 'PARATYPE', and 'Dutch E. Indies Sumatra 1928-9 A.Thienemann. det. O.A.Johannsen B.M. 1937-703' (BMNH).

In alcohol (not seen): 1♀ syntype, as male 'type' (BMNH); 1♀ syntype, as male 'paratype' (BMNH).

Note. Johannsen (1932) did not designate a holotype. However, his description of the adult male is obviously based on a single specimen. For example, the stated absence of fore tarsi and sensilla basiconica on the anal point is true for only one of the male syntypes reexamined here. That specimen, illustrated in ventral view by Johannsen (1932, fig. 32), bears a label 'Type', while the second male is labelled 'Paratype'. Nevertheless, even if these labels were attached by Johannsen they are of no relevance to type status according to the Code of Zoological Nomenclature. As the morphology of the so-called 'Type' is not typical for the species (see 'Differential diagnoses'), a lectotype designation validating the label after the fact is considered unwarranted and unproductive.

Further material examined. INDONESIA, Sumatra: 1 pharate adult ♂ + part of 1 pharate adult ♀ on one slide, 2 pharate adult ♀♀ on one slide, 2 pharate adult ♀♀ + 1 pharate adult ♂ + 1 pupal exuviae on one slide, 1 larva, as male 'type' (Lake Ranau, 21.I.1929); 1 pupal exuviae + 1 larva, as male 'paratype' (Lake Ranau outlet, 20.I.1929) (all ZSM).

INDIA: 2♂♂, near Darjeeling, Rangeet River, 250m a.s.l., "Him.2"; XI.1961, leg. L. Brundin; 1♂, Madras State, Cauvery River, Kaveri-cross, 3 mi S. of Mattur, 750ft a.s.l., 12.I.1965 leg. W. L. & J. G. Peters; 1♂, West Bengal, Kalyani, 25.X.1986, leg. S. Chattopadhyay (all ZSM).

THAILAND: 1♂, Ping River, 15 km S. Chiang Dao, 30.XII.1989, leg. H. Malicky (ZSM).

FRANCE: Saumur, river Loire, leg. X.-F. Garcia; 20 pupal exuviae, surface drift, VII.1997; 14 larvae, VI.1998; 25 pupal exuviae, 5 pharate adult ♂♂, 5 pharate adult ♀♀, 15♂♂, 10♀♀, bulk rearing, VII.1998 (Coll. PHL).

GREECE: 1♂, Delphi, 15.VII.1976, leg. W. Bestler; 3♂♂, Karia, 40°00'N, 22°26'E, 750-800 m a.s.l., 20.VII.1974; 1♂, Chios, N. Keramos 38°34'N, 25°56'E, 60 m; 1 adult abdomen, Rhodope Mts, Hauptbach (main stream) No. 6, Prasinada, 24°32'N, 41°20'E, 18.VII. 1991, leg. H. Malicky (all ZSM).

Differential diagnoses. The adult male of *C. conversus* (Johannsen) is characterised by having a long anal point; in other described species of *Cladotanytarsus* the anal point ends abruptly behind the sensillar pit (Spies 1998) or bears a small apical nipple. Johannsen (1932) describes the anal point of *conversus* as a 'slender spur which apparently lacks the longitudinal row of dots an [sic!] the dorsal side'. There appear to be no sensilla basiconica in the anal point sensillar pit of the syntype labelled 'Type', but all other specimens from the Oriental region have 1-3, although they can be small. The specimens from Europe conform to the generic diagnosis in Cranston et al. (1989) by having 5-8 sensilla basiconica. On the only male seen from the material of Chaudhuri & Chattopadhyay (1990), there are only 4 scutellar setae, not 8-10 as stated by those authors, and the anal point bears at least 1 sensillum basiconicum, not "0".

The adult females of most West Palaearctic *Cladotanytarsus* have not been described. According to Sæther (1977), anterolateral spurs on tergite IX occur occasionally in the genus.

The pupa of *conversus* has the long thoracic horn fringed with setae except at tip, as shown by the Nearctic *C. daviesi* Bilyj (Bilyj & Davies 1989), but has more numerous taeniae in the anal lobe fringe (*daviesi* <20). *Cladotanytarsus* Pe6 (Langton 1991) from a river in Portugal is very similar, but smaller and with setae of thoracic horn less extensive; without associated material it is not possible to determine whether it is conspecific.

The *conversus* larva is so far unique in *Cladotanytarsus* by having the first lateral teeth of the mentum equally strongly developed as the median tooth. "*Tanytarsus* type *mancus* N7" (Zvereva 1950) from the Yaroslavl' district and Komi Autonomous Republic in Russia is known only as larva. It is close to *conversus*, as observed by Pankratova (1983) who reproduced Zvereva's figures. The first lateral teeth

Tab. 1. *Cladotanytarsus conversus* (Joh.); parametric differences between eastern, intermediate, and western populations.

	Oriental	eastern Mediterranean	river Loire
Wing length [mm]	1.2-1.62	1.4-1.7	1.6-1.95
Antennal ratio	0.71-0.89	0.98-1.12	1.15-1.38
Anal point sensilla basiconica	0-3	2-5	5-8

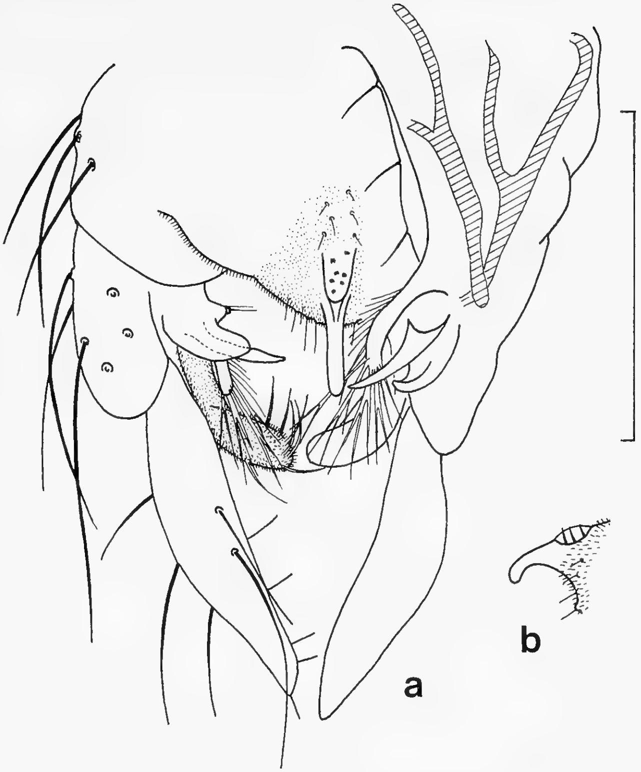

Fig. 1. *Cladotanytarsus conversus* (Joh.); male (river Loire). **a.** Hypopygium. **b.** Anal point, lateral. Scale line: 0.1 mm.

of the mentum, though well developed, are less high than the median tooth, and the mandible has two basal teeth on the inner side.

Description

Adult male.

Colour (fresh material from river Loire). Head olive green or buff with pedicellus, mouth and antennal plume brown. Thorax brownish with darker brown scutal stripes and sutures; anterior and posterior anepisternum II and a triangular area postero-dorsally on the preepisternum olive green or pale brown (giving the effect of two superimposed inverted triangular pale areas on the side of the thorax); legs green with bases of tibiae brown, or all pale brown. Abdomen green or buff with tergites sometimes infuscated posteriorly.

Head. Setae: 8-13 clypeals (n=9), 3-11 temporals (n=7). Antenna: pedicellus 0.69-0.87 times as long as broad; 13th flagellomere 291-512 μm long, AR 0.71-1.22 (n=17). Palpomere lengths 1-5 (in μm): 22-40, 30-62, 50-102, 72-112, 86-160 (n=14). Frontal tubercle papillate, 6-24 μm long (n=8).

Thorax. Setae: 4-10 acrostichals (n=10), 6-10 dorsocentrals, 1 or 2 prealars, 4 scutellars (n=13).

Wing. Length 1.2-1.95 mm (n=11); branches of vein R (except R_{4+5} distally) and Cu without setae, M with setae on apical half; membrane with macrotrichia near wing tip only.

Legs. Segment lengths (in μm) and proportions:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR
p_1	460-680	240-380	560-824	240-416	240-336	168-232	94-120	1.80-2.35
p_2	480-720	360-600	220-352	120-208	80-160	56-104	50-88	0.57-0.70
p_3	530-824	490-800	300-536	200-352	190-304	110-192	70-120	0.61-0.69

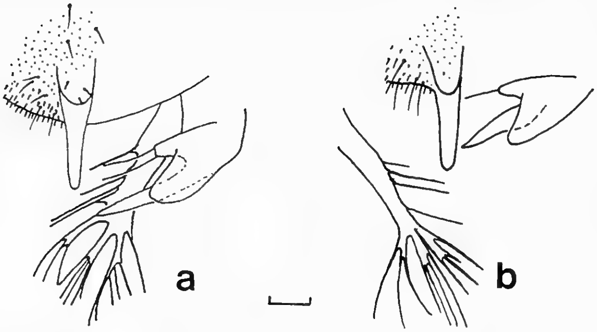

Fig. 2. *Cladotanytarsus conversus* (Joh.); male anal point, superior volsella, digitus and median volsella (Sumatra). **a.** 'paratype'. **b.** 'type'.

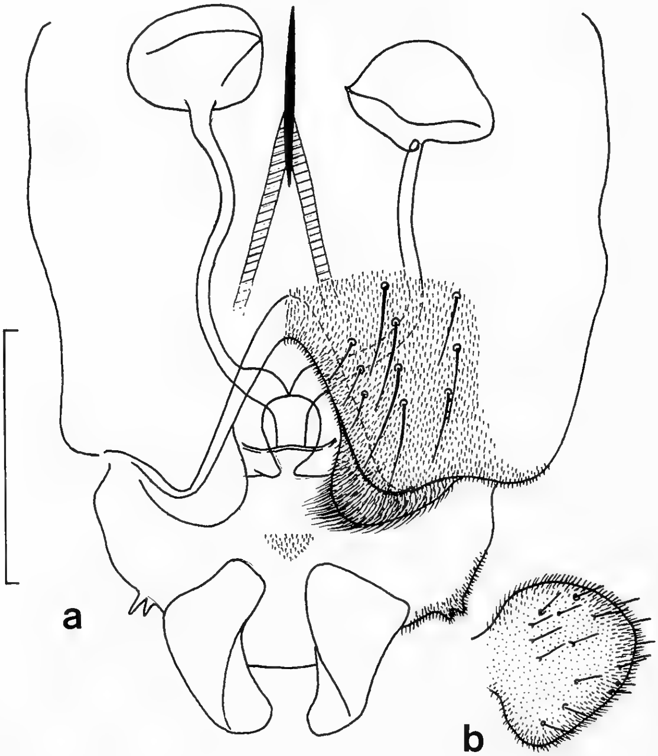

Fig. 3. *Cladotanytarsus conversus* (Joh.); female. **a.** Genitalia ventral. **b.** Cercus, lateral. Scale line: 0.1 mm.

Combs of midtibia each with a short spur, outer comb of hindtibia with a long spur, inner comb without a spur. Tarsus 1 of midleg with 3-6 sensilla chaetica towards apex (n=6).

Hypopygium (Figs 1, 2). Tergite IX tapered to base of anal point. Anal point long, parallel-sided, bluntly rounded at tip, curved downwards; 0-8 sensilla basiconica in sensillar pit (n=13); 4-10 small setae further anteriad on tergite (n=12). Superior volsella small, curved downwards at tip. Digitus long, straight or weakly curved, pointed or blunt at tip. Inferior volsella swollen at tip, bearing 8-15 simple curved setae (n=11). Median volsella with simple and 3-7 flattened, branched setae on apical half (n=12). Gonostylus narrow.

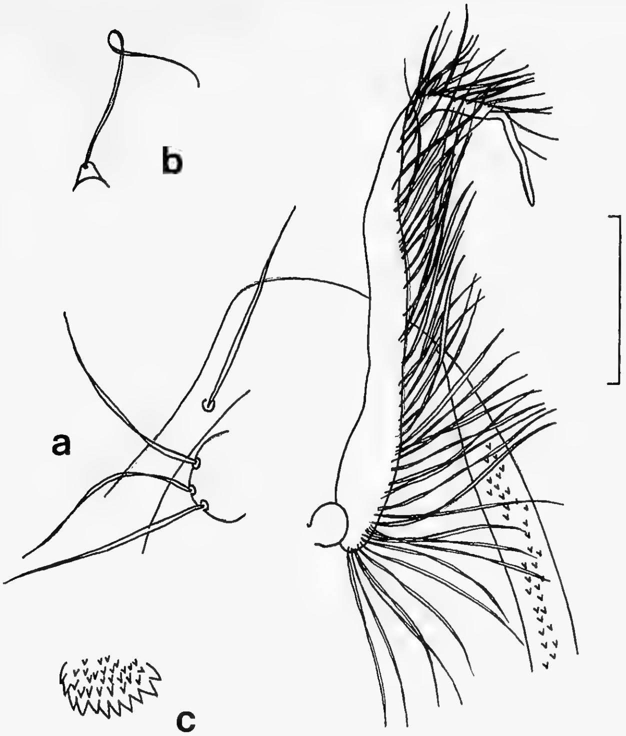

Fig. 4. *Cladotanytarsus conversus* (Joh.); pupa. **a.** Thorax. **b.** Cephalic tubercle and frontal seta. **c.** Comb of segment VIII. Scale line: 1 mm.

Adult female (similar to male except as follows).

Colour. Green; coronal triangle, mouth, median and lateral scutal stripes, a spot on median anepisternum II, and ventral half of preepisternum brown; legs brownish or with only the knees darkened; abdominal tergites from segment III somewhat infuscated.

Head. Setae: 8-16 clypeals, 5-11 temporals (n=7). Antenna: pedicellus 0.80-0.96 as long as broad; flagellomere lengths 1-4 (in μm): 60-80, 38-46, 46-60, 96-140; AR 0.63-0.77 (n=7). Palpomere lengths 1-5 (in μm): 28-32, 32-40, 74-86, 72-80, 122-148 (n=4). Frontal tubercle at most minute, conical.

Thorax. Setae: 8-13 acrostichals, 6-7 dorsocentrals, 1 prealar, 4 scutellars (n=6).

Wing. Length 1.5-1.8 mm (n=4); setae on all veins, macrotrichia over distal third of membrane.

Legs. Segment lengths (in μm) and proportions:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR
p_1	456-540	320-328	570-640	300-320	220-232	150-160	90-104	1.78-2.0
p_2	544-584	496-520	250-288	144-152	96-104	64-72	70-72	0.50-0.58
p_3	568-624	560-640	352-440	240-248	184-200	88-128	72-96	0.58-0.71

Tarsus 1 of midleg with 5-8 sensilla chaetica towards apex (n=3).

Genitalia (Fig. 3). Sternite VIII with caudomesal margins rounded, the median emargination deep, V-shaped or rounded, anteriorly forming a narrow to moderately wide floor to the vagina. Tergite IX rounded, with antero-lateral forked projections and 14-24 setae (n=4). Gonocoxite IX with 1-3 setae (n=4). Cercus 54-70 μm long (n=5). Seminal capsule 48-60 μm long (n=8).

Pupa.

Colour. Transparent; cephalothorax brownish, abdominal armament and apodemes gold.

Exuvial length 2.6-3.6 mm (n=15).

Cephalothorax (Fig. 4a). Cephalic tubercle (Fig. 4b) shallow conical, 20-30 μm high (n=7). Setae:

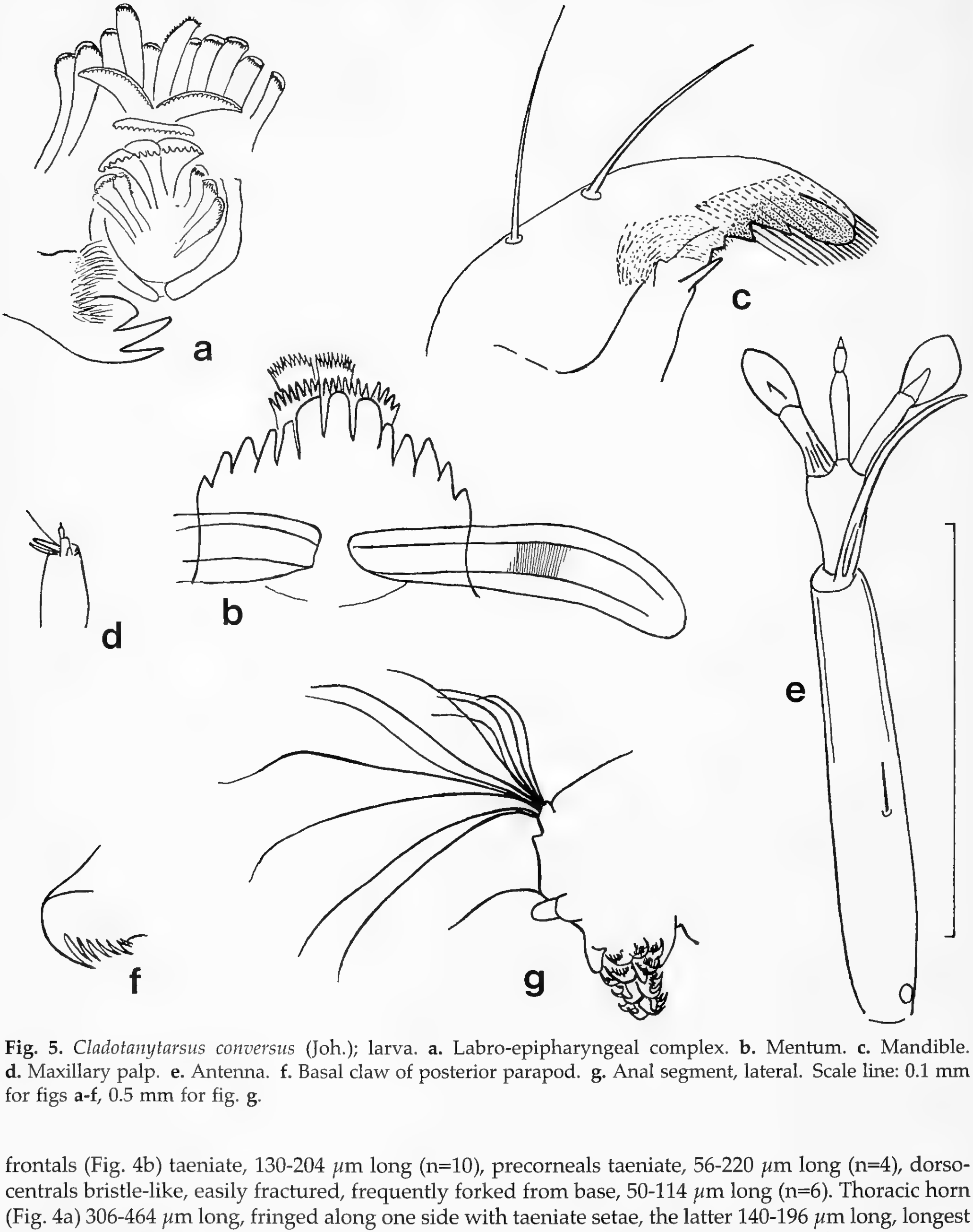

Fig. 5. *Cladotanytarsus conversus* (Joh.); larva. **a.** Labro-epipharyngeal complex. **b.** Mentum. **c.** Mandible. **d.** Maxillary palp. **e.** Antenna. **f.** Basal claw of posterior parapod. **g.** Anal segment, lateral. Scale line: 0.1 mm for figs **a-f**, 0.5 mm for fig. **g**.

frontals (Fig. 4b) taeniate, 130-204 μm long (n=10), precorneals taeniate, 56-220 μm long (n=4), dorsocentrals bristle-like, easily fractured, frequently forked from base, 50-114 μm long (n=6). Thoracic horn (Fig. 4a) 306-464 μm long, fringed along one side with taeniate setae, the latter 140-196 μm long, longest near base, progressively shorter to near horn apex which is bare (n=10). Posterior thoracic mound strongly swollen. Sutural margin with a band of posteriorly directed sharp points medially.

Abdomen. Anterior, longitudinally oval point patches present on tergites II-VI, patches on IV 10-13 points long and $^6/_7$ points wide, ratios (n=13) of respective patch length to that on IV 0.54-0.8: 0.75-1.06: 1.0: 0.75-1.2: 0.5-1.08. Hook row about half the width of segment II, of 97-135 hooks (n=12). Pedes spurii B weak on segment II. Tergite VIII with anterolateral shagreen patches. Sternites I-III finely shagreened, stronger anterolaterally on II. Posterolateral comb of segment VIII (Fig. 4c) 54-82 μm wide, with 6-9 marginal teeth and scattered ventral points. Chaetotaxy (D = dorsal, V = ventral, L = lateral setae; T = taeniae).

Fig. 6. *Cladotanytarsus conversus* (Joh.); map of known distribution.

	I	II	III	IV	V	VI	VII	VIII	IX
D	2	3	5	5	5	5	5	1	
L	0	3	3	3					
T					3	3	3	4/5	21-30 (n=16)
V	1	3	4	4	4	4	4		
T								1	

Larva (n=12).

Conforms to the generic description given in Pinder & Reiss (1983) except for the structure of the mentum. Briefly described and figured by Zavrel (1934).

Colour. Red in life (after Zavrel). Total body length 3.2-4.3 mm.

Head. Length of head capsule 240-288 μm. Ventral postoccipital margin brown. Antennal pedestal 32-50 μm high. Antenna five-segmented (Fig. 5e); lengths of segments (in μm): 82-108; 16-24; 16-28; 7-12, 4-6; AR 1.28-1.91. Mandible (Fig. 5c) 86-112 μm long. Mentum (Fig. 5b) 62-76 μm wide, with 13 teeth, the 3 median equally well developed, the central one paler than the rest. Labrum (Fig. 5a) and maxillary palp (Fig. 5d) unexceptional.

Body. Posterior parapods with basal claws internally long-serrated (Fig. 5f). Anal segment as in Fig. 5g.

Ecology and phenology. Over the investigated reach of the River Loire (from Nevers to Saumur – 300 km), the species is abundant in the main stream and in the flowing parts of connected water bodies. It also occurs in the potamon of the River Cher, tributary of the Loire. It has been found in a current velocity range of 5 cm/s to over 1 m/s, but most frequently between 30 and 60 cm/s. The water temperature range where it occurs is 14 to 26 °C. The larvae are found mainly in mineral substrata, from sand to boulders, mostly in mixed sand and gravel, though a few have been found amongst roots and on floating plants, submerged plants and wood. The guts of mounted specimens are detritus-filled, without diatom frustules.

The larvae from Lake Ranau, south-west Sumatra, were collected from the sandy littoral at 1-1.5 m depth and from the outflow stream (Thienemann 1954). The lake is large, 18 km long with a maximum depth of 229 m. The water temperature down to 10 m was 27 °C and the oxygen concentration >7 mg/l (Thienemann 1930). Lakes with a good wave action tend to have near saturation oxygen concentrations in the littoral, and lotic chironomids are frequently found there. The guts of the two mounted larvae from Lake Ranau are full of diatom frustules.

In the river Loire emergence of adults occurs from mid May to September.

Discussion

The map (Fig. 6) of the known localities for C. *conversus* suggests a relict late Tethyan distribution. Were this substantiated by further records, an interesting question would arise: over 130 million years what prevents a small species easily dispersed by air movements, inhabiting both stagnant and lotic water over its known range and without a restricted food source, from becoming more diffusely distributed? A possible alternative explanation is that the species originated in the Far East and spread westwards in post-Tethyan times, the high mountain ranges of northern Asia preventing a northward movement.

Tab. 1 shows that the Oriental specimens are mostly smaller and have lower antennal ratios and fewer sensilla basiconica on the anal point than those from the river Loire. The material from Greece and Turkey is morphologically intermediate. It appears that the species forms a cline across its range from the Far East to western France, which may be fragmented through the subsequent loss of linking populations.

Acknowledgements

We are grateful to J. Chainey (BMNH) and W. Schacht (ZSM) for lending us specimens from their respective museums, to M. Baehr and M. Spies for their advice on the manuscript, and also to M. Spies for his ready response to requests for information. The senior author cherishes fond memories of Dr. F. Reiss, friend and mentor, who was discussing the status of the Loire specimens with him shortly before his death.

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SPIXIANA	**23**	2	207–210	München, 01. Juli 2000	ISSN 0341-8391

Description of the pupa of *Tanytarsus cuieirensis* Fittkau & Reiss

(Insecta, Diptera, Chironomidae)

Angela M. Sanseverino & Sofia Wiedenbrug

Sanseverino, A. M. & S. Wiedenbrug (2000): Description of the pupa of *Tanytarsus cuieirensis* Fittkau & Reiss (Insecta, Diptera, Chironomidae). – In: Baehr, M. & M. Spies (eds.): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 207-210.

Four species belonging to the *riopreto*-group (Fittkau & Reiss 1973) of the genus *Tanytarsus* are known from Brazil, all of them based on descriptions of adult males. *Tanytarsus cuieirensis* (Fittkau & Reiss) is a member of this group, and in the present work the pupa is described and a diagnosis for pupae of the *riopreto*-group is suggested.

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Für Herrn Reiss

Introduction

Most publications on *Tanytarsus* van der Wulp concern species from the Holarctic region. In the Neotropics this genus is comparatively poorly known, with only 21 species described (Sublette & Sasa 1994, Spies & Reiss 1996, Ekrem & Reiss 1999). Fittkau (1971) presented a list of 437 species of chironomids distributed into 58 genera (33 possibly new), collected with light traps in the Amazon region; in this material *Tanytarsus* was mentioned as a particularly diverse genus (70 species were estimated). In spite of its great diversity, until now only seven species of *Tanytarsus* have been published from Brazil, four of them belonging to the *riopreto*-group described from the Amazon basin (Fittkau & Reiss 1973). *Tanytarsus cuieirensis* Fittkau & Reiss is a member of the *riopreto*-group previously known only as adult male. In the present work the pupa of *T. cuieirensis* is described, and a possible diagnosis for the pupae of this group is presented.

Material and methods

The material was collected by E. J. Fittkau during a research program supported by the Instituto Nacional de Pesquisas da Amazônia-INPA (Manaus, Brazil) and the Max-Planck-Institut für Limnologie (Plön, Germany). The sample was taken from Rio Cuieiras (city of Manaus, Amazonas state, Brazil) using a Brundin drift net, the exuviae and pharate adult males were mounted in Euparal, adults were prepared uncleared. The morphological terminology follows Sæther (1980). For measurements n=1. The term "taenia" was used for any broad flattened seta on the pupa (Langton 1994).

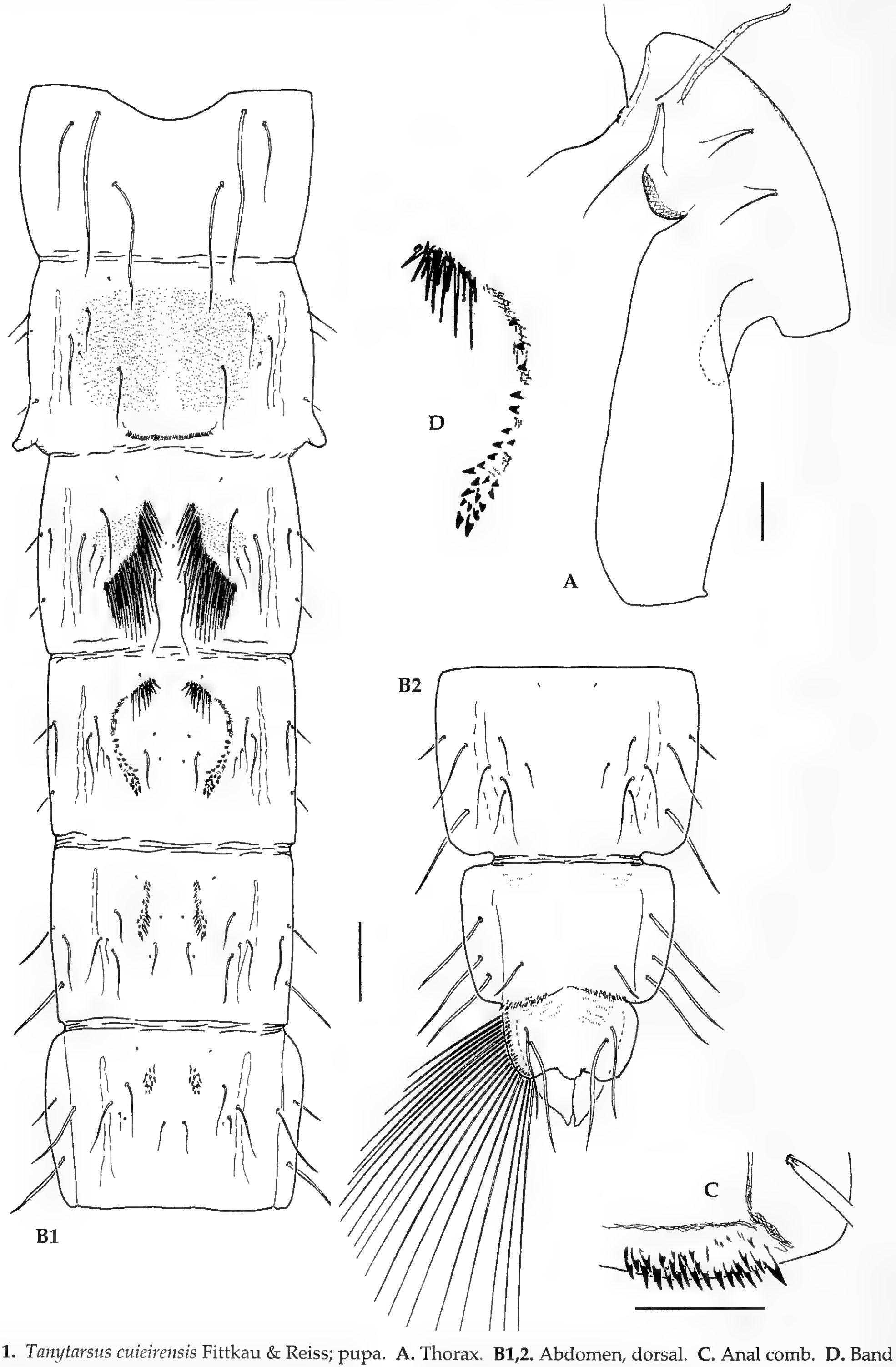

Fig. 1. *Tanytarsus cuieirensis* Fittkau & Reiss; pupa. **A.** Thorax. **B1,2.** Abdomen, dorsal. **C.** Anal comb. **D.** Band of spines on tergite IV. Scales: A, B: 100 μm, C: 50 μm.

Tanytarsus cuieirensis Fittkau & Reiss
Fig. 1

Tanytarsus cuieirensis Fittkau & Reiss, 1973: 14; adult male.

Type material examined (BRAZIL, Amazonas state, leg. E. J. Fittkau): Holotype: ♂, sample A 62, Rio Cuieiras about 50 km above its mouth, at light, 15.XII.1960, on slide in Canada balsam (INPA, Manaus, Brazil). – Paratypes: 2♂♂, sample A 431, Igarapé do Cachoeira (tributary of R. Cuieiras) near Cachoeira da Traíra, at light, 26.XI.1962 (ZSM).

Other material examined. 3 pharate ♂♂, 2 pupal exuviae, sample A 308, BRAZIL, Amazonas state, Rio Cuieiras at mouth of Rio Branquinho, drift net, 21.XII.1961, leg. E. J. Fittkau (ZSM).

Description of pupa

Colour of pupal exuviae pale brown, somewhat darker near lateral muscle marks on tergites.

Cephalothorax (Fig. 1A): Length 667 μm. Frontal apotome rugulose. Frontal setae thin (99 μm), mounted on weakly developed cephalic tubercles; frontal warts absent. Thoracic horn elongate and slender (260 μm), sparsely covered with spinules. Thorax smooth, over median suture rugulose with small spinules and brown coloured. Prealar region inwardly folded. Wing sheath with nose. Thorax setation: 1 median and 1 lateral antepronotal, both thick and long (about 195 μm); 3 precorneals (111, 243, 128 μm), Pc_2 and Pc_3 closer to each other, Pc_2 thicker and longer; 2 pairs of dorsocentrals (95, 88, 56, 111 μm), each pair with one seta thicker and longer.

Abdomen (Figs 1B-D): Total length 1642 μm. Tergites I and VII without shagreen. T II with homogeneous shagreen, sparse medially. T III with a pair of long bands of longer spines and a pair of lateral fields of fine shagreen, bands anteriorly straight, posteriorly curving outward. T IV with bracket-shaped pair of long bands of spines and pigment (Fig. 1D), anterior band section of slender, elongate spines directed to caudal, mid section with short spines directed to median, occasionally sparse or absent, posterior band section with short spines directed to median, lateral and caudal; short spines of mid and posterior section cone-shaped. T V with pair of elongate bands of spines, bands sometimes anteriorly slightly curved. T VI with pair of rounded to elongate patches of spines. T VIII-IX with oral-lateral shagreen. Sternites I, IV-VII without shagreen. S II-III medially with very fine shagreen. S VIII with fine oral-lateral shagreen. Conjunctives and pleura unarmed. Hook row about ⅓ width of segment. Pedes Spurii A absent; Pedes Spurii B present on segment II. Segment VIII with unusually broad postero-lateral comb (60 μm), consisting of numerous small marginal teeth (Fig. 1C). Anal lobe well developed, with complete fringe of ca. 20 taeniae in single row and with two pairs of dorsal taeniae. Abdominal setation: segment I with 3 D, 0 L and 1 V, D-setae taeniate and unusually long; segment II with 4 D, 3 L and 4 V; segments III-VI with 5 D, 3 L and 4 V; segment VII with 5 D, 3 L and 4 V, seta L_3 taeniate and thicker than the other two; segment VIII with 1 D, 3 taeniate L and 2 V. Tergites II-VII with O-setae.

Discussion

Based on the pupa of *Tanytarsus cuieirensis*, we suggest that the presence of 1 median and 1 lateral antepronotal, both thick and long, at least 1 thick and long dorsocentral, at least 2 long taeniate D-setae on tergite I, 3 taeniate L-setae on segment VIII and the shape of the anal comb are probably diagnostic for the pupae of the *riopreto*-group.

Six morphotypes from Amazonas (Ospina-Torres 1992), one from Rio de Janeiro (Stumpp 1993) and one from Rio Grande do Sul state (Wiedenbrug, pers. obs.) have been recorded from Brazil and share the diagnostic characters given above. Sublette & Sasa (1994) considered more than the original four species of *Tanytarsus* as members of *riopreto*-group, some of them with described pupae (*T. clivosus* Reiss, 1972; *T. hamatus* Reiss, 1972; *T. hastatus* Sublette & Sasa, 1994; *T. pandus* Sublette & Sasa, 1994). According to the descriptions, all these species have an anal comb shape different from *T. cuieirensis* and more than three taeniate L-setae on segment VIII; however, the paratypes of *T. clivosus* and *T. hamatus* show two taeniate D-setae on tergite I. In order to confirm if the suggested characters are diagnostic for the group a revision is in preparation, including other life stages and descriptions of new species.

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Tanytarsus aquavolans, spec. nov. and *Tanytarsus nearcticus*, spec. nov., two surface-swarming midges from arctic tundra ponds

(Insecta, Diptera, Chironomidae)

Malcolm G. Butler

Butler, M. G. (2000): *Tanytarsus aquavolans*, spec. nov. and *Tanytarsus nearcticus*, spec. nov., two surface-swarming midges from arctic tundra ponds (Insecta, Diptera, Chironomidae). – In Baehr, M. & M. Spies (eds): Chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 211-218.

Two new species of *Tanytarsus* van der Wulp, 1874 are described from adult specimens collected on coastal tundra ponds in arctic Alaska and Canada. *T. aquavolans*, spec. nov. is an early-emerging, pelagic-swarming midge showing pronounced modifications to wings, legs, male antennae and hypopygium associated with surface mating. *T. nearcticus,* spec. nov. is a later-emerging midge that also swarms and mates on the water surface, but shows modification of only leg and antennal proportions, relative to aerially-swarming species in the *gregarius* group.

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Introduction

In their revision of European *Tanytarsus,* Reiss & Fittkau (1971) proposed the *gregarius* group for two very similar species, *T. gregarius* Kieffer and *T. inaequalis* (Goetghebuer). Characteristic of profundal and sublittoral benthos in oligotrophic to eutrophic lakes of central Europe, these have remained the only members of this species group (Cranston et al. 1989). During studies of Alaskan arctic tundra ponds near Barrow (Butler et al. 1980, Butler 1980a, b) and Prudhoe Bay (Butler 1982), two new species were discovered which also belong in or near the *gregarius* group. Because they were among the most abundant of over 20 chironomid taxa emerging from the Barrow ponds, these two species became a focus of my systematic work at the Zoologische Staatssammlung in 1980-81, under the tutelage of Drs F. Reiss and E. J. Fittkau. Dr. J. E. Sublette (Tucson, Arizona) subsequently provided additional material of both species collected from the Barrow ponds in earlier years, and specimens of one species from two other arctic localities. Here I describe the adults of *Tanytarsus aquavolans,* spec. nov. and *Tanytarsus nearcticus,* spec. nov., and comment on some morphological, ecological, and behavioral characteristics of these arctic midges.

Methodology

Locations of the ponds sampled are described by Butler (1980b, 1982). Large numbers of adults and pupal exuviae of both species were collected with emergence traps at the Barrow sites (Butler 1980a,b). Because many trapped specimens were recently eclosed and thus not fully hardened, most measure-

Fig. 1a. *Tanytarsus aquavolans*, spec. nov.; adult male. Hypopygium, dorsal (scale: 100 μm).

ments were made on specimens collected by dipping adults from the pond surface during swarming, or by rearing. Some individual life stage associations were obtained by laboratory rearing of larvae or pupae at 10 °C. All material was preserved in 70 % ethanol until mounted in Euparal. Measurements were made according to Schlee (1968), and are presented as means, followed by ranges and numbers of measurements as applicable. Terminology follows Sæther (1980). Abbreviations used below are: CNC = Canadian National Collections (Ottawa, Ontario); IBP = International Biological Programme; USNM = United States National Museum (Washington, D.C.); ZSM = Zoologische Staatssammlung Munich (Germany).

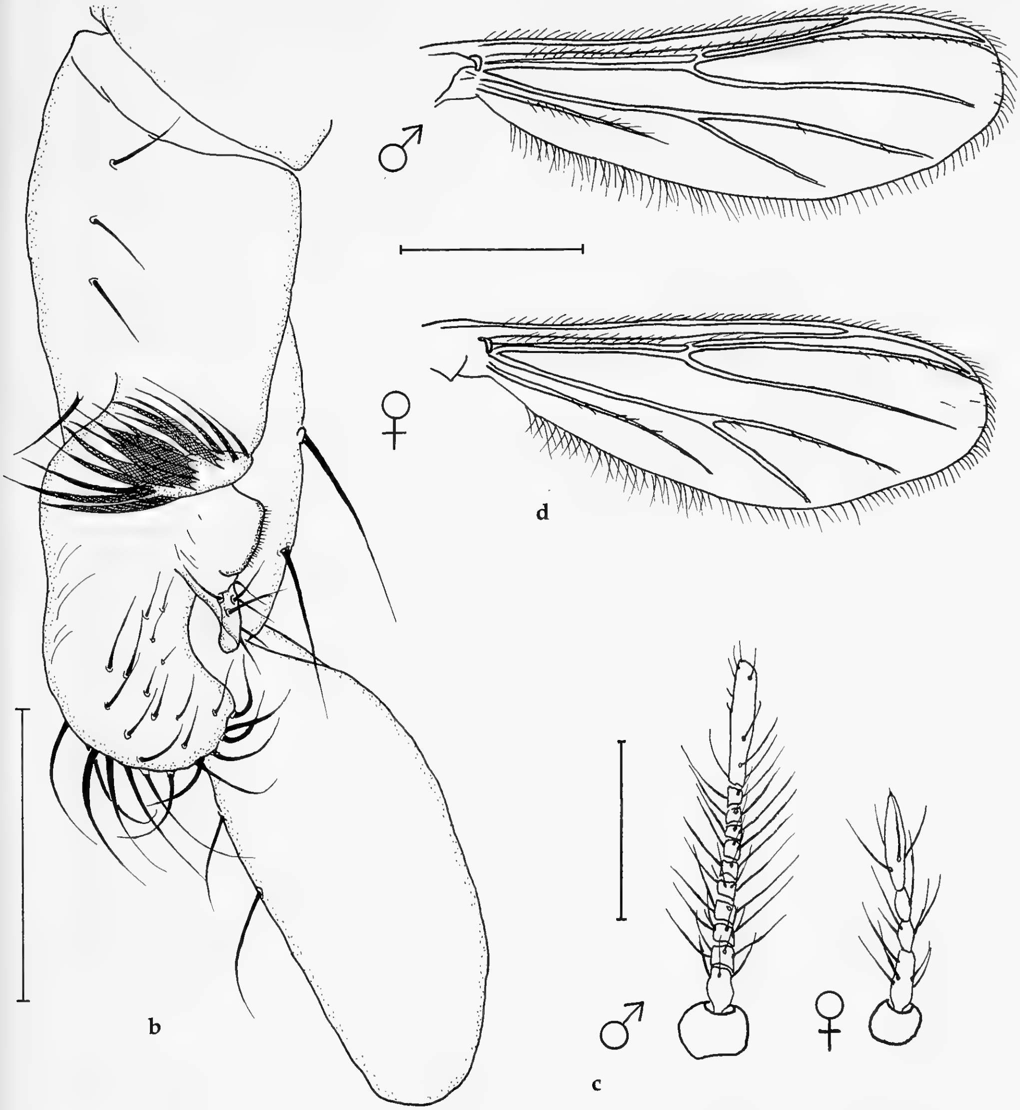

Fig. 1b-c. *Tanytarsus aquavolans*, spec. nov.; adult male. **b.** Gonocoxite/gonostylus and appendages, median aspect (scale: 100 μm). **c.** Male and female antennae (scale: 25 μm). **d.** Male and female wings (scale: 50μm).

Tanytarsus aquavolans, spec. nov.
Fig. 1

"*Tanytarsus gregarius* gr.-sp. 2" Butler 1980a; Butler et al. 1980; ecology and phenology.
"*Tanytarsus* sp. 1" Butler 1980b; life history and production ecology.

Type material. Holotype: 1 associated Pex+adult ♂ (on two slides, in Euparal), USA, Alaska, Barrow, IBP site Pond J, 23.VI.1977, leg. M. Butler (USNM). – Paratypes (all from USA, Alaska; slide-mounted in Euparal or balsam): 10 adult ♂♂ on one slide, 3 adult ♀♀ on one slide, as holotype except 25.VI.1977 (USNM); 4 adult ♂♂ on one slide, Prudhoe Bay, Loon Pond (70°23'N, 148°31'W), 28.VI.1979 (ZSM); 2 adult ♂♂, 2 adult ♀♀, Alaska, Barrow, Pond J, 3.VII.1972, leg. D. A. Bierle, slides No. CH236.10 to 13 (CNC); 1 adult ♀, as previous except 4.VII.1972, slide No. CH249.1 (CNC).

Diagnosis. *Tanytarsus aquavolans*, spec. nov. is easily recognized by the unique hypopygium in combination with several pronounced morphological reductions. The male antennal flagellum is shortened and bears short setae; both sexes have short palps, legs and wings. The rarity of setae in the wing cells is characteristic. Important diagnostic characters of the male hypopygium include its generally robust form, lack of median setae on the anal tergite, lack of microtrichia or (usually) spine groups between anal point crests, lack of a digitus, and division of the superior volsella into two distinct portions with the proximo-dorsal surface bearing microtrichia. Among described Holarctic *Tanytarsus*, the new species is most similar to members of the *lugens*- or *gregarius* groups (after Reiss & Fittkau 1971), but shows too many deviating characters for group placement to be productive at this time.

Etymology. The name reflects the pelagic swarming behavior of this surface-mating species.

Description

Adult male.

Size. Total length 2.5 mm (2.4-2.7, n=5).

Coloration. Greenish-brown in life. Alcohol-preserved specimens light brown with chestnut-brown scutal bands (separated), postnotum, and preepisternum. Abdomen, legs, and scutellum uniformly light brown.

Head. Frontal tubercle large, conical (length 21-46 μm, n=7). Palpomere lengths 2-5 (in μm) 48, 93, 73, 116 (n=8).

Antenna (Fig. 1c). Highly reduced relative to generic standard. Distal flagellomeres fused so that only 9-12 segments can be distinguished, thus AR cannot be measured consistently. Total length of flagellum 0.47 mm (0.43-0.51, n=8). Length of longest flagellar seta 130 μm.

Wing (Fig. 1d). Length 1.48 mm (1.41-1.67, n=16), VR=0.96 (0.94-0.98, n=8). Setae present on veins R_1, R_{4+5}, Cu, and An; absent from cells except occasionally at distal margin of r_{4+5}.

Legs. Segment lengths (in μm; n=1) and proportions:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR
p_1	750	550	600	270	210	150	120	1.12 (1.08-1.23, n=15)
p_2	720	600	250	160	120	80	80	0.41 (0.38-0.42, n=12)
p_3	790	690	360	220	200	110	100	0.52 (0.49-0.53, n=12)

Foreleg lacking beard, bearing single tibial spur (length 26 μm). Mid and hind tibia with two combs, each bearing a single spur. Pulvilli present.

Hypopygium (Figs 1a,b). Of generally robust appearance. Anal tergite lacking lateral teeth and median setae. Anal tergal bands V-shaped, not parallel or connected. Anal point broad, with anal point crests reaching to the rounded tip. No microtrichia, and generally no spine groups between crests (1 specimen in 24 examined had a single spine between crests, 24 μm anterior of anal point tip). Each side of anal point bearing 8-10 setae. Superior volsella with two distinct portions (Figs 1a,b): basal portion inflated, entire dorsal surface densely covered with microtrichia and supporting 6-12 dorsal and lateral setae; distal portion lacking microtrichia, but with 7-12 median, dorsal and lateral setae. Digitus lacking. Median volsella projecting postero-ventrally and bearing many subulate and foliate lamellae (Figs 1a,b). Inferior volsella completely covered with microtrichia, distal ⅓ curving to dorsal and bearing long, curved setae (Fig. 1b).

Adult female.

Size. Total length 2.1 mm (1.7-2.8, n=5).

Coloration. Same as male.

Antenna as in Fig. 1c.

Wing (Fig. 1d). Length 1.50 mm (1.33-1.65, n=9). VR=0.91 (0.86-0.94, n=6). Shape and setation similar to male.

Legs. Segment lengths (in μm; n=1) and proportions:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR
p_1	630	500	580	260	200	130	100	1.15 (1.13-1.16, n=6)
p_2	660	600	250	150	110	80	80	0.42 (0.40-0.45, n=6)
p_3	790	720	380	220	210	100	90	0.52 (0.41-0.55, n=6)

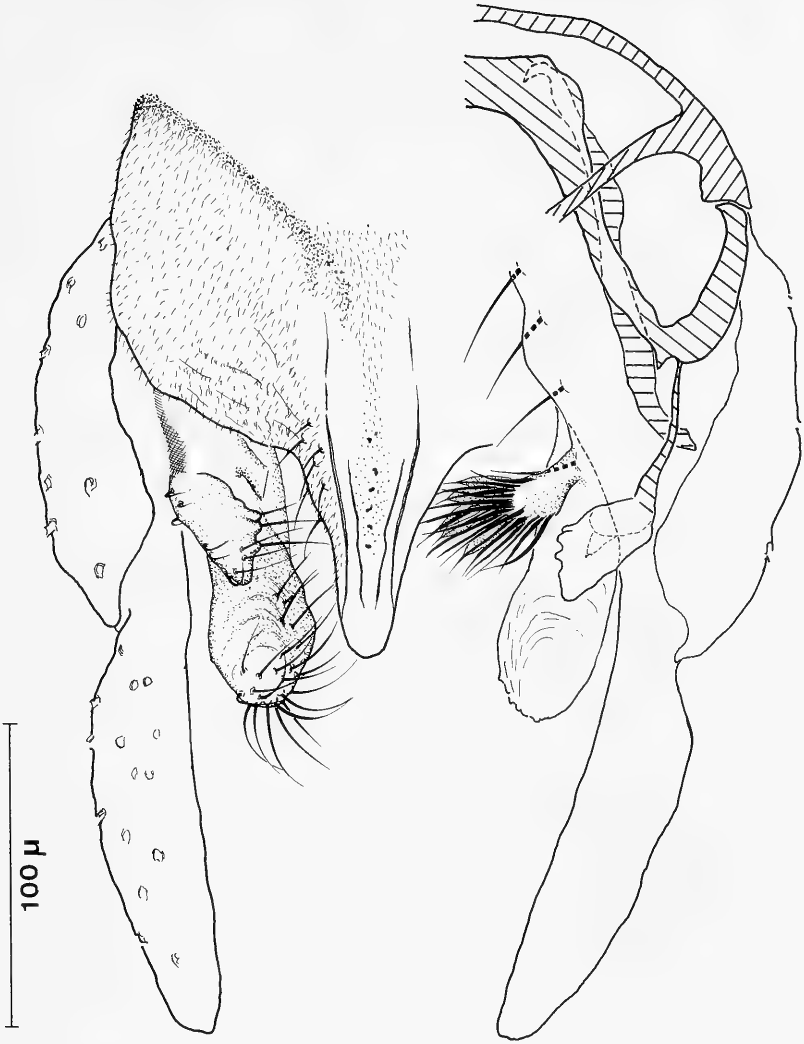

Fig. 2a. *Tanytarsus nearcticus,* spec. nov.; adult male. Hypopygium, dorsal (scale: 100 µm).

Tanytarsus nearcticus, spec. nov.
Fig. 2

"*Tanytarsus inaequalis*" Butler 1980a; Butler et al. 1980; ecology and phenology.
"*Tanytarsus* sp. 2" Butler 1980b; life history and production ecology.

Type material. Holotype: 1 individually associated Lex+Pex+adult ♂ (on 1 slide, in Euparal), USA, Alaska, Barrow, IBP site Pond X, 27.VII.1976, leg. M. Butler (USNM). – Paratypes (all slide-mounted in Euparal or balsam). CANADA: adult ♂, labeled "Chesterfield NWT 9-VIII-1950 J. R. Vockeroth CNC 9"; ♂ hypopygium, labeled "Coral Harbour Southampton Is. 20-VII-1948 G. E. Shewell CNC 573-1136" (CNC); USA (Barrow, Alaska, leg. M. Butler): 1 Pex+adult ♂ (on 2 slides), Pond G, 17.VII.1976; 1 Lex+Pex+adult ♀ (on 1 slide), as holotype except Pond G; 1 adult ♂, Pond Q, 14.VII.1977; at USNM. 1 Lex+Pex+adult ♂ (on 1 slide), Pond X, 14.VII.1976; 1 Lex+Pex+adult ♀ (on 1 slide), Pond G, 27.VII.1976 (ZSM); 1 adult ♂, Barrow, Pond J, 10.VII.1972, No. CH230.4; 1 adult ♂, 3 adult ♀♀, 11.VII.1972, No. CH450.1 to 3 and CH231.1, leg. D. A. Bierle (CNC); 15 adult ♂♂ on 12 slides (No. 563-102, 104, 162, 171, 174, 179, 187, 200, 202, 203, 204), Cape Thompson, Ogotoruk Cr., pond 4, Cl-583 #6064, 4.VIII.1961, leg. J. J. Davis (CNC).

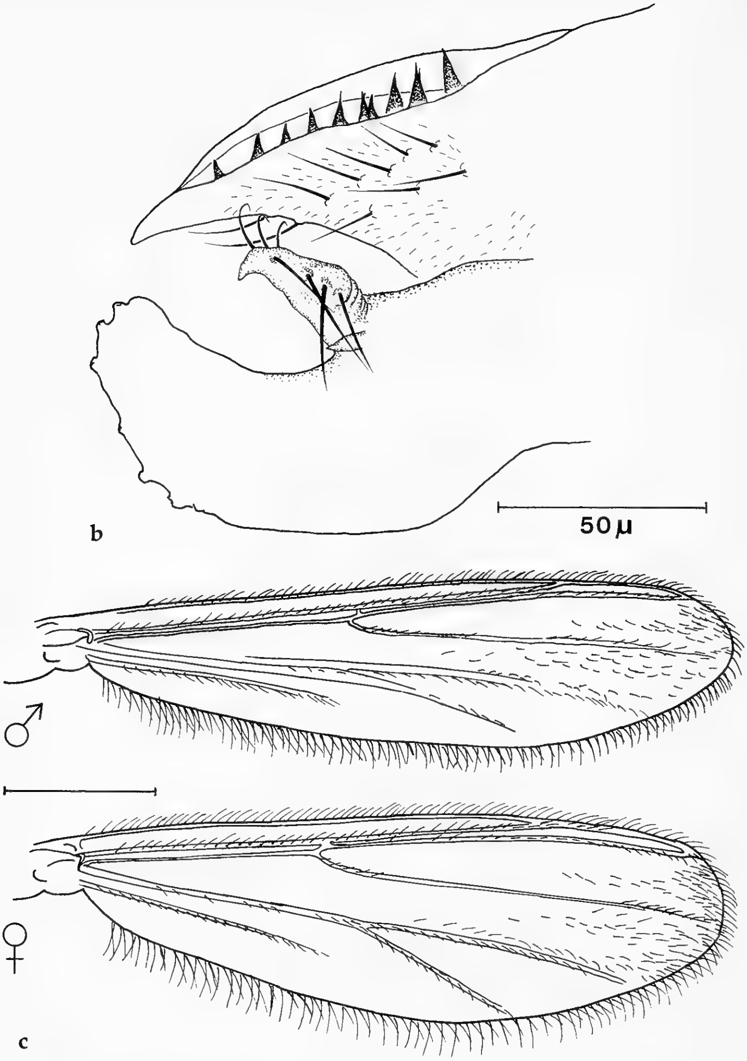

Fig. 2b-c. *Tanytarsus nearcticus,* spec. nov.; adult male. **b.** Anal point, superior and inferior volsella, median aspect (scale: 100 μm). **c.** Male and female wings (scale: 50 μm).

Diagnosis. *Tanytarsus nearcticus,* spec. nov. is very similar to *T. inaequalis* (Goetghebuer), and the two may be considered sister-species. Adult male *T. nearcticus* from four locations in arctic Alaska and Canada differ from *inaequalis* material from several German lakes (Großer Plöner See, Stechlinsee, Chiemsee) by the following characters:

The most notable difference is in the antennal ratio: *T. nearcticus* = 0.60-0.79, *inaequalis* = 1.54-1.73 (Reiss & Fittkau 1971). *T. nearcticus* is slightly smaller, with WL=1.8-2.2 mm, *inaequalis* WL=2.5-3.0 mm.

Fore leg ratio: *T. nearcticus* = 1.53-1.69, *inaequalis* = 1.93-2.0 (Reiss & Fittkau 1971).

Hypopygium: See *T. inaequalis* figures in Reiss & Fittkau (1971) and Pinder (1978). In both species, usually 3 long, straight setae project from the median margin of the superior volsella. Most *inaequalis* specimens have a gap between the basal and the two more distal setae, usually with the proximal seta originating farther ventral than the other two. In *T. nearcticus,* the 3 setae are usually in a close, evenly-spaced group, often with the central seta inserting dorsally of the other two. The broad, smooth, spatulate tip of the anal point in *T. nearcticus* contrasts with the narrower tip of *inaequalis,* which usually shows some ventral granulation. The sum of these differences is considered sufficient for species separation, in analogy to similar such "dual species" pairs of which one member shows surface mating adaptations (Wülker 1959).

Etymology. The name should not be taken to imply restriction of the species to North America. It seems likely that *T. nearcticus* will also be found in the northern Palaearctic when similar habitats are investigated there.

Description

Adult male.

Size. Total length 2.7 mm (2.5-2.9, n=7).

Coloration. Light green in life. Alcohol-preserved specimens translucent yellow with chestnut-brown scutal bands (separated), posterior pronotum, and preepisternum.

Head. Frontal tubercle finger-like; length 14-23 μm, width 8-12 μm (n=6). Palpomere lengths 2-5 (in μm) 46, 139, 121, 175 (n=7).

Antenna. AR 0.72 (0.60-0.79, n=12).

Wing (Fig. 2c). Length 1.99 (1.71-2.16, n=10). VR=0.87 (0.86-0.90, n=6). Setae on veins R_{4+5} and M_{1+2}, and in cells r_{4+5} and m_{1+2}.

Legs. Segment lengths (in μm; n=1) and proportions:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR
p_1	1010	650	990	510	460	320	160	1.57 (1.51-1.65, n=9)
p_2	960	870	410	280	220	160	120	0.47 (0.44-0.50, n=11)
p_3	1100	1070	650	410	360	230	130	0.60 (0.56-0.62, n=12)

Foreleg lacking beard; fore tibia bearing single spur (length 28 μm). Mid and hind tibia with two combs each bearing a long spur. Pulvilli present.

Hypopygium (Figs 2a,b). Anal tergite lacking lateral teeth and median setae. Anal tergal bands V-shaped, meeting weakly. Anal crests arise near confluence of anal tergal bands and converge with margin of anal tergite anterior to tip anal of point. Sensillar pit (Spies 1998) with 6-13 (n=9) spine groups (= sensilla basiconica) and small, erect microtrichia; a few spine groups may also be present anterior to the sensillar pit proper. Tip of anal point spatulate and devoid of punctation, granulation, or microtrichia. Each side of anal point bearing 7-10 setae. Superior volsella inversely drop-shaped with tip projecting ventrally; bearing 3-4 long, straight setae projecting medially from inner margin, plus 6-9 smaller dorsal and lateral setae (Figs 2a,b). Digitus a small finger arising from medial side of base of superior volsella (Figs 2a,b). Median volsella projecting postero-ventrally, bearing 6-8 foliate lamellae and numerous bristle-like setae (Fig. 2a). Inferior volsella completely covered with microtrichia, distal ⅓ bearing long, curved setae and curving to dorsal; distal-median margin in dorsal aspect usually with convex or angular projection, giving the volsella a club-shaped appearance.

Adult female.

Size. Total length 2.2 mm (1.8-2.4, n=7).

Coloration. Same as male.

Wing (Fig. 2c). Length 2.19 (2.00-2.54, n=6). Relatively broader than in male.

Legs. Segment lengths (in mm; n=1) and proportions:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR
p_1	790	510	860	450	360	250	130	1.62 (1.53-1.69, n=4)
p_2	820	750	380	240	190	120	100	0.51 (0.49-0.53, n=4)
p_3	940	960	610	400	320	190	120	0.65 (0.64-0.66, n=4)

Ecology, behavior, and phenology

In the shallow tundra ponds at Barrow, Alaska, *Tanytarsus aquavolans* was most abundant in the fibrous, peaty sediments of the emergent *Carex* zone near the pond margins. *T. nearcticus* was common in the softer, depositional sediments toward the pond centers (Butler 1980b, Butler et al. 1980). Both species were semivoltine in one pond where populations were studied in detail. Adults of both species are pelagic swarmers, a phenomenon reported for a number of high-latitude, winter-emerging, or marine chironomids (see Armitage 1995). Of the two species, *T. aquavolans* shows the more pronounced modification of palps, wings, legs, male antennae, and hypopygium), but the male antenna of *T. nearcticus* also shows reduction compared to related species. Similar modifications have been described for many, taxonomically diverse chironomid species (e.g. Wülker 1959). These parallel developments are generally considered adaptations to pelagic swarming or surface mating, or reductions of structures no longer beneficial under strong selection pressure against flight, for example in habitats subjected to persistent high winds.

Butler (1980a) reported *T. aquavolans* among the earliest, and *T. nearcticus* as the very last species to appear during the 3-4 week chironomid emergence season at the Barrow tundra ponds. Highly synchronous emergence (5-6 days per species) means that congeners are temporally isolated within each pond. Not only is reproductive isolation thus assured, but interference competition with other pelagic-swarming midges for the limited water surface is minimized by this temporal succession of emergence periods (Butler 1980a,b).

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Tanytarsus usambarae, spec. nov. from West Usambara Mts., Tanzania, East Africa

(Insecta, Diptera, Chironomidae)

Elisabeth Stur & Torbjørn Ekrem

Stur, E. & T. Ekrem (2000): *Tanytarsus usambarae,* spec. nov. from West Usambara Mts., Tanzania, East Africa (Insecta, Diptera, Chironomidae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/2:** 219-223.

Tanytarsus usambarae, spec. nov. from West Usambara Mts. is described and figured as male imago. In the Usambaras, the species co-exists with the closely related *Tanytarsus luctuosus* Freeman. Both have a peculiarly shaped median volsella which separates them from all other African *Tanytarsus* species. *T. usambarae* does not fit well into Palaearctic species group concepts. The genus diagnosis of *Tanytarsus* is emended to include species with a scutal tubercle. *Tanytarsus saetosus* Lehmann is transferred to the genus *Neostempellina* Reiss.

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Introduction

Tanytarsus v. d. Wulp, 1874, is well represented in the Afrotropical region. 24 species are listed in the Catalogue of the Diptera of the Afrotropical region (Freeman & Cranston 1980), five more were described by Lehmann (1979, 1981), an additional six by Ekrem (1999b), while Ekrem & Harrison (1999) added one more from East Africa. On the other hand, Ekrem (1999a) transferred *Tanytarsus bukavus* Lehmann, 1979, and *Tanytarsus congolensis* Lehmann, 1979, to *Cladotanytarsus* Kieffer, and Ekrem & Reiss (1999) transferred *Tanytarsus abnormis* Lehmann, 1981, to the genus *Neostempellina* Reiss. Examination of the type material of *Tanytarsus saetosus* Lehmann, 1981, deposited in the Zoologische Staatssammlung München (ZSM), revealed that this species also belongs to the genus *Neostempellina.* Thus, excluding *Neostempellina saetosa,* comb. nov. and including *T. usambarae,* spec. nov., a total of 33 *Tanytarsus* species are so far known from the Afrotropical region.

Material, methods and morphology

The terminology follows Sæther (1980) with the additions and corrections given by Sæther (1990). The term "shoulders" is used for the posteromarginal lobes of the male anal tergite. The mounting procedure is according to Sæther (1969). Measurements are taken according to Schlee (1966) with the additions given by Ekrem (1999b), and presented as ranges followed by the mean.

During the work of reviewing Afrotropical *Tanytarsus,* the junior author examined the type material of *Tanytarsus luctuosus* Freeman, deposited at the Natural History Museum (London). Neither Freeman (1958) nor Lehmann (1979) described *T. luctuosus* to have a scutal tubercle, but examination of the types and of Lehmann's material from Zaïre (now the Democratic Republic of Congo) revealed that *T. luctuosus* possesses a well developed scutal tubercle. Since absence of this structure has been regarded as diagnostic for the genus *Tanytarsus* (Cranston et al. 1989) we choose to emend the genus diagnosis to also include species with a scutal tubercle.

Tanytarsus usambarae, spec. nov.

Figs 1A-E

Types. Holotype: ♂, Tanzania, W. Usambara Mts, Mazumbai, Kaputu stream, 1420 m a.s.l., Malaise trap, 14.XI-3.XII.1990, leg. ZMBN's Tanzania expedition (ZMBN Type No. 352). – Paratypes: 4♂♂, as holotype. All slide-mounted in Canada balsam, deposited at Museum of Zoology, University of Bergen, Bergen, Norway. (ZMBN)

Etymology. The species is named after its type locality, the Usambara Mts.

Diagnostic characters. The new species differs from other *Tanytarsus* species by the following combination of characters in the adult male: broad, transverse, brown pigmented bands on tergites II, III, VI and VII; tergites I, IV and V pale yellowish; tergites VIII and IX brown; wing hairy, carrying setae on all veins except M, and more than 25 setae in cell m; frontal tubercles minute, only visible as two white dots; hypopygium with 4-6 median setae on anal tergite, anal point with 8-10 spines between well developed anal crests; superior volsella with posterior tubercle, more than 8 dorsal setae and numerous dorsolateral microtrichia, digitus absent; median volsella large with numerous long, slender, simple lamellae reaching beyond apex of inferior volsella.

Description

Male imago (n = 5 if not otherwise stated).

Total length: 2.7-3.0 mm, 2.9 mm. Wing length 1.55-1.66 mm, 1.59 mm. Total length/wing length 1.7-1.9, 1.8.

Colouration. Cleared specimens with light brown head, darker brown antennae and eyes; thorax (Fig. 1E) with dark brown patches anteriorly on scutum, laterally under parapsidal suture, on median anepisternum II, on posterior anepisternum II, on epimeron II, on postnotum, and on preepisternum; antepronotum and scutellum light brownish; legs and halteres light brown; abdominal tergites II, III, VI and VII with broad, transverse, dark band; tergites I, IV and V pale yellowish; tergites VIII and IX brown.

Head. Antennae normally developed, AR 0.92-1.03, 0.95. Ultimate flagellomere 454-522 μm, 476 μm long. Longest antennal seta about 480 μm long. Distance between eyes about 150 μm. Minute frontal tubercles only visible as two white dots. Temporal bristles 10-11; including 3 inner verticals, 3-4 outer verticals and 3-4 postorbitals. Clypeus semicircular, 72-86 μm, 79 μm long with 9-14 setae. Tentorium 104-126 μm, 113 μm long, 29-32 μm, 31 μm wide at sieve plate. Stipes 120-126 μm, 124 μm long, 18-22 μm, 19 μm wide. Cibarial pump 47-48 μm wide. Lengths of palpomeres I-IV (in μm): 36, 36-47, 148 (n = 1), 122 (n = 1), fifth palpomere missing.

Thorax (Fig. 1E). Scutal tubercle absent. Dorsocentrals 8-11, acrostichals 22-25, prealars 1-2, scutellars 6-8. Halteres with 6-7 setae.

Wing. VR 1.16-1.20, 1.18. Sc bare, R with 36-42, 32 setae, R_1 with 28-37, 32; R_{4+5} with 52-61, 55 setae; M bare; M_{1+2} with 70-80, 76 setae; M_{3+4} with 34-40, 38; Cu with 19-27, 22; Cu_1 with 23-25, 24; PCu with 56-71, 63 and An with 31-38, 35 setae. Cell m with 28-45 setae, r_{4+5} with more than 200, m_{1+2} with more than 250 including on false vein, m_{3+4} with about 150 and cu + an together with 250-290 setae.

Legs. Spur on front tibia 32-36 μm, 35 μm long including scale. Spurs of middle tibia 32 μm long including 14-18 μm long comb and 22-29 μm long including 12-18 μm long comb; of hind tibia 36-43 μm long including 18 μm long comb and 32-36 μm long including 18 μm long comb. Length of fore femur 720-763 μm, 743 μm; fore tibia 317-364 μm, 344 μm; mid femur 720-760 μm, 737 μm; mid tibia 590-637 μm, 615 μm; hind femur 738-810 μm, 774 μm and hind tibia 774-814 μm, 795 μm. All tarsal segments missing.

Hypopygium (Figs 1A-D). Tergite IX 95-107 μm, 99 μm long with 4-6 median setae, 16-20 apical setae; apical margin with small lateral shoulders; lateral teeth not visible; microtrichia free area between anal crests. Anal point 45-61 μm, 57 μm long, 14-16 μm wide at base and 8-9 μm wide at apex. Anal point with 8-10 spines between well developed anal crests. Anal tergite bands caudally curved, almost

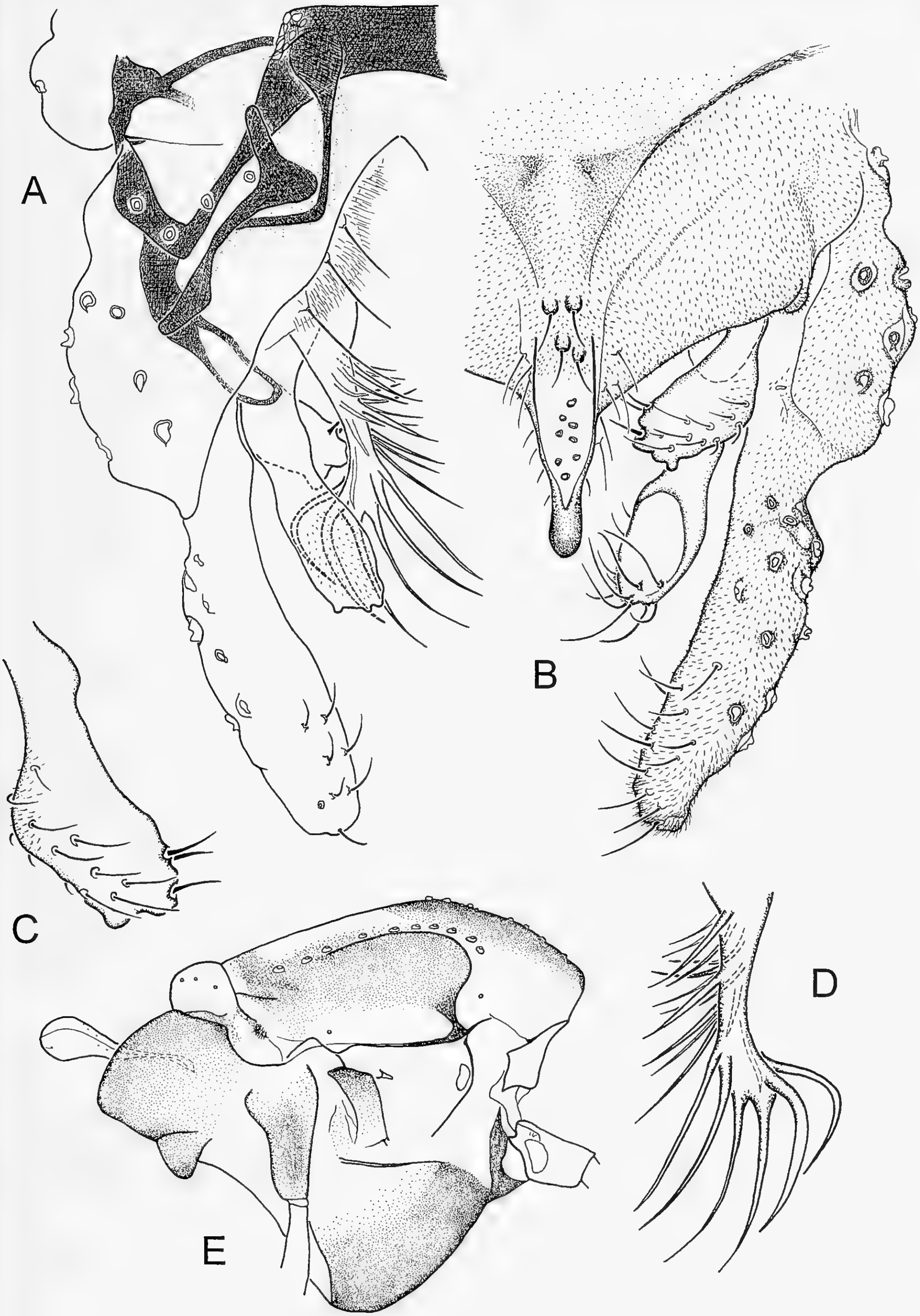

Fig. 1. *Tanytarsus usambarae,* spec. nov. **A.** Hypopygium ventral view. **B.** Hypopygium dorsal view. **C.** Superior volsella. **D.** Median volsella. **E.** Thorax.

reaching anal point, with median elongations almost connecting the tergite bands. Transverse sternapodeme 50-75 μm, 59 μm long; phallapodeme forked, 86-109 μm, 96 μm long, anterolateral branch being shorter than anteromedian branch. Gonocoxite 100-143 μm, 118 μm long, gonostylus sausage-shaped, 89-114 μm, 104 μm long. Superior volsella more or less oval with small tubercle on posterior margin (Fig. 1C); bearing 9-12 weak dorsal setae and 3 median setae, the apical 2 stronger than the basal one; dorsolateral microtrichia present; digitus absent. Median volsella (Fig. 1D) 82-95 μm, 88 μm long including about 20, 20-45 μm long, simple lamellae reaching beyond apex of inferior volsella. Inferior volsella, club-shaped, comparatively straight, 70-89 μm, 78 μm long, with strong apical setae. HR 1.02-1.25, 1.13; HV 2.54-2.84, 2.68 (n = 3).

Systematics

African *Tanytarsus* species generally do not conform well to European species group concepts (Ekrem 1999b), and although *T. usambarae*, spec. nov. shares some characteristics with the species of the *T. lugens* and *T. gregarius* groups, it does not fit the group diagnoses. Based on the adult male morphology, *T. usambarae* keys to the *T. lugens* group when the few microtrichia between the anal crests are ignored (Cranston et al. 1989). When regarded as possessing a field of microtrichia between the anal crests, *T. usambarae* keys to the *T. gregarius* species group. However, although the microtrichia do extend to in between the anal crests, they do not constitute a field as seen in *T. gregarius* Kieffer and *T. inaequalis* Goetghebuer. We therefore regard a field of microtrichia not to be present between the anal crests.

The new species differs from the group diagnosis of the *T. lugens* group (Reiss & Fittkau 1971) in having AR < 1.4, a smooth anal point apex, and a particularly large median volsella with numerous simple lamellae. *T. usambarae*, spec. nov. shares these characters with its probable sister species, *T. luctuosus*, from which it differs only in having a posterior tubercle on the superior volsella, pale yellowish abdominal tergites I, IV and V, and in lacking a scutal tubercle. *T. usambarae* and *T. luctuosus* co-exist in the West Usambara Mts., and both were found in the material collected by the same Malaise trap.

Habitat

The type locality of *T. usambarae* is situated close to Mazumbai Forest Reserve on Kwagoroto Hill in the West Usambara Mts. Kaputu stream originates at about 1860 m a.s.l. and runs through almost undisturbed rain forest before it empties into a marshy area at about 1400 m (Andersen & Johanson 1992). The type sample was taken at an altitude of about 1420 m. Here the stream varies from 0.5-2 m in width, and is 10-20 cm deep. The current is regarded as moderate (Andersen & Johanson 1992). The bottom substrate is varied with stones, fine sand and mud and contains some plant litter. At the time of collection, the water temperature varied between 14.6 °C and 17.6 °C, and the pH was measured to be 5.9.

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A review of Oriental *Rheotanytarsus* Thienemann & Bause, with descriptions of some new species

(Insecta, Diptera, Chironomidae)

Rosina A. K. Kyerematen, Trond Andersen & Ole A. Sæther

Kyerematen, R. A. K., T. Andersen & O. A. Sæther (2000): A review of Oriental *Rheotanytarsus* Thienemann & Bause, with descriptions of some new species (Insecta, Diptera, Chironomidae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/3:** 225-258.

Ten new Oriental species are described: *R. falcatus* as male and female, and *R. beccus, falcipedius, koraensis, kuantanensis, pallidus, phaselus, sessilipersonatus, soelii,* and *verticillus* as males only. Seven species are redescribed: *R. additus* (Johannsen) and *R. trivittatus* (Johannsen) as male, female and pupa, *R. adjectus* (Johannsen) as male and female, and *R. acerbus* (Johannsen), *R. aestuarius* (Tokunaga), *R. madarihatensis*, nom. nov. (for *R. pellucidus* Chaudhuri & Datta, 1994 nec (Walker, 1848), and *R. tamaquartus* Sasa as males only. Specimens of *R. curtistylus* (Goetghebuer), *R. reissi* Lehmann, and *R. orientalis* Moubayed were re-examined. *R. tobaseptidecimus* Kikuchi & Sasa, *R. amamiflavus* Sasa and *R. okisimplex* Sasa were re-examined from literature.

Rheotanytarsus tumidus Chaudhuri & Datta is a junior synonym of *R. aestuarius* (Tokunaga). A lectotype is newly designated for *R. additus* (Johannsen). *R. formosae* Kieffer belongs in the genus *Tanytarsus* v. d. Wulp.

The genus *Rheotanytarsus* has recently been tentatively divided into 18 species groups of which 10 occur in the Oriental region. Keys to males and pupae of described Oriental *Rheotanytarsus* are given, and zoogeography is discussed.

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Introduction

The larvae of *Rheotanytarsus* are rheobiontic, filter-feeding using nets suspended between arms at the anterior end of their characteristic cases (Pinder & Reiss 1983). The larvae live in moderately fast to moderately slow flowing rivers, streams, creeks and ponds. The larvae of the *trivittatus* group, however, live in temporary, stagnant waters. The genus is particularly plentiful, both in numbers of species and in individuals, in tropical rain forests (Kyerematen 1996).

Up to now 94 species of *Rheotanytarsus* have been described, from all zoogeographical regions except the Antarctic. In an unpublished manuscript by Saether & Kyerematen, the species were tentatively grouped into 21 more or less distinct groups of which 10 occur in the Oriental region. Prior to the present authors' review, sixteen described species had been recorded from this region, most of them also as pupae. In a previous paper (Kyerematen et al. 2000), the *pellucidus* group was treated and *R. minusculus* Kyerematen described from Thailand. This group also includes two species previously recorded from the Oriental region, *R. thailandensis* Moubayed and *R. oss* Cranston. In the present paper we describe 10 new species, redescribe 7, and give comments on the remaining Oriental species.

After completion of the work presented here the authors have been made aware of several additional new species and undescribed life stages. Undoubtedly, this review still covers only a fraction of the *Rheotanytarsus* fauna present in the Oriental region.

Methods, terminology and material

The general terminology follows Sæther (1977, 1980). The counts of setae on the wing veins include both dorsal and ventral setae, setae which stand at the margin of a vein are regarded as belonging to the vein. The broad, flattened setae of the pupal exuviae are called taeniae in accordance with Langton (1994).

Meristic data are given as the observed range, followed by a mean when four or more measurements were made, followed by the number of measurements in parentheses. Linear measurements are given in μm unless stated.

The types and other material examined are from The Natural History Museum, London, England (BMNH); the Deutsches Entomologisches Institut, Eberswalde, Germany (DEI); the Zoologische Staatssammlung Munich, Germany (ZSM); the Burdwan University Entomological Collection, West Bengal, India (BUEC); the collection of Xinhua Wang, Nankai University, Tianjin, China (XW); and the collection of Joël Moubayed, Montpellier, France (JM). Some of this material are uncleared full mounts on which it is not possible to see all details such as the tentorium and the stipes, and several other measurements might be slightly doubtful. The type material of all newly described species is deposited in the Museum of Zoology, Bergen, Norway (ZMBN).

Genus *Rheotanytarsus* Thienemann & Bause

Syntanytarsus (Rheotanytarsus) Thienemann & Bause in Bause, 1913: 120.
Tanytarsus (Rheotanytarsus) auct.
Rheotanytarsus Thienemann & Bause; Fittkau 1960: 397.

Type species. *Tanytarsus pentapoda* Kieffer, 1909 by subsequent designation of Goetghebuer (1954: 132).

Diagnosis. As in Pinder & Reiss (1983, 1986), Cranston et al. (1989), Sæther (1977), and Kyerematen (1996).

Systematics

The described species of the genus can be grouped into 21 more or less distinct groups (Sæther & Kyerematen, unpublished). Many species remain to be associated and placement of all adult specimens is not possible for the moment. However, some features allow placement of some of the species.

Type material (from DEI) of *R. formosae* Kieffer, 1921 from Taiwan was examined and the species found to belong to the genus *Tanytarsus* v. d. Wulp. The new combination, *T. formosae* (Kieffer, 1921), is a homonym of *T. formosae* Kieffer, 1912 which according to Ekrem (1998) is a junior synonym of *Tanytarsus formosanus* Kieffer, 1912. The type material of *T. formosae* (Kieffer, 1921) has been re-examined by Torbjørn Ekrem (pers. comm.) and shown to contain two species both different from *T. formosanus*.

Key to adult males of Oriental *Rheotanytarsus* Thienemann & Bause

1. Median volsella very long, extending beyond apex of inferior volsella .... 2.

– Median volsella shorter, not extending beyond apex of inferior volsella .... 4.

2. Median volsella apically with two distinct plates (Figs 2A-C). Indonesia .... *adjectus* (Johannsen)

– Median volsella with distal lamelliform setae never fused into plate .... 3.

3. Anal tergite bands transverse; superior volsella with single apicolateral seta in addition to 3 stronger median setae; anal point narrow (Kyerematen et al. 2000: figs 57-60). Thailand .... *minusculus* Kyerematen

– Anal tergite bands V-shaped; superior volsella with 2-5 apicolateral setae in addition to 3 stronger median setae; anal point broad (Cranston 1997: figs 2, 7b; Kyerematen et al. 2000: figs 45-48). Australia, Thailand .... *oss* Cranston

4. Tergite IX posterior margin with projections or shoulders to each side; median volsella not reaching apex of superior volsella .... 5.

– Tergite IX posterior margin triangular, rounded, or at most straight .... 6.

5. Tergite IX posterior margin with well pronounced projections (Figs 4A-C). Indonesia .... *additus* (Johannsen)

– Tergite IX without such projections, but with distinct shoulders (Figs 4D-H). Indonesia, Australia .... *trivittatus* (Johannsen)

6. Digitus well developed, extending beyond margin of superior volsella at least in some views . 7.

– Digitus small or absent, not extending beyond margin of superior volsella .... 12.

7. Median volsella not reaching apex of superior volsella; if gonostylus abruptly tapered distally, then apical portion nearly completely parallel-sided and straight .... 8.

– Median volsella at least reaching apex of superior volsella; if gonostylus abruptly tapered, then apical portion not parallel-sided and straight .... 11.

8. Superior volsella with knob- or hook-like posterior extension .... 9.

– Superior volsella rounded, ovoid, oblong or thumb-like .... 10.

9. Gonostylus abruptly tapered with parallel-sided apical portion; superior volsella with posterior extension hook-like; apex of anal point broad (Lehmann 1970: figs 26-29). Europe, Lebanon, ?Thailand .... *reissi* Lehmann

– Gonostylus not abruptly tapered; superior volsella with posterior extension knob-like; apex of anal point spatulate (Moubayed 1989: figs 9-10). Thailand .... *orientalis* Moubayed

10. Anal point spatulate (Sasa 1993: figs 10.6, 10.7). Japan (Okinawa) .... *okisimplex* Sasa

– Anal point tapering (Sasa 1990: fig. 11). Japan (Nansei Islands) .... *amamiflavus* Sasa

11. Gonostylus abruptly tapered with apical portion curved; superior volsella with large, bluntly triangular posterior extension; median volsella apparently without apical plate (Figs 2D-G). Indonesia, China, India .... *acerbus* (Johannsen)

– Gonostylus not abruptly tapered; superior volsella subquadrangular; median volsella with wide apical plate (Figs 3A-D). Japan, China .... *tamaquartus* Sasa

12. Abdomen banded; anal point crests long, proximally fused forming an arc; superior volsella rounded; median volsella without plate; gonostylus not abruptly tapered (Figs 1A-D; Sasa & Kikuchi 1995: plate 40A, figs 1A-D). Japan, China, India .... *aestuarius* (Tokunaga)

– Abdomen not banded; hypopygium not with above configuration .... 13.

13. Gonostylus more or less abruptly tapered, with distinctly parallel-sided apical portion or with curved apex; superior volsella with pronounced posterior extension; median volsella extending beyond apex of superior volsella .... 14.

– If gonostylus abruptly tapered, then without parallel-sided or curved apex .... 15.

14. Gonostylus with apical portion distinctly parallel-sided; superior volsella with posterior extension long, digitiform (Figs 6E-H). Malaysia .... *phaselus*, spec. nov.

– Gonostylus with apex curved; superior volsella with posterior extension broad and rounded (Moubayed 1990: figs 1-2, Kyerematen et al. 2000: figs 20-23). Thailand .... *thailandensis* Moubayed

15. Antenna with 12 flagellomeres; wing length < 0.9 mm; superior volsella rounded; gonostylus not abruptly tapered .... 16.

– Antenna with 13 flagellomeres; wing length usually > 0.9 mm .... 17.

16. Apex of anal point narrow (Figs 2H-K); thorax pale. Malaysia .... *kuantanensis*, spec. nov.

– Apex of anal point broad (Figs 7I-L); thorax pale to dark. Malaysia, India .... *madarihatensis*, nom. nov.

17. Tergite IX posterior margin straight; anal tergite bands V-shaped and medially joined; AR > 0.6 (Kikuchi & Sasa 1990: fig. 23). Indonesia .... *tobaseptidecimus* Kikuchi & Sasa

– Tergite IX posterior margin triangular or rounded; if anal tergite bands V-shaped, then not medially joined .... 18.

18. Apex of anal point spatulate; gonostylus tapering abruptly or gradually .... 19.

– Apex of anal point parallel-sided or tapering; gonostylus tapering gradually .... 24.

19. Superior volsella with pronounced, hook-like posterior extension (Figs 3I-L). Thailand .... *falcipedius*, spec. nov.

– Superior volsella rounded .... 20.

20. Gonostylus tapering gradually .... 21.

– Gonostylus abruptly tapered in apical portion .... 23.

21. Anal point crests proximally fused, forming an arc (Figs 4I-L). Thailand .... *beccus*, spec. nov.

– Anal point crests V-shaped .... 22.

22. Median volsella short, not reaching apex of superior volsella; basal anal tergite bands present (Figs 7A-D). Thailand .... *falcatus*, spec. nov.

– Median volsella reaching beyond apex of superior volsella; basal anal tergite bands absent (Lehmann 1970: figs 2-4). Europe, Lebanon, ?Thailand .... *curtistylus* (Goetghebuer)

23. Median volsella recurved, AR about 0.7 (Figs 1E-H). Thailand .... *sessilipersonatus*, spec. nov.

– Median volsella not markedly recurved, AR about 0.4 (Figs 1I-L). Thailand .... *soelii*, spec. nov.

24. Median volsella not reaching beyond apex of superior volsella; anal point crests V-shaped .... 25.

– Median volsella extending beyond apex of superior volsella; anal point crests proximally fused, forming an arc (Figs 6A-D). Thailand .... *pallidus*, spec. nov.

25. Anal point broad, parallel-sided; AR about 0.1-0.3 (Figs 6I-L). Thailand .... *koraensis*, spec. nov.

– Anal point lanceolate; AR about 0.3-0.4 (Figs 3E-H). Thailand .... *verticillus*, spec. nov.

Key to known pupae of Oriental *Rheotanytarsus* Thienemann & Bause

1. Tergite VIII with caudolateral comb; T II-V with anterior paired patches of spinules; thoracic horn with knee-like bend, heavily sclerotized .... 2.

– Tergite VIII with single spur; T II-IV, II-V or II-VI with paired patches of spinules; thoracic horn may be sharply bent, but not knee-like .... 3.

2. Hook row of about 90 hooklets; anal lobe fringe of much less than 20 taeniae (Figs 5A-F). Indonesia .... *additus* (Johannsen)
- Hook row of 60-70 hooklets; anal lobe fringe of about 20 taeniae (Figs 5G-L). Indonesia, Australia .... *trivittatus* (Johannsen)

3. Thoracic horn sharply bent at midlength; tergites II-IV with oral, paired, rounded patches of spinules .... 4.
- Thoracic horn not sharply bent; tergites II-V or II-VI with spinule patches .... 5.

4. Tergite VIII with 3 lateral taeniae (Moubayed 1990: figs 3-6; Kyerematen et al. 2000: figs 28-31). Thailand, Malaysia .... *thailandensis* Moubayed
- Tergite VIII with 5 lateral taeniae (Cranston 1997: figs 7b, 9j). Thailand, Australia .... *oss* Cranston

5. Tergites II-VI with sharply defined, paired spinule patches .... 6.
- Sharply defined patches of spinules limited to tergites II-V .... 7.

6. Anal lobe with one long dorsal seta; thoracic horn with few fine spinules (Lehmann 1970: fig. 5). Europe, Lebanon, ?Thailand .... *curtistylus* (Goetghebuer)
- Anal lobe with two short dorsal setae; thoracic horn with many fine spinules in distal half (Moubayed 1989: figs 11-16). Thailand .... *orientalis* Moubayed

7. Anal lobe without dorsal setae; distal half of thoracic horn with many spinules. Indonesia .... *adjectus* (Johannsen)
- Anal lobe with long dorsal setae; distal half of thoracic horn with few to many spinules .... 8.

8. Tergites II and III with transversely elongated or rectangular spine patches (Lehmann 1970: fig. 24). Europe, Lebanon, ?Thailand .... *reissi* Lehmann
- Tergites II and III with circular or elliptical spine patches (Sasa 1980: plate 12). China, Japan .... *tamaquartus* Sasa

The species

The *aestuarius* group

The group is characterised by the banded abdomen (otherwise found only in the Afrotropical *R. ceratophylli* (Dejoux) and in *R. trivittatus* (Johannsen) which, however, have projections or shoulders to each side of the anal point), by an anal point with long, proximally fused crests (otherwise found in the *trivittatus* group, in *R. pallidus*, spec. nov., and in *R. tamasecundus* Sasa), by an ovoid superior volsella, and median volsellae with setae not fused into an apical plate.

Rheotanytarsus aestuarius (Tokunaga)

(Figs 1A-D)

Tanytarsus aestuarius Tokunaga, 1938: 360.
Rheotanytarsus aestuarius (Tokunaga); Sasa & Kikuchi 1986: 26; Wang & Zheng 1993: 91; Sasa & Kikuchi 1995: 133.
Rheotanytarsus tumidus Chaudhuri & Datta in Chaudhuri et al., 1994: 153, **syn. nov.**

Material examined. Holotype ♂ of *R. tumidus* Chaudhuri & Datta (BUEC type No. 196), INDIA: West Bengal, Alipurduar, 26°25'N, 91°5'E, 609 m a.s.l., pond side, 15.IV.1987, A. K. De.

Diagnosis. The banded abdomen combined with a spatulate anal point, gradually tapering gonostylus, and the absence of caudolateral anal tergite projections separates the species from all other known members of the genus.

Description

Adult male (n=1).

Wing length 1.35 mm. Wing length / length of profemur 1.86. Abdomen yellow, tergites caudally with dark transverse bands.

Head. AR 0.83; Fm13 length 405. Temporal setae 9, including 2 inner verticals, 5 outer verticals, and 2 postorbitals. Clypeus with 20 setae. Tentorium length 131, 30 wide at sieve pore. Palpomere lengths 30, 34, 90, 105, 131; Pm5/Pm3 1.46.

Thorax. Acrostichals 13, dorsocentrals 7, scutellars 6.

Wing. VR 1.44. Sc and M bare, R with 23 setae, R_1 32, R_{4+5} 66, RM 2, M_{1+2} 64, M_{3+4} 44, Cu 20, setae on other veins not countable. Cell m with 12 setae, r_{4+5} about 250, m_{1+2} about 220, setae in other cells not countable.

Legs. Spur of fore tibia 23 long including 8 of basal scale, spurs of mid ti 30 and 34 long including 15 of comb, hind ti spurs 38 and 42 including 19 of comb. Width at apex of fore ti 34, mid ti 38, hind ti 41. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	728	387	–	–	–	–	–	–	–	–	–
p_2	690	524	298	161	118	76	52	0.57	3.72	4.08	7.3
p_3	765	662	444	250	284	137	66	0.67	3.60	3.21	7.3

Hypopygium (Figs 1A-D). Anal tergite bands V-shaped, not fused. Tergite IX with about 6 weak dorsal setae anterior of anal point, and 6 caudal setae around the latter. Anal point 90 long, spatulate; crests well developed, proximally fused forming an arc. Phallapodeme 90 long, transverse sternapodeme 53 long. Gonocoxite 113 long, gonostylus 105 long. Superior volsella (Fig. 1C) 49 long, apically rounded; inferior volsella 68 long; median volsella (Fig. 1D) 68 long, with 3 foliate, about 3 subulate, and several simple distal setae. HR 1.07.

Remarks. Measurements from the holotype of *R. tumidus* do not quite agree with all those given for *aestuarius* by previous authors. No type specimen of Tokunaga's species has been seen for the present study, but the characteristic coloration combined with an apparently identical hypopygium are considered sufficient for synonymization.

Distribution. Japan, China and India (Wang & Zheng 1993, Sasa & Kikuchi 1995).

The *pentapoda* group

The pupae have tergites II-VI with paired anterior circular patches of spines, tergite II bare or with posterior shagreen not arranged into two groups, and anal lobe without dorsal seta.

The male adults have basal tergite bands and V-shaped anal tergite bands; spatulate or narrow and tapering anal point with V-shaped crests; superior volsella with reduced digitus except in the Afrotropical *R. samaki* Lehmann; median volsella extending beyond superior volsella but not reaching apex of inferior volsella, and with apical plates; and abruptly tapered gonostylus (except in *R. samaki*) with the apical portion not parallel-sided.

Rheotanytarsus sessilipersonatus, spec. nov.

(Figs 1E-H)

Material examined. Holotype: ♂ (ZMBN type No. 324; slide-mounted in Canada balsam), THAILAND: Krabi Province, Tham Pheung, 19-23.I.1997, Malaise trap, L. O. Hansen / G. E. E. Søli.

Diagnosis. The combination of a recurved median volsella reaching beyond the superior but not to the apex of the inferior volsella, triangular posterior margin of tergite IX, reduced digitus, oval superior volsella, spatulate anal point, and abruptly tapering gonostylus will separate the species from other members of the genus.

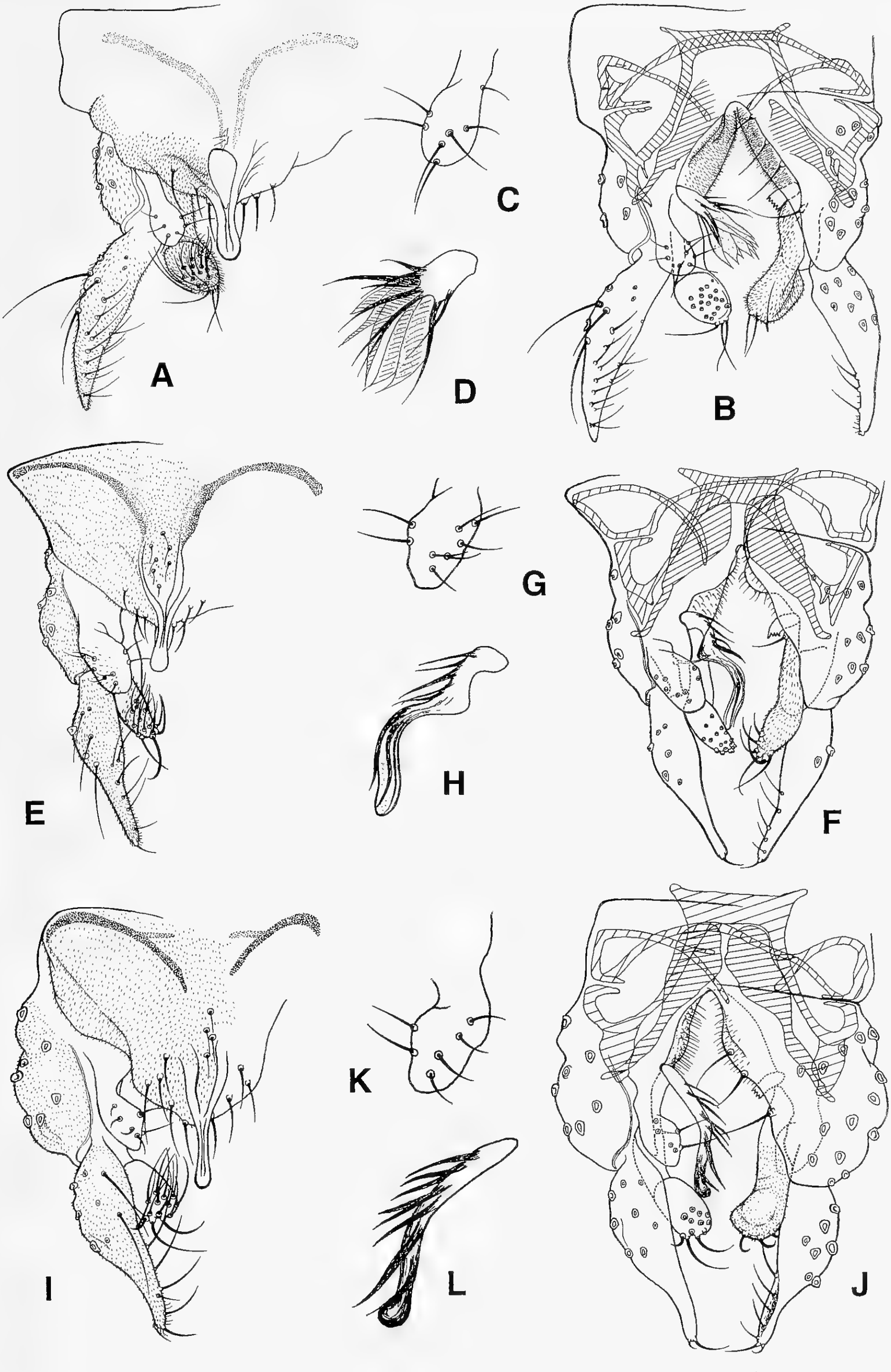

Fig. 1. Male genitalia of *Rheotanytarsus aestuarius* (Tokunaga) (holotype of *R. tumidus* Chaudhuri & Datta). (A-D); *R. sessilipersonatus,* spec. nov. (E-H); *R. soelii,* spec. nov. (I-L). **A,E,I.** Hypopygium, dorsal aspect. **B,F,J.** Hypopygium, tergite IX removed; left: dorsal, right: ventral. **C,G,K.** Superior volsella. **D,H,L.** Median volsella.

Description

Adult male (n=1).

Total length 2.24 mm. Wing length 1.27 mm. Total length / wing length 1.76. Wing length / length of profemur 1.71. Thorax dark brown, abdomen pale, legs pale with apical portions of femora darker.

Head. AR 0.72; Fm13 360 long. Temporal setae 7, including 3 inner verticals, 2 outer verticals and 2 postorbitals. Clypeus with 15 setae. Tentorium 70 long, 20 wide at sieve pore, 8 wide at posterior tentorial pit. Stipes 86 long, 20 wide. Palpomere lengths 30, 30, 70, 80, 136; Pm5/Pm3 1.94.

Thorax. Acrostichals 10, dorsocentrals 11, scutellars 3.

Wing. VR 1.47. Sc and M bare, R with 17 setae, R_1 28, R_{4+5} 57, RM 1, M_{1+2} 65, M_{3+4} 28, Cu 15, Cu_1 20, PCu 43, An 21. Cell m with 6 setae, r_{4+5} about 250, m_{1+2} about 200, m_{3+4} about 110, cu and an combined about 100.

Legs. Spur of front tibia 16 long, spurs of mid ti 22 and 32 long including 12 of comb, hind ti spurs 40 and 42 long including 14 of comb. Width at apex of front ti 40, mid ti 34, hind ti 42. Lengths of front to hind femur 744, 664, 752; of front to hind tibia 320, 488, 584; all tarsi lost.

Hypopygium (Figs 1E-H). Anal tergite bands V-shaped, not fused. Tergite IX with 7 dorsal setae between anal tergite bands, and with 9 caudal setae around base of anal point. Anal point 62 long, 26 wide at base, 10 wide at apex; crests well developed, V-shaped. Phallapodeme 76 long, transverse sternapodeme 40 long. Gonocoxite 100 long, gonostylus 90 long. Superior volsella (Fig. 1G) 40 long, oval; inferior volsella 78 long; median volsella (Fig. 1H), markedly curved and long (70), almost reaching apex of inferior volsella, with subulate setae fused into plate without apical points. HR 1.11, HV 2.49.

Etymology. Referring to the shape of the median volsella which looks like a seated person.

Distribution. Known only from southern Thailand.

Rheotanytarsus soelii, spec. nov.

(Figs 1I-L)

Material examined. Holotype: ♂ (ZMBN type No. 325; slide-mounted in Canada balsam), THAILAND: Krabi Province, Tham Pheung, 19-23.I.1997, Malaise trap, L. O. Hansen / G. E. E. Søli.

Diagnosis. The species can be separated from *R. sessilipersonatus* by having a lower AR (about 0.4 vs about 0.7) and the median volsella not markedly recurved.

Description

Adult male (n=1).

Total length 2.06 mm. Wing length 1.18 mm. Total length / wing length 1.75. Wing length / length of profemur 1.73. Thorax dark brown, abdomen pale, legs pale with apical portions of femora darker.

Head. AR 0.43; Fm13 228 long. Temporal setae 8, including 3 inner verticals, 3 outer verticals and 2 postorbitals. Clypeus with 15 setae. Tentorium 60 long, 14 wide at sieve pore, 8 wide at posterior tentorial pit. Stipes 80 long, 18 wide. Palpomere lengths 32, 32, 80, 92, Pm5 lost.

Thorax. Acrostichals 14, dorsocentrals 9, scutellars 3.

Wing. VR 1.62. Sc and M bare, R with 12 setae, R_1 28, R_{4+5} 53, RM 2, M_{1+2} 58, M_{3+4} 29, Cu 15, Cu_1 15, PCu 46, An 29. Cell m with 6 setae, r_{4+5} about 250, m_{1+2} about 200, m_{3+4} about 110, cu and an combined 83.

Legs. Spur of front tibia 18 long, spurs of mid ti 29 and 28 long including 12 of comb, hind ti spurs 26 and 30 long including 16 of comb. Width at apex of front ti 40, mid ti 32, hind ti 46. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	680	304	896	400	280	232	88	2.95	1.88	1.10	–
p_2	600	440	240	112	72	32	32	0.54	5.16	4.33	7.5
p_3	648	608	344	168	176	112	64	0.57	3.08	3.65	7.6

Hypopygium (Figs 1I-L). Anal tergite with medially interrupted basal tergite band and well developed, separate, V-shaped anal tergite bands; with 4 dorsal and 9 caudal setae. Anal point 56 long, 19 wide at base, 4 wide at apex; crests well developed, V-shaped. Phallapodeme 73 long, transverse sternapodeme 31 long. Gonocoxite 93 long, gonostylus 71 long. Superior volsella (Fig. 1K) 33 long, oval; inferior volsella 69 long; median volsella (Fig. 1L) 54 long, reaching beyond apex of superior volsella, with distal subulate setae fused into ovoid plate without apical points. HR 1.30, HV 2.90.

Etymology. Named after Dr. Geir E. E. Søli who collected the holotype.

Distribution. Known only from southern Thailand.

The *photophilus* group

The pupae of this group are characterised by a thoracic horn with median bend and points in the distal half, tergites II-V with circular anterior spine patches, an undivided posterior shagreen patch on tergite II, and an anal lobe without dorsal setae.

The males have antennal ratio lower than 2.0; at least 4 setae between anal tergite bands; spatulate or broad and parallel-sided anal point with V-shaped crests; superior volsella usually with posterior extension; median volsella reaching apex of inferior volsella, with apical setae fused into plate(s) with or without apical points; and gonostylus abruptly tapered in apical portion – except in *R. adjectus* (Johannsen) – or occasionally with parallel-sided apical portion.

Rheotanytarsus adjectus (Johannsen)

(Figs 2A-C)

Tanytarsus adjectus Johannsen, 1932: 547.
Rheotanytarsus adjectus (Johannsen); Thienemann in Zavrel 1934: 146, 153, 154.

Material examined. 4♂♂, 2♀♀ syntypes (all INDONESIA, leg. A. Thienemann, at BMNH): 1♂ (B3=101, B.M. 1937-703), W. Java, Buitenzorg, Botanical Garden, tributary to Tjiliwong River, 11.IX.1928; 1♀ (B4, B.M. 1937-703), as previous except from outlet of acid pond; 1♂, 1♀ (B21, B.M. 1937-703), as previous except from Hotel Bellevue, outlet of swimming pool, 15.IX.1928; 2♂♂ (144, B.M. 1937-703), E. Java, tributary to Ranu Lamongan, 12.X.1928.

Diagnosis. The species can be separated from other members of the genus by having a long median volsella reaching apex of inferior volsella and carrying two apical plates.

Description

Adult male (n=3-4 except when otherwise stated).

Total length 1.74-2.07, 1.95 mm. Wing length 0.99-1.15, 1.10 mm. Total length / wing length 1.75-1.80, 1.78. Wing length / length of profemur 1.57-1.62, 1.60. Thorax pale yellow, possibly greenish in life, with vittae only feebly indicated.

Head. AR 0.32-0.40; Fm13 165-180 long. Temporal setae 7-8 (2), including 2 inner verticals, 2-3 outer verticals and 3 postorbitals. Clypeus with 14-19 (2) setae. Tentorium and stipes not measurable. Palpomere lengths 30-34, 32; 34-45, 40; 79-94, 86; 81-90, 88; 158-188.

Thorax. Acrostichals 18-20, 20; dorsocentrals 9-10, 10; scutellars 4.

Wing. VR 1.47-1.64. Sc and RM bare, R with 13-17 setae, R_1 19-30, R_{4+5} 41-52, M 1-2, M_{1+2} 45-55, M_{3+4} 26-32, Cu 22-26, Cu_1 15-20, PCu 50-60, An 20-25 (2). Cell m with 10-25 setae, r_{4+5} and m_{1+2} each with more than 200, setae in other cells not countable.

Legs. Spur of front tibia 19-30, 25 long; spurs of mid ti 32-34, 34 long including 15-19, 18 of comb; hind ti spurs 34-38, 36 long including 19 of comb. Width at apex of front ti 34-39, 37; mid ti 32-34, 34; hind ti 41. Sensilla chaetica 3-5 at apical 0.13-0.30. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	633-728, 688	284-350, 324	638	321	255	194	85
p_2	605-709, 666	416-482, 459	236-274	113-132	85-104	57-66	43-47
p_3	652-756, 714	501-605, 559	312-338	198-250	198-236	109-137	61-66

	LR	BV	SV	BR
p_1	1.57	1.82	1.44	3.8
p_2	0.56-0.57	4.17-4.22	4.32-4.76	4.2-4.8
p_3	0.62-0.66	2.51-2.61	3.45-3.70	–

Hypopygium (Figs 2A-C). Anal tergite bands V-shaped, separate. Tergite IX triangular; with 12-15, 14 dorsal and 6-8, 7 caudal setae. Anal point 38-49, 43 long; crests well developed, separate to near apex. Phallapodeme 75-90 long, transverse sternapodeme 41 (1) long. Gonocoxite 109-120, 112 long; gonostylus broad, gradually tapering, 101-109, 106 long. Superior volsella (Fig. 2B) 38-45, 40 long; inferior volsella 75-79, 77 long; median volsella (Fig. 2C) 71-75, 74 long, with distal setae fused into double plate. HR 1.00-1.10, 1.06, HV 1.72-2.01, 1.85.

Female (n=1-2)

Total length 1.59-1.77 mm. Wing length 1.02-1.12 mm. Total length / wing length 1.56-1.58. Wing length / length of profemur 1.66-1.71. Coloration as male.

Head. AR 0.28-0.38; flagellomere lengths 75-79, 49-54, 56-60, 45-51, 68. Temporal setae about 12-14. Clypeus with about 14-16 setae. Tentorium and stipes not measurable. Palpomere lengths 30-34, 41, 94-99, 83-94, 169-173.

Thorax. Acrostichals 20, dorsocentrals 12-14, scutellars 2-4.

Wing. VR 1.66-1.67. Sc bare, R with 20-22 setae, R$_1$ 26-27, R$_{4+5}$ 58-59, M 0-1, RM 1-2, M$_{1+2}$ 67, M$_{3+4}$ 43, Cu 23, Cu$_1$ 18, PCu 60, An 38 setae. Cell m with 24 setae, setae in other cells not countable.

Legs. Spur of front tibia 24-26 long, spurs of mid ti 26-34 long including 15-19 of comb, hind ti spurs 38 long including 15-23 of comb. Width at apex of front ti 38-39, mid ti 34, hind ti 39-43. Sensilla chaetica 21-22 at apical 0.55-0.56. Lengths and proportions of legs:

	fe	ti	ta$_1$	ta$_2$	ta$_3$	ta$_4$	ta$_5$	LR	BV	SV	BR
p_1	614-652	312-331	671	340	260	98	76	2.15	1.82	1.38	3.0
p_2	548-605	378-435	217-236	104-113	76	47-52	38-43	0.54-0.58	4.32-4.50	4.26-4.40	4.0-4.2
p_3	576-662	473-520	284	170	180	85	47	0.60	2.76	3.70	3.5

Genitalia. Tergite IX with about 20-25 setae. Gonocoxite apparently without setae. Cercus 54-68 long. Seminal capsule 53 long, 38 wide. Notum not measurable.

Remarks. Johannsen (1932) reports his type series to have been "reared from larvae", but for the present study no associated immature material could be found in the Thienemann collection at ZSM. According to Zavrel (1934), *R. adjectus* (Johannsen) is not separable from the European *R. muscicola* (Kieffer) in the juvenile stages.

Distribution. Known only from Java in Indonesia.

The *curtistylus* group

The pupa of this monobasic group has thoracic horn with median bend and spinules in distal half, spine patches on tergites II-V, tergite II with posterior shagreen arranged into two groups, and anal lobe with hair-like dorsal seta.

The male has dark thorax, abdomen and legs; wing vein M with setae; few setae between anal tergite bands; spatulate anal point with V-shaped crests; superior volsella rounded without extension; median volsella extending beyond superior volsella but not reaching apex of inferior volsella, with apical plate with apical points; and gonostylus gradually tapered.

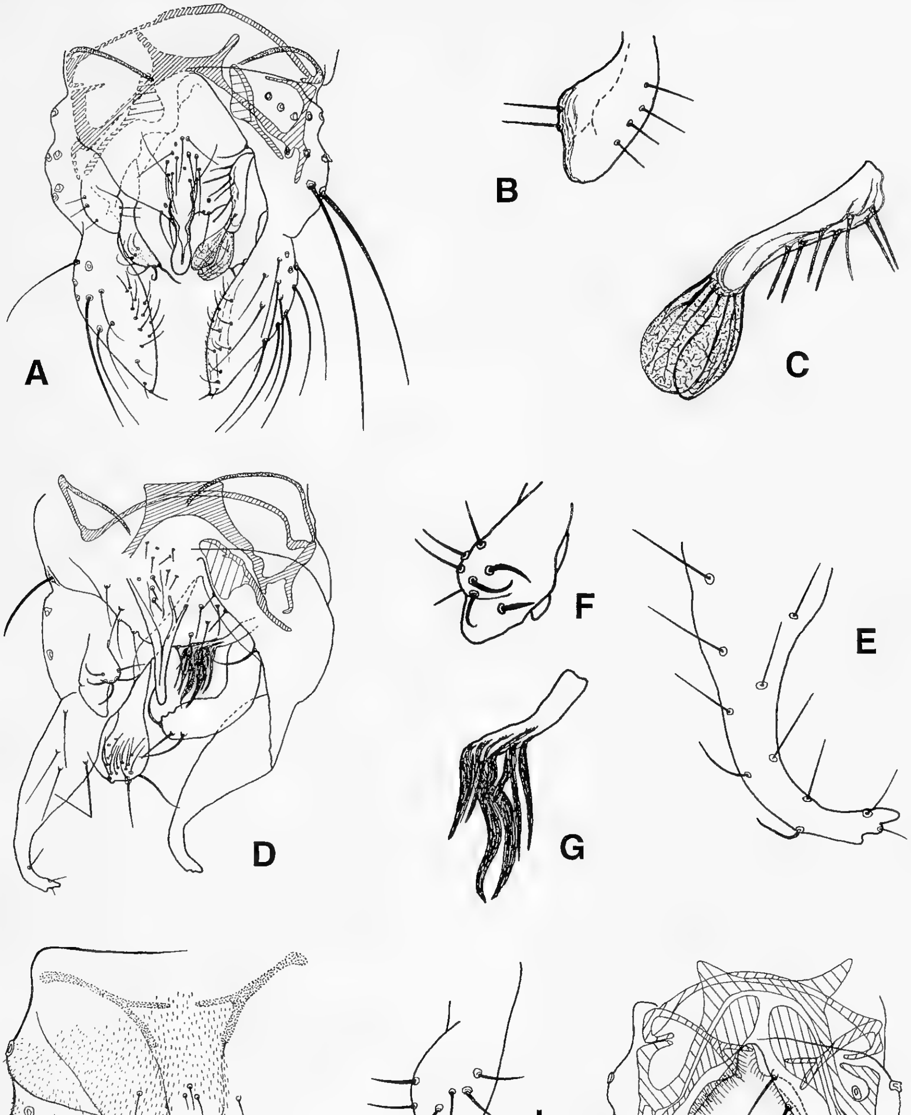

Fig. 2. Male genitalia of *Rheotanytarsus adjectus* (Johannsen) (A-C); *R. acerbus* (Johannsen) (D-G); *R. kuantanensis*, spec. nov. (H-K). **A,D.** Hypopygium; left: dorsal, right: ventral. **H.** Hypopygium, dorsal aspect. **I.** Hypopygium, tergite IX removed; left: dorsal, right: ventral. **E.** Distal portion of gonostylus. **B,F,J.** Superior volsella. **C,G,K.** Median volsella.

Rheotanytarsus curtistylus (Goetghebuer)
(Lehmann 1970: figs 2-5)

Tanytarsus curtistylus Goetghebuer, 1921: 121.
Rheotanytarsus curtistylus (Goetghebuer); Lehmann 1970: 359.

Material examined. GERMANY: 1♂, Bavaria, Ldkr FFB, Schöngeising, Kellerbach, 11.IX.1962, W. Schacht (ZSM). SPAIN: 1♂, "Probe 13", 28.VIII.1953, E. J. Fittkau (ZSM). LEBANON: 1♂, 2 Pex, Anjar, 11.X.1981 J. Moubayed (JM).

Diagnosis. See group diagnosis.

R. curtistylus has been described in sufficient detail by Lehmann (1970). The species is distributed in south and central Europe, and the Middle East. It was recorded from Thailand by Moubayed (1988). We have, however, been unable to confirm this record.

The *acerbus* group

The known pupae have the thoracic horn bare or with points at most in distal ⅓-¼; paired, circular anterior spine patches on tergites II-V; posterior spinule patch on tergite II divided; hook row on tergite II occupying less than median ⅓; and anal lobe with hair-like dorsal seta.

In the males the anal point is spatulate or narrow with V-shaped crests; the superior volsella is rounded and the digitus reduced except in *R. acerbus* (Johannsen) where the superior volsella has a large posterior extension and the digitus extends beyond the volsellar margin; the median volsella at most reaches beyond the apex of the superior volsella; and the gonostylus is abruptly tapered and has a curved apex.

Rheotanytarsus acerbus (Johannsen)
(Figs 2D-G)

Tanytarsus (Rheotanytarsus) acerbus Johannsen, 1932: 547.
Rheotanytarsus acerbus (Johannsen); Thienemann in Zavrel 1934:147, 154; Wang & Zheng 1993: 92; Chaudhuri et al. 1994: 151.

Material examined. INDONESIA: Holotype ♂, hypopygium only (R5c=106, B.M. 1937-703; at BMNH); S. Sumatra, Wai Negri, a small forest stream near Ranau, 22.I.1929, A. Thienemann. CHINA: 1♂ Guangdong Province, Fengkai, 20.IV.1988, X. Wang (XW).

Diagnosis. The species can be separated from other members of the genus by having a superior volsella with a bluntly rounded, apical projection; digitus extending beyond volsellar margin; median volsella reaching apex of superior but not inferior volsella; and gonostylus abruptly tapered with curved apical portion.

Description

Adult male (n=1-2).

Total length 2.44 mm. Wing length 1.42 mm. Total length / wing length 1.72. Wing length / length of profemur 1.64. Thorax dark brown, abdomen pale, legs pale with apical portions of femora darker.

Head. AR 0.77; Fm13 385 long. Temporal setae 7, including 3 inner verticals, 3 outer verticals and 1 postorbital. Clypeus with 20 setae. Tentorium 70 long, 24 wide at sieve pore, 12 wide at posterior tentorial pit. Stipes 70 long, 24 wide. Palpomere lengths 32, 34, 106, 128, 210; Pm5/Pm3 1.98.

Thorax. Acrostichals 10, dorsocentrals 8, scutellars 3.

Wing. VR 1.57. Sc and RM bare, R with 20 setae, R_1 28, R_{4+5} 45, M 2, M_{1+2} 46, M_{3+4} 39, Cu 20, Cu_1 19, PCu 48, An 31 setae. Cell m with about 4 setae, r_{4+5} about 220, m_{1+2} about 200, m_{3+4} about 100, cu and an combined about 80.

Legs. Spur of front tibia 18 long, spurs of mid ti 26 and 30 long including 12 of comb, hind ti spurs 26 and 32 long including 12 of comb. Width at apex of front ti 46, mid ti 42, hind ti 46. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	864	480	992	456	360	288	120	2.07	1.19	1.35	3.2
p_2	688	512	320	168	104	64	84	0.62	3.96	3.75	6.5
p_3	800	624	504	280	256	120	80	0.81	2.62	2.82	4.4

Hypopygium (Figs 2D-G). Anal tergite bands separate, widely V-shaped. Tergite IX with about 11 dorsal setae between or anterior of anal point crests, and about 6-8 caudal setae around anal point. Anal point 49-74 long; crests well developed, separate to near middle of anal point. Phallapodeme 53-72 long, transverse sternapodeme 30-38 long. Gonocoxite 94-112 long, gonostylus (Fig. 2E) 90-106 long, with curved apex. Superior volsella (Fig. 2F) 36-41 long, with bluntly rounded apical projection; inferior volsella 64-84 long; median volsella (Fig. 2G) 50-53 long, with about 5 subulate to foliate distal setae. HR 1.04-1.06, HV 2.30.

Distribution. Known from Sumatra in Indonesia, India, and Guandong province in southern China (Wang & Zheng 1993).

The *pellucidus* group

The group was revised by Kyerematen et al. (2000). There are three known Oriental species: *R. thailandensis* Moubayed, *R. oss* Cranston, and *R. minusculus* Kyerematen.

Note that the group name derives from *R. pellucidus* (Walker), not the junior homonym *R. pellucidus* Chaudhuri & Datta which does not belong in the *pellucidus* group.

The *guineensis* group

Pupae of the *guineensis* group have spine patches on tergites II-V or usually on II-VI; at least on TII these are rectangular or transversely elongate instead of rounded. Many species lack a dorsal seta on the anal lobe, when present it is hair-like.

In the males the posterior margin of tergite IX is straight in *R. pela* (Roback), *R. procerus* Reiss, *R. rioensis* Langton & Armitage, and *R. tamaquintus* Sasa, a feature otherwise present only in the *trivittatus* group. The digitus extends beyond the margin of the superior volsella in a few species. In what can be distinguished as a subgroup *guineensis* sensu stricto (*R. akrina* (Roback) and above) the superior volsella has the posterior margin hook- or knob-like, while in the remaining species the superior volsella is rounded. The median volsella does not reach the apex of the inferior volsella and often not even that of the superior volsella.

Rheotanytarsus kuantanensis, spec. nov.

(Figs 2H-K)

Material examined. Holotype: ♂ (ZMBN type No. 326; slide-mounted in Canada balsam), MALAYSIA: Dahong Region, Kuantan, Pandam Waterfalls, 8-10.VIII.1993, Malaise trap, G. E. E. Søli. – Paratype: 1♂ as holotype (ZMBN).

Diagnosis. The species is characterised by its small size, low antennal ratio and only 12 flagellomeres, by the oblong superior volsella, gradually tapering gonostylus, and narrow anal point.

Description

Adult male (n=1-2).

Total length 1.36 mm. Wing length 0.78 mm. Total length / wing length 1.75. Wing length / length of profemur 1.77. Thorax, abdomen and legs pale.

Head. AR 0.22-0.24; Fm12 86-92 long. Temporal setae 7, including 3 inner verticals, 2 outer verticals and 2 postorbitals. Clypeus with 15-16 setae. Tentorium 40-60 long, 10-12 wide at sieve pore, 6 wide at posterior tentorial pit. Stipes 60-74 long, 12-16 wide. Palpomere lengths 16-20, 20-22, 50, 52, 90; Pm5/Pm3 1.80.

Thorax. Acrostichals 10, dorsocentrals 7-9, scutellars 3.

Wing. VR 1.52-1.66. Sc and M bare, R with 8-10 setae, R_1 12-13, R_{4+5} 33, RM 1-2, M_{1+2} 35-37, M_{3+4} 13-14, Cu 5-8, Cu_1 9, PCu 26-27, An 14-15. Cell m with 4 setae, r_{4+5} about 180, m_{1+2} about 200, m_{3+4} about 50, cu and an combined 36.

Leg. Spur of front tibia 14-16 long, spurs of mid ti 14-18 and 22-24 long including 8-10 of comb, hind ti spurs 26-28 and 30-32 long including 10-14 of comb. Width at apex of front ti 26-30, mid ti 24-26, hind ti 28-30. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	440-452	192-208	552-570	252-280	200	156	80	2.77-2.87	1.72	1.14-1.15	–
p_2	420	304-312	160-180	76-80	60	36-40	32-36	0.51-0.59	4.20-4.37	4.02-4.57	5.9
p_3	460-464	360-372	220	132	124	76	48	0.61	2.74	3.73	–

Hypopygium (Figs 2H-K). Anal tergite with narrowly interrupted basal band and separate, V-shaped anal tergite bands; with 2-3 dorsal setae between anal tergite bands and 8-9 dorsal to caudal setae outside of bands and around anal point. Anal point 32-36 long, 10-14 wide at base, apex 3-4 wide, crests well developed and V-shaped. Phallapodeme 44-50 long, transverse sternapodeme 36-42 long. Gonocoxite 58-64 long, gonostylus 46-52 long. Superior volsella (Fig. 2J) 20-22 long, bulbous; inferior volsella 44-46 long; median volsella (Fig. 2K) 24-30 long, markedly curved with subulate setae fused into plate without apical points. HR 1.23-1.26, HV 2.62.

Remarks. Although the type material consists of only two specimens, the small size, short terminal flagellomere etc. indicate that the reduced number of flagellomeres is not an aberration, but a distinguishing character of the species. Intraspecific variation of the male antenna in chironomids more commonly occurs as 10-12 rather than 12-13 flagellomeres. Where the variation is indeed 12-13, the separation between the last two flagellomeres usually is incomplete. The same argument also applies to *R. pandamensis*, spec. nov.

Etymology. Named after the town of Kuantan, site of the type locality.

Distribution. Known only from Malaysia.

Rheotanytarsus tamaquartus Sasa
(Figs 3A-D)

Rheotanytarsus tamaquartus Sasa, 1980: 16; Wang & Zheng 1993: 90.

Material examined. 1♂, CHINA: Guangdong Province, Fengkai, 20.IV.1988, X. Wang (XW).

Diagnosis. Separated from other species by having gonostylus gradually tapering; median volsella overreaching superior volsella, with a very large plate.

Description

Adult male (n=1).

Total length 2.10 mm. Wing length 1.21 mm. Total length / wing length 1.73. Wing length / length of profemur 1.85. Coloration pale yellow, possibly greenish in life, vittae only feebly indicated.

Head. AR 0.56; Fm13 250 long. Temporal setae 7, including 3 inner verticals, 2 outer verticals and 2 postorbitals. Clypeus with 15 setae. Tentorium 84 long, 28 wide at sieve pore, 10 wide at posterior tentorial pit. Stipes not measurable. Palpomere lengths 30, 34, 80, 92, 140; Pm5/Pm3 1.75.

Thorax. Acrostichals 18, dorsocentrals 8, scutellars not countable.

Wing. VR 1.50. Sc, RM and M bare, R with 18 setae, R_1 29, R_{4+5} 51, M_{1+2} 50, M_{3+4} 28, Cu 17, Cu_1 16, PCu 38, An 23 setae. Cell m with 12 setae, r_{4+5} about 300, m_{1+2} about 200, m_{3+4} about 100, cu and an combined 65.

Legs. Spur of front tibia absent, spurs of mid ti 26 and 28 long including 14 of comb, hind ti spurs 38 and 46 long including 16 of comb. Width at apex of front ti 42, mid ti 36, hind ti 46. Lengths and proportions of legs:

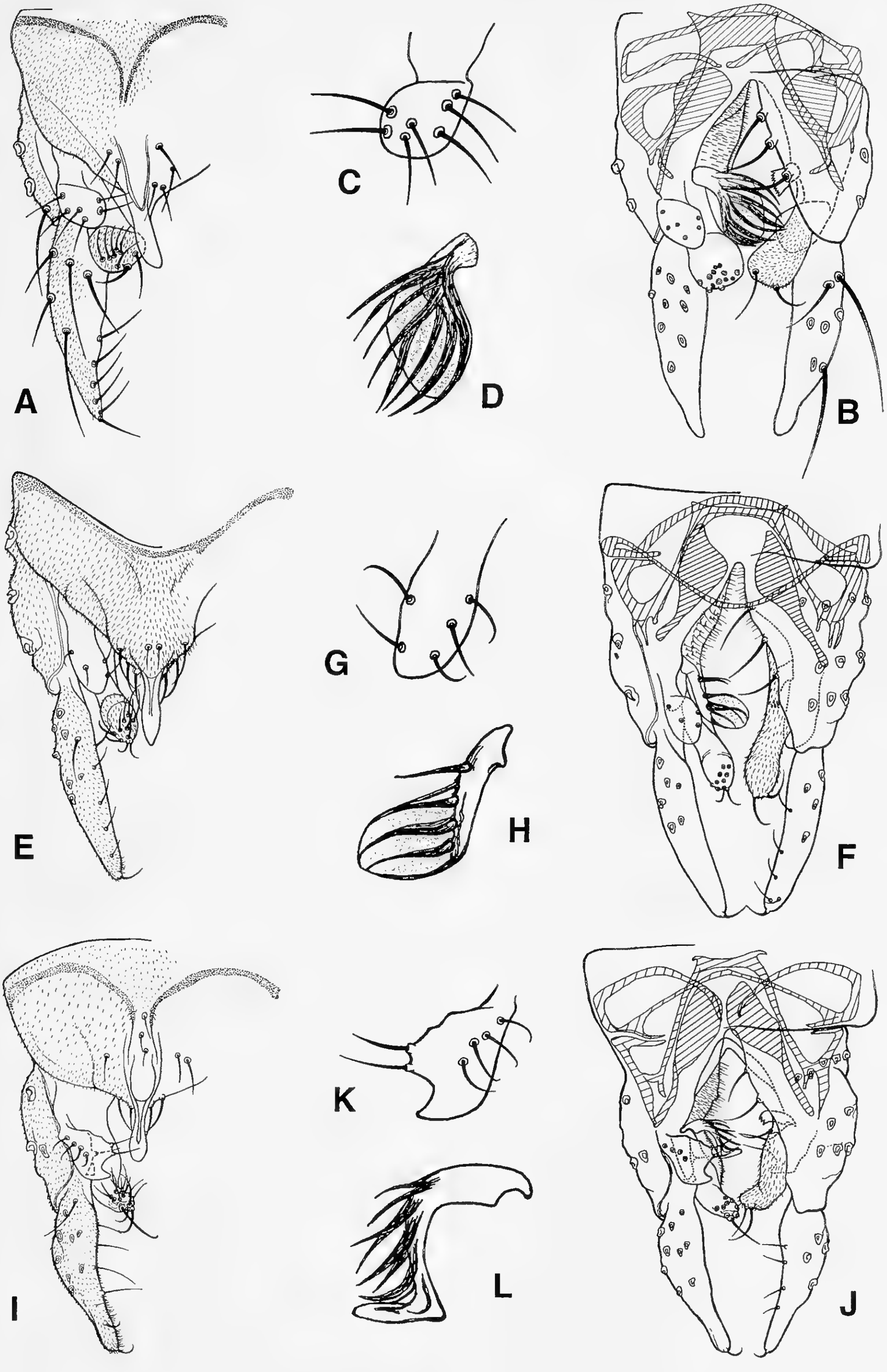

Fig. 3. Male genitalia of *Rheotanytarsus tamaquartus* Sasa (A-D); *R. verticillus*, spec. nov. (E-H); *R. falcipedius*, spec. nov. (I-L). **A,E,I.** Hypopygium, dorsal aspect. **B,F,J.** Hypopygium, tergite IX removed; left: dorsal, right: ventral. **C,G,K.** Superior volsella. **D,H,L.** Median volsella.

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	654	304	–	–	–	–	–	–	–	–	–
p_2	600	461	265	127	96	61	46	0.57	4.02	4.00	3.5
p_3	685	538	385	211	192	115	81	0.72	2.68	3.18	3.8

Hypopygium (Figs 3A-D). Anal tergite apparently with V-shaped bands. Tergite IX triangular, with 8 caudal setae. Anal point 64 long, 28 wide at base, 8 wide at apex; crests well developed, V-shaped. Phallapodeme 70 long, transverse sternapodeme 36 long. Gonocoxite 90 long, gonostylus 94 long. Superior volsella (Fig. 3C) 30 long, sub-quadrangular; inferior volsella 76 long; median volsella (Fig. 3D) 34 long; subulate setae basally fused but ending in separate points along median volsellar margin. HR 0.96, HV 2.23.

Distribution. Known from Japan and Guangdong province in southern China (Wang & Zheng 1993).

Rheotanytarsus verticillus, spec. nov.

(Figs 3E-H)

Material examined. Holotype: ♂ (ZMBN type No. 327; slide-mounted in Canada balsam), THAILAND: Chiang Mai Province, Doi Suthep, What Phra That Temple, 15.IV.1991, sweep net, T. Andersen. – Paratypes: 5♂♂, as holotype (ZMBN).

Diagnosis. Characterised by medially joined, slightly V-shaped anal tergite bands; lanceolate anal point; oblong superior volsella; median volsella slightly longer than superior volsella and with distal subulate setae fused into plate; gonostylus gradually tapering.

Description

Adult male (n=5-6 except when otherwise stated).

Total length 1.48-1.69, 1.60 mm. Wing length 0.96-1.06, 1.02 mm. Total length / wing length 1.53-1.61, 1.57. Wing length / length of profemur 1.89-1.98, 1.95. Thorax dark brown, abdomen pale, legs pale with apical portions of femora darker.

Head. AR 0.31-0.37, 0.36; Fm13 140-174, 164 long. Temporal setae 6-7, 6; including 3 inner verticals; 2 outer verticals and 1-2, 1 postorbital. Clypeus with 11-17, 14 setae. Tentorium 60-80, 69 long; 12-14, 13 wide at sieve pore; 6-10, 8 wide at posterior tentorial pit. Stipes 80-90, 84 long; 12-20, 15 wide. Palpomere lengths 22-26, 25; 24-30, 27; 66-72, 68; 70-80, 75; 136-142, 139 (4); Pm5/Pm3 1.92-2.12, 2.05 (4).

Thorax. Acrostichals 10-18, 14; dorsocentrals 7-8, 7; scutellars 2-3, 3.

Wing. VR 1.54-1.65, 1.56. Sc and M bare, R with 10-15, 13 setae; R_1 13-22, 16; R_{4+5} 34-48, 40, RM 0-1, 0; M_{1+2} 37-49, 43; M_{3+4} 19-26, 21; Cu 12-15, 13; Cu_1 10-16, 12; PCu 34-39, 36; An 16-21, 18. Cell m with 6 setae, r_{4+5} about 250, m_{1+2} about 200, m_{3+4} about 110, cu and an combined 83.

Legs. Spur of front tibia 12-14, 13 long; spurs of mid ti 18-22, 19 and 24-28, 25 long including 10-12, 11 of comb; hind ti spurs 26-30, 28 and 26-32, 30 long including 12-14, 13 of comb. Width at apex of front ti 32-36, 34; mid ti 28-30, 29; hind ti 32-36, 34. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3
p_1	488-560, 519	232-272, 246	640-670 (3)	312-352 (3)	248-272 (3)
p_2	488-556, 517	356-400, 377	184-220, 202	88-100, 93	64-72, 68
p_3	512-584, 553	436-480, 455	260-320, 294	156-180, 166	152-176, 162

	ta_4	ta_5	LR	BV	SV
p_1	192-208 (3)	80 (2)	2.53-3.10 (3)	1.68-1.69 (2)	1.00-1.21 (3)
p_2	40-48, 45	32-40, 37	0.52-0.55, 0.53	4.42-4.82, 4.57	4.33-4.62, 4.47
p_3	92-108, 100	52-60, 56	0.59-0.68, 0.64	2.66-2.75, 2.69	3.30-3.68, 3.45

Hypopygium (Figs. 3E-H). Anal tergite bands ending far anterior, in rudimentary V-shape, but linked by continuous anterior transverse band. Tergite IX with 1-2, 2 dorsal and 6-8, 7 caudal setae. Anal point 38-46, 42 long; 14-18, 15 wide at base; 4 wide at apex; crests well developed, V-shaped. Phallapodeme 52-58, 55 long; transverse sternapodeme 28-38, 33 long. Gonocoxite 70-80, 75 long;

gonostylus 58-68, 64 long. Superior volsella (Fig. 3G) 24-30, 27 long, oblong; inferior volsella 46-54, 50 long; median volsella (Fig. 3H) 28-36, 32 long, with subulate setae fused into whorl-like plate with about 5-6 apical points. HR 1.13-1.24, 1.18; HV 2.33-2.62, 2.51.

Etymology. From Latin 'verticillus' = whorl, referring to the shape of the plate on the median volsella.

Distribution. Known only from northern Thailand.

Rheotanytarsus falcipedius, spec. nov.

(Figs 3I-L)

Material examined. Holotype: ♂ (ZMBN type No. 328; slide-mounted in Canada balsam), THAILAND: Chiang Mai Province, Doi Suthep, What Phra That Temple, 15.IV.1991, sweep net, T. Andersen. – Paratypes: 5♂♂, as holotype (ZMBN).

Diagnosis. Easily distinguishable by the combination of spatulate anal point; superior volsella with hook-like posterior extension; very short, characteristically shaped median volsella; and gonostylus distinctly but not abruptly tapering.

Description

Adult male (n=5-6 except when otherwise stated).

Total length 2.21-2.48, 2.31 mm. Wing length 1.18-1.31, 1.26 mm. Total length / wing length 1.75-1.98, 1.83. Wing length / length of profemur 1.51-1.88, 1.77. Thorax dark brown, abdomen pale, legs pale with apical portions of femora darker.

Head. AR 0.52-0.57, 0.55; Fm13 260-300, 281 long. Temporal setae 7-8, 8; including 3 inner verticals, 2-3, 3 outer verticals and 2 postorbitals. Clypeus with 16-19, 17 setae. Tentorium 80-96, 88 long; 22-24, 23 wide at sieve pore; 10 wide at posterior tentorial pit. Stipes 84-100, 95 long; 12-20, 18 wide. Palpomere lengths 28-32, 30; 28-34, 31; 90-114, 99; 98-110, 103; 160-192, 181 (4). Pm5/Pm3 1.60-1.86, 1.72 (4).

Thorax. Acrostichals 14-18, 16; dorsocentrals 7-10, 8; scutellars 3-4, 3.

Wing. VR 1.41-1.48, 1.45. Sc and M bare, R with 13-17, 15 setae; R_1 19-25, 22; R_{4+5} 50-63, 53; RM 0-1, 1; M_{1+2} 40-57, 49; M_{3+4} 29-34, 32; Cu 13-20, 17; Cu_1 19-22, 21; PCu 35-43, 39; An 27-30, 29. Cell m with 12 setae, r_{4+5} about 220, m_{1+2} about 170, m_{3+4} about 80, cu and an combined 60.

Legs. Spur of front tibia 14-18, 16; spurs of mid ti 19-24, 22 and 26-30, 28 long including 10-12, 12 of comb; of hind ti 24-32, 28 and 31 long including 12-14, 13 of comb. Width at apex of front ti 36-40, 38; of mid ti 32-36, 33; of hind ti 36-40, 39. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4
p_1	664-784, 709	340-368, 353	784-896 (3)	400-448 (3)	316-360 (3)	260-320 (3)
p_2	604-660, 631	448-512, 471	248-312, 282	128-148, 140	88-108, 98	52-60, 57
p_3	680-724, 689	556-584, 572	424-472, 451	236-252, 244	212-228, 221	136-152, 142

	ta_5	LR	BV	SV	BR
p_1	104-112 (3)	2.31-2.46 (3)	1.62-1.67 (3)	1.19-1.29 (3)	–
p_2	36-40, 39	0.55-0.63, 0.60	3.82-4.62, 4.14	3.72-4.24, 3.90	4.6-4.7 (2)
p_3	56-64, 58	0.76-0.81, 0.79	2.53-2.60, 2.57	2.76-2.91, 2.80	7.5 (1)

Hypopygium (Figs 3I-L). Anal tergite bands V-shaped, separate. Tergite IX with 1-3, 2 dorsal setae between anal tergite bands, and 6-8, 7 further lateral to caudal setae. Anal point 56-66, 61 long; 16-24, 20 wide at base; 4-6, 5 wide at apex; crests well developed, V-shaped. Phallapodeme 68-78, 72 long; transverse sternapodeme 26-30, 29 long. Gonocoxite 86-96, 93 long; gonostylus 74-86, 80 long. Superior volsella (Fig. 3K) 24-30, 27 long, with pronounced, hook-like posterior extension; inferior volsella 48-54, 52 long; median volsella (Fig. 3L) 22-28, 24 long, markedly curved, with subulate setae fused into a narrow apical and a sub-apical plate with 1-2 apical points. HR 1.07-1.27, 1.16; HV 2.63-3.24, 2.88.

Etymology. From Latin 'falcipedius' = bow-legged, referring to the shape of the gonostylus.

Distribution. Known only from northern Thailand.

Rheotanytarsus reissi Lehmann
(Lehmann 1970: figs 26-30)

Rheotanytarsus reissi Lehmann, 1970: 368.

Material examined (all leg. J. Moubayed, in coll. JM). THAILAND: 1♂, 1 Pex, 17.VII.1987. LEBANON: 2♂♂, Awwali River, St. A13, 13.III.1981; 1♂, Awwali River, St. 27 (2), 13.VI.1981.

Diagnosis. Close to the preceding species, but differs in having a strongly developed digitus, non-spatulate anal point, and an abruptly tapering gonostylus with parallel-sided apical portion.

R. reissi is described in sufficient detail in Lehmann (1970). The species is known from Germany and Spain, and was recorded from Thailand by Moubayed (1988). From the latter material we have studied one male and one pupal exuviae, but are unable to confirm this record due to the condition of the slide.

The *trivittatus* group

The pupae have thoracic horn without median bend; tergites II-V or II-VI with circular anterior spine patches and with intraspecific variation in both *R. additus* (Johannsen) and *R. trivittatus* (Johannsen); T II with posterior shagreen arranged in two groups; segment VIII with caudolateral comb of 3-6 curved, thorn-like spurs (the Australian *R. barrengarryensis* Cranston with single spur only); and anal lobe with taeniate or hair-like dorsal seta.

The adult males have posterior margin of tergite IX straight or, in the group in its strictest sense, with shoulders or projections to each side of the anal point; median volsella not reaching apex of inferior volsella, with setae fused into apical plate(s); median volsella in the group sensu stricto not reaching beyond apex of superior volsella, in the group in its wider sense extending beyond superior volsella; gonostylus not abruptly tapered (tapered and with parallel-sided apical portion in one new Neotropical species).

Rheotanytarsus tobaseptidecimus Kikuchi & Sasa
(Kikuchi & Sasa 1990: fig. 23)

Rheotanytarsus tobaseptidecimus Kikuchi & Sasa, 1990: 317.

Diagnosis. Separated from other members of the genus by the combination of tergite IX with straight posterior margin; antennal ratio relatively high (0.6-0.7); anal point broad and non-spatulate; anal tergite bands V-shaped and medially joined, but weak; superior volsella round; and gonostylus abruptly tapered but without parallel-sided apical portion. In the original description, the median volsella is stated to be without a plate, but this needs to be reexamined as the plates often are not easily observed.

The species is described in sufficient details by Kikuchi & Sasa (1990). It is known only from Lake Toba, Sumatra, Indonesia.

Rheotanytarsus additus (Johannsen)
(Figs 4 A-C, 5 A-F)

Tanytarsus additus Johannsen, 1932: 548; Zavrel 1934: 150.
Rheotanytarsus additus (Johannsen); Thienemann in Zavrel 1934: 152, 154.

Material examined. INDONESIA (all leg. A. Thienemann): Lectotype ♂, here designated (Rg, B.M. 1937-703; at BMNH), S. Sumatra, Lake Ranau, water surface, 26.I.1929; paralectotypes: 2♂♂, 3♀♀, as lectotype (BMNH). Other: 3♂♂, 1♀ (133, B.M. 1937-703), Java, 1928-29 (BMNH); 1♂, 2 Pex, as lectotype (ZSM).

Note. The lectotype designation is carried out in order to define *R. additus* (Johannsen) against the very similar *R. ceratophylli* (Dejoux). Specimens from Java at BMNH and from the type sample at ZSM are not paralectotypes, because they are not part of the material listed by Johannsen (1932).

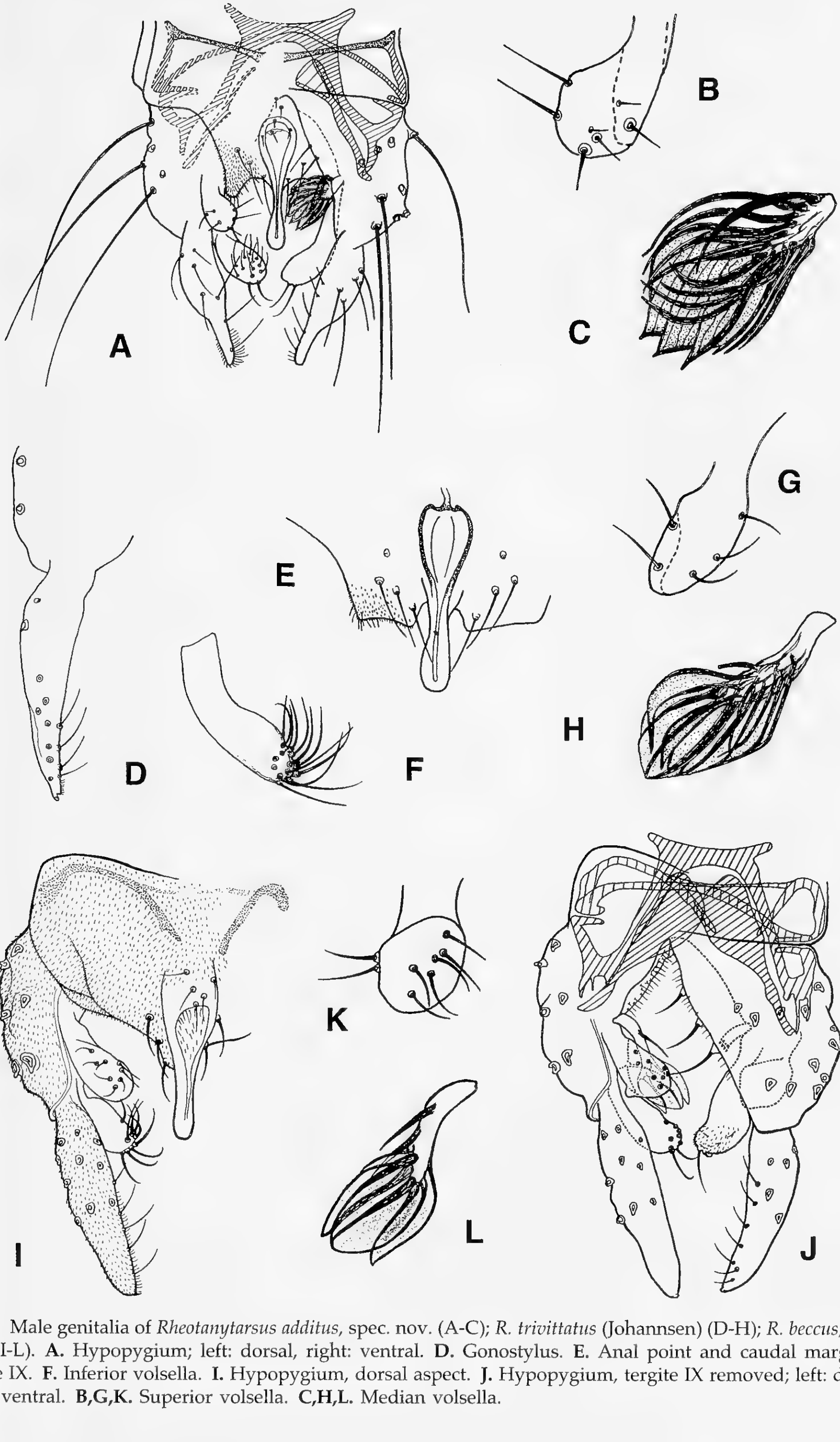

Fig. 4. Male genitalia of *Rheotanytarsus additus*, spec. nov. (A-C); *R. trivittatus* (Johannsen) (D-H); *R. beccus*, spec. nov. (I-L). **A.** Hypopygium; left: dorsal, right: ventral. **D.** Gonostylus. **E.** Anal point and caudal margin of tergite IX. **F.** Inferior volsella. **I.** Hypopygium, dorsal aspect. **J.** Hypopygium, tergite IX removed; left: dorsal, right: ventral. **B,G,K.** Superior volsella. **C,H,L.** Median volsella.

Diagnosis. Differs from all other known members of the genus except the Afrotropical *R. ceratophylli* (Dejoux) by having pronounced triangular projections to each side of the anal point. From *R. ceratophylli* it differs in having these projections longer, and by having an abruptly tapering gonostylus.

Description

Adult male (n=6-7 except when otherwise stated).

Total length 1.99-2.62, 2.21 mm. Wing length 1.08-1.38, 1.19 mm. Total length / wing length 1.84-2.04, 1.91. Wing length / length of profemur 2.09-2.29, 2.19. Thorax, legs and abdomen pale yellow, slightly darker vittae feebly indicated.

Head. AR 0.63-0.72, 0.69 (4); Fm13 261-323, 303 (4) long. Temporal setae 7-9, 8 (5); including 2-4, 3 inner verticals; 3-4, 4 outer verticals and 1-3, 2 postorbitals. Clypeus with 16-20, 18 (5) setae. Tentorium 90-113, 99 (4) long; 19-28, 23 (4) wide. Palpomere lengths 26-34, 30; 34-45, 39; 71-86, 77; 83-101, 90; 113-154, 134 (n=4-5); Pm3 with 2 lanceolate sensilla clavata about 15 long.

Thorax. Acrostichals 14-18, 16; dorsocentrals 10-12, 11 (5); scutellars 2-4, 3.

Wing. VR 1.38-1.58, 1.46. Sc, RM and M bare, R with 9-16, 12 setae; R_1 13-20, 15; R_{4+5} 27-38, 31; M_{1+2} 25-32, 30; M_{3+4} 8-21, 15; Cu 0-2, 1; Cu_1 6-11, 9; PCu 18-36, 27; An 7-18, 13. Cell m with 0-1, 0 setae; r_{4+5} 51-105, 77; m_{1+2} 43-98, 61; m_{3+4} 5-17, 10; cu and an combined 0-8, 3 setae, 0-1, 0 of them on reduced anal lobe.

Legs. Spur of front tibia 15-26, 22 long; spurs of mid ti 23-30, 27 long including 11-15, 14 of comb; hind ti spurs 26-34, 27 long; including 11-19, 18 of comb. Width at apex of front ti 34-40, 37; of mid ti 30-36, 32; of hind ti 34-41, 37. Sensilla chaetica 4-7, 5 at apical 0.13-0.25, 0.21. Lengths and proportions of legs (n=4 for front tarsi):

	fe	ti	ta_1	ta_2	ta_3	ta_4
p_1	482-600, 546	293-340, 313	562-662, 613	293-350, 324	222-269, 245	151-189, 173
p_2	520-614, 559	383-472, 428	232-214, 250	118-137, 125	66-95, 84	47-66, 56
p_3	558-690, 614	529-682, 590	331-406, 356	184-236, 209	165-213, 180	95-123, 105

	ta_5	LR	BV	SV	BR
p_1	66-85, 76	1.82-2.06, 1.92	1.76-1.88, 1.82	1.36-1.48, 1.42	3.6-5.6, 4.2
p_2	38-47, 40	0.57-0.60, 0.59	3.97-4.60, 4.35	3.82-4.00, 3.90	3.0-5.8, 4.5
p_3	52-66, 60	0.62-0.65, 0.63	2.64-2.80, 2.72	3.13-3.29, 3.23	5.2-7.6, 6.1

Hypopygium (Figs 4A-C). Basal transverse anal tergite band apparently interrupted. Tergite IX with triangular projections to each side of anal point; 5 dorsal setae between or anterior of anal point crests, and about 12-16, 14 caudal setae, including about 4 weak setae at apex of each lateral projection. Anal point 54-70, 56 long; crests well developed, separate to near apex. Phallapodeme 53-92, 68 (6) long; transverse sternapodeme 41-56, 46 (5) long. Gonocoxite 86-90, 87 long; gonostylus 75-104, 81 long. Superior volsella (Fig. 4B) 30-49, 35 long, ovoid; inferior volsella 53-68, 61 long; median volsella (Fig. 4C) 34-41, 35 long, with distal setae apparently fused into single plate with several terminal points. HR 1.06-1.20, 1.15; HV 2.66-3.31, 2.86.

Female (n=3-4 except when otherwise stated).

Total length 1.42-1.98, 1.79 mm. Wing length 0.95-1.32, 1.17 mm. Total length / wing length 1.50-1.56, 1.53. Wing length / length of profemur 2.33-2.50, 2.37. Coloration as in male.

Head. AR 0.30-0.38, 0.36; flagellomere lengths 56-75, 65; 41-49, 44; 45-53, 49; 34-47, 43; 45-79, 66. Temporal setae 7 (1), including 3 inner verticals, 2 outer verticals and 2 postorbitals. Clypeus with 18 (1) setae. Tentorium and stipes not measurable. Palpomere lengths 23-34, 30-38, 64-68, 83-84, 139-156.

Thorax. Acrostichals 16-18, 17; dorsocentrals 14; scutellars 2-4, 3.

Wing. VR 1.36-1.51, 1.42. Sc and M bare, R with 12-19, 15 setae; R_1 16-18, 17; R_{4+5} 38-48; RM 1-2; M_{1+2} 28-32; M_{3+4} 25-27 (2); Cu 12-18; Cu_1 14-17; PCu 30-43; An 22 (1). Cell m with 0-28 setae, r_{4+5} about 100-175 (2), m_{1+2} about 100-220, m_{3+4} about 75-80 (2), cu and an combined about 75-80 (2), about 14-15 (2) of them on reduced anal lobe.

Legs. Spur of front tibia 19-23, 21 long; spurs of mid ti 30-36, 34 long; including 13-15, 14 of comb; hind ti spurs 26-34, 30 long; including 13-17, 15 of comb. Width at apex of front ti 34-38, 36; of mid ti 30-36, 34; of hind ti 34-39, 37. Sensilla chaetica 11-13, 12 at apical 0.38-0.52, 0.46. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4
p_1	406-529, 491	227-321, 293	444-619, 559	208-312, 273	161-232, 202	123-161, 147
p_2	529-576	321-454, 406	170-250, 221	85-118, 103	66-80, 72	38-57, 47
p_3	576-662	425-624, 548	246-340	137-189	123-170	76-95

	ta_5	LR	BV	SV	BR
p_1	57-80, 69	1.88-1.96, 1.91	1.82-2.06, 1.94	1.37-1.43, 1.40	2.2-3.3, 2.9
p_2	33-43, 39	0.53-0.56, 0.54	4.30-4.70	4.04-4.29	3.6 (1)
p_3	38-57	0.57-0.60	2.91-3.16 (2)	3.36-3.62 (2)	3.8-6.0

Genitalia. Tergite IX with about 16-20 setae. Gonocoxite apparently without setae. Cercus 56-68, 64 long. Seminal capsule 60-71 long, 45-49 wide. Notum 56-113 long.

Pupa (n=3-4 except when otherwise stated).

Total length 3.08-4.24, 3.61 mm. Exuviae pale with outer edges of cephalothorax and abdomen slightly darker.

Cephalothorax. Frontal apotome (Fig. 5A) wrinkled. Frontal setae apparently absent. Median antepronotals (MAps) 68-146, 113 long; LAps 10-110, 58 long; all taeniate. Precorneals taeniate, close together; anterior Pc 58-126 long; median Pc 110-150, 127 long; posterior Pc 140-160, 151 long. Dorsocentrals Dc_1 12-120 long, Dc_2 20-70 long, Dc_3 30-90 long, Dc_4 18-102 long; Dc_1 2-6 in front of Dc_2, Dc_2 110-216 in front of Dc_3, Dc_3 2-6 in front of Dc_4. Thoracic horn (Fig. 5B) 376-616, 500 long; 24-56, 40 wide; with fine spinules over about distal half. Nose of wing sheath (Fig. 5C) 12-38 long.

Abdomen (Fig. 5D). Tergite I bare. Spines on T II-V(VI) arranged in circular patches. Median shagreen essentially absent, weak and sparse shagreen present caudolaterally on T IV-V(VI). Number of spines on T II-V(VI): 60-200, 50-70, 50-60, 50, 35 (1). T II (Fig. 5E) with additional pair of posterior patches of very fine spinules; hook row occupying approximately ⅓ of segment width, containing about 70-90 hooklets. Anal comb (Fig. 5F) with about 4-10 curved spurs. Lateral setae/taeniae on segments II-VIII not countable; lengths of L_3 and L_4 on VIII 102-222 (2), 110-220 (2). Anal lobe with 1 long, taeniate dorsolateral seta; 32-51, 46 taeniae in fringe; longest taeniae 346-440 long.

Distribution. Known only from Java and Sumatra in Indonesia.

Rheotanytarsus trivittatus (Johannsen)

(Figs 4 D-H, 5 G-L)

Tanytarsus trivittatus Johannsen, 1932: 546; Zavrel 1934: 151.
Rheotanytarsus trivittatus (Johannsen); Thienemann in Zavrel 1934: 152, 154; Cranston 1997: 724.
Rheotanytarsus johnstoni Glover, 1973: 422; Cranston 1991: 124 (part, pupa); Cranston 1996: 181.

Material examined. Syntypes: 2♂♂ on three slides, 3♀♀ (R26, B.M. 1937-703), INDONESIA: S. Sumatra, Lake Ranau, at light, 28.I.1928, leg. A. Thienemann. Other: 1 Pex, outlet of lake Ranau, sample R1c, 20.I.1929 (ZSM).

Diagnosis. *R. trivittatus* (Johannsen), as well as *R. additus* (Johannsen) and the Afrotropical *R. ceratophylli* (Dejoux), has triangular projections to each side of the anal point. However, in *R. trivittatus* these are less pronounced, and the species also has more numerous setae on the wing membrane than *R. additus* and *R. ceratophylli,* the median volsella is much longer, and the antennal ratio lower.

Description

Adult male (n=1-2).

Total length 2.13 mm. Wing length 1.21-1.23 mm. Total length / wing length 1.75. Wing length / length of profemur 1.88-1.95. Thorax, legs and abdomen yellow, with darker yellow to brownish vittae and brown metanotum.

Head. AR 0.36-0.44; Fm13 165-214 long. Temporal setae 8-9, including 2 inner verticals, 3 outer verticals and 3-4 postorbitals. Clypeus with about 15 setae. Tentorium 113 long, 23 wide. Palpomere lengths 38, 38, 94, 90, 161.

Thorax. Acrostichals 18-20, dorsocentrals 14-16, scutellars 4-6.

Wing. VR 1.39-1.41. Sc, RM and M bare, R with 16-23 setae, R_1 14-16, R_{4+5} 43-46, M_{1+2} 45-54, M_{3+4} 27-33, Cu 18-19, Cu_1 17-20, PCu 45, An 23-28. Cell m with 10-25 setae, r_{4+5} and m_{1+2} each more than 200, m_{3+4} about 100-130, cu and an combined about 180-190, about 45 of them on reduced anal lobe.

Legs. Spur of front tibia 23 long, spurs of mid ti 30 long including 15 of comb, of hind ti 38 long including 15-19 of comb. Width at apex of front ti 36-38, of mid ti 30, of hind ti 38-41. Sensilla chaetica 9 at apical 0.28-0.40. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	624-632	302-340	–	–	–	–	–	–	–	–	–
p_2	643-662	435-468	255-260	132-142	95-109	61	38	0.56-0.59	3.97	4.22-4.35	4.8-5.0
p_3	633-709	539-576	387	255	123	66	–	0.67	–	3.32	–

Hypopygium (Figs 4D-H). Tergite IX with triangular projections to each side of anal point (Fig. 4E); with 0 dorsal and about 20 caudal setae, including about 6 weak setae at apex of each lateral projection. Anal point (Fig. 4E) 28-38 long, crests well developed, separate to near apex. Phallapodeme and transverse sternapodeme not measurable. Gonocoxite 98 long, gonostylus (Fig. 4D) 90-98 long. Superior volsella (Fig. 4G) 41-45 long, elongate ovoid; inferior volsella (Fig. 4F) 71-75 long; median volsella (Fig. 4H) 71 long, with distal setae fused into plates with terminal points. HR 1.08, HV 2.36.

Female (n=1-3).

Total length 1.55-1.66 mm. Wing length 1.19-1.33 mm. Total length / wing length 1.30-1.38. Wing length / length of profemur 1.88-1.96. Coloration as in male.

Head. AR 0.28-0.29; flagellomere lengths 79-86, 49-54, 60, 45-51, 68. Temporal setae 9-10, including 2 inner verticals, 4 outer verticals and 3-4 postorbitals. Clypeus with 16-22 setae. Tentorium and stipes not measurable. Palpomere lengths 30-34, 38-41, 101-116, 101-109, 191-195.

Thorax. Acrostichals 22-28, dorsocentrals 20-22, scutellars 6-8.

Wing. VR 1.44-1.49. Sc and M bare, R with 20-28 setae, R_1 26-34, R_{4+5} 54-58, RM 1-2, M_{1+2} 60-67, M_{3+4} 34-37, Cu 16-17, Cu_1 21-22, PCu 49-60, An 22-28. Cell m with 34-40 setae, r_{4+5} about 200, m_{1+2} about 200, m_{3+4} about 200, cu and an combined about 50.

Legs. Spur of front tibia 25-26 long, spurs of mid ti 34-41 long including 19-21 of comb, hind ti spurs 38-41 long including 19-21 of comb. Width at apex of front ti 38-41, of mid ti 38, of hind ti 39-45. Sensilla chaetica 11-12 at apical 0.32-0.36. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	633-680	312-369	318	364	274	208	85	1.95	1.90	1.46	3.9
p_2	628-690	473-501	255-284	132-151	85-104	57-71	38-43	0.54-0.57	4.05-4.23	4.20-4.45	3.0-5.6
p_3	680-737	586-627	359-387	208-217	170-194	104	66	0.61-0.65	2.92-3.06	3.38-3.58	3.3-4.7

Genitalia. Tergite IX with about 20-25 setae. Gonocoxite apparently without setae. Cercus 68-83 long. Seminal capsule 43-56 long, 41-47 wide. Notum 98-113 long.

Pupa (n=1-2).

Total length 2.90-2.94 mm. Exuviae pale with outer edges of cephalothorax dark.

Cephalothorax. Frontal apotome (Fig. 5G) granulose dorsally. Frontal setae absent. Median antepronotals (MAps) 130-150 long, LAps 44-50 long, all taeniate. Precorneals taeniate and close together; anterior Pc 20-46 long, median Pc 110-120 long, posterior Pc 124 long. Anterior dorsocentrals Dc_1 14-20 long, Dc_2 10-40 long, Dc_3 and Dc_4 not measurable; Dc_1 4 in front of Dc_2. Thoracic horn (Fig. 5H) 380-392 long, 36-40 wide, with fine spinules in distal ⅔. Nose of wing sheath (Fig. 5I) 18-28 long.

Abdomen (Fig. 5J). Tergite I bare. Spines on T II-V(VI) arranged in circular patches. Median shagreen essentially absent, weak and sparse shagreen present caudolaterally on T IV-V. Number of spines on T II-V: 60, 60-65, 50-60, 50-55. T II (Fig. 5K) with additional pair of posterior patches of very fine spinules; hook row occupying approximately ⅓ of segment width, containing about 60-70 hooklets. Anal comb of hree curved spurs (Fig. 5L), 14-16, 20-22, 24-30 long. Lateral setae on segments II-VIII as 2, 2, 2, 3, 3, 3, 3; on segments II-IV all hair-like, V with 2 hair-like and 1 taeniate, VI-VIII all taeniate; lengths of L_3 and L_4 on VIII 90 and 190. Anal lobe with one taeniate dorsolateral seta; 20 taeniae in fringe, longest taeniae 400-420 long.

Distribution. Known from Sumatra in Indonesia and from Australia.

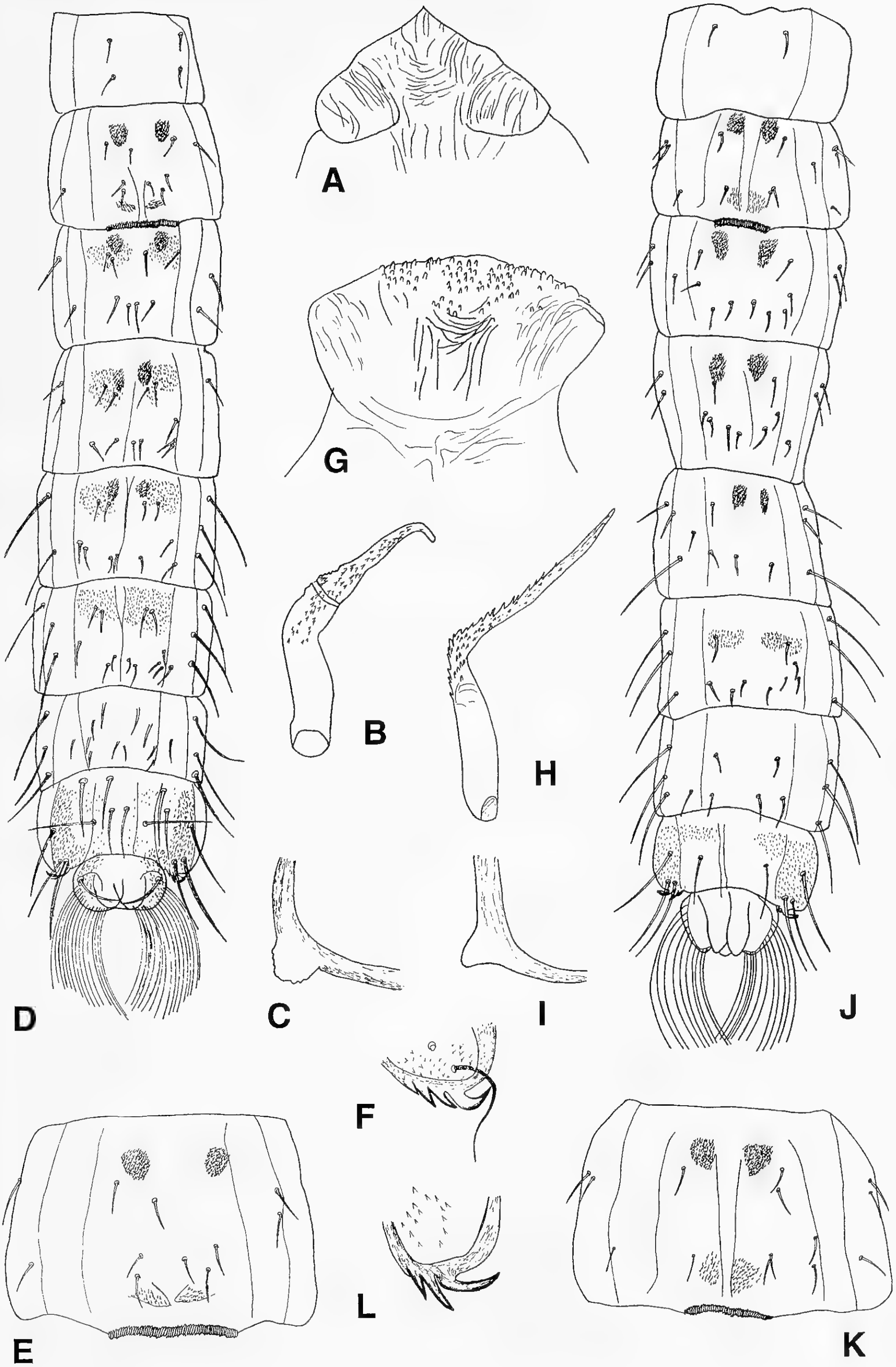

Fig. 5. Pupal structures of *Rheotanytarsus additus*, spec. nov. (A-F); *R. trivittatus* (Johannsen) (G-L). **A,G.** Frontal apotome. **B,H.** Thoracic horn. **C,I.** Wing sheath nose. **D,J.** Abdomen, dorsal. **E,K.** Tergite II, dorsal. **F,L.** Anal comb.

The *ororus* group

The known pupae have the frontal apotome anteriorly rugulose; thoracic horn with median bend, with points in distal ⅔-¾; tergites II-V with paired anterior circular patches of spines; hook row of T II occupying less than ⅓ of segment width; anal lobe with hair-like dorsal seta.

The males have V-shaped anal tergite bands and additional, medially joined basal bands in *R. beccus*, spec. nov. and *R. pallidus*, spec. nov., and there are at least some setae between or just posterior of the bands; the anal point has proximally fused crests; the superior volsella is rounded with reduced digitus; the median volsella reaches the apex of the superior and sometimes that of the inferior volsella; and the gonostylus is not abruptly tapered.

Rheotanytarsus beccus, spec. nov.

(Figs 4I-L)

Material examined. Holotype: ♂ (ZMBN type No. 329; slide-mounted in Canada balsam), THAILAND: Chiang Mai Province, Doi Suthep, What Phra That Temple, 15.IV.1991, sweep net, T. Andersen.

Diagnosis. Distinguished from all other species except *R. pallidus* by the presence of medially joined basal tergite bands in combination with the above group characteristics. Differs from *R. pallidus* by having a dark thorax, a slightly spatulate anal point, and about 5 dorsal setae anterior of anal point crests.

Description

Adult male (n=1).

Total length 1.97 mm. Wing length 1.16 mm. Total length / wing length 1.70. Wing length / length of profemur 1.97. Thorax dark, abdomen pale, legs pale with apical portions of femora darker.

Head. AR 0.40; Fm13 198 long. Temporal setae 6, including 3 inner verticals, 2 outer verticals and 1 postorbital. Clypeus with 16 setae. Tentorium 82 long, 20 wide at sieve pore, 10 wide at posterior tentorial pit. Stipes 80 long, 18 wide. Palpomere lengths 30, 30, 82, 88, 168; Pm5/Pm3 2.05.

Thorax. Acrostichals 18, dorsocentrals 8, scutellars 3.

Wing. VR 1.52. Sc, RM and M bare, R with 18 setae, R_1 21, R_{4+5} 42, M_{1+2} 40, M_{3+4} 24, Cu 11, Cu_1 14, PCu 38, An 20 setae. Cell m with 8 setae, r_{4+5} about 300, m_{1+2} about 250, m_{3+4} about 70, cu and an combined 90.

Legs. Spur of front tibia 14 long, spurs of mid ti 20 and 28 long including 12 of comb, hind ti spurs both 32 long including 14 of comb. Width at apex of front ti 36, of mid ti 32, of hind ti 38. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	588	280	–	–	–	–	–	–	–	–	–
p_2	580	336	240	116	80	–	–	0.55	–	4.23	–
p_3	620	508	368	208	196	120	64	0.72	2.54	3.06	–

Hypopygium (Figs 4I-L). Anal tergite bands V-shaped, linked by basal band. Tergite IX with with 6 dorsal and 8 caudal setae. Anal point 66 long, 22 wide at base, 6 wide at apex; crests well developed and proximally fused, forming an arc. Phallapodeme 68 long, transverse sternapodeme 36 long. Gonocoxite 82 long, gonostylus 72 long. Superior volsella (Fig. 4K) 24 long, oval; inferior volsella 54 long; median volsella (Fig. 4L) 36 long, not markedly curved, somewhat spatulate with subulate setae fused into a plate with few apical points. HR 1.14, HV 2.74.

Etymology. From Latin ‘beccus’ = beak, bill, referring to the tip of the tentorium.

Distribution. Known only from northern Thailand.

Rheotanytarsus pallidus, spec. nov.
(Figs 6A-D)

Material examined. Holotype: ♂ (ZMBN type No. 330; slide-mounted in Canada balsam), THAILAND: Chiang Mai Province, Doi Suthep, What Phra That Temple, 15.IV.1991, sweep net, T. Andersen.

Diagnosis. Differs from *R. beccus*, spec. nov. in having thorax and abdomen pale, a non-spatulate anal point, and 3 dorsal setae on the anal tergite.

Description

Adult male (n=1).

Total length 1.78 mm. Wing length 1.18 mm. Total length / wing length 1.51. Wing length / length of profemur 1.93. Thorax and abdomen pale, legs pale with apical portions of femora darker.

Head. AR 0.44; Fm13 206 long. Temporal setae 6, including 3 inner verticals, 2 outer verticals and 1 postorbital. Clypeus with 15 setae. Tentorium 74 long, 20 wide at sieve pore, 12 wide at posterior tentorial pit. Stipes 90 long, 16 wide. Palpomere lengths 28, 30, 76, 84, 158; Pm5/Pm3 2.08.

Thorax. Acrostichals 16, dorsocentrals 9, scutellars 4.

Wing. VR 1.52. Sc and M bare, R with 15 setae, R_1 20, R_{4+5} 49, RM 1, M_{1+2} 53, M_{3+4} 24, Cu 15, Cu_1 12, PCu 38, An 23. Cell m with 8 setae, r_{4+5} about 300, m_{1+2} about 250, m_{3+4} about 70, cu and an combined 90.

Legs. Spur of front tibia 16 long, spurs of mid ti 22 and 28 long including 12 of comb, hind ti spurs both 30 long including 12 of comb. Width at apex of front ti 38, of mid ti 34, of hind ti 38. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	612	288	748	372	272	236	100	2.60	1.68	1.20	–
p_2	580	420	240	112	80	56	40	0.57	4.30	4.17	–
p_3	620	50	372	200	188	124	40	0.57	4.30	4.17	–

Hypopygium (Figs 6A-D). Anal tergite bands V-shaped, linked by basal band. Tergite IX with 3 dorsal and 10 caudal setae. Anal point 56 long, 24 wide at base; 6 wide at apex; crests well developed, proximally fused forming an arc. Phallapodeme 60 long, transverse sternapodeme 42 long. Gonocoxite 72 long, gonostylus 64 long. Superior volsella (Fig. 6C) 28 long, relatively large and knob-like; inferior volsella 48 long; median volsella (Fig. 6D) 34 long, not markedly curved, apex with both a plate and some free, lamellate setae. HR 1.12, HV 2.78.

Distribution. Known only from northern Thailand.

The *phaselus* group

The only known pupa of this group has frontal apotome anteriorly rugulose, frontal setae present, thoracic horn with median bend and spinules in distal ⅔, tergites II-V with circular anterior spine patches, T II with posterior shagreen arranged into two groups, hook row of about 70 hooklets occupying ½ of segment width, and anal lobe without dorsal seta.

The males included here all have at least a few dorsal anal tergite setae; V-shaped anal tergite bands; spatulate anal point with V-shaped crests (proximally fused in *R. phaselus*, spec. nov.); superior volsella with posterior extension; median volsella usually not reaching apex of superior volsella; and gonostylus usually abruptly tapered, often with parallel-sided apical portion.

Rheotanytarsus phaselus, spec. nov.
(Figs 6E-H)

Material examined. Holotype: ♂ (ZMBN type No. 331; slide-mounted in Canada balsam), MALAYSIA: Dahong Region, Kuantan, Pandam Waterfalls, 8-10.VIII.1993, Malaise trap, G. E. E. Søli.

Diagnosis. Separated from other members of the genus by long, digitiform extension of superior volsella; pale thorax, presence of well developed, V-shaped anal tergite bands and reduced basal bands; slightly spatulate, narrow anal point; and abruptly tapered gonostylus with completely parallel-sided apical portion.

Description

Adult male (n=1).

Total length 1.81 mm. Wing length 1.11 mm. Total length / wing length 1.63. Wing length / length of profemur 1.65. Thorax and abdomen pale, legs pale with apical portions of femora darker.

Head. AR 0.37; Fm13 184 long. Temporal setae 8, including 3 inner verticals, 3 outer verticals and 2 postorbital. Clypeus with 17 setae. Tentorium 54 long, 12 wide at sieve pore, 8 wide at posterior tentorial pit. Stipes 80 long, 12 wide. Palpomere lengths 22, 26, 62, 72, 112; Pm5/Pm3 1.81.

Thorax. Acrostichals 14, dorsocentrals 8, scutellars 3.

Wing. VR 1.63. Sc and M bare, R with 14 setae, R_1 25, R_{4+5} 58, RM 2, M_{1+2} 58, M_{3+4} 26, Cu 17; Cu_1 14, PCu 45, An 22. Cell m with 8 setae, r_{4+5} about 300, m_{1+2} about 250, m_{3+4} about 70, cu and an combined about 90.

Legs. Spur of front tibia 16 long, spurs of mid ti 20 and 22 long including 12 of comb, hind ti spurs 34 and 36 long including 14 of comb. Width at apex of front ti 36, of mid ti 28, of hind ti 34. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	672	308	–	–	–	–	–	–	–	–	–
p_2	580	456	220	120	80	52	40	0.48	4.30	4.71	5.9
p_3	644	508	–	–	–	–	–	–	–	–	–

Hypopygium (Figs 6E-H). Anal tergite bands well developed, separate, V-shaped; weak, medially interrupted basal bands also present. Tergite IX with 2-3 dorsal and 11 caudal setae. Anal point 46 long, 14 wide at base, 4 wide at apex; crests well developed, proximally fused forming an arc. Phallapodeme 60 long, transverse sternapodeme 34 long. Gonocoxite 70 long, gonostylus 70 long. Superior volsella (Fig. 6G) 26 long, relatively large and reniform with digitiform extension; inferior volsella 56 long; median volsella (Fig. 6H) 36 long, markedly curved, with subulate setae fused into plate with apical points. HR 1.12, HV 2.78.

Etymology. From Latin 'phaselus' = kidney bean, referring to the shape of the superior volsella.

Distribution. Known only from Malaysia.

The *orientalis* group

Only the pupa of *R. orientalis* Moubayed is known. It has. the frontal apotome anteriorly rugulose; frontal setae present; thoracic horn with median bend and spinules in distal half; tergites II-V with circular anterior spine patches; T II with posterior shagreen arranged into two groups, hook row occupying ⅓-½ of segment width; and 2 short dorsal setae on each anal lobe.

The adult males mostly have spatulate or occasionally parallel-sided or tapering anal point with V-shaped crests; rounded superior volsella except in *R. orientalis*; median volsella not reaching beyond apex of superior volsella; and gonostylus not abruptly tapered.

Rheotanytarsus koraensis, spec. nov.

(Figs 6I-L)

Material examined. Holotype: ♂ (ZMBN type No. 333; slide-mounted in Canada balsam), THAILAND: Phang Nga Province, Ko Ra, 26.I.-4.II.1997, Malaise trap, L. O. Hansen / G. E. E. Søli. – Paratypes: 5♂♂, as holotypes; 1♂, Chiang Mai Province, Doi Suthep, What Phra That Temple, 15.IV.1991, sweep net, T. Andersen (ZMBN).

Diagnosis. Differs from other members of the genus by the group characteristics combined with a broad, parallel-sided anal point.

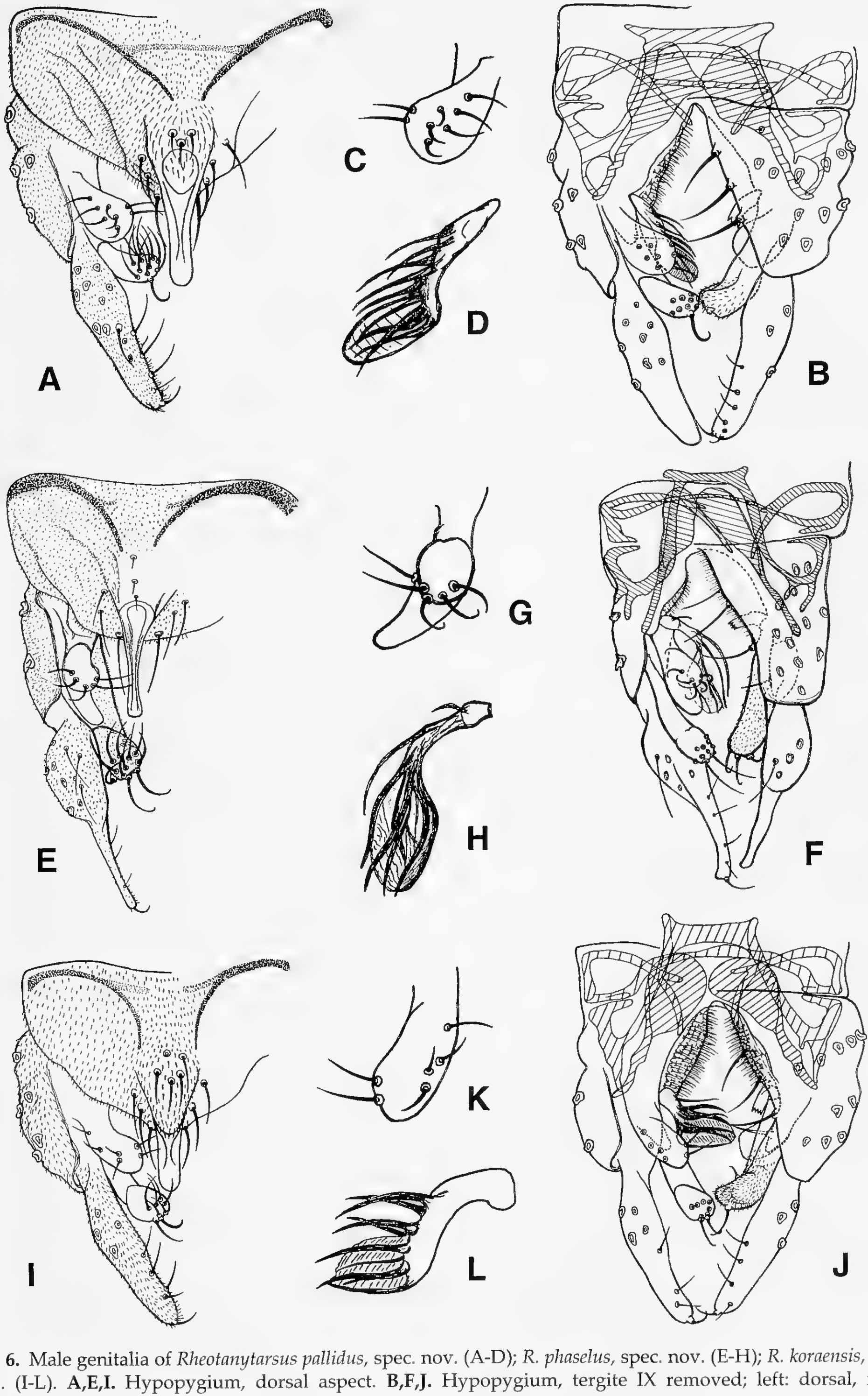

Fig. 6. Male genitalia of *Rheotanytarsus pallidus*, spec. nov. (A-D); *R. phaselus*, spec. nov. (E-H); *R. koraensis*, spec. nov. (I-L). **A,E,I.** Hypopygium, dorsal aspect. **B,F,J.** Hypopygium, tergite IX removed; left: dorsal, right: ventral. **C,G,K.** Superior volsella. **D,H,L.** Median volsella.

Description

Adult male (n=6-7 except when otherwise stated).

Total length 1.29-1.69, 1.43 mm. Wing length 0.76-1.05, 0.85 mm. Total length / wing length 1.61-1.80, 1.71. Wing length / length of profemur 1.82-2.18, 1.97. Thorax dark brown, abdomen pale, legs pale with apical portions of femora darker.

Head. AR 0.13-0.29, 0.20; Fm13 50-130, 84 long. Temporal setae 7-8, 7; including 3-4, 3 inner verticals; 2-3, 2 outer verticals; and 2 postorbitals. Clypeus with 13-17, 15 setae. Tentorium 46-76, 60 long; 12-14, 13 wide at sieve pore; 6-10, 7 wide at posterior tentorial pit. Stipes 60-90, 69 long; 12-24, 17 wide. Palpomere lengths 16-26, 22; 14-24, 20; 40-66, 50; 58-74, 65; 100-150, 120 (4); Pm5/Pm3 2.00-2.42, 2.28 (4).

Thorax. Acrostichals 14-18, 16; dorsocentrals 7-11, 8; scutellars 3-5, 4.

Wing. VR 1.35-1.71, 1.56. Sc, RM and M bare, R with 10-14, 12 setae; R_1 8-17, 13; R_{4+5} 24-42, 32, M_{1+2} 26-50, 35; M_{3+4} 13-25, 17; Cu 8-14, 11; Cu_1 9-14, 11; PCu 22-35, 32; An 12-20, 16. Cell m with 10 setae, r_{4+5} about 150, m_{1+2} about 150, m_{3+4} about 50, cu and an combined 35.

Legs. Spur of front tibia 10-16, 13 long; spurs of mid ti 16-20, 17 and 22-24, 23 long including 10 of comb; hind ti spurs 22-30, 26 and 26-32, 29 long including 12-14, 12 of comb. Width at apex of front ti 28-34, 30; of mid ti 24-28, 26; of hind ti 28-34, 31. Lengths (n=4-6 on ta_1-ta_5) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4
p_1	360-528, 437	176-264, 210	408-648, 502	232-332, 261	184-248, 200	104-188, 145
p_2	368-528, 426	272-388, 313	136-220, 157	64-112, 83	40-68, 51	32-48, 36
p_3	400-568, 463	312-460, 365	184-292, 233	120-180, 135	120-164, 130	72-108, 81

	ta_5	LR	BV	SV	BR
p_1	56-80, 72	2.22-2.77, 2.46	1.56-1.76, 1.68	1.19-1.39, 1.25	–
p_2	24-40, 31	0.47-0.53, 0.51	3.96-4.90, 4.45	4.16-5.00, 4.64	4.3-6.7, 5.3
p_3	48-60, 50	0.55-0.70, 0.64	2.56-2.80, 2.70	3.29-4.13, 3.58	3.7-7.5, 5.1

Hypopygium (Figs 6I-L). Anal tergite bands widely separate, V-shaped; interrupted basal bands also present. Tergite IX with 3-6, 4 dorsal setae and 8-9, 8 further lateral and caudal. Anal point 36-46, 41 long; 16-20, 17 wide at base; 4-6, 5 wide at apex; crests well developed, V-shaped. Phallapodeme 50-60, 53 long; transverse sternapodeme 26-31, 29 long. Gonocoxite 64-79, 72 long; gonostylus 44-60, 52 long. Superior volsella (Fig. 6K) 24-31, 28 long, oblong with slightly pointed apex; inferior volsella 43-50, 45 long; median volsella (Fig. 6L) 29-36, 32 long, with many long sharply pointed setae; distal subulate setae fused into a large plate sometimes difficult to distinguish. HR 1.20-1.53, 1.40; HV 2.67-2.93, 2.78.

Etymology. Named after the town of Ko Ra, site of the type locality.

Distribution. Known only from Thailand.

Rheotanytarsus falcatus, spec. nov.

(Figs 7A-H)

Material examined. Holotype: ♂ (ZMBN type No. 332; slide-mounted in Canada balsam), THAILAND: Krabi Province, Tham Pheung, 19-23.I.1997, Malaise trap, L. O. Hansen / G. E. E. Søli. – Paratypes: 6♂♂ and 1♀, as holotype (ZMBN).

Diagnosis. Differs from *R. koraensis*, spec. nov. by the spatulate anal point and only 2-3 dorsal anal tergite setae (3-6 in *koraensis*).

Description

Adult male (n=5-7 except when otherwise stated).

Total length 1.18-1.33, 1.27 mm. Wing length 0.73-0.78, 0.75 mm. Total length / wing length 1.58-1.1.79, 1.68. Wing length / length of profemur 1.86-2.11, 2.00. Thorax dark brown, abdomen pale, legs pale with apical portions of femora darker.

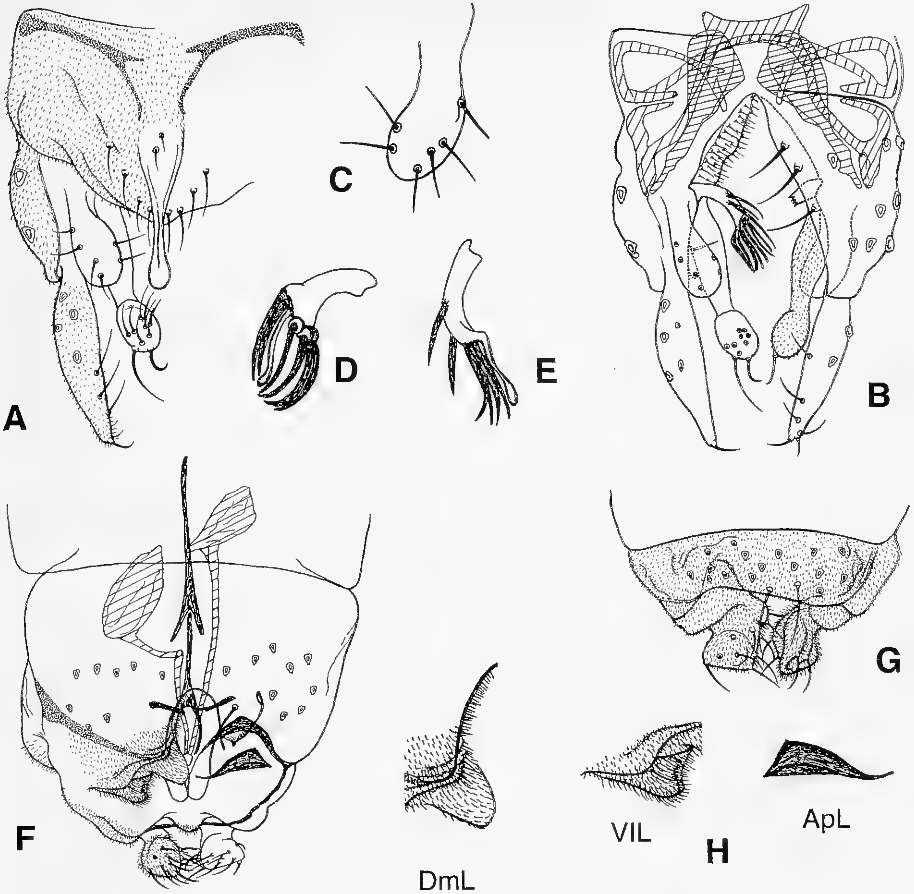

Fig. 7. Genitalia of *Rheotanytarsus falcatus*, spec. nov.: male (A-D); female (F-H); *R. madarihatensis* nom. nov.: male (I-L). **A,I.** Hypopygium, dorsal aspect. **B,J.** Hypopygium, tergite IX removed; left: dorsal, right: ventral. **C,K.** Superior volsella. **D,E,L.** Median volsella. **F.** Terminal segments, ventral. **G.** Terminal segments, dorsal aspect. **H.** Gonapophysis VIII (DmL, dorsomesal lobe; VIL, ventrolateral lobe; ApL, apodeme lobe).

Head. AR 0.21-0.23, 0.23; Fm13 70-92, 84 long. Temporal setae 7, including 3 inner verticals, 2 outer verticals, and 2 postorbitals. Clypeus with 13-17, 15 setae. Tentorium 48-70, 57 long; 12-14, 13 wide at sieve pore; 4-6, 5 wide at posterior tentorial pit. Stipes 64-72, 68 long; 14-24, 20 wide. Palpomere lengths 20-22, 21; 18-24, 21; 52-62, 59; 60-72, 67; 110-118, 113 (4); Pm5/Pm3 1.77-1.97, 1.89 (4).

Thorax. Acrostichals 12-20, 16; dorsocentrals 7-8, 7; scutellars 3-4, 3.

Wing. VR 1.52-1.59, 1.56. Sc and M bare, R with 8-14, 11 setae; R_1 10-14, 12; R_{4+5} 27-32, 30; RM 0-1, 1; M_{1+2} 34-39, 36; M_{3+4} 15-20, 17; Cu 12-14, 12; Cu_1 10-11, 11; PCu 29-38, 33; An 16-22, 19. Cell m with 5 setae, r_{4+5} about 150, m_{1+2} about 100, m_{3+4} about 30, cu and an combined 40.

Legs. Spur of front tibia 10-14, 12 long; spurs of mid ti 18-20, 18 and 10-14, 12 long including 10-12, 10 of comb; hind ti spurs 24 and 24-30, 26 long including 10-14, 12 of comb. Width at apex of front ti 26-32, 29; of mid ti 26-30, 27; of hind ti 30 (4). Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4
p_1	368-400, 377	152-184, 171	440-488 (3)	232-264 (3)	176 (1)	–
p_2	344-400, 374	256-288, 265	160-176 (3)	72-80 (3)	48-56 (3)	32-40 (3)
p_3	376-448, 411	312-360, 336	232-248 (2)	120-128 (2)	88-128 (3)	56-72 (3)

	ta_5	LR	BV	SV	BR
p_1	–	2.50-2.90 (3)	–	1.11-1.24 (3)	–
p_2	32 (3)	0.61-0.62 (3)	3.96-4.15 (3)	3.75-3.91 (3)	5.1-6.0 (3)
p_3	40-48 (3)	0.64-0.70 (2)	2.79-3.39 (2)	3.22-3.45 (2)	6.7 (1)

Hypopygium (Figs 7A-E). Anal tergite bands widely separate, V-shaped; interrupted basal bands also present. Tergite IX with 2-3, 2 dorsal setae and 7-9, 8 further lateral and caudal. Anal point 38-47, 42 long; 10-14, 11 wide at base; 4-6, 4 wide at apex; crests well developed, V-shaped. Phallapodeme 50-52, 51 long; transverse sternapodeme 20-30, 23 long. Gonocoxite 62-74, 67 long; gonostylus 44-52, 47 long. Superior volsella (Fig. 7C) 27-34, 30 long, oblong; inferior volsella 50-60, 53 long; median volsella (Fig. 7D,E) 30-36, 32 long, sickle-shaped, not reaching apex of superior volsella, with subulate setae fused into narrow plate with few apical points. HR 1.38-1.45, 1.43; HV 2.48-3.02, 2.74.

Female (n=1).

Total length 1.38 mm. Wing length 1.01 mm. Total length / wing length 1.37. Wing length / length of profemur 1.80. Thorax pale; postnotum, preepisternum and vittae dark. Abdomen pale, legs pale with apical ¼ of femora darker.

Head. AR 0.24; flagellomere lengths 76, 52, 60, 48, 56. Temporal setae 6, including 3 inner verticals, 2 outer verticals and 1 postorbital. Clypeus with 16 setae. Tentorium 70 long, 10 wide at sieve pore, 4 wide at posterior tentorial pit. Stipes 90 long, 12 wide. Palpomere lengths 28, 28, 62, 62; Pm5 lost.

Thorax. Acrostichals 14, dorsocentrals 11, scutellars 2.

Wing. VR 1.77. Sc and M bare, R with 14 setae, R_1 31, R_{4+5} 56, RM 2, M_{1+2} 48, M_{3+4} 28, Cu 15, Cu_1 15, PCu 31, An 21. Cell m with 4 setae, r_{4+5} about 270, m_{1+2} about 200, m_{3+4} 110, cu and an combined 90.

Legs. Spur of front tibia 18 long, spurs of mid ti 24 and 26 long including 12 of comb, hind ti spurs 28 and 30 long including 12 of comb. Width at apex of front ti 34, of mid ti 34, of hind ti 34. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	560	380	–	–	–	–	–	–	–	–	–
p_2	488	376	200	96	64	32	32	0.53	4.36	4.32	4.4
p_3	528	480	272	144	136	80	48	0.57	3.14	3.71	5.1

Genitalia (Figs 7F-H). Tergite IX with about 16-20 setae. Gonocoxite apparently without setae. Cercus 40 long. Seminal capsule 54 long, with 4 long sclerotisation, and 16 long neck. Notum 126 long.

Etymology. From Latin 'falcatus' = sickle-shaped, referring to the median volsella.

Distribution. Known only from southern Thailand.

Rheotanytarsus madarihatensis, nom. nov.

(Figs 7I-L)

Rheotanytarsus pellucidus Chaudhuri & Datta in Chaudhuri et al., 1994 – preoccupied by *R. pellucidus* (Walker, 1848)

Material examined. (see 'Remarks' below). Holotype ♂ (BUEC type No. 196 according to slide label, No. 195 acc. to Chaudhuri et al. 1994), INDIA: West Bengal, Madarihat, 25.II.1988, leg. T. Dutta acc. to slide (A. K. De acc. to Chaudhuri et al. 1994). – Other: MALAYSIA: 1♂, Dahong Region, Kuantan, Pandam Waterfalls, 8-10.VII.1993, Malaise trap, G. E. E. Søli (ZMBN).

Diagnosis. Distinguished from the two preceding species by having only twelve flagellomeres, and a spatulate anal point broader than in *R. falcatus*, spec. nov.

Description

Adult male (n=1-2, holotype in parentheses).

Total length 1.23 mm. Wing length 0.74 (0.99) mm. Total length / wing length 1.65. Wing length / length of profemur 1.94. Thorax pale to dark, abdomen pale, legs pale with apical portions of femora darker.

Head. AR 0.19 (0.26); Fm12 66 (108) long. Temporal setae 6, including 3 inner verticals, 2 outer verticals and 1 postorbital. Clypeus with 13 setae. Tentorium 40 long, 8 wide at sieve pore, 6 wide at posterior tentorial pit. Stipes 60 long, 18 wide. Palpomere lengths 20, 24, 42, 46, 90; Pm5/Pm3 2.14.

Thorax. Acrostichals 12, dorsocentrals 7, scutellars 2.

Wing. VR 1.49 (1.53). Sc, RM and M bare, R with 15 (14) setae, R_1 16 (16), R_{4+5} 30 (37), M_{1+2} 38 (29), M_{3+4} 14 (20), Cu 9 (13), Cu_1 10 (11); PCu 27 (31), An 14 (16). Cell m with 4 (11) setae, r_{4+5} about 140, m_{1+2} about 120, m_{3+4} about 40 (70), cu and an combined 22 (83).

Legs. Spur of front tibia 14 long, spurs of mid ti 16 and 24 long including 10 of comb, hind ti spurs 28 and 30 long including 14 of comb. Width at apex of front ti 26, of mid ti 24, of hind ti 26. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV
p_1	384	200	80	240	200	156	76	2.40	1.58	1.21
p_2	408	296	144	60	52	36	28	0.49	4.82	4.89
p_3	424	340	–	–	–	–	–	–	–	–

Hypopygium (Figs 7I-L). Anal tergite bands short, widely separate V-shaped; weak basal bands also present. Tergite IX with 5 dorsal and 9 caudal setae. Anal point 36 long, 12 wide at base, 4 wide at apex; crests well developed, V-shaped. Phallapodeme 44 long, transverse sternapodeme 24 long. Gonocoxite 54 long, gonostylus 48 long. Superior volsella (Fig. 7K) 16 long, somewhat oblong; inferior volsella 46 long; median volsella (Fig. 7L) 26 long, not markedly curved, with subulate setae fused into plate with few apical points. HR 1.12, HV 2.56.

Etymology. Named after the type locality.

Remarks. See 'Remarks' under *R. kuantanensis*, spec. nov.

The holotype is somewhat squashed. The legs are not measurable, and the median volsellae not clearly observable. The size is slightly larger than for the Malaysian specimen, and the coloration apparently lighter. However, the matching reduction to twelve flagellomeres with similar antennal ratio, the spatulate anal points, respectively similar anal terigte bands and superior volsellae lead us to regard the two specimens as conspecific.

The authors have also seen one of the two paratype slides of *R. pellucidus* Chaudhuri & Datta (date as holotype; BUEC), but that male adult belongs to an undetermined species of *Micropsectra* Kieffer.

Distribution. Known from India and Malaysia.

Rheotanytarsus amamiflavus Sasa
(Sasa 1990: fig. 11)

Rheotanytarsus amamiflavus Sasa, 1990: 123; Sasa & Kikuchi 1995: 133.

Diagnosis. Separated by the group characteristics combined with a broad, non-spatulate anal point, absence of dorsal anal tergite setae and basal tergite bands, with a dark thorax and pale legs, and a digitus extending beyond the superior volsella.

The species is described in sufficient detail by Sasa (1990) and Sasa & Kikuchi (1995). It is known from the Nansei Islands (southern Japan).

Rheotanytarsus okisimplex Sasa
(Sasa 1993: figs 10.6, 10.7)

R. okisimplex Sasa, 1993: 130; Sasa & Kikuchi 1995: 133.

Diagnosis. Differs from the preceding species by having a pale thorax, subcosta with setae, and a spatulate anal point.

The species is described in sufficient detail by Sasa (1993) and Sasa & Kikuchi (1995). So far it has been found only on Okinawa (southern Japan).

Rheotanytarsus orientalis Moubayed
(Moubayed 1989: figs 9-16)

R. orientalis Moubayed, 1989: 278.

Material examined. Holotype: ♂, THAILAND: Kwai River, Tham Rawa, 120 m a.s.l., 16.VI.1986, J. Moubayed (ZMBN). – Other (not listed in original description): 1 Pex on holotype slide, 1 pharate ♂ labeled as holotype (ZMBN).

Diagnosis. Differs from other members of the group by having a knob-like extension of the superior volsella. As in *R. okisimplex* Sasa, *R. amamiflavus* Sasa, and the Japanese *R. kuramasimplex* Sasa the digitus of the superior volsella extends beyond the margin. The anal point is spatulate and there are at least 4 dorsal anal tergite setae.

R. orientalis has been described in sufficient detail by Moubayed (1989). It is known only from Thailand.

Zoogeography

Sæther & Kyerematen (unpublished) in order to determine the phylogeny of the genus re-examined all previously described species and using different parsimony analyses obtained 21 species groups. Ten of these groups are found in the Oriental region.

The phyletic interrelationship of the species of *Rheotanytarsus* suggests the splitting of their common ancestor into Asian, African and Neotropical lineages at the earliest very near the end of the fragmentation of the super-continent Pangaea. The Megagaeic lineage shows a warm/eurythermic vicariant Gondwanan pattern with multiple sister group relationships between the South Asian subregion, the Australian and the Afrotropical regions. The East Asia – North America linkage is likely of post-Miocene origin. South Asian – West Palaearctic vicariance is found in several groups.

In the *pentapoda* group tracks between Africa and eastern South America and further to Central America are apparent as is a track between the West Palaearctic and South Asia.

The *photophilus* group includes species from South Asia, Europe and Africa. There apparently are vicariance patterns between Africa and South Asia, and between South Asia and the West Palaearctic.

The monotypic *curtistylus* group is known from West Palaearctic and South Asia.

In the *acerbus* group a Beringian connection between East Asia and North and Central America is apparent.

In the *pellucidus* group a single new African species from Ghana as well as a single new Central American species, *R. oss* Cranston from Australia and southern Thailand, *R. minusculus* Kyerematen from Thailand, and *R. tamasecundus* Sasa from Japan, most likely are all a result of peripheral isolation of the widespread *R. pellucidus* (Walker).

In the *guineensis* group the picture is rather unclear, but patterns between Australia and South Asia as well as between South Asia and Africa are indicated.

In the *trivittatus* group there appears to be a tropical Gondwanan vicariance pattern between Africa and South Asia / Australia and possibly a direct trans-Pacific dispersal between South Asia and Central America.

The *ororus* group combines 2 species from Thailand with 3 species from West and Central Africa. There thus apparently is a northern tropical Gondwanaland vicariance pattern.

The *phaselus* group combines one species from Malaysia with one West African species and three Central American species, but is a rather tenuous group.

The *orientalis* group combines 6 South Asian species with one species from non-Oriental Japan.

The Oriental members of the genus thus show several connections with Australia, the East Palaearctic (East Asia), Africa, and to some extent with the West Palaearctic.

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Ablabesmyia reissi, spec. nov., a new species of Tanypodinae from Rio Negro province, Argentina, with descriptions of the adult female and preimaginal stages

(Insecta, Diptera, Chironomidae)

Analía C. Paggi & Diego Añón Suarez

Paggi, A. C. & D. A. Suarez (2000): *Ablabesmyia reissi*, spec. nov., a new species of Tanypodinae from Rio Negro province, Argentina, with descriptions of the adult female and preimaginal stages (Insecta, Diptera, Chironomidae). – In: Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss. – Spixiana **23/3**: 259-266.

A description is offered for the adult male, female and preimaginal stages of *Ablabesmyia reissi*, spec. nov. The species' subgeneric position is discussed and the new *reissi* species group created. Ecological features and the habitat at the type locality are described.

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Introduction

Larvae belonging to the genus *Ablabesmyia* Johannsen, 1905 were collected as part of benthic studies (Añón Suarez 1997) carried out in Lago Escondido near San Carlos de Bariloche, Río Negro province, Argentina (41°2'S, 71°4'W). Larva-pupa-adult associations were obtained from laboratory rearings, additional adult specimens were collected near the lake with a light trap. While checking other collection material, a complete rearing was found in a sample from Ramos Mexía reservoir, Neuquén and Río Negro provinces (39°15'-39°40'S, 68°40'-69°29'W). A congeneric species, *A. (Karelia) bianulata* Paggi, 1988, is known to also occur in our study area.

In the present paper, the immature and adult stages of a new species are described from the above material, and its position in the genus is discussed.

Methods

Part of the material was cleared with 10% KOH and slide-mounted in Canada balsam; the rest was mounted in Euparal. Terminology and abbreviations follow Sæther (1980) and Roback (1985). Tables are arranged as in Roback (1985) to make comparisons easier. Total specimen length and wing length are given in mm, other linear measurements in μm, with the values presented as means followed by ranges in parentheses.

Ablabesmyia reissi, spec. nov.

Figs 1-17

Types. Holotype: 1 reared ♂, ARGENTINA, Rio Negro province, 30 km W. of San Carlos de Bariloche, Lago Escondido, 6.I.1998, leg. D. Añón Suarez; on slide in Euparal, deposited at Museum of Natural Science of La Plata, La Plata, Argentina. – Paratypes (all ARGENTINA; at Inst. of Limnology, La Plata). From type locality, leg. D. Añón Suarez: 5♂♂, 3.XII.1988; 1 larva, 2.XI.1988; 1 larval exuviae + pupa, 2 pupal exuviae; 1♂, 19.XI.1992; 1 reared ♀, 2 reared ♂♂, 1 larval exuviae + 1 pupal exuviae, 6.I.1998; Neuquén, Embalse Ramos Mexia, leg. F. Kaisin: 1 reared ♂, 5.XI.1983.

Etymology. The new species is named in memory of Friedrich Reiss, and to acknowledge his important contributions to the chironomids of Patagonia.

Diagnosis. Adult males of *A. reissi*, spec. nov. can be identified by their color pattern (see description of wing spots, leg bands, abdomen) in combination with the expanded subterminal megaseta of the gonostylus, the slightly sinuate or apically curved superior volsella, and the small median volsella with setae on its base.

A diagnosis for the adult female cannot be given here, since too few other species of *Ablabesmyia* are known in detail in this life stage.

The pupa of *A. reissi* is distinguished by the slightly dome-shaped frontal apotome, oval thoracic horn with distinct reticulate pattern, curved aeropyle and globose apex, and by the pigmentation of wing sheath and abdominal tergite IV.

The larva is characterised by the dark brownish ligula with concave tooth apices and the inner teeth slightly outcurved, the two-segmented maxillary palp (P1/P2 around 1.09) separated from the palpiger by a membranous portion, and the posterior parapod with one hooked and two dark brownish claws.

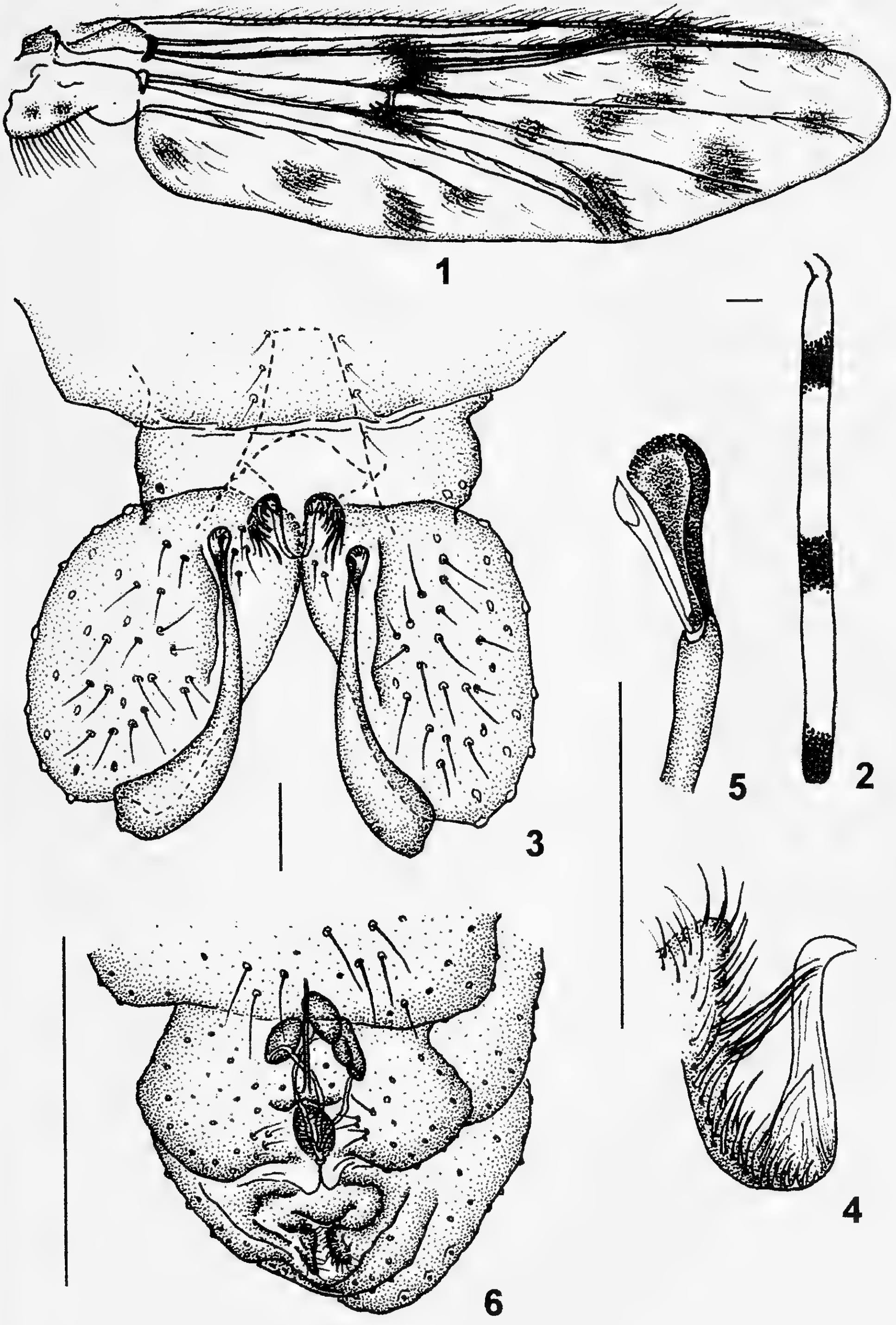
Description

Adult male (also see Table 1).

Coloration (in alcohol). Greyish with extensive greyish brown markings in a defined pattern, as follows: head brownish, maxillary palps greyish, antennal pedicel and last flagellomere brownish; thorax brownish, vittae, postnotum, preepisternum and two pleural spots dark brownish, scutellum light brownish with two dark brownish longitudinal bands; wing whitish with yellow veins and dark spots as in Fig. 1; coxae brownish, other leg segments greyish with dark bands: femur with one band located in distal ⅓, tibia with three bands (Fig. 2), on fore ti distributed (after Roback 1971: text fig. 3)

Tab. 1. Meristic data for adults of *Ablabesmyia reissi*, spec. nov.

	Male			Female
	range	mean	n	(n=1)
Total length	3.85-4.05	4.01	6	3.65
Wing length	2.28-2.72	2.45	9	2.08
Total/wing le.	1.49-1.80	1.66	7	1.75
AR	1.53-2.3	1.73	9	0.28
Tentorium le.	174-238	204	9	163
Palpom.1 le.	91-143	112	8	102
Pm2	143-180	163	8	142
Pm3	159-180	170	8	152
Pm4	190-301	261	8	254
VR	0.73-0.8	0.77	9	0.78
LR_1	0.76-0.83	0.79	7	0.75
LR_2	0.65-0.72	0.68	7	0.64
LR_3	0.79-0.83	0.81	7	0.83
Gonocoxite le.	147-206	196	9	–
Gonostylus le.	147-182	161	9	–
HR	1-1.19	1.08	9	–
HV	2.22-2.89	2.53	7	–



Figs 1-6. *Ablabesmyia reissi,* spec. nov.; adults (1-5: male). **1.** Wing. **2.** Fore tibia. **3.** Hypopygium, dorsal. **4.** Superior and median volsellae. **5.** Gonostylus apex. **6.** Female genitalia, ventral. Scales (μm): 100 (Figs 2, 6), 50 (3-5).

as A/B 0.48 and LMB/LBCB 0.31, ta_1 with median band and distal ⅓ dark brownish, ta_{2-3} distal ⅓ dark brownish, ta_{4-5} entirely dark except hind ta_4 which is as ta_{2-3}; abdominal tergites II-V with anterior ⅔ of each T dark, T VI-VIII entirely dark brownish, TIX brownish, gonocoxite distally and gonostylus proximally with dark bands, megaseta dark brownish.

Head (n=3). Temporal setae 36 (32-41), clypeals 36 (35-38).

Thorax (n=3). Antepronotals 17 (15-23), acrostichals about 30-34, dorsocentrals and humerals 31 (30-33), prescutellar dorsocentrals 10, uniserial; prealars 25 (22-29) (n=4), scutellars 26-30 in a posterior row and 26-30 scattered more anteriorly.

Wing (n=3). Squamals 38 (37-40), membrane with dense macrotrichia especially over the dark spots (Fig. 1).

Legs (n=5). Tibial spur lengths: p_1 52 (48-55); p_2 53 (48-58) and 40 (35-45); p_3 61 (58-65) and 44 (38-50).

Abdomen. All tergites with abundant setae irregularly distributed.

Hypopygium (Figs 3-5). Lengths (n=5): superior volsella 31 (25-35), median volsella 12 (10-13), megaseta 27 (23-30).

Adult female (n=1; also see Table 1).

Coloration. Similar to male except abdominal tergites II-VII each with a dark band across middle, and T VIII-IX all brownish; sternites II-VII each with lateral dark bands, VII, IX, X all brownish, cerci light greyish.

Head. Temporals 32-33; clypeals 37.

Thorax. Antepronotals 25, acrostichals about 35, dosocentrals 35, prescutellars 24, prealars 30, scutellars 54 distributed half in a posterior row, half scattered anteriorly.

Wing. Squamals 45, membrane macrotrichia and color pattern as in male.

Legs. Tibial spur lengths: p_1 50, p_2 48 and 35, p_3 50 and 38.

Abdomen. Tergites as in male.

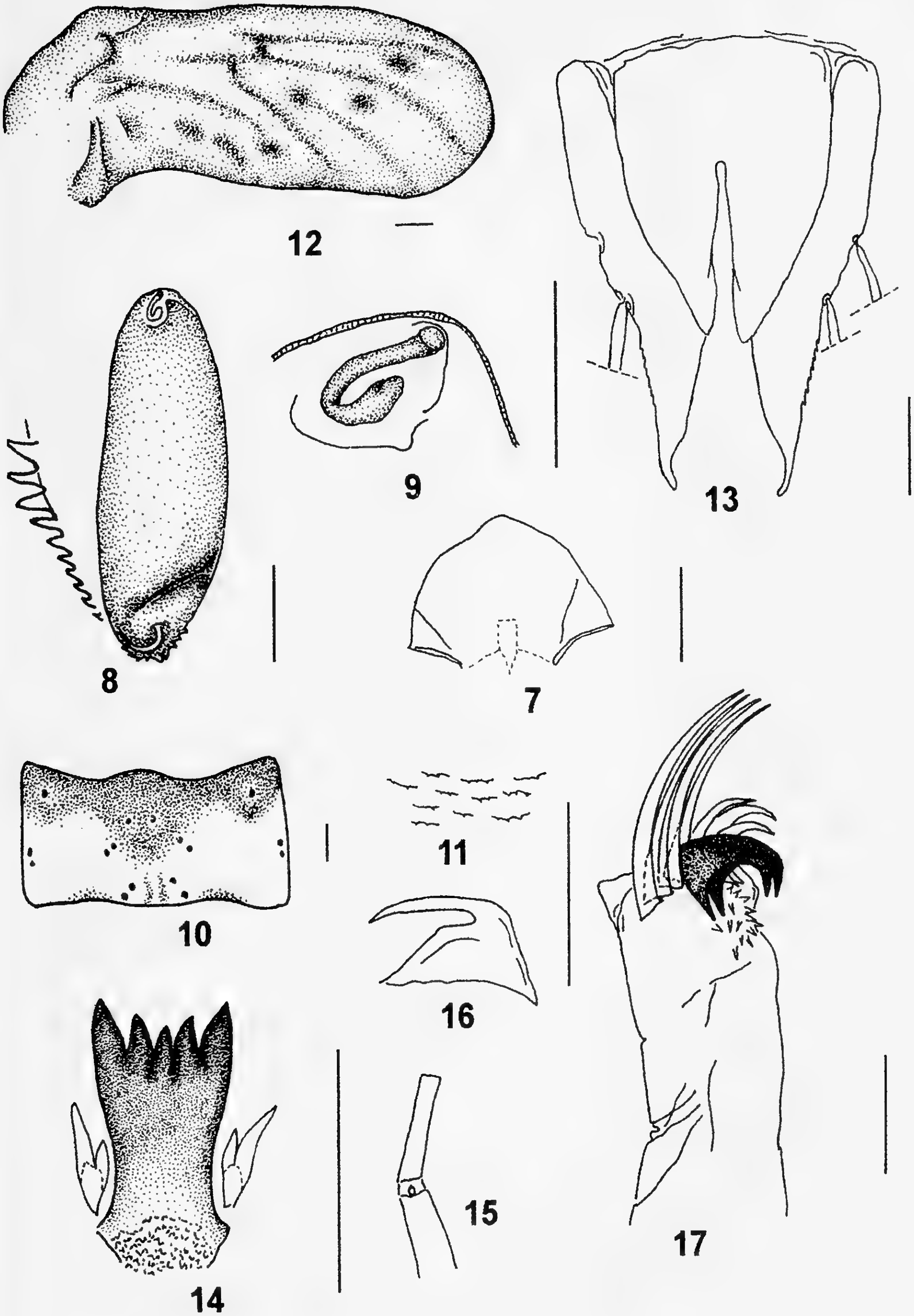
Genitalia (Fig. 6). Notum length 128, cercus 28, seminal capsule length 60, width 40.

Pupa (also see Table 2).

Coloration mostly brownish. Frontal apotome (Fig. 7) slightly dome-shaped. Thoracic horn (Figs 8, 9) oval, yellowish brown, with distinct reticulate pattern, aeropyle tube curved, apex globose. Thoracic comb (Fig. 8) of 8-9 blunt spines in a single row. Abdominal T IV (Fig. 10) with anterior, transverse brownish band in characteristic pattern; shagreen denticles as in Fig. 11. Wing sheath with distinct vein traces, vein M complete, spot pattern as in Fig. 12. Postero-lateral margin of anal lobe (Fig. 13) with 8-10 very small, sharp spines.

Tab. 2. Meristic data for immatures of *Ablabesmyia reissi*, spec. nov. Character abbreviations after Roback 1985 where applicable.

Pupae				Larvae			
	range	mean	n		range	mean	n
Thor. horn length	295-447	389	8	A_1 length	366-397	380	8
Thor. horn width	81-163	137	8	Pos. CS	0.55-0.59	0.57	8
ANi length	7.5-20	13	5	(A_{2-4}) length	94.5-102	97.5	3
ANi / thor. horn	0.018-0.045	0.033	5	AR	3.69-4.08	3.9	3
Pos. LS_1 VII	0.32-0.41	0.35	9	MD length	146-164	154	8
Pos. LS_1 VIII	0.22-0.35	0.29	9	A_1/MD	2.35-2.59	2.47	8
Anal lobe le.	376-498	439	9	Li length	81-98.5	90	8
pos. LS_1 AL	0.39-0.46	0.43	9	It/O	0.86-0.94	0.91	8
GS/AL male	0.65-0.78	0.73	6	Mt/O	0.79-0.88	0.85	8
GS/AL female	0.32-0.35	0.33	3	Pl length	38-58	50	8
				P_1 length	40.4-48	44	8
				P_2 length	38-45	40	8
				P_1/P_2	1-1.26	1.09	8
				Pc length	88-109	95	8
				Pc le./wi.	2.7-3.9	3.42	8



Figs 7-17. *Ablabesmyia reissi*, spec. nov.; immatures (7-13: pupa, 14-17: larva). **7.** Frontal apotome. **8.** Thoracic horn and comb. **9.** Aeropyle tube. **10.** Abdominal tergite IV. **11.** Shagreen denticles on T IV. **12.** Wing sheath. **13.** Anal lobe. **14.** Ligula and paraligula. **15.** Maxillary palp. **16.** Hooked claw of posterior parapod. **17.** Posterior parapod. Scales (μm): 100 (Figs 7, 8, 10, 13-15, 17), 50 (9, 11, 16).

Larva (also see Table 2).

Total length (n=10) 4.68 (3.31-5.56) mm. Head capsule light brownish, length (n=10) 832 (792-874), IC 0.74. Ligula (Fig. 14) dark brownish, apices of teeth concave, inner teeth slightly outcurved; paraligula bifid, light brownish. Pecten hypopharyngis of 15-18 teeth, some of them longer. Maxillary palp (Fig. 15) two-segmented, basal segment slightly shorter, separate from palpiger by a difficult-to-see, membranous portion. Body segments light yellowish. Posterior parapod claws include one hooked (Fig. 16) and two dark brownish ones (Fig. 17). Procercus with 7 coarse anal setae. Anal tubules conical; supranal setae simple.

Discussion

In the key to North American adult males of *Ablabesmyia* by Roback (1971), *A. reissi*, spec. nov. runs to *A. monilis* (L.) if one considers the superior volsella (aedeagal blade) as sinuate, but discounts the median volsella (basal lobe) which is very small and clear in our species and not strongly sclerotized. *A. reissi* also resembles *monilis* in the coloration of abdominal tergites II-V. The alternative after Roback is to regard the superior volsella as simply curved or slightly sinuate, and the inferior volsella as not evident or membranous. With the given abdominal color pattern the key leads to *A. mallochi* (Walley), but that species differs in structures of the aedeagus, gonocoxite, and gonostylus (megaseta), and has larger tibial spurs and LR.

When comparing larval structures using Roback (1985), *A. monilis* and *mallochi* strongly differ from *A. reissi* in the number of maxillary palpomeres, as well as in the meristic characters of Tab. 2. Their pupae (Roback 1985) differ principally in color patterns of abdominal tergite IV and the wing sheath.

If the larval maxillary palp of *A. reissi* is interpreted as not more than two-segmented, the species falls into the subgenus *A. (Karelia)* Roback. In Roback's (1985) key, our species runs to couplet 5 (considering the ligula inner tooth moderately outcurved). However, it differs from *A. illinoensis* (Malloch), *A. pulchripennis* (Lundbeck), *A. idei* (Walley) and *A. cinctipes* (Johannsen) – the latter after Caldwell (1993) – by a different combination of A_1 length, a lower P1/P2, an AR around 3.9, A1/MD around 2.47, and in posterior parapod claw configuration. The pupa of our species is near *A. cinctipes*, but differs by the dome-shaped frontal apotome, thoracic horn without constricted lower portion, club-shaped aeropyle tube, tergite IV not uniformly colored, and wing sheaths with vein M complete.

A. punctulata (Philippi) sensu Edwards (1931) differs from our specimens in having two additional spots in cell r_{4+5}, and a larger distance between crossveins MCu and RM. One male in the Edwards material at BMNH – from Nahuel Huapi lake (Argentina); kindly examined for us by Dra M. Riera-devall – shows a front tibia with three mesal and two apical dark bands, thus differing from *A. reissi*, spec. nov. and even from Edwards' own description (one mesal, one apical and one subapical band). With Philippi's type material apparently lost, *Chironomus punctulatus* Philippi is a nomen dubium that should be taken out of use at least until Edwards' entire series under that name is reexamined. For additional species names in this context see Spies & Reiss (1996).

A. infumata (Edwards) – reported from Peulla (Chile) and Lago Correntoso (Argentina) – is close to *A. punctulata*, *A. monilis* (Edwards, op. cit.) and our species. However, *A. infumata* is much darker than the other species (abdominal tergites all dark) and has two dark bands on the front femur; small and fainter wing spots and tips of the branches of vein R not distinctly darker, and a slender subterminal gonostylus megaseta.

Ablabesmyia (Sartaia) metica Roback – described from Colombia – possesses a lower adult male AR than our species, its wing vein C ends just above the tip of M_{3+4} (*A. reissi*: C ends beyond M_{3+4}, closer to tip of M_{1+2}), and its hypopygium is lacking the superior volsella (present in our species).

The larvae and pupae of *A. punctulata*, *infumata*, and *metica* have not been described.

A problem arises when trying to determine the subgeneric status of *A. reissi*, spec. nov. Based on the expanded subterminal megaseta of the gonostylus, according to Murray & Fittkau (1989) the species would fall into the subgenus *A. (Ablabesmyia)*. On the other hand, following Roback (1985) the two visible segments of the larval maxillary palp would lead to the subgenus *A. (Karelia)*. However, that author described immature material from Peru, Colombia and Mexico which, for the time being, he could not include into existing subgenera due to its peculiar characteristics. Despite this, he made a tentative categorization. The features of our larvae matching those given by Roback (1985) are a more advanced position of the campaniform sensillum (CS in Tab. 2) of antennal segment 1 (A_1), and the assumed presence of a third, membranous palpomere in the elongated base of the maxillary palp. After Roback (1985: fig. 42B, C) this configuration could be considered intermediate between that of the subgenera *(Karelia)* and *(Asaia)* and that of the *ramphe* and *monilis* groups of *A. (Ablabesmyia)*. Comparing our specimens with the data in Roback's table 18 (1985: 207), a great similarity with the subgenerically unassigned *Ablabesmyia* sp. 1 (= part of *Pentaneura* sp. 6 Roback, 1966) can be observed in the above mentioned features, especially with the specimens reported from Peru. However, in contrast to *A.* sp. 1, our larvae possess a hooked claw on the posterior parapod.

With regard to the pupae Roback associated with *A.* sp.1 (but did not illustrate), our specimens fit his description, especially in the shape of the aeropyle (slightly winding and with a club-shaped apex). As a result, this would include them into the subgenus *(Ablabesmyia)*, except for the distinctly reticulate respiratory organ on our pupae.

Summarising the above evidence, *Ablabesmyia reissi*, spec. nov. can be tentatively included in the nominal subgenus of *Ablabesmyia*. Within the latter, the creation of a new *reissi* group of species can reflect the unique combination of features (based on Roback's 1985 tab. 1, p.164), for example: (adult) absence of apical setae from dorsal lobe, absence of lateral lobe; (larva) maxillary palp with 2 segments plus a semi-sclerotized third, posterior parapod with a hook-shaped claw.

Study area and ecology

Escondido is a shallow lake (Z_{max}: 8 m, Z_{mean} 5.5 m) situated 30 km west of Bariloche city (North Patagonia) at 764 m a.s.l. The dominant vegetation in the watershed is a mixed forest of "coihue" (*Nothofagus dombeyii* (Mirb.) Blume), "ciprés" (*Austrocedrus chilensis* (D. Don) Florin & Boutleje), and "ñire" (*Nothofagus antartica* (G. Foster) Oesterd). The littoral zone of the lake is colonized by *Schoenoplectus californicus* (Meyer) Soják *(= Scirpus californicus)* and *Potamogeton linguatus* Hangström, while *Nitella* sp. is distributed in deeper areas of the lake, but always at low densities.

The lake's temperature pattern shows a warm monomictic behavior (Balseiro & Modenutti 1990). Dissolved oxygen is always present at concentrations near saturation. Secchi disk visibility always reaches the maximum depth (8 m). Conductivity values range between 40 μS/cm in winter and 80 μS/cm by the end of the summer. The pH is neutral (7.02) and the concentration of chlorophyll a low (0.5 and 1.8 mg/m^3) for winter and summer, respectively (Diaz & Pedrozo 1993). On account of these characteristics the lake has been classified as oligotrophic (Balseiro & Modenutti 1990, Diaz & Pedrozo 1993).

A. reissi were found in both the littoral and the deep zone of the lake, with highest numbers in the former. Microcrustaceans (cladocerans and copepods), other chironomids and Acari make up their most frequent prey, as observed on slide-mounts of gut contents (Añón Suarez 1997).

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Larvae of *Eurycnemus crassipes* (Panzer) (Diptera: Chironomidae) ectoparasitic on prepupae/pupae of *Hydropsyche siltalai* Döhler (Trichoptera: Hydropsychidae), with a summary of known chironomid/trichopteran associations

Patrick Ashe, James P. O'Connor & Declan A. Murray

Ashe, P., J. P. O'Connor & D. A. Murray (2000): Larvae of *Eurycnemus crassipes* (Panzer) (Diptera: Chironomidae) ectoparasitic on prepupae/pupae of *Hydropsyche siltalai* Döhler (Trichoptera: Hydropsychidae), with a summary of known chironomid/trichopteran associations. In Baehr, M. & M. Spies (eds): Contributions to chironomid research in memory of Dr. Friedrich Reiss (Suppl.). – Spixiana **23/3**: 267-274

Studies on the immature stages of *Eurycnemus crassipes* (Panzer) from Ireland suggest that larvae are obligate ectoparasites on the prepupae/pupae of *Hydropsyche siltalai* Döhler. An account is given of the larval ecology and distribution of the genus *Eurycnemus*. *E. crassipes* is recorded from Bosnia-Herzegovina, Slovenia and Switzerland for the first time. A literature survey reveals that known chironomid/trichopteran associations involve at least eleven chironomid genera, and such associations appear to be a much more widespread phenomenon than previously recognised.

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Introduction

Two species of *Eurycnemus* van der Wulp, 1874 are known: *E. crassipes* (Panzer, 1813) in Europe (Ashe & Cranston 1990) and *E. nozakii* Kobayashi, 1998 from Honshu, Japan. Published records of *Eurycnemus* from outside the Palaearctic have been regarded as erroneous (Ashe et al. 1987). When describing the immature stages of *E. crassipes*, Murray & Ashe (1981) indicated a possible association between its larva and a trichopteran species. Recent reports that larvae of *E. nozakii* are ectoparasitic on *Goera japonica* Banks (Trichoptera: Goeridae) (Kobayashi 1993, 1994a, 1995, 1998) suggest a generic association between larvae of *Eurycnemus* and prepupae/pupae of Trichoptera. This prompted the senior author to investigate more thoroughly the larval ecology of *E. crassipes* by searching a shallow riffle region of the River Flesk, S. W. Ireland. The present paper reports new findings on an association between *E. crassipes* and *Hydropsyche siltalai* Döhler (Trichoptera: Hydropsychidae), re-examines zoogeographical distribution data on *Eurycnemus*, and summarises known associations (commensal, phoretic and ectoparasitic) between Chironomidae and Trichoptera.

Methods and material

A shallow riffle site on the River Flesk, S. W. Ireland, was chosen for the investigation, and from the ecological data available on the immature stages of *Eurycnemus* (Murray & Ashe 1981) it was assumed for the purposes of the search that *E. crassipes* is ectoparasitic on *Hydropsyche* prepupae/pupae. By driving long, upright branches into the substrate, the riffle area was divided into three rectangular, box-like sections each about 1 m wide and 10 m long, the total area studied being about 30 square metres. Work began on the downstream end of each box and every stone likely to support *Hydropsyche* pupal cases was examined. Any such cases found were removed, opened and discarded if nothing was found. Suspect cases were placed in a tray of river water for further examination, and those which contained or were suspected of containing larvae or pupae of *E. crassipes* were preserved in 75% alcohol.

Material found: Ireland, Co. Kerry, River Flesk (Grid reference: V964893), 8.VIII.1994, leg. P. Ashe. 3 pupae and associated larval exuviae, 1 pupa and larval head capsule, 1 larval exuviae (pupa already emerged), 1 ?3rd instar larva, 2 mature (4th instar) larvae.

Abbreviations of museums: HNHM = Hungarian Natural History Museum, Budapest; IRSN = Institut Royal des Sciences Naturelles de Belgique, Bruxelles; NMI = National Museum of Ireland, Dublin; NHM = The Natural History Museum, London; NMW = Naturhistorisches Museum Wien, Vienna; NMSE = National Museum of Scotland, Edinburgh; MNHN = Museum National d'Histoire Naturelle, Paris; SMNH = Swedish Museum of Natural History, Stockholm; UMO = University Museum, Oxford,(England); UMZC = University Museum of Zoology, Cambridge (England).

Distribution of *Eurycnemus*

In addition to records from the Palaearctic (Ashe & Cranston 1990; present paper), occurrences of *Eurycnemus* have been reported for the Nearctic (Canada: Oliver et al. 1978; United States: Sublette 1970, Coffman 1978), the Neotropical (St. Vincent: Sæther 1981; Ecuador: Turcotte & Harper 1982), the Oriental (Japan – Nansei Islands: Sasa 1990, Sasa & Kikuchi 1995), and the Australasian region (Australia: Blyth et al. 1984). In Ashe et al. (1987) it was stated that "reports to date of the genus from the Nearctic, Neotropical and Australasian regions are erroneous", but this statement was not explained. Here, reasons are given for discounting each of these false records.

Sublette (1970) transferred *Brillia annuliventris* (Malloch), known from the United States, to *Eurycnemus,* and this was the basis for the record in Coffman (1978), but Oliver (1981) reassigned this species to the genus *Euryhapsis* Oliver. Oliver et al. (1978) key an unnamed species of *Eurycnemus,* but Oliver (pers. comm.) declares this a misidentification of *Euryhapsis cilium* Oliver, and that *Eurycnemus* is not known from the Nearctic region. Turcotte & Harper (1982) report a single larval specimen of *Eurycnemus* from a stream in Ecuador. This specimen is apparently lost, its identity will thus remain unclear.

Sæther (1981) described a female imago, *Eurycnemus* sp., from the island of St. Vincent in the West Indies. However, our examination of the undescribed female genitalia of *E. crassipes* showed that the St. Vincent specimen is not a *Eurycnemus*. Sæther & Wang (1992) have since indicated that it belongs to *Irisobrillia* Oliver.

An Australian record of larval *Eurycnemus* is given in Blyth et al. (1984: "*Erycnemus* [sic.] sp. (69E)"), and other records are evidently the same or allied species (Marchant et al. 1984: "nr. *Eurycnemus* sp. 1"; Metzeling et al. 1984: "nr. *Eurycnemus* sp. 1", "?nr. *Eurycnemus* sp. 2"; Doeg 1984: "nr *Eurycnemus* sp (69E)"). This Australian material has been re-examined and identified as *Austrobrillia* Freeman (P. S. Cranston, pers. comm.).

The species *Eurycnemus amamiapiatus* Sasa from the Nansei Islands of Japan (Sasa 1990, Sasa & Kikuchi 1995), an area considered to be part of the Oriental Region, is now known to be a species of *Xylotopus* Oliver (Kobayashi 1994b). There is also a record of *Eurycnemus* from Asiatic Russia (Reiss 1977), the River Angara at Irkutsk, but Reiss later re-identified the adult male specimen as a *Euryhapsis* (M. Spies, pers. comm.).

Thus, the genus *Eurycnemus* is so far documented only from the Palaearctic, with the two species, *E. crassipes* from Europe (Ashe & Cranston 1990, Murray & Ashe 1981) and *E. nozakii* from Japan (Kobayashi 1998).

Distribution of *E. crassipes*

E. crassipes (Panzer) has been reported from Austria, Belgium, France, Germany, Hungary, Ireland, Netherlands, Russia, Spain, Sweden and the United Kingdom (England, Scotland), whereas mid 19th century records from Latvia require confirmation. Note that certain records from France (Massif Central and Pyrenees) are erroneous and refer instead to *Buchonomyia thienemanni* Fittkau (Serra-Tosio & Laville 1991).

The species is here recorded for the first time from three additional countries: Bosnia-Herzegovina: 17.VII.1909, Pale, leg. Czerny (NMW). Slovenia: 27.VII.-6.VIII.1973, “Bohinj, Riocev Laz” [= Bohinjska Bistrica, Ribcev Laz], 530 m, leg. A. E. Stubbs (NHM). Switzerland: 4.VII.1913, Schaffhausen, leg. A. E. Eaton (NHM).

The following list is based on published and unpublished (museum) records:

AUSTRIA (all NMW): “Austria” (leg. Schiner); “Austria Inf. Alpen” (leg. Schiner); Frankenfels (leg. Bergenstamm); Hainfeld (leg. Mik); Wiklina (?) (leg. Bergenstamm); BELGIUM: Brabant: Bueken (Goetghebuer 1911); Namur: Eprave (Goetghebuer 1922) – IRSN; Sy (leg. Goetghebuer) – IRSN; BOSNIA-HERZEGOVINA: Pale (leg. Czerny) – NMW; ENGLAND: Devon: River Exe, near Bridgetown (Murray & Ashe 1981); Bickleigh (?leg. Verrall) – UMO; Hampshire: Brockenhurst Heath (Curtis 1825); River Itchen (Langton 1984); Shropshire: Longner Hall, Shrewsbury (Edwards 1929) – NHM, NMSE, UMO, UMZC; Westmorland: Rydal (Edwards 1929); Yorkshire: Ilkley (Edwards 1929); FRANCE: “De France. Cabinet de M. Percheron” (Macquart 1834); “environs de Paris” (leg. Macquart) – MNHN; Rhône: Lyon (Winthem Coll., det. Meigen) – NMW; GERMANY: Baden-Württemberg: Mülheim (Meigen 1818); Bayern: Würzburg (Winthem Coll., det. Meigen) – NMW; River Inn, upstream of Mühldorf (leg. C. Orendt); Hessen: Neuwied (Meigen 1818); Uerdingen (Kieffer 1923) – HNHM; Nordrhein-Westfalen: (not stated, ?Aachen) (Panzer 1813); Bonn (Wiedemann Coll.) – NMW; Köln (leg. A. E. Eaton) – NHM; Sachsen: Dresden (det. Kuntze) – NMW; HUNGARY: Budapest (Thalhammer 1899; Kieffer 1923); Kecskemét (Thalhammer 1899); IRELAND: Co. Carlow: River Slaney, New Bridge, Kildavin (Grid Ref. S899597); River Slaney, Kilcarry Bridge (Grid Ref. S893624); Co. Cork: River Ilen, Madore Bridge (Grid Ref. W103419); River Ilen, bridge near Hollybrook (Grid Ref. W117363); Co. Kerry: Killarney, (leg. J. N. Halbert) – NMI; Killarney, River Flesk (leg. P. S. Cranston) – NHM; River Flesk (Murray & Ashe 1981); River Flesk (several sites, Grid references: V9643885, V964893, V987900, W084814, W114826, W048790, leg. P. Ashe) – NMI; River Laune, Beaufort Bridge (Grid Reference V8892); Co. Laois: River Nore, Athanagh (Grid Ref. S423763); Co. Mayo: Ballylahan Bridge, River Moy (Grid Ref. M277992); Co. Meath: River Boyne, Ardsallagh (Grid Ref. N894640); River Boyne, Kilcarn Bridge (Grid Ref. N8865); Co. Offaly: River Shannon, Shannonbridge (Grid Ref. M967254); Co. Roscommon: River Suck, Castlecoote (Grid Ref. M809627); River Suck, Mount Talbot (Grid Ref. M813531); River Suck, Newtown Bridge (Grid Ref. M844346); Co. Sligo: Easky River, Easky Bridge (Grid Ref. G377378); outflow of Glencar Lake (Grid Ref. G734430); Co. Waterford: River Blackwater, Ballyduff (Grid Ref. W964992); River Blackwater, Lismore, (Grid Ref. X047988); Co. Wexford: River Slaney, Ballycarney Bridge (Grid Ref. S967488); NETHERLANDS: Gelderland: Arnhem (van der Wulp 1877); Heelsum (leg. Snellen van Vollenhoven) (van der Wulp 1874a, b); RUSSIA: River Neva, near Leningrad [= St. Petersburg] (Pankratova 1968); River Mezen, Timan Ridge (Komi Region) (leg. Y. Kuzmina); SCOTLAND: Inverness: Boat of Garten, [River Spey, near Nethysbridge] (leg. Francis Jenkinson) – UMZC; near Tulloch Glen stream (Evans 1915) – NMSE; SLOVENIA: Bohinjska Bistrica, Ribcev Laz (leg. A. E. Stubbs) – NHM; SPAIN: “Hispania” (Thalhammer); Provinces of La Coruña, Lugo, Pontevedra, Teruel (Soriano et al. 1997): SWEDEN: no locality specified (Peter Wahlberg) – SMNH; Bohuslän: no locality specified (Carl Bohemann) – SMNH; no locality specified (Peter Wahlberg) – SMNH; Östergötland: “Ostrogoth. ad Gusum” (Zetterstedt 1850, Wahlgren 1919); “ad Börshult in paroecia Ekeby” (Zetterstedt 1852); Skåne: “Årup Scaniae borealis” [= Årup, 18 km east of Kristianstad] (Zetterstedt 1855); no locality (Wahlgren 1919); Småland: Örsled, near Växjö (Brundin 1947); SWITZERLAND: Schaffhausen (leg. A. E. Eaton) – NHM.

The following 19th century records require confirmation: LATVIA: “Curland” (Gimmerthal 1842, 1845); “Livland” (Gimmerthal 1842, 1845); Russia: “Umgegend von Treparewo” [= near Mozhaisk, about 100 km WSW of Moscow] (Fedcenko 1891).

In the new River Flesk survey, only eight trichopteran pupal cases were found to contain immature stages of *E. crassipes*. All were *H. siltalai*, although there are three species of *Hydropsyche* recorded from the studied section of the river.

Nothing as yet is known of the 1st and 2nd instar larvae of *E. crassipes* and whether or not an association exists between these and *H. siltalai*. In Ireland, prepupae/pupae of the latter occur between April and September, pupal exuviae of *E. crassipes* have been found in the drift from May to September. In the material examined, several 4th instar larvae and pupae of *E. crassipes* have been found in the *H. siltalai* pupal cases, but a smaller and probable 3rd instar was also collected inside one pupal case. The precise habitat of the earlier *E. crassipes* instars is unknown. Larvae of *H. siltalai* are caseless but construct a fixed, funnel-shaped net used to gather suitable suspended particulate food matter. The Japanese species, *E. nozakii*, is associated with the case-bearing caddis *Goera japonica*, but again nothing is known of the early instars although Kobayashi (1998) also reported finding 3rd and 4th instar larvae and pupae within *Goera* pupal cases.

When the final instar trichopteran larva constructs its pupal case, a 3rd or 4th instar *Eurycnemus* larva manages to remain inside with its host. Once the host enters the prepupal/pupal stage the chironomid can commence feeding on it. Infested or parasitized *H. siltalai* pupal cases, when viewed through the clear membrane on the underside of the case (attachment point), have a greyish appearance from the partially consumed body components. Movement of the *E. crassipes* larva or pupa may be observed through the same membrane.

The prominent blunt projection on the antero-dorsal margin of the *Eurycnemus* pupal scutum (Murray & Ashe 1981, Kobayashi 1998) can be hypothesized to help the pupa escape by forcing an opening through the stony trichopteran pupal case. Similar structures are reported in the pupae of some chironomids which are also ectoparasitic on Trichoptera, e.g. *Cardiocladius albiplumus* Sæther (Oliver & Bode 1985) and *Collartomyia hirsuta* (Goetghebuer) (Amakye & Sæther 1992).The pupa of *Buchonomyia thienemanni* Fittkau also possesses chitinised projections (on the bases of the antennal sheaths) and it is also believed to be associated in some way with a trichopteran species (Ashe 1995), but since this has not been proven the species is excluded from Table 1.

Table 1. Summary of known chironomid/trichopteran associations (commensal, phoretic and ectoparasitic).

Chironomid taxon	**Trichopteran host**	**Distribution**	**Reference**
Commensal species			
Corynoneura sp.	*Glossosoma intermedium* (Glossosomatidae), *Hesperophylax designatus* (Limnephilidae)	Nearctic (USA)	Vinikour & Anderson (1981)
Cricotopus sp.	*Glossosoma intermedium* (Glossosomatidae)	Nearctic (USA)	Vinikour & Anderson (1981)
Dratnalia potamophylaxi	*Potamophylax cingulatus*, *P. nigricornis* (Limnephilidae)	Palaearctic (Europe)	Cranston et al. (1983), Dratnal (1979), Lellák (1971), Schnell (1991), Sæther & Halvorsen (1981)
"*Eukiefferiella*" sp.	*Brachycentrus occidentalis* (Brachycentridae)	Nearctic (USA)	Gallepp (1974)
Eukiefferiella sp.	*Glossosoma intermedium* (Glossosomatidae), *Hesperophylax designatus* (Limnephilidae), *Neophylax concinnus* (Limnephilidae)	Nearctic (USA)	Vinikour & Anderson (1981)

Chironomid taxon	Trichopteran host	Distribution	Reference
Phaenopsectra sp.	*Hydropsyche* spp., *Cheumatopsyche* spp. (Hydropsychidae)	Nearctic (Canada)	Rutherford & Mackay (1986)
Polypedilum sp.	*Glossosoma intermedium* (Glossosomatidae) *Hesperophylax designatus* (Limnephilidae)	Nearctic (USA)	Vinikour & Anderson (1981)
Polypedilum sp.	*Hydropsyche* spp. *Cheumatopsyche* spp. (Hydropsychidae)	Nearctic (Canada)	Rutherford & Mackay (1986)
indet. Orthocladiinae	*Hydropsyche pellucidula* (Hydropsychidae)	Palaearctic (?Italy)	Corallini Sorcetti & Moretti (1987)
indet. Orthocladiinae	*Anabolia* sp. [?*nervosa*] (Limnephilidae)	Palaearctic (?Czech Rep.)	Lellák (1966)
Phoretic species			
Rheotanytarsus sp.	*Nectopsyche exquisita* (Leptoceridae)	Nearctic (USA)	White et al. (1980)
Ectoparasitic species			
Cardiocladius albiplumus	*Hydropsyche bronta, H. morosa, H. slossonae, H. sparna, Cheumatopsyche* spp. (Hydropsychidae)	Nearctic (Canada)	Rutherford & Mackay (1986)
Cardiocladius albiplumus	*Hydropsyche incommoda, H. venularis, Cheumatopsyche* spp. (Hydropsychidae)	Nearctic (USA)	Parker & Voshell (1979), Oliver & Bode (1985)
Collartomyia hirsuta	*Amphipsyche scottae,* *Cheumatopsyche thomasetti* (Hydropsychidae)	Afrotropical	Amakye & Sæther (1992), Borkent (1984)
Eurycnemus crassipes	*Hydropsyche siltalai* (Hydropsychidae)	Palaearctic (Ireland)	present paper
Eurycnemus nozakii	*Goera japonica* (Goeridae),	Palaearctic (Japan),	Kobayashi (1993, 1994a, 1995, 1998)
Parachironomus sp.	eggs of *Phryganea* sp. (Phryganeidae)	Palaearctic (Russia, Germany)	Chernovskii (1932), Lenz (1951)
Polypedilum fallax	*Potamophylax cingulatus* (Limnephilidae)	Palaearctic (Sweden)	Otto & Svensson (1981)
indet. Tanypodinae	?	Nearctic (USA)	Wisseman & Anderson (1984)
indet. Chironomidae (several genera)	*Ecclisocosmoecus scylla,* *Pseudostenophylax edwardsi* (Limnephilidae)	Nearctic (USA)	Wisseman & Anderson (1984)

The pupal exuviae of *E. crassipes* vary greatly in size, the smallest measured being 4.96 mm and the largest 11.8 mm (138% larger than the former). This large variation is postulated to be a consequence of ectoparasitism, with the adult size of *E. crassipes* depending on the size of the trichopteran host at the time of infestation.

All records to date indicate that *Eurycnemus* is confined to lotic waters, primarily the middle and lower reaches of rivers.

Summary of chironomid/trichopteran associations

Steffan (1967), in a review of ectosymbiosis in aquatic insects, listed only two cases involving associations of chironomids with Trichoptera. A summary of chironomid / trichopteran associations – phoretic, commensal and ectoparasitic – is given in Table 1, which shows that the phenomenon is much more common than is generally recognised.

There are some clues in the physical features of some chironomid larvae and pupae, which give a strong indication of such species being associated with Trichoptera. For pupae see the discussion under 'Ecology', in the larval stage such features are:

(i) Body colour pure white or off-white (e.g. *Eurycnemus*, *Buchonomyia*). In *Collartomyia hirsuta* the larva is pinkish red (Borkent 1984) probably due to the presence of haemoglobin to ensure adequate uptake of oxygen in the higher water temperatures of tropical Africa. Chironomid larvae vary greatly in colour from whitish to yellowish, brownish, greenish, purplish, pinkish and bright red, but white is very rarely encountered.

(ii) Posterior parapods reduced and apparently incapable of normal use for gripping the substrate, often smaller than the enlarged anal gills. In *Collartomyia* and *Buchonomyia* the posterior parapods project laterally from the body rather than ventrally as in most chironomid larvae.

In Table 1, apart from one phoretic genus, all species associated with Trichoptera have been assigned to either the commensal or the ectoparasitic category. If the relevant reference states that the chironomid is feeding on trichopteran tissue then it has been assigned to the ectoparasitic category. Species appearing to feed on other sources are assigned to the commensal category, along with those whose mode of feeding is unclear. However, the example of *Dratnalia potamophylaxi* (Fittkau & Lellák) shows the potential problems with such assignments. Dratnal (1979, sub *Eukiefferiella szczensnyi* Dratnal) stated that the immature stages of the host caddisfly were not injured by the chironomid larvae, indicating a commensal relationship between the two species. However, Schnell (1991) found one of six observed *D. potamophylaxi* larvae in a small wound on the last abdominal segment of a larva of *Potamophylax cingulatus* (Stephens), "indicating that the chironomid larvae actually feed on their hosts" (op. cit.).

All the reports to date, apart from *Collartomyia hirsuta* from the Afrotropical Region, are confined to the Palaearctic and Nearctic regions with, respectively, four and seven named and several undetermined genera (Table 1). Many further discoveries are likely to be made, and all zoogeographical regions (except Antarctica) are likely to contain several genera and species associated with Trichoptera.

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First record of *Steatonyssus noctulus* Rybin, 1992 in Central Europe

(Acari, Mesostigmata, Macronyssidae)

Doris Rupp & Peter Ludwig

Rupp, D. & Ludwig, P. (2000): First record of *Steatonyssus noctulus* Rybin, 1992 in Central Europe (Acari, Mesostigmata, Macronyssidae). – Spixiana **23/3:** 275-278

The bat parasitizing mite *Steatonyssus noctulus* is recorded for the first time in Germany. The mite was found in Bavaria on its specific host *Nyctalus noctula.* This is the first record outside of the former USSR. A brief redescription of S. *noctulus* is given, which makes it possible to distinguish this species from *S. spinosus* and *S. periblepharus,* the two other common species of the genus *Steatonyssus* frequently found on bats in Germany. Further *S. noctulus* appears together with *Macronyssus flavus* on *Nyctalus noctula.* Females of *Steatonyssus* can be characterised according to the length of M11, which in *S. noctulus* is as long as D5-7, in *S. spinosus* a little bit shorter than D5-7 and in *S. periblepharus* very short. All collected mites have been deposited in the collection of the Zoologische Staatssammlung München (ZSM).

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Introduction

Steatonyssus Kolenati, 1858 is the most speciose genus of the family Macronyssidae. The genus is widely distributed throughout the world, occupying all zoogeographical regions. These mites are parasites of small mammals, especially bats (Micherdzinski 1980). Many of the bat parasitizing species are host specific, but others appear to parasitize multiple hosts (Radovsky 1967, Micherdzinski 1980, Schmidt 1987, Kulzer 1998). An example is *Steatonyssus spinosus,* which is reported to live on 16 species of bats, including *Nyctalus noctula* (Radovsky 1967, Schmidt 1987, Stanyukovich 1997).

The present study did not locate *S. spinosus* on *Nyctalus noctula* in Germany. However, the closely related species *S. noctulus* was located. This finding represents the first record of *S. noctulus* outside of the former USSR (Russia, Latvia, Belorussia, Moldava, Ukraine, Azerbaidjan, Kazachstan, Kirgizstan) (Stanyukovich 1997). As the name implies, *S. noctulus* is strongly associated with the bat *Nyctalus noctula,* but also described from *Miniopterus schreibersi* (Stanyukovich 1997). In the present communication scanning electron microscopic illustrations and a diagnosis together with *S. spinosus* is presented to facilitate its determination.

Materials and methods

Parasites were collected from living bats with the help of authorised persons. After inspection, all bats were returned to their roosts. Dead, injured or exhausted bats living in the care of humans were also examined. The fur and patagium of more than 1122 bats (more than 780 living and 342 dead bats) of 23 species was investigated thoroughly on the occurence of parasites. The collected mites were preserved in 70 % ETOH. The investigated bats belonged to the following species (number of individuals in brackets): *Myotis myotis* (467)- *M. blythii* (1)- *M. bechsteinii* (6) – *M. nattereri* (42) – *M. daubentonii* (87) – *M. emarginatus* (9) – *M. mystacinus* (79) – *M. brandtii* (20) – *Pipistrellus pipistrellus* (127) – *P. nathusii* (6) – *P. savii* (1) – *Eptesicus serotinus* (6) – *E. nilsonii* (10) – *Nyctalus noctula* (114) – *N. leisleri* (3) – *Vespertilio murinus* (16) – *Plecotus auritus* (45) – *P. austriacus* (17) – *Barbastellus barbastellus* (7) -*Rhinolophus ferrumequinum* (2) – *R. hipposideros* (2) – *R. mehelyii* (5) – *Miniopterus schreibersii* (>50). For light microscopy, they were cleared in warm 50% lactic acid. For scanning electron microscopy (SEM) specimens were dehydrated in a graded ETOH series, critical – point dried in a Polaron E3000 CP, sputtered in a Bio-Rad SC 510 sputter coater and studied under a Philips XL 20 SEM. Only adult females of the genus *Steatonyssus* were determined.

The terminology for the characters and the setal notation is based on Radovsky (1967).

Occurence and distribution

Steatonyssus noctulus was frequently found on *N. noctula* in Bavaria in the following districts: AÖ, FFB, FS, LA, M, MÜ and PAN (registration numbers). The parasite occurs in association with *Macronyssus flavus*, a specific mite on *N. noctula* (Radovsky 1967, Schmidt 1987, Stanyukovich 1997). Nearly all individuals of *N. noctula* examined were infested by *M. flavus*. *S. noctulus* was not found as frequently as *M. flavus*, but always in association with it. The number of *S. noctulus* parasitizing a given bat was always less than that of *M. flavus*. Although all bats examined during winter were either dead or living in human care, the degree of infestation with mites appears to be higher than in summer. This is true for *S. noctulus* as well as for *M. flavus*. *S. noctulus* was never found on another bat species other than *N. noctula*. Two other species of the genus *Steatonyssus* were frequently found on bavarian bats, *S. spinosus* and *S. periblepharus*. These species seem to be less host specific than *S. noctulus*. *S. spinosus* was recorded mainly on bats of the genus *Myotis*, especially *Myotis myotis*, whereas *S. periblepharus* was found especially on members of the genus *Pipistrellus*. In this study both species were never observed on *Nyctalus noctula*.

Morphological characters for determination

Females of the genera *Macronyssus* and *Steatonyssus* can be distinguished according to the following characters:

- *Steatonyssus*: Females with dorsal plate divided in two parts (Fig. A) and differentiated band on the posterior margin of the sternal plate (Fig. C).
- *Macronyssus flavus*: Dorsal plate single and undivided (Fig. B).

Protonymphs have two dorsal plates in both genera, but the pygidial plate of the protonypmhs is much smaller than the ophistosomal plate of adult females in *Steatonyssus* (Figs A, D).

The main character to distinguish the three most common species of *Steatonyssus* in Bavaria is the length of the setae on the opisthosomal plate:

- *S. noctulus*: M11 is as long or even longer than D 5-7 (Fig. E). Measurement: average 51 (44-63) μm (Rybin 1992).
- *S. spinosus*: M 11 is a little bit shorter than D 5-7 (Fig. F). Measurement: 40 μm (Micherdzinski 1980), respectively 42-45 μm according to Radovsky (1967).
- *S. periblepharus*: Length of M11 is very much shorter than D 5-7 (Fig. G). Measurement: 11-15 μm (Radovsky 1967).

Sternal shield:

- *S. periblepharus*: Length of the sternal setae St 1 is not more than one half of the length of St 2.
- *S. noctulus* and *S. spinosus*: Length of St 1 is not shorter than St 2.

Relation between the length and the breadth of the podosomal plate according to the literature:

- *S. noctulus*: 1-1.11 (Rybin, 1992).
- *S. spinosus*: 1.15-1.2 in animals collected from *M. blythi* in Osch (Kirgizstan) (Rybin 1992), respectively 1.12-1.22 in animals collected from *Vespertilio superans* from Korea (Till & Evans 1964).

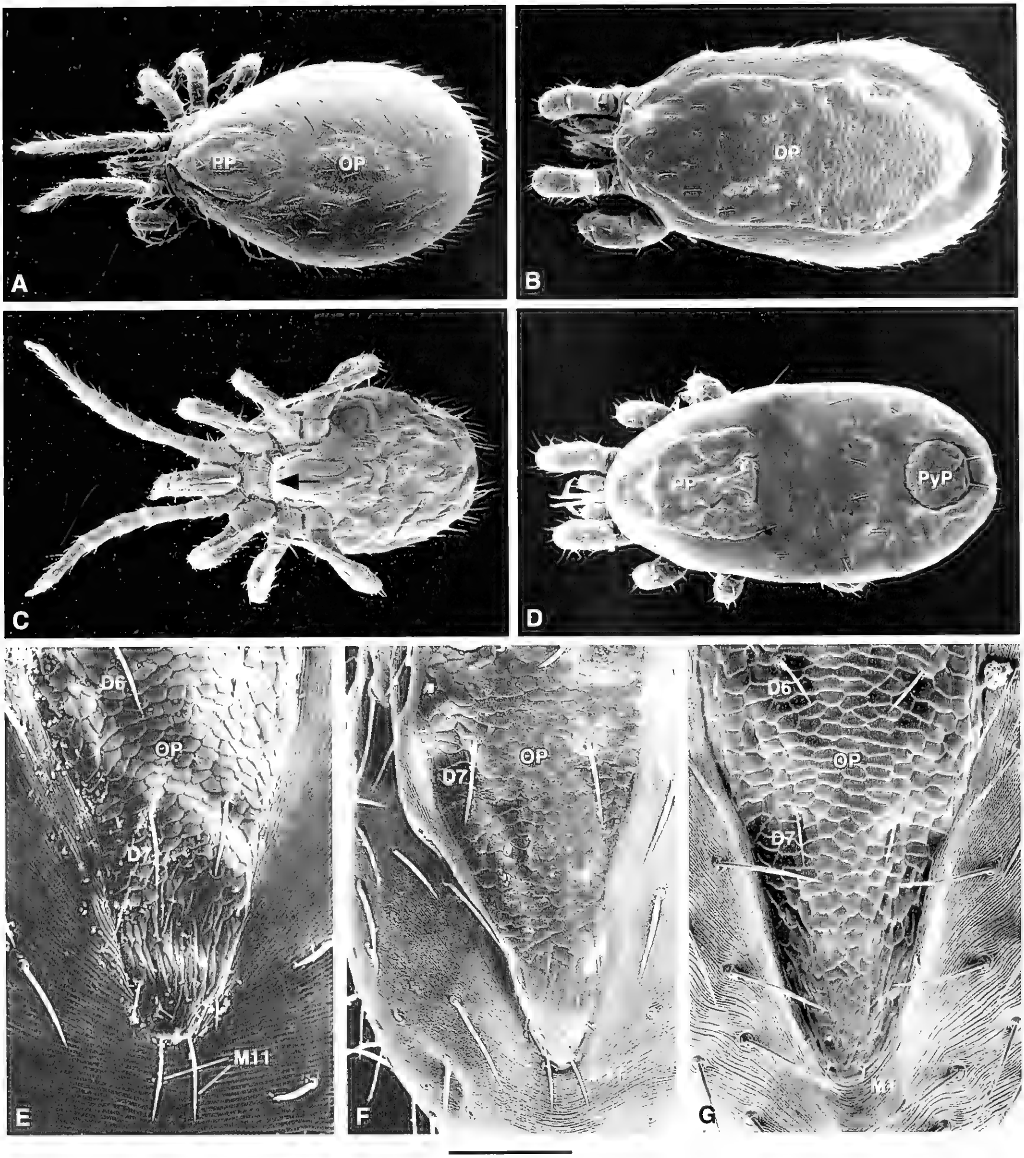

Fig. 1. **A.** Dorsal view of a female of *Steatonyssus noctulus* showing the separate podosomal (PP) and opisthosomal plate (OP), 320 μm. **B.** Dorsal view of a female of *Macronyssus flavus* with an undivided dorsal plate (DP), 180 μm. **C.** Ventral view of a female of *St. noctulus*. The arrow shows the differentiated band on the posterior margin of the sternal plate, which is typical for this genus, 290 μm. **D.** Dorsal view of a protonymph of *Macronyssus flavus*, 160 μm. Abbreviations: PP, podosomal plate; PYP, pygidial plate. **E-G.** Dorsal view of the posterior part of the opisthosomal plate (OP) of females of the genus *Steatonyssus* with its typical setae. **E.** *St. noctulus*, 80 μm. **F.** *St. spinosus*, 90 μm. **G.** *St. periblepharus*, 70 μm.

Relation between the length of tarsi 1 and tarsi 2 according to the literature:
- *S. noctulus:* 1.23-1.67 (Rybin 1992).
- *S. spinosus:* 1.14-1.18 (Rybin 1992).

Discussion

Steatonyssus noctulus appears to have just one host in Bavaria, *Nyctalus noctula*. Stanyukovich (1997) reported this mite also from *Miniopterus schreibersi* (Kuhl, 1819), but this bat does not occur in Bavaria. In contrast to our observations, some records of *S. spinosus* on *N. noctula* are known from Central Europe (Dusbabek 1964, Radovsky 1967, Schmidt 1987). Because *S. noctulus* was first described by Rybin only in 1992, we suggest, that these records are likely to be of *S. noctulus* instead of *S. spinosus*. Further, typical characters of different specimens of *S. spinosus* collected from different hosts by different authors show high levels of variation (see Morphological characters for determination). This and the fact, that many of the known bat parasites are very host specific (e.g. Spinturnicidae) confirm the presumption, that new species of the genus *Steatonyssus* remain to be described. Consequently as well careful reidentifications of collected mites as well as new studies should be done.

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We are especially thankful to Dr. A. Zahn. Further we would like to express our thanks to A. Bautsch, B. Bembe, G. Dinger, B. Dittmer, I. Frey-Mann, M. Hammer, I. Hehl, B. Henatsch, H. Hoffmann, J. Holzhaider, A. Keil, M. Kistler, M. Kredler, T. Kuhlmann, D. Leipert, H. Limbrunner, Dr. F. Mayer, A. Meschede, Dr. J. Pillat, G. Reiter, B. U. Rudolf, M. Ruffert, C. Schachenmeier, F. Seidler, Dr. S. Schmidt, R. Straub, U. Weizenegger, B. Walk and K. Zentner for collecting parasites. We thank M. Ryba and V. Ziegler for the translation of Rybins (1992) paper, Dr. K. Schönitzer for helpfull comments on the manuscript and Dr. C. Parvey for improving the english.

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SPIXIANA	23	3	279–281	München, 01. November 2000	ISSN 0341-8391

Two new Holcopogonid species from Africa

(Insecta, Lepidoptera, Holcopogonidae)

L. A. Gozmány

Gozmány, L. A. (2000): Two new Holcopogonid species from Africa (Insecta, Lepidoptera, Holcopogonidae). – Spixiana **23/3:** 279-281

Turatia argillacea, spec. nov. and *T. turpicula,* spec. nov. from the collection of the Zoologische Staatssammlung, München, are described and compared with their nearest relatives.

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During a study stay in the Zoological Collection of the Bavarian State, Munich (ZSM) I found some specimens of Holcopogonid taxa which proved to represent two hitherto undescribed species from Africa. They are herein described and compared with their nearest relatives.

Turatia argillacea, spec. nov.

Fig. 1

Types. Holotype: ♂ Tanganjika Songea, Peramiho 1.000 m, 24. VIII. 1952 leg. Lindemann und Pavlitzki Staatsslg. München" "ZSM Genitalprp. No. 988" "Holotypus *Turatia argillacea* Gozm. gen. prep. No. 3772 det. L. Gozmány". – Paratype: First label as for holotype "Genitalia K. Sattler 507 b" "Paratypus *Turatia argillacea* Gozm. det. L. Gozmány". The slide of the paratype could not be found in the collection, and I have not seen it. Both type specimens are preserved in the Zoological State Collection, Munich (ZSM).

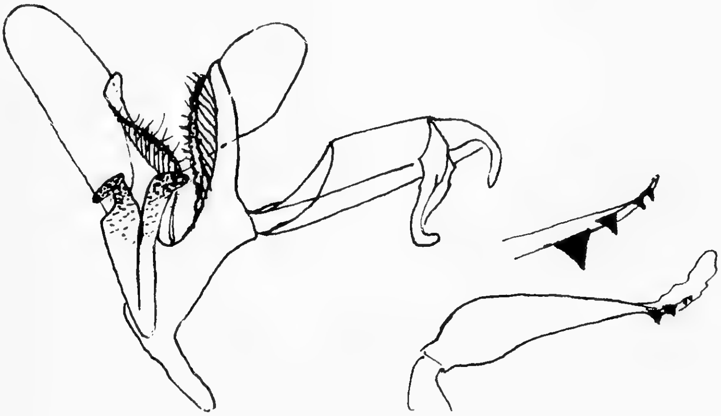

Fig. 1. *Turatia argillacea,* spec. nov., holotypus. Male genitalia ventrally; aedagal spines also magnified.

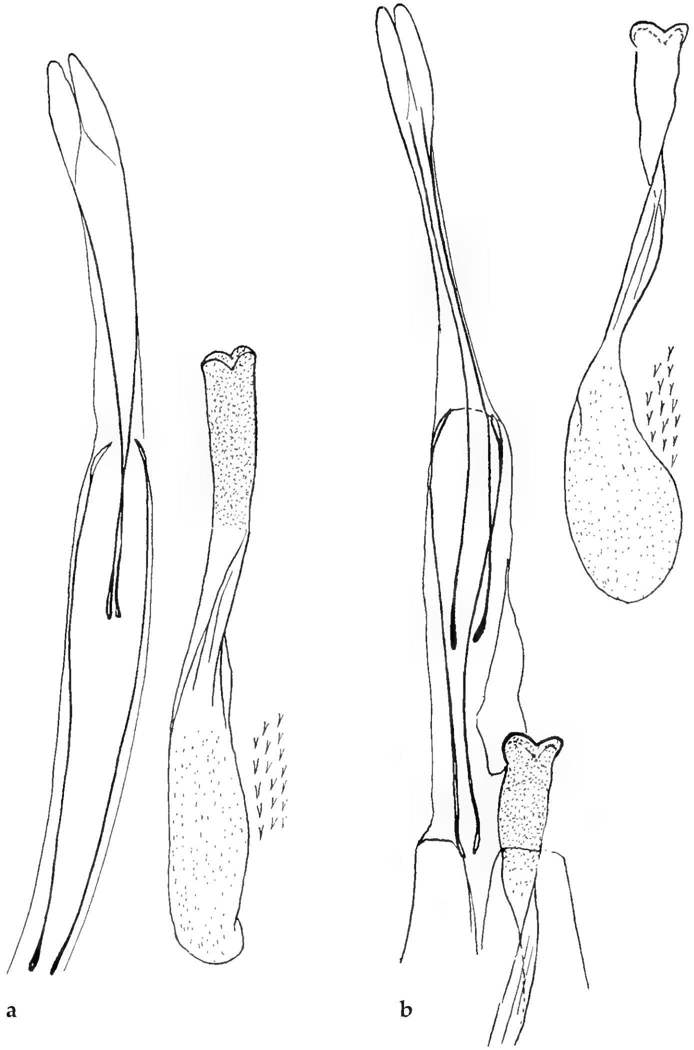

Fig. 2. *Turatia turpicula*, spec. nov. Female genitalia. **a.** Paratypus, slide No. 6596; **b.** Paratypus, slide No. 6591. Both ventrally, spinose armature of bursa copulatrix also magnified.

Description

Alar expanse: 16-18 mm. Head, palpi, thorax and basic colour of fore wings a light sandy yellow; pattern dark brown: a cellular dot at ⅓, 2 discocellulars at ⅔, and some very few scattered brownish scales; cilia yellowish white; hind wings pearl grey, cilia whitish.

Male genitalia (Fig. 1): Sacculus boat-shaped, extrorse, valva with large and elongated semioval, marginally hirsute flap, about ½ as long as valva; aedoeagus with 4 apical spines, diminishing apicad, all nearly equilateral triangle in form.

Female genitalia: Unkown.

Differential diagnosis: Nearest to *Turatia sceocentra* (Meyrick, 1921), but this latter species has also a plical dot, the discocellulars are not double; in the male genitalia the sacculus is introrse, the costal lobe very narrow, the aedoeagus has merely a sharp tip (SE Africa to Zululand).

Turatia turpicula, spec. nov.

Fig. 2

Types. Holotype: ♀, "S. W. Afrika Swakopmund III. 1959 leg. G. Hobohm Staatsslg. München" "Holotypus *Turatia turpicula* Gozm. det. L. Gozmány". – Paratypes: 3♀♀, with the same data, slides 6586, 6591, Gozmány. Holotype and 2 paratypes in the Zoological State Collection, Munich (ZSM), 1 paratype (slide 6591) in the Hungarian Natural History Museum, Budapest.

Description

Alar expanse: 17-18 mm. Head, palpi, thorax, basic colour of fore wings light greyish-brown (light fuscous), pattern nearly nonexistent: only a few darker scales as discocellulars; cilia greyish-white.

Male genitalia: Unknown.

Female genitalia (Figs 2a,b): Antrum both ventrally and dorsally bilobate, lobes semicircular, calyx finely sclerotized, free, nearly throughout (to ductus bursae), corpus bursae with longitudinal rows of minute spinulae.

Differential diagnosis: The two hitherto known South African taxa, *Turatia rhyodes* (Meyrick, 1909) and *Turatia scaeocentra* (Meyrick, 1921) differ by a much shorter free calys, the antrum is not bilobate; the basic colour and pattern of the fore wings are different.

Acknowledgement

I am indebted to the late Dr. W. Dierl for his extensive help in all matters pertaining to my work and studies in the ZSM.

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Janse, A. J. T. 1960. The Moths of South Africa: Gelechiadae **6**: 156-157 (also with references to figures).

21. Wilson, D. E. & S. Ruff: The Smithsonian Book of North American Mammals. – Smithsonian Institution Press, Washington & London, 1999. 750 S., zahlr. Abb. ISBN 1-56098-845-2.

In diesem Buch werden alle wildlebenden Säugetierarten des nordamerikanischen Kontinents einschließlich der an seinen Küsten vorkommenden Wale und Robben beschrieben. Es entstand unter Mitwirkung von über 200 Fachwissenschaftlern aus Kanada und den USA, inititiiert und organisiert wurde das Unternehmen von der Smithsonian Institution Washington in Zusammenarbeit mit der American Society of Mammalogists. Dank dieser renommierten Autoren- bzw. Herausgeberschaft konnte ein Werk vorgelegt werden, das taxonomisch wie inhaltlich den aktuellen Kenntnisstand widerspiegelt und kaum Ansätze für fachliche oder inhaltliche Kritik bietet. Der Geltungsbereich erstreckt sich von Alaska und Kanada bis Panama. Nach systematisch-taxonomischen Gesichtspunkten gegliedert, werden äußeres Erscheinungsbild, Lebensraum und Lebensweise der behandelten Arten ausführlich beschrieben. Daran schließt sich eine steckbriefartige Beschreibung diagnostischer Merkmale sowie eine Auflistung der bekannten Unterarten an, letztere jeweils mit Angabe des Verbreitungsgebietes. Literaturzitate im Text wurden vermieden, doch wird am Ende eines jeden Artkapitels weiterführende Literatur genannt, die in einem umfangreichen Literaturverzeichnis zusammengefaßt wird. Besonders hervorzuheben ist der fast gelungene Anspruch, jede Art in einer aussagekräftigen Lebendaufnahme abzubilden. Lediglich bei einigen Spitzmausarten wurden mangels entsprechender Fotos wohl frischtote Kadaver abgelichtet. Wenig hilfreich sind dagegen die Verbreitungskarten, da sie sehr klein ausgefallen sind und außerdem die Grenzen der nordamerikanischen Staaten nicht eingezeichnet sind. Hier wird man sich an den detailgenauen Karten im bewährten zweibändigen Werk von E. R. Hall wesentlich besser informieren können.

Ansonsten vermittelt das Buch aber einen hervorragenden Eindruck vom Artenreichtum der nordamerikanischen Säugetierfauna und kann dem Fachwissenschaftler ebenso empfohlen werden wie dem interessierten Laien.

R. Kraft

22. Ziegler, T. & W. Böhme: Genitalstrukturen und Paarungsbiologie bei squamaten Reptilien, speziell den Platynota, mit Bemerkungen zur Systematik. – Mertensiella 8, 1997. 210 S. Softcover. 2 Tab., 117 S/W-Abb., 14 Taf. mit Farbfotos. ISBN 3-9801929-7-0.

Die Genitalmorphologie wird den meisten Lesern vor allem aus dem Bereich der Entomologie bekannt sein. Daß aber auch bei Reptilien, in diesem Fall bei den Platynota – d.h. Taubwaran, Krustenechsen und Waranen – genitalmorphologische Untersuchungen wichtige Beiträge zur Systematik und Phylogenie liefern, zeigt dieses Werk der beiden Bonner Zoologen eindrücklich.

Zu Beginn geben die Autoren einen historischen Überblick über Genitalmorphologie sowie eine allgemeine Vorstellung der Platynota und erklären Aufbau und Funktion der Kloake.

Die Präparation der männlichen und weiblichen Kopulationsorgane, Hemipenes und Hemiclitores genannt, wird dargestellt und dabei ausführlich auf eine vor kurzem entwickelte Methode eingegangen, mit der die Genitalstrukturen von bereits fixiertem Museumsmaterial nachträglich präpariert werden können.

Die Genitalstrukturen des Taubwarans, beider Krustenechsen-Arten und von 37 Waran-Arten (plus zahlreichen Unterarten) werden beschrieben und mit bereits existierenden Literaturangaben verglichen. Dabei werden erstmals von beinahe allen untersuchten Arten auch die weiblichen Genitalstrukturen vorgestellt, die im Allgemeinen deutlich kleiner als die männlichen Kopulationsorgane sind, aber deren Merkmalsausprägung entsprechen. Hervorragende Zeichnungen des Erstautors, Fotos und elektronenmikroskopische Aufnahmen ergänzen den Text und vermitteln einen optischen Eindruck der vorgestellten Strukturen.

Die genitalmorphologischen Befunde resultieren in einer ausführlichen und aktuellen Diskussion der verwandtschaftlichen Beziehungen der Platynota. So wird beispielsweise für die Artengruppe um den Bindenwaran *Varanus salvator* – die unter anderem durch auffällige genitalmorphologische Autapomorphien charakterisiert ist – die neue Untergattung *Soterosaurus* aufgestellt. Im Smaragdwaran-Komplex (*Varanus prasinus*-Komplex) werden zahlreiche taxonomische Neubewertungen vorgenommen. Es werden auch funktionsmorphologische und paarungsbiologische Aspekte diskutiert, wobei mit Stichworten wie Reproduktionserfolg und Spermienkonkurrenz hochaktuelle evolutionsbiologische Fragestellungen angeschnitten werden.

Ausführliche deutsche und englische Zusammenfassungen sowie die durchgehend zweisprachigen Bildunterschriften machen die Ergebnisse dieses Werkes auch nicht deutschsprachigen Wissenschaftlern zugänglich. Das Buch wendet sich vor allem an Herpetologen, kann aber auch Systematikern aus anderen Fachbereichen, die über den eigenen Tellerrand blicken möchten, uneingeschränkt empfohlen werden.

K. Philipp

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Body size, age and sexual dimorphism in the genus *Salamandra*. A study of the Balkan species

(Amphibia, Urodela, Salamandridae)

M. L. Kalezić, G. Džukić, A. Djorović & I. Aleksić

Kalezić, M. L., G. Džukić, A. Djorović & I. Aleksić (2000): Body size, age and sexual dimorphism in the genus *Salamandra*. A study of the Balkan species (Amphibia, Urodela, Salamandridae). – Spixiana **23/3:** 283-292

We studied two in many respect different Balkan salamander species *(Salamandra atra* and *S. salamandra)* in order to characterise their sexual size differences, as well as the age structure, correlations between age and morphometric traits, and survival rate of adult females and males. On the ground of morphometrics, in the samples of *S. salamandra* a number of statistically significant intersex differences was found between morphometric traits related with over-all size relations, feeding and locomotion abilities, with a marked population effect. However, genders of *S. atra* were much more alike. In both species, female-male differences in life span and timing of sexual maturity appeared to be negligible, while females had non-significantly higher mortality rate than males.

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Introduction

The importance of body size in ecology, life history, and reproductive fitness has been widely acknowledged for years (e.g. Fairbairn 1997). Thus, the patterns of interspecific variation in body size are expected to reflect patterns of adaptive divergence, which is true not only for the mean size of the species, but also for the sizes of each sex.

It is a commonplace in batrachology that females grow larger than males in most taxa, i.e. these taxa exibit female-biased sexual size dimorphism (hereafter abbreviated to SSD) (e.g. Shine 1979, Duellman & Trueb 1986, Halliday & Tejedo 1995). However, many amphibian groups still remain to be explored in this respect more carefully. The European salamanders of the genus *Salamandra*, especially the two species inhabiting the Balkan Peninsula: the fire salamander *(Salamandra salamandra)* and the alpine salamander *(Salamandra atra)* are among them. Highly polytypic *S. salamandra* is the most widely distributed species among the fire salamanders species group *(S. salamandra, S. corsica, S. algira* and *S. infraimmaculata)*. It has a mostly west Palaearctic distribution: from southwest France, through central Europe and the Balkan Peninsula to the Black Sea (see Klewen 1991, Veith 1994, Griffiths 1996). The range of the alpine salamander is much smaller (the Alps and the Dinaridian mountains), and so far only three subspecies have been described. These two salamander species appeared to be different in many other respects. The alpine salamander can be found only in cool and dump mountainous localities, in the Balkan at an altitude above 1.500 m a.s.l, mostly above the tree line. On the contrary, the fire salamander is encountered in much more mesophilic climate providing shade and moisture.

It cannot be found above 1.700 m in the Balkan. Also, profound differences occur in the mode of reproduction. Embryonic development and metamorphosis are completed in oviducts of *S. atra*. The fire salamanders have variable reproductive modes; its eggs hatch prior to, or simultaneously with parturition. The young are mostly born as gill-bearing larvae, which after a period of aquatic existence metamorphose into juvenile form and leave water to continue their life on land.

It is widely accepted that males of the fire salamander are somewhat smaller than females (Degani 1986, Rebelo & Caetano 1995, Klewen 1986), with a slender body and longer limbs relative to body length (Eiselt 1958). Particularly during the breeding season, males have a more swollen cloaca than females. More scanty data on the sex body sizes in the alpine salamander indicate negligible difference. However, to the best of our knowledge, in depth sex-dimorphism study, especially allometry analysis conducted to reveal difference in their body shape, has never been done. Also, although the fire salamander is a well known and widespread tailed amphibian in Europe, age data obtained by skeletochronology have been so far scarcely known (see Warburg 1992, 1994, Rebelo & Caetano 1995), while data for the alpine salamander are only anecdotal ones (Fachbach 1988).

The aim of this paper was to study proximate aspects of SSD (i.e. direction, pattern and magnitude of sexual dimorphism) of the two Balkan salamander species, including the study of age structure parameters and the relations between age and morphometric characters.

Materials and methods

Materials

The adult alpine salamanders came from Slovenia (Mt. Kranjski Snežnik: 3♀♀, 6♂♂), and from Mt. Prokletije Massif (Lumbardska planina, Bogićevica, Djerovica; Serbia and Montenegro: 10♀♀). These samples belong to presumably different subspecies, *S. atra atra* and *S. a. prenjensis*, respectively (Džukić 1993). It is also of interest that the alpine salamander populations from Mt. Prokletije are the fringe ones (Krizmanić 1997). Adult fire salamanders were collected from the fields of two Serbian areas: Mt. Vršački breg (Pojilo, Mesićki potok: 6♀♀, 32♂♂), and on the hills near the town Despotovac (the river Resava valley; 14♀♀, 5♂♂). Adulthood of each specimen studied was confirmed by the inspection of gonads. Salamanders studied, except loaned ones, were deposited in the Georg Džukić's batrachological collection (Institute for Biological Research, Belgrade).

Morphometrics

The following sixteen morphometric characteristics were measured with digital calliper (to the nearest 0.01 mm) for each individual: L – total length, Lsv – snout-vent length (from the snout to the posterior edge of the cloaca basis), Lcd – tail length (from the anterior edge of the cloaca basis to the tail tip), Lc – head length (measured from the snout to the gular fold), Ltc – maximal head width (between mouth corners), Ac – maximal head height, D -distance between fore and hind limbs (axilla to groin), Lpa – forelimb length, Lpp – hindlimb length, Dn – internarial distance, Do – eye diameter, Spp – minimum interorbital distance, Lpr – parotoid gland length, A – manus length (from inner border of wrist to tip of third toe), P – pes length (from inner border of foot to tip of the forth toe), Lm – jaw length (measured from the snout to the corner of the mouth). The paired measurements were taken on the right side only, neglecting thus potential asymmetry. All data were log – transformed in order to normalise variables.

The nested ANOVA was used to reveal effects of sample and effects of sex (nested within sample) on morphometric variability in analysed salamander species. The t-tests were used to analyse differences in body weight and in morphometric traits between sexes. As measure of overall differences between sexes, the multivariate Mahalonibis' distance was calculated using all analysed morphometric traits.

The coefficients of bivariate allometry were estimated as regression coefficients from linear regression of logarithmically transformed morphometric data, using a snout-vent length as an independent size variable.

Age study

Ages of each individual were assessed by skeletochronology. A general description of this histological method can be found elsewhere (e.g. Castanet & Smirina 1990, Castanet et al. 1993). Sections of the diaphysis of toe phalanges were used to count the lines of arrested growth. Frozen sections of the demineralized bones were cut at 16 micrometers and stained in Ehrlich's hematoxylin. We managed to assess an individual onset of sexual maturity as a sudden decrease in bone growth and concomitant rapprochement of lines of arrested growth (see Kleinenberg & Smirina 1969, Francillon-Vieillot et al. 1990).

The differences in age of sexual maturity between sexes were analysed by nonparametric Wilcoxon two sample tests and by Kolmogorov-Smirnov tests for analysis of frequency distributions. The mean survival rate was roughly estimated from the age structure of analysed groups (Krebs 1989):

$SR = T/(N + T - 1)$, where T is the sum of the coded ages times their frequencies and N is the number of animals in x age class. The 95 % confidence intervals (CI) for survival rates were calculated as:

$CI = 1.96(pq - 1)^{1/2}$, where $q = (1 - p)$; and p is the survival rate and n is the simple size.

Results

Morphometrics

In the alpine salamander statistically significant differences among populations were found for four of 16 morphometric traits (Tab. 1). Also, there were no differences in morphometric variability between genders of this salamander. To ensure a sufficient number of individuals of each sex for further analyses, we pooled specimens of alpine newt from different localities into one sample. The mean values (± SE) and ranges of body weight and 16 morphometric traits of the alpine salamander samples are given in Tab. 2.

The differences between samples of *S. salamandra* were much more pronounced. The samples significantly differed in variability of all traits, except for the interorbital distance. The sex factor influenced variability of body weight, head width, and traits closely related with locomotion (lengths of forelimb and tail) (Tab. 1). Individuals from the Despotovac population sample had somewhat larger dimensions of all analysed traits comparing with those from the Vršac population (Tabs 3 and 4).

The alpine salamander females appeared to be slightly larger than males for the most characters measured, but only females interorbital distances were significantly larger than in males ($t=2.56$; $df=17$; $P<0.05$). The differences between sexes were much more pronounced in the fire salamander. In the population sample from Despotovac males were significantly larger than females for the body length ($t=2.37$; $df=17$; $P<0.05$), as well as for forelimb ($t=3.61$; $df=17$; $P<0.01$), manus ($t=2.82$; $df=17$; $P<0.05$), and tail length ($t=2.83$; $df=17$; $P<0.05$). In the population sample from Vršac, females were significantly heavier ($t=4.35$; $df=36$; $P<0.001$), with wider head ($t=2.63$; $df=36$; $P<0.05$) and larger parotoid glands than males ($t=2.13$; $df=36$; $P<0.05$). On the contrary, males had slightly larger forelimbs, manus, peas and tail length than females, but these differences were statistically nonsignificant.

The Mahalanobis' distance analysis also showed that there was no significant difference between the alpine salamander females and males ($D^2=15.41$, $F_{(Ndf=16; Ddf=2)}=0.46$, $P>0.851$). The overall differences between genders of the fire salamander varied geographically. In the Despotovac population sample the overall difference between sexes was insignificant ($D^2=31.1$, $F_{(Ndf=16; Ddf=2)}=0.84$, $P>0.05$), while in the Vršac population sample this difference appeared to be highly statistically significant ($D^2=25.43$, $F_{(Ndf=16; Ddf=21)}=4.68$, $P<0.01$).

Bivariate allometry

In the alpine salamander most of analysed traits showed an isometric growth. A statistically significant positive bipartite algometry was found only for the head length ($b=1.234\pm0.387$; $P<0.05$), the distance between nostrils in females

($b=0.491\pm0.669$; $P<0.05$), and for the total body length in males ($b=1.248\pm0.062$; $P<0.05$), while the distance between orbits in males showed a negative allometric growth ($b=-0.818\pm0.391$; $P<0.01$). In the fire salamander from the Despotovac population sample the statistically significant positive

Table 1. The differences between populations and between females and males in body weight and 16 morphometric traits in *Salamandra atra* and *Salamandra salamandra*. F values are obtained from nested ANOVA, with sex factor nested within population factor. For character symbols see text.

	S. atra **(n=19)**				***S. salamandra*** **(n=57)**			
	Population (df=1)		Sex (df=1)		Population (df=1)		Sex (df=1)	
	F	P	F	P	F	P	F	P
W	/	/	/	/	**30.49**	**0.0001**	**11.24**	**0.001**
L	0.52	0.480	0.45	0.5097	**18.97**	**0.0001**	2.11	0.1309
Lsv	1.59	0.2247	0.56	0.4669	**27.60**	**0.0001**	0.78	0.4622
Lc	**4.76**	**0.0443**	2.43	0.1390	**10.89**	**0.0017**	0.28	0.7587
Lcd	0.20	0.6633	0.38	0.5437	**6.11**	**0.0167**	**6.36**	**0.0033**
Ltc	1.74	0.2063	0.30	0.5935	**33.04**	**0.0001**	**3.58**	**0.0347**
Ac	3.97	0.0637	0.19	0.6722	**23.87**	**0.0001**	1.58	0.2148
D	0.01	0.9761	0.05	0.8343	**13.94**	**0.0005**	1.18	0.3154
Lpa	0.50	0.4882	0.42	0.5278	**17.03**	**0.0001**	**6.22**	**0.0038**
Lpp	2.41	0.1405	0.72	0.4077	**10.08**	**0.0025**	1.37	0.2642
Dn	0.19	0.6652	0.27	0.6127	**16.50**	**0.0002**	0.63	0.5381
Do	4.20	0.0572	0.10	0.7613	**15.11**	**0.0003**	1.16	0.3222
Spp	**9.31**	**0.0076**	0.32	0.5821	1.79	0.1864	1.13	0.3315
Lpr	**4.76**	**0.0444**	0.23	0.6392	**4.40**	**0.0407**	2.13	0.1294
A	0.10	0.7510	0.08	0.7840	**4.63**	**0.0359**	2.17	0.1242
P	0.25	0.6261	0.01	0.9376	**8.73**	**0.0047**	1.98	0.1486
Lm	**4.90**	**0.0312**	1.06	0.3542	**4.90**	**0.0312**	1.06	0.3542

Table 2. Mean values, standard errors and ranges of body weight (in gr) and 16 morphometric traits (in mm) of *Salamandra atra* females and males. For character symbols see text.

	Females (n=13)		Males (n=6)	
	Mean ± SE	Range	Mean ± SE	Range
W	8.70±0.44	6.5-10.0	/ ± /	/ – /
L	114.0±2.72	96.7-126.2	114.44±4.53	93.2-123.8
Lsv	67.94±1.45	59.5-74.4	16.31±0.74	56.9-73.2
Lc	16.60±0.63	12.9-20.1	16.31±0.74	13.5-18.2
Lcd	50.99±1.78	41.4-59.4	51.71±2.66	40.0-58.8
Ltc	12.63±0.35	10.5-14.8	12.28±0.41	11.1-13.7
Ac	7.25±0.55	4.7-10.2	6.25±0.40	5.8-7.8
D	33.97±1.10	27.6-40.1	34.24±1.43	27.8-38.2
Lpa	19.74±0.67	16.5-23.6	19.72±1.22	15.5-23.6
Lpp	21.33±0.84	17.6-26.3	20.74±1.11	16.9-24.1
Dn	4.36±0.21	3.0-5.5	4.36±0.17	3.8-5.0
Do	3.26±0.27	2.2-5.0	3.65±0.15	3.1-4.0
Spp	5.03±0.37	3.8-7.7	3.75±0.15	3.4-4.4
Lpr	8.99±0.32	6.8-10.5	8.35±0.43	7.3-9.8
A	7.44±0.28	6.1-9.1	7.20±0.48	5.9-9.1
P	9.53±0.46	6.3-12.7	9.80±0.77	8.3-12.3
Lm	10.02±0.23	8.7-11.4	10.36±0.49	8.3-11.9

allometry was found for the head width in females ($b = 0.58\pm0.25$; $P<0.05$) and the manus length in males ($b=0.109\pm0.199$; $P<0.05$). The length of parotoid gland and tail length in females from this population showed the statistically significant negative allometry ($b=-0.076\pm0.373$; $P<0.05$ and $b = -0.503\pm0.504$; $P<0.05$, respectively). In the fire salamander from the Vršac population sample, the

Table 3. Mean values, standard errors and ranges of body weight (in gr) and 16 morphometric traits (in mm) of *Salamandra salamandra* females and males from population Despotovac. For character symbols see text.

	Females (n=14)		Males (n=5)	
	Mean ± SE	Range	Mean ± SE	Range
W	48.78±2.177	36.94-67.28	50.21±2.18	45.79-56.53
L	182.38±3.52	154.51-99.8	197.57±2.88	189.71-207.37
Lsv	116.86±1.63	109.1-127.3	119.83±2.00	112.41-124.46
Lc	25.84±0.45	22.5-28.6	26.42±0.52	24.44-27.44
Lcd	73.10±2.50	52.0-84.8	86.77±1.71	84.25-93.50
Ltc	21.56±0.32	19.8-23.7	21.56±0.82	19.40-23.78
Ac	14.78±0.34	13.2-17.2	15.13±0.41	14.10-16.34
D	63.62±1.38	54.6-73.2	62.52±2.33	53.60-66.72
Lpa	35.02±0.75	29.1-38.9	40.12±0.59	38.62-41.74
Lpp	37.17±0.70	33.1-41.0	39.70±0.74	37.81-42.30
Dn	7.79±0.18	6.8-8.9	7.85±0.20	7.26-8.43
Do	5.99±0.17	4.7-6.8	6.57±0.20	5.96-7.03
Spp	6.72±0.22	5.2-8.0	6.26±0.14	5.72-6.47
Lpr	13.53±0.37	11.5-15.8	13.30±0.75	10.8-14.59
A	12.73±0.20	11.8-14.5	13.80±0.30	13.33-14.90
P	15.22±0.30	13.5-17.0	16.32±0.41	14.81-17.30
Lm	16.80±0.30	14.8-18.6	17.85±0.54	16.8-19.70

Table 4. Mean values, standard errors and ranges of body weight (in gr) and 16 morphometric traits (in mm) of *Salamandra salamandra* females and males from population Vršac. For character symbols see text.

	Females (n=6)		Males (n=32)	
	Mean ± SE	Range	Mean ± SE	Range
W	41.76±2.39	34.73-50.11	27.81±1.09	16.88-40.66
L	168.62±0.89	166.62-172.68	170.08±2.63	142.68-199.56
Lsv	105.51±2.48	100.42-116.38	102.16±1.56	86.60-119.86
Lc	23.98±0.35	22.99-25.46	23.62±0.41	19.40-28.78
Lcd	70.01±2.86	60.68-77.41	75.54±1.34	61.48-92.80
Ltc	19.67±0.36	18.59-20.62	18.21±0.23	15.78-21.02
Ac	12.54±0.49	10.62-14.13	11.37±0.33	8.12-15.40
D	57.66±1.65	51.40-62.55	54.33±0.96	43.65-63.38
Lpa	32.25±0.94	28.59-35.47	34.36±0.55	26.86-40.30
Lpp	35.42±0.69	32.64-37.26	34.99±0.58	29.32-42.09
Dn	6.815±0.27	5.59-7.60	7.10±0.11	5.91-8.60
Do	5.28±0.23	4.64-6.20	5.39±0.12	3.42-6.64
Spp	6.31±0.22	5.79-7.07	5.91±0.17	4.10-8.61
Lpr	13.05±0.57	10.46-14.44	11.92±0.18	9.16-13.69
A	11.50±0.82	8.75-13.41	12.77±0.34	8.17-16.35
P	13.82±0.40	12.28-14.84	14.778±0.30	11.88-19.27
Lm	16.33±0.50	15.43-18.73	15.648±0.35	10.80-19.92

positive allometric growth was found for the hindlimb ($b=0.260 \pm 0.250$; $P<0.05$) and manus lengths ($b=0.249 \pm 0.254$; $P<0.05$) in females, and the head width ($b=0.708 \pm 0.072$; $P<0.001$), internarial distance ($b=0.714 \pm 0.126$; $P<0.05$) and length of parotoid gland in males ($b=0.656 \pm 0.151$; $P<0.05$). In females from this population the statistically significant negative allometric growth was also found for the tail length ($b=-1.330 \pm 0.631$; $P<0.05$) and for the interorbital distance ($b=-0.615 \pm 0.292$; $P<0.01$).

Wolterstorff index

The measures of interlimb distance and the length of the fore-limb, combined in a Wolterstorff's index (WI, see Arntzen & Wallis 1994) show sexual dimorphism in some European tailed amphibians, especially of the crested newt species (*Triturus cristatus* superspecies), including the fire salamander (Eiselt 1958). The values of this index are usually higher in males than in females. In the fire salamander sample from Despotovac population sample WI values ranged from 0.460 to 0.662 for females (mean ±SE=0.554±0.016), and for males from 0.579 to 0.726, (mean ±SE=0.645±0.025). Intersex difference appeared to be statistically significant ($t=3.1$, $P<0.05$). The main value of WI in the population sample from Vršac was 0.561±0.017 (range 0.505-0.611) for females and 0.635±0.008 (range 0.529-0.760) for males. The intersex difference was also statistically significant ($t=3.813$, $P<0.01$). Thus, males of the fire salamander from the Balkans were more limb-lengthed relative to the interlimb distance. This indicates their greater locomotory efficiency which has been proved by their greater activity compared to females during the breeding season (see Warburg 1994). However, there was no such difference between genders of the alpine salamander ($t=0.218$, $P>0.05$). The mean WI value for females was 0.584±0.016 (range 0.488-0.704), and for males 0.577±0.028 (range 0.492-0.668).

Age structure and time of sexual maturity

As the population effect for longevity and time of sexual maturity appeared to be negligible in both species, samples were pooled for statistical analyses. We estimated that all the adult specimens examined were at least in their fifth year of posthatching life. The oldest male among the fire salamanders was 13 years old, and the oldest female was 14 years old, with the average age of 7.91±0.47 for males, and 8.20±0.44 for females. In the alpine salamanders these figures were lower; 10 years was the age of the oldest male and 11 years of the oldest female, with the mean age of 7.00±0.86 and 7.08±054, respectively. No significant differences were found between the age distributions of the two genders in either species (Wilcoxon two sample test, $P>0.05$), (Figs 1 and 2). Also, there were no statistically significant differences in frequency distributions of age classes between females and males in both species (Kolmogorov-Smirnov test, $P>0.05$).

On the average, the attainment of sexual maturity was somewhat prolonged in females compared to males in the alpine salamander (3.20±0.29 vs. 2.25±0.25, with the range of 2-4 and 2-3 yrs. for females and males, respectively. However, the average time of sexual maturity in the fire salamander was somewhat higher in males (3.40±0.18, range 2-5 yrs.) than in females (3.00±0.15, range 2-5). Nevertheless, intersex difference for this life-history trait appeared to be statistically non-significant in both species (Wilcoxon two sample test, $P>0.05$).

Survival Rate

In the alpine salamander the roughly estimated survival rate ranged from 0.526 (CI=0.295) for females to 0.615 (CI=0.295) in males. In other words, on the average 53 % of female and 61 % of male individuals survive from one year to the other. In the fire salamander the estimated survival rates ranged from 0.536 (CI=0.224) in females to 0.787 (CI=0.144) in males. These results indicated that females had higher mortality than males in both species, but as confidence intervals overlapped, these differences were non-significant.

Correlations between size measures and age and time of sexual maturity

The time of attainment of sexual maturity had no significant correlation with any body size measures, regardless of sex, in both analysed species, as was the case with age in the alpine salamander. In the fire salamander the statistically significant correlation between body size and age was found only in males from the Vršac population sample. In this group majority of analysed traits were correlated with age. These include: body weight, body and tail lengths and snout-vent length, head measures, forelimb length, hindlimb lengths, the size of parotoid gland and internarial distance (significancy at least $P<0.05$).

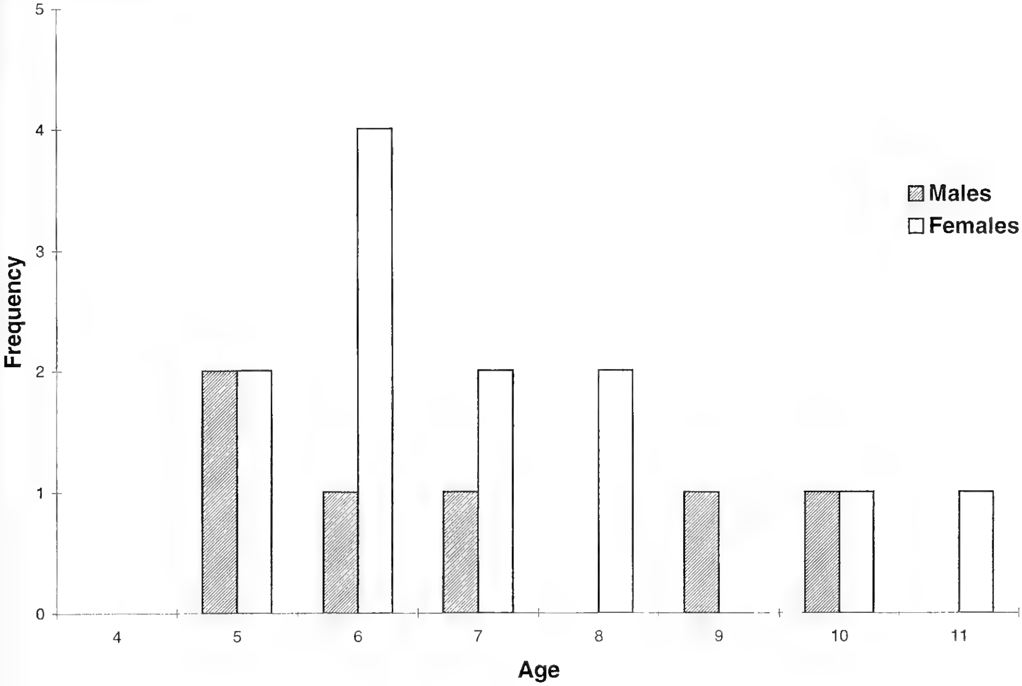

Fig. 1. Age distribution for males and females of *Salamandra atra*.

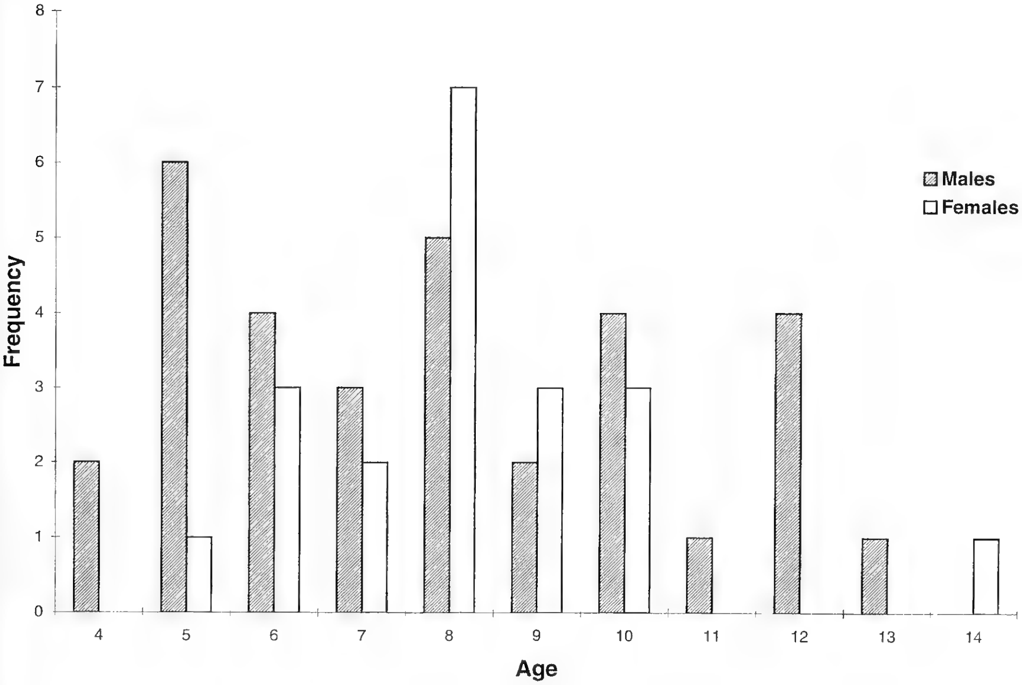

Fig. 2. Age distribution for males and females of *Salamandra salamandra*.

Discussion

Body size and age

The body size of the fire salamander we studied is well within the range for these species so far recorded for the Balkan Peninsula. Thus, Džukić (1993) stated that the mean value of the total body length for the sexually matured fire salamanders from Serbia was 181±18 mm (N=170), with the highest value of 245 mm (♀ from Novo Brdo, Zebince, Kosovo). Similar values were found for other Balkan populations studied (Bulgaria, Bureš & Cončev 1963; Roumania, Fuhn 1960; Hungary, Dely 1966). For the alpine salamander an appreciable number of specimens measured came from the Prenj and Cvrsnica mountains (Bosnia and Hercegovina) and those specimens appeared to be somewhat larger (Klewen 1991) in comparison to individuals we studied. Specimens from Balkan, both females and males, were on average larger than those from different localities of the Italian and Switzerland part of Alps (Nasceti et al. 1988) but the differences were not significant (t-test, P>0.05).

In general, there is a trend to increased longevity, and to less extent, an age of maturation in northern and mountain amphibian populations as compared to southern and lowland populations (e.g. Smirina 1994). It was found that a long phase of hibernation, followed by a comparatively short period of activity at a high altitude of the Alps in Austria, led to considerably delayed sexual maturity and increased longevity for the alpine newt (*Triturus alpestris;* Schabetsberger & Goldschmid 1994) in comparison with Balkan populations (Smirina & Sofianidou 1985, Kalezić et al. 1996). However, such relationships between these life-history characteristics and the altitude of the breeding site seem not to hold for the alpine salamander in comparison to the fire salamander that inhabits temperate environment. But, our alpine salamanders were much younger than those from the Austrian Alps (longevity maximum after metamorphosis 14-15 yrs., age of sexual maturation 4-5 yrs.; Fachbach 1988). In contrast to the above hypothesis is the fact that fire salamanders from the Balkan Peninsula appeared to be younger than those from Portugal (18-19 years, Rebelo & Caetano 1995) and from Israel (20 years, Warburg 1994).

Among life history characteristics the timing of maturation is a critical event influencing the morphology and fitness (i.e. lifetime reproductive success) of individuals, as well as the demographic structure of populations and species (Stearns 1991, Roff 1992). This trait seems to be rather conservative in the genus *Salamandra,* regardless of the region studied, ranging from 2-4 yrs. for females and 2-5 yrs for males (this study), or 3-4 yrs. vs. 2-3 yrs. (Rebelo & Caetano 1995). In numerous amphibian species females delay the age of sexual maturation by one to three years later than males (Halliday & Tejedo 1995). By delaying maturation, females attain larger body-size at first breeding with a resulting benefit in reproductive performance. In *Salamandra* species this apparently varies according to the region studied – this generality holds for the Portugal fire salamander (Rebelo & Caetano 1995), but fails for the Balkan salamanders (this study).

Sexual dimorphism

There is a large array of factors that affect sexual size dimorphism. In general, sexual size dimorphism of any species may be a consequence of differences in some life-history traits and sex-related action of sexual and/or natural selection, including fecundity selection. Thus, the direction and the degree of SSD are the result of different selective regimes usually acting separately on females and males. The importance of these regimes varies among species and populations, or even with time in the same population.

It was claimed that in amphibians selection on female body size was, contrary to that on the male body size, "typically more uniform in direction and intensity because of the strong correlation between body-size and measures of reproductive success such as fecundity and offspring size" (Halliday & Tejedo 1995, p. 438). Also, for amphibians in general, selection for higher fecundity in females causes their larger body size than in males (Halliday & Tejedo 1995). In the alpine salamander, a rare species among tailed amphibians with viviparous reproduction (Wake 1993), a female, regardless of body size, gives birth to only one or usually two fully metamorphosed youngs. The offspring, during the first year of lengthy oviductal gestation (2-5 years), feed on remaining yolked eggs of an initial clutch numbered 20-30 eggs per ovary (Griffiths 1995). In the case of slight variation of reproductive output, fecundity selection could be at least released. If there is neither pronounced selection for lager male body size, nor differences in life-history traits, no sexual size dimorphism may be the outcome. It seems that the absence of genders size and shape differences is the characteristic of other alpine salamander populations (i.e. from Italy and Switzerland), and the same holds for the close species of the black salamander *S. lanzai* (Nasceti et al. 1988).

The fire salamander, however, harbours intersex differences in many measures expressing over-all size relations, locomotion abilities, as well as in body shape parameters. In many parts of the species range: e.g. Israel (Degani 1986), Portugal (Rebelo & Caetano 1995), Germany (Klewen 1986) females were somewhat bigger than males, significantly or not, while in the Balkans a reverse trend was observed. Apparently, a direction and magnitude of SSD in the fire salamander is not consistent between areas studied and/or populations. This species is among urodeles in which fighting between males has been noticed (Kastle 1986). According to the predictions of sexual selection theory, males could be bigger than females (Halliday & Verrell 1986). On the other hand, due to highly variable females reproductive output (clutch size can vary from 10 to 50 larvae) appreciable fecundity selection could be expected as well. What is about life-history traits that might influence the SSD in the fire salamander? Up to now it is known that intersex differences in the fire salamander life span and time of sexual maturity appeared to be statistically significantly different in the Portugal specimens (Rebelo & Caetano 1995). According to their study, males live longer than females, and tend to mature one year earlier than females. However, we found no evidence that males had a longer life-span than females, which also goes for the fire salamander from Israel (Warburg 1994). Also, there is no difference in the time of sexual attainment in the Balkan fire salamanders. Another life-history dimorphic trait that is potentially different between genders is the survival rate that is higher in males in comparison to females but without statistical significance. It might be speculated that SSD, observed in the fire salamander, is a correlated response to the differential growth rate of the two sexes during a juvenile phase that is the major period of growth during life span. This happens for example, in the crested alpine newt (*Triturus carnifex*; Cvetković et al. 1997, Kalezić & Djorović 1998).

The available samples of the Balkan salamander species were small and largely sex biased. A factors influencing the estimation of SSD could be a potential sample bias, especially when distributions of body-size and age may change in time even within populations (Halliday & Tejedo 1995) and potential mesurement errors. Having lacked additional samples, geographical variation in the direction, pattern and magnitude of the sexual dimorphism were still far from fully explored matter. Apparently, much more research is needed to enlighten sexual size dimorphism in Salamanadra species as the first, and than, as a more difficult task, to resolve factors contributing to this dimorphism.

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A new toad of the *Bufo typhonius* complex from humid montane forests of Bolivia

(Amphibia, Anura, Bufonidae)

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Lötters, S. & J. Köhler (2000): A new toad of the *Bufo typhonius* complex from humid montane forests of Bolivia (Amphibia, Anura, Bufonidae). – Spixiana **23/3**: 293-303

A new species of toad referable to the *Bufo typhonius* species complex is described from humid montane forests in the Departamentos Cochabamba and Santa Cruz, Bolivia. The new species is mainly characterised by tuberculate dorsal skin, well developed protrusions at angle of jaws, a lateral row of conical tubercles and absence of neural vertebrae. In addition, we provide diagnostic characters for *Bufo acutirostris* Spix, 1824 and comment on other available names of the complex. Including the new species, at least four different forms related to *B. typhonius* (Linnaeus, 1758) are known from Bolivia.

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Introduction

The taxonomy of Neotropical toads related to *Bufo typhonius* is very chaotic (Hoogmoed 1986, 1989, 1990). In recent years it has become evident that behind the name *B. typhonius* a complex of similar species is hidden (*Bufo margaritifer* complex of some authors), which are distributed over the entire Amazon basin and lower Central America. Nothing is known about their phylogenetic relationships (Frost 1985, Hoogmoed 1986, 1989, 1990, Caldwell 1991, Duellman & Schulte 1992, Hass et al. 1995). Because of the difficulty to assign the many available names and the lack of a comprehensive revision (e.g. Hoogmoed 1990) contributors sometimes simply refer to morphs related to *B. typhonius* without assigning names (e.g. Duellman & Mendelson 1995, Köhler & Lötters 1999).

In recent times, Bolivia has become well known for its diversity in anurans. Due to a remarkable increase in scientific efforts within the last decade, the number of species known has almost doubled (De la Riva et al. 2000). Populations referable to *B. typhonius* repeatedly were reported from this country (Schmidt 1857, 1858, De la Riva 1990, Hoogmoed 1990, Aparicio 1992, De la Riva et al. 1992, 1996, Reynolds & Foster 1992, Köhler et al. 1997, Harvey et al. 1998, Köhler & Lötters 1999, De la Riva et al. 2000). Among them, at least four different species or morphs can be distinguished (for their known distributions see Fig. 1): (1) *Bufo castaneoticus* and (2) a sympatric form occurring in the Departamento Pando in north-western Bolivia (Köhler & Lötters 1999). Following the diagnosis provided for the latter form by Köhler & Lötters (1999), this morph is somehow similar to *B. acutirostris*, an apparently valid taxon known from eastern Colombia, southern Venezuela and north-western Brazil (Hoogmoed & Gruber 1983). Also Hoogmoed (1986) concluded that populations from Amazonian Bolivia resemble *B. acutirostris*. But he suggested that Bolivian specimens are not conspecific with those from northern Amazonia because of the large intervening area from which such toads are unknown. Currently, it is

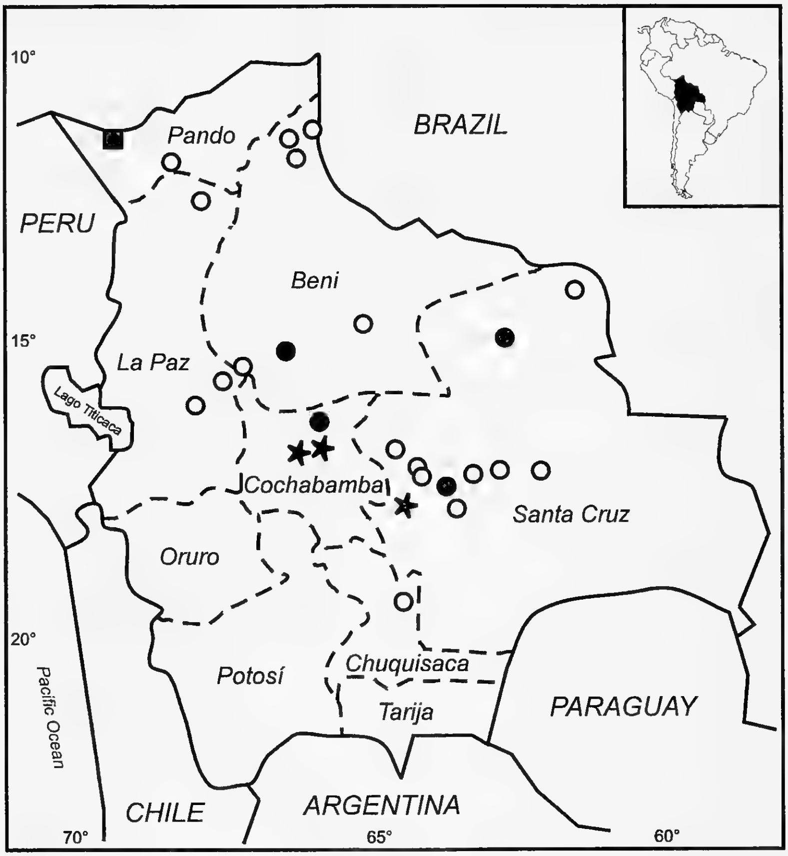

Fig. 1. Known distributions of toads of the *Bufo typhonius* complex in Bolivia. Asterisks: known localities of *B. stanlaii,* spec. nov.; square: sympatric occurrence of *B. castaneoticus* and *B.* cf. *acutirostris;* dots: *Bufo* sp. 1; circles: lowland populations of unknown taxonomic status.

impossible to clarify the taxonomic status of the many populations resembling *B. acutirostris*. Therefore, we here apply the name *B. acutirostris* to the holotype only (see Appendix). For the population from north-western Bolivia (*Bufo* sp. A in Köhler & Lötters 1999) we use the name *B.* cf. *acutirostris.* (3) A morph from the central lowlands which at least occurs in the Departamentos Beni, Cochabamba and Santa Cruz. Conspecifity of these populations is supported by the coincidence of advertisement call characters (De la Riva et al. 1996, Köhler et al. 1997; for Departamento Cochabamba, unpubl. data)*. This form may represent an undescribed species (this form is here called *Bufo* sp. 1). But further research involving additional specimens from various lowland sites in Bolivia (Fig. 1) and adjacent countries is needed. (4) A morph reported from humid montane forests in the Departamento Cochabamba by Reynolds & Foster (1992) and Köhler et al. (1997). Reynolds & Foster (1992) suggested it to represent an undescribed species. Although we are aware that the *B. typhonius* complex needs rigorous revision, recently collected material supports that non of the available names is applicable to the above mentioned morph from humid montane forests. The purpose of this paper is to describe it as a new species.

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* Hoogmoed (1986) proposed that at least sympatric species of the *B. typhonius* complex in Suriname can be distinguished by their vocalisations (although data were not provided). The only other advertisement calls described from species related to *B. typhonius* are those of *B. castaneoticus* (Köhler & Lötters 1999) and *B. dapsilis* (Zimmerman & Bogart 1988) which are clearly distinguished from those described by De la Riva et al. (1996) and Köhler et al. (1997).

Material and methods

Specimens examined are deposited in the Colección Boliviana de Fauna (CBF), La Paz; National Museum of Natural History, Smithsonian Institution (USNM), Washington; Zoologisches Forschungsinstitut und Museum Alexander Koenig (ZFMK), Bonn; and Zoologische Staatssammlung München (ZSM).

Geographic positions of localities of the new species were obtained with a Magellan 3000 XL GPS receiver. Colour slides of specimens were taken in the field. Measurements of specimens are in millimetres and were taken to the nearest 0.1 mm with dial callipers. Abbreviations are as follows: SVL (snout-vent length), HW (head width at angles of jaws), HL (head length, distance from tip of snout to angle of jaws), IOD (interorbital distance), TYMD (vertical diameter of tympanic annulus), EYED (horizontal diameter of eye), TIBL (tibia length), FOOT (foot length, distance from proximal edge of outer metatarsal tubercle to tip of third toe), N-N (inter-narial distance), E-N (eye-nostril distance, measured from nostril to anterior corner of eye), PARL (length of parotoid gland), PARW (greatest width of parotoid gland), HAND (hand length, distance from proximal edge of outer metacarpal tubercle to tip of third finger). Despite some modifications, terminology and diagnostic characters generally follow Duellman & Mendelson (1995). Sexes in adults were determined by dissection. For webbing formulae we use the scheme of Savage & Heyer (1967) as modified by Myers & Duellman (1982).

Bufo stanlaii, spec. nov.

Figs 2-4

?*Bufo margaritifer* – Schmidt 1857: 13; Schmidt 1858: 251 (non Laurenti, 1768).
Bufo sp. – Reynolds & Foster 1992: 89.
Bufo margaritifer complex (partim) – Köhler et al. 1997: 7 (non Laurenti, 1768).

Types. Holotype: CBF 3346, an adult female, from a point 3.3 km on the road to San Onofre from the road from Cochabamba to Villa Tunari (17°11'S, 65°45'W), Provincia Chapare, Departamento Cochabamba, Bolivia, 1900 m above sea level; collected on 9 February 1998 by Jörn Köhler and Stefan Lötters (field number JKSL 506). – Paratypes: USNM 257797, an adult male, and USNM 257798, a subadult female, from the same locality as the holotype, collected on 1 and 3 November 1979 by Mercedes S. Foster; ZFMK 67097, juvenile, same locality as holotype; USNM 257796, an adult male, from km 96.7 on the road from Cochabamba to Villa Tunari, Provincia Chapare, Departamento Cochabamba, Bolivia, 1967 m above sea level, collected on 22 September 1979 by Mercedes S. Foster; ZFMK 60464, an adult female, from km 115 on the road from Cochabamba to Villa Tunari, Provincia Chapare, Departamento Cochabamba, Bolivia, 1850 m above sea level, collected on 9 December 1994 by Lutz Dirksen and Jörn Köhler; ZFMK 67096, an adult male, from a point ca. 36 km on the "old" road from Paractito to Cochabamba (17°07'S, 65°35'W), Provincia Chapare, Departamento Cochabamba, Bolivia, 1600 m above sea level, collected on 3 January 1999 by Jörn Köhler and Stefan Lötters; ZSM 144/1999, an adult male, from La Hoyada (17°54'S, 64°08'W), Provincia Florida, Departamento Santa Cruz, Bolivia, 1700 m above sea level, collected on 16 November 1998 by Jörn Köhler and Stefan Lötters.

Etymology. The specific name is a patronym for Mr. Stanley Lai (New York) in recognition of supporting taxonomic research and forthcoming conservation projects in Bolivia.

Diagnosis. A species of the *Bufo typhonius* complex with the following combination of characters: (1) SVL of three adult males 39.1-54.1 mm (mean 45.8 mm), of two adult females 57.2 and 59.4 mm; (2) snout pointed in dorsal view, acute in lateral view, protruding beyond margin of lip; mouth slightly curved in profile; (3) nostrils protuberant at point anterior to anterior margin of lower jaw; (4) canthal crest not raised, supraorbital and prominent supratympanic crests continuous and prominent (more elevated in females); (5) tympanum rounded in males, ovoid in females, distinct, smaller than eye; (6) well developed bony protrusion at angle of jaws; (7) neural crests of vertebrae absent; (8) well developed parotoid glands ovoid to triangular, protruding laterally and incorporated into lateral row of tubercles; (9) lateral row of tubercles present, rounded in males, conical in females; (10) skin on dorsal and dorsolateral surfaces including all cranial crests tubercular, dorsally most intense on posterior head; (11) skin of limbs tubercular or spinous; (12) first and second finger equal in length, or first finger slightly longer; (13) palmar tubercle large, ovoid, three or four times the size of rounded thenar tubercle; (14) basal webbing between fingers; (15) inner metatarsal tubercle ovoid, twice the size

Fig. 2. Female holotype of *Bufo stanlaii,* spec. nov. (CBF 3346) in life.

of outer rounded metatarsal tubercle; (16) foot webbing formula I 1 – 1⁺ II 1⁻ – 2⁻ III 1 – 4 IV 4 – 0⁺ V; (17) supernumerary tubercles present, numerous; (18) dorsum brown, with irregular dark markings and spots, pale middorsal line or stripe; ventral colours brown and cream; (19) vocal slits absent and nuptial excrescences present in males.

The new species is most similar to *B. acutirostris* (see Appendix; Fig. 5), *B.* cf. *acutirostris* from north-western Bolivia and *Bufo* sp. 1 from the Bolivian lowlands. In *B. acutirostris* and *Bufo* sp. 1, the bony protrusion at the angle of jaws is weakly developed (well developed in *B. stanlaii*); in their males, the supratympanic crest is only hardly elevated, its maximum elevation smaller than half the vertical tympanum diameter (although variable in size, the supratympanic crest in *B. stanlaii* males is always larger than half the vertical tympanum diameter). In *B. acutirostris* the nostril (although also at point anterior to anterior margin of lower jaw) is situated immediate to the anterior margin of the lower jaw (well anterior to anterior margin of lower jaw in *B. stanlaii*). In *Bufo* sp. 1 the snout is straight posteroventrally in profile, or concave respective to eye (snout always convex respective to eye in *B. stanlaii*). In *B.* cf. *acutirostris* from north-western Bolivia neural crests of vertebrae may be present (always absent in *B. stanlaii*); males possess vocal slits (absent in *B. stanlaii*).

The other proposed species in the *B. typhonius* complex (see also discussion) can be distinguished from the new species as follows: *Bufo pleuropterus* has more pointed toe tips, outer and inner metatarsal tubercle of nearly same size, a more homogeneously tuberculated dorsum and a less pointed snout. *Bufo castaneoticus* and *B. proboscideus* lack a prominent supratympanic crest and a lateral row of tubercles; in addition, *B. castaneoticus* is smaller and *B. proboscideus* has a very distinctly pointed snout;

Fig. 3. Male paratype of *Bufo stanlaii,* spec. nov. (ZFMK 67096) in life.

B. ceratophrys, B. roqueanus and *B. typhonius* (including *B. margaritifer* and *B. nasutus*) are considerably larger (female SVL > 80.0 mm); *B. ceratophrys* can be distinguished further by the presence of a triangular dermal projection on the eyelid, and *B. roqueanus* and *B. typhonius* by the presence extremely enlarged supratympanic flanges; *B. dapsilis* almost lacks cranial crests and tubercles; *B. nasicus* lacks prominent supratympanic crests and has longer legs (Spix 1824, Schmidt 1858, Hoogmoed 1977, 1986, Caldwell 1991, Rodríguez & Duellman 1994).

Description of holotype

Adult female; body robust; head wider than long, head length less than one third of SVL; snout pointed from above, acute in lateral profile, protruding beyond margin of lip, slightly curved posteroventrally in profile (curve convex respective to eye); well developed bony protrusion at angle of jaws; dorsal surface of snout weakly depressed; nostrils lateral at point anterior to anterior margin of lower jaw, protuberant, directed dorsolaterally; canthus rostralis barely concave; loreal region concave, horizontal eye diameter about the same as distance from nostril to anterior corner of eye; temporal area straight; tympanum distinct, ovoid, smaller than eye; canthal crest not raised; supraorbital crest suspicious posterior to eye, continuous with prominent supratympanic crest; parotoid gland well developed, ovoid, slightly triangular, protruding laterally; lateral row of conical tubercles from mid of parotoid gland to area between sacrum and groin; skin on dorsal and dorsolateral surfaces tubercular, partly with conical tubercles; mid-dorsum and area between eyes relatively smooth; all cranial crests, paro-

Fig. 4. Dorsal and ventral view of holotype of *Bufo stanlaii*, spec. nov. (CBF 3346) in preservative.

toid glands and in-between conspicuously tubercular; skin of lateral body and head, upper lip, throat, chest and limbs spinous; skin of belly spinous and tubercular, partly with conical tubercles.

Forelimb relatively slender; relative length of fingers I = II < IV < III; palmar tubercle prominent, ovoid; thenar tubercle rounded, in size about one third of former; subarticular and supernumerary tubercles filling almost all area of palm; basal webbing between fingers, edge of webbing slightly serrate.

Hind limb slender; sole from proximal edge of outer metatarsal tubercle to tip of third toe about the same length as tibia; relative length of toes I < II < III < V < IV; inner metatarsal tubercle distinct, ovoid; outer metatarsal tubercle small, rounded, about half the size of inner; plantar surface with supernumerary tubercles; toes with prominent subarticular tubercles; toes with moderate webbing, edge slightly serrate, webbing formula I 1 – 1^+ II 1^- – 2^- III 1 – 4 IV 4 – 0^+ V.

Measurements and proportions are provided in Table 1.

In preservative, ground colour brown; dorsally with dark brown "dead leaf pattern" from between eyes anterior to cloacal region, with pale middorsal line from snout to cloaca; upper loreal region, lateral side of supratympanic crest and lateral body below row of tubercles dark brown; laterally below eye and on tympanic membrane pale markings, continued on ventrolaterally; limbs with irregular dark brown markings; dorsolateral and lateral tubercles light orange, others brown; spines on limbs brown, light orange, or cream; throat, chest and anterior belly brown with scattered cream spots, posteriorly with irregular cream marbling; posterior belly uniformly brownish cream; cloacal region bordered by cream spots; ventral surfaces of limbs brown with irregular cream markings; palm light brown with cream tubercles; sole brown with cream tubercles; foot webbing light brown with cream borders. Coloration in life differed only in respect to the more intensive reddish colour of lateral and dorsal tubercles. Iris was silvery greenish (taken from colour slides).

Variation. For variation in measurements and proportions see Tab. 1. In the female USNM 257798, the head measures slightly more than one third of the SVL. The snout is less pointed in ZFMK 60464. The parotoid gland may be more ovoid or more triangular than in the holotype (even variable within one individual). ZSM 144/1999 (male) in general is less tubercular dorsally and less spinous laterally than all other specimens. Ventral spines are absent or almost absent in USNM 257796 and ZSM 144/1999. In USNM 257796, ZFMK 67096, and ZSM 144/1999, the limbs are tubercular (versus spinous in the holotype). The male USNM 257796 has remarkably large feet when comparing FOOT and FOOT/SVL with the other type specimens. In ZFMK 60464 (female), the palmar tubercle is four times the size of the thenar tubercle. In the subadult female USNM 257798, the palmar tubercle is two times the size of the thenar tubercle which may reflect ontogenetic variation. ZSM 144/1999 exhibits a somewhat more rounded palmar tubercle.

Sexual dimorphism is indicated by males having smaller size (Tab. 1), a more rounded (versus ovoid) tympanum, somewhat less prominent supratympanic crests and the presence of a lateral row of rounded (versus conical) tubercles. Vocal slits are absent and nuptial excrescences on Fingers I and II present in all males. In the juvenile (ZFMK 67097), cranial crest are less developed while other characters fit those of the adults.

Colour variation includes light or reddish brown ground colour; the "dead leaf pattern" may be absent while the light brown middorsal line (occasionally bordered with dark brown) is always present; few dark brown markings may be present on the posterior dorsum; lateral areas (dark in the holotype) may have the ground colour; tubercles (light orange in the holotype) may be brown or cream; the throat may be cream with irregular brown markings; the cream area on the posterior belly (with irregular brown markings) may reach anteriorly to the chest.

Distribution and ecology. *Bufo stanlaii* is known from the localities given in the type series, comprising an elevation range from 1600 to almost 2000 m above sea level. The localities are situated within humid montane rainforest at the Amazonian versant of the Bolivian Andes. The annual precipitation in this area reaches more than 3500 mm, most of which appears from January to March; mean annual temperature can be expected to range between 12 and 15 °C (see Lauer & Erlenbach 1987). Specimens were observed active during the day and at night in leaf litter. The holotype, collected in February 1998, and ZFMK 60464, collected in December 1994, each contain masses of tan eggs in their ovaries.

Tab. 1. Measurements (in mm) and proportions of adults of type series of *Bufo stanlaii*, spec. nov. For abbreviations see text.

	Holotype	Paratypes					
	CBF 3346 (♀)	ZFMK 60464 (♀)	USNM 257798 (subadult ♀)	USNM 257796 (♂)	USNM 257797 (♂)	ZFMK 67096 (♂)	ZSM 144/1999 (♂)
SVL	57.2	59.4	38.6	44.3	39.1	46.5	54.1
HW	21.9	20.2	14.9	17.1	14.5	16.1	20.6
HL	17.6	22.2	12.3	13.3	12.2	13.8	16.6
IOD	8.9	9.9	6.2	6.8	6.2	6.6	9.6
TYMD	4.0	3.4	3.1	3.0	2.6	3.4	4.0
EYED	5.3	5.1	4.2	4.4	4.1	5.0	6.2
TIBL	21.6	22.3	15.3	19.7	14.7	18.6	20.9
FOOT	21.1	21.2	14.6	20.1	14.6	17.0	19.2
N-N	3.2	3.5	2.7	2.9	2.5	3.0	3.1
E-N	5.5	6.0	4.2	4.3	4.3	4.9	5.1
PARL	10.3	10.0	6.2	7.8	7.9	7.7	9.5
PARW	6.6	6.2	4.4	4.9	4.5	4.9	5.2
HAND	15.2	14.2	11.1	14.0	10.3	12.6	14.2
HW/SVL	0.38	0.34	0.39	0.39	0.37	0.35	0.38
HL/SVL	0.31	0.37	0.32	0.30	0.31	0.30	0.31
IOD/HW	0.41	0.49	0.42	0.40	0.42	0.41	0.47
TYMD/HW	0.18	0.17	0.21	0.18	0.18	0.21	0.19
EYED/HW	0.24	0.25	0.28	0.26	0.28	0.31	0.30
E-N/HW	0.25	0.30	0.28	0.25	0.30	0.30	0.25
PARL/SVL	0.18	0.17	0.16	0.18	0.20	0.17	0.17
TIBL/SVL	0.38	0.38	0.40	0.44	0.38	0.40	0.39
FOOT/SVL	0.37	0.36	0.38	0.45	0.37	0.37	0.35

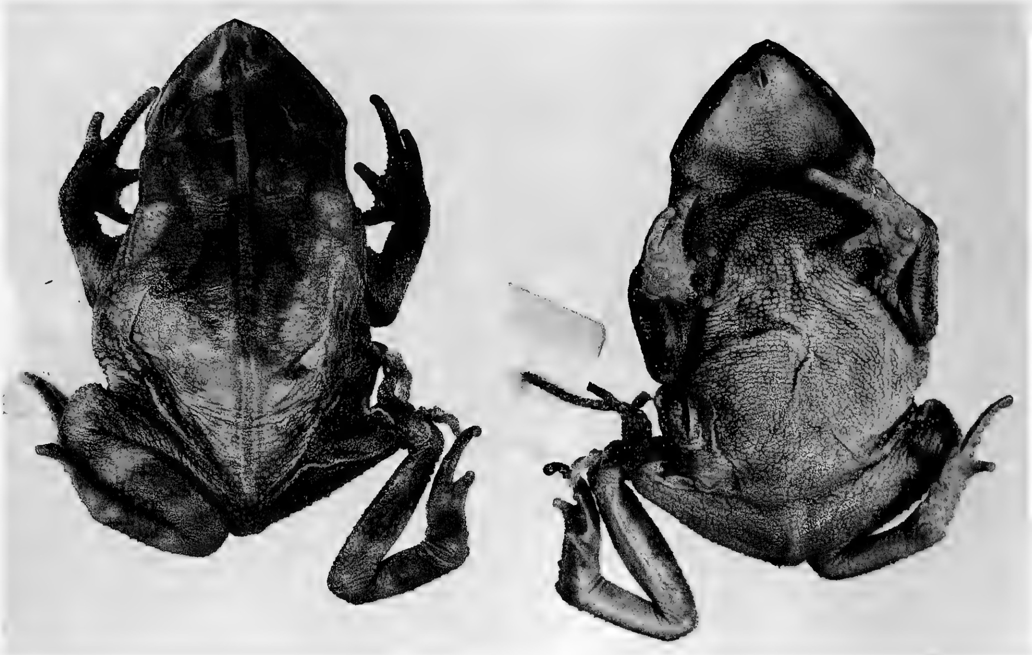

Fig. 5. Preserved holotype of *Bufo acutirostris* Spix, 1824; male (ZSM 1147/0).

Discussion

Describing a new toad of the *Bufo typhonius* complex is accompanied by certain difficulties with respect to other available names. Most descriptions are imprecise and often type specimens are in poor condition or even lost. In the following we summarise and discuss the taxonomic status of names associated with the *B. typhonius* complex by different authors.

Hoogmoed (1990) stated that 17 forms previously related to the *Bufo typhonius* complex (e.g. Cei 1968, 1972; Frost 1985) "do not have anything to do with it". As a result, he preliminary considered the following members – besides *B. typhonius* (Linnaeus, 1758) itself – as part of this complex: *B. ceratophrys* Boulenger, 1882, *B. dapsilis* Myers & Carvalho, 1945 and *B. nasicus* Werner, 1903. Moreover, Hoogmoed (1990) proposed that *B. typhonius roqueanus* Melin, 1941 will have to be elevated to the species rank (in a way adopted by Duellman & Schulte 1992 and Morales 1995) and that the names *B. acutirostris* Spix, 1824, *B. margaritifer* (Laurenti, 1768) and *B. proboscideus* Spix, 1824 will have to be re-established. *Bufo margaritifer* was suggested as a possible replacement name for *B. typhonius* because of nomenclatural problems (Hoogmoed 1989, 1990). We do not address to this problem here and treat both names synonymous. *Bufo alatus* Thominot, 1884 from Panama was tentatively suggested to represent a synonym of *B. acutirostris* (Hoogmoed 1986) but may actually represent a valid trans-Andean species (C. M. Vélez, pers. comm.). The type material of *B. nasutus* Schneider, 1799 is apparently lost. Reading its original description (Schneider 1799), we tentatively consider it a synonym of *B. typhonius.* The name *B. naricus* Spix, 1824 is either referable to the *B. typhonius* complex. However, because the type material is lost (Hoogmoed & Gruber 1983) and the original description and the figure therein do not provide significant details (Spix 1824), we consider *B. naricus* a nomen dubium. The taxonomic status of *B. pleuropterus* Schmidt, 1857 (currently considered a synonym of *B. typhonius*) remains unclear. According to the descriptions by Schmidt (1857, 1858) and photographs provided to us of the juvenile holotype (Musaei Zoologici Univ. Jag. Kraków No. 1030), it may possibly represent a valid species. However, the drawing by Schmidt (1858: plate 17) is somewhat misleading with respect to the snout shape. Actually, the snout is considerably less pointed in dorsal view (Fig. 6). The type locality of *B. pleuropterus* was given as "Grenzgebiet von Bolivia gegen Peru, in etwa 3000' Höhe" by Schmidt

Fig. 6. Preserved holotype of *Bufo pleuropterus* Schmidt, 1857; juvenile (Musaei Zoologici Univ. Jag. Kraków No. 1030; photograph by Krzysztof Smagowicz).

(1858). According to the loss of Bolivian territory in 1909 and the travel route of the collector, J. v. Warszewiez (see Savage 1970), the type locality is probably in present-day Peru. The taxonomic status of *B. sternosignatus* Günther, 1859 was uncertain (Hoogmoed 1990) until recently La Marca & Mijares-Urrutia (1996) redescribed this species as a taxon probably not related to *B. typhonius.*

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Appendix: Diagnostic characters of *Bufo acutirostris*

The following diagnosis is based on the holotype of *Bufo acutirostris* Spix, 1824 (ZSM 1147/0, jar label: "habitat ad flumen, Amazonien/Brasilien"): Adult male (Fig. 5) with (1) SVL 35.3 mm, HW 14.0 mm, HL 11.8 mm, TIBL 13.9 mm; (2) snout pointed in dorsal view, acute in lateral view, protruding beyond margin of lip, slightly curved posteroventrally in profile (curve is convex respective to eye); (3) nostrils protuberant at point immediately anterior to anterior margin of lower jaw; (4) canthal crest not raised, supraorbital and supratympanic crests continuous but weak (maximum elevation of supratympanic crest smaller than half the vertical tympanum diameter); (5) tympanum rounded, distinct, smaller than eye; (6) weak bony protrusion at angle of jaws; (7) neural crests of vertebrae absent; (8) well developed parotoid glands triangular, protruding laterally and incorporated into lateral row of tubercles; (9) lateral row of tubercles present, rounded; (10) skin on dorsal and dorsolateral surfaces (except cranial crests) tubercular, dorsally most intense on anterior dorsum; (11) skin of limbs tubercular and partly spinous; (12) first finger slightly longer than second; (13) palmar tubercle large, ovoid, three times the size of rounded thenar tubercle; (14) basal webbing between fingers; (15) inner metatarsal tubercle ovoid, twice the size of outer rounded metatarsal tubercle; (16) foot webbing formula I 1 – 1^{+} II 1^{-} – 2^{-} III 1 – 4 IV 4 – 0^{+} V; (17) supernumerary tubercles present, numerous; (18) dorsum dark and posteriorly light brown with irregular dark brown markings; ventral colour cream; (19) nuptial excrescences absent.

23. Wójcik, J.M. & M. Wolsan: Evolution of Shrews. – Mammal Research Institute, Polish Academy of Sciences, Bialowieza, Polen, 1998. 458 S., zahlr. Abb. u. Tab. ISBN 83-907521-0-7.

Die Erforschung der Biologie und Physiologie der Spitzmäuse hat in den vergangenen Jahren beachtenswerte Fortschritte gemacht. Auch die Systematik und Klassifizierung dieser Familie ist – zumindest bei einigen Gattungen – einer endgültigen Klärung näher gekommen, vor allem durch die Anwendung karyologischer und molekularbiologischer Untersuchungsmethoden. Es ist daher erfreulich, dass der aktuelle Kenntnisstand über phylogenetische Trends in dieser Gruppe nun im vorliegenden Buch, das die Einzelbeiträge namhafter Spezialisten enthält, zusammenfassend dargestellt wird. Thematisch ist es in zwei Teile gegliedert: Im historisch-paläontologischen Teil werden stichwortartig alle bekannten Fossilfunde tertiärer und pleistozäner Spitzmäuse unter Angabe der jeweiligen Originalquelle aufgezählt. Der rezent-zoologische Teil behandelt Besonderheiten und Entwicklungstrends im Zahnbau, im Stoffwechsel und Energiehaushalt sowie im Sozialverhalten. Dabei werden bei allen Themenkomplexen jeweils die grundlegenden Unterschiede zwischen den beiden rezenten Unterfamilien Soricinae und Crocidurinae herausgearbeitet.

Gerade bei einer relativ merkmalsarmen Gruppe wie den Spitzmäusen haben die "modernen" phylogenetischen Untersuchungsmethoden besondere Bedeutung erlangt. Demzufolge werden der Chromosomen-, Eiweiß- und DNA-Evolution jeweils eigene Abschnitte gewidmet. Dabei werden nicht nur spezielle Ergebnisse dargestellt, sondern auch die strukturellen bzw. physiologischen Grundlagen der betreffenden Methodik erläutert.

Das Buch spiegelt das zunehmende Interesse an dieser Tiergruppe wider und belegt gleichzeitig, welche enormen Fortschritte der Einsatz moderner Untersuchungsmethoden erbracht hat. Es behandelt alle Aspekte der Evolution dieser Gruppe und ist eine unverzichtbare Wissensquelle für jeden, der sich mit dieser Gruppe beschäftigen möchte. R. Kraft

24. Beaman, M. & S. Madge 1998: Handbuch der Vogelbestimmung. Europa und Westpaläarktis. Übersetzt aus dem Englischen und bearbeitet von D. Singer unter Mitarbeit von A. Lang, H. Leisering und R. Specht. – Verlag Eugen Ulmer, Stuttgart. 867 S., geb.

Über die Vögel Europas gibt es inzwischen zahlreiche Bestimmungsbücher; darunter ein halbes Dutzend wirklich ausgezeichneter. Dennoch gelingt mitunter auch mit Hilfe der besten Feldführer die Bestimmung nicht mit letzter Sicherheit, weil Jugend- oder Übergangskleider oder andere Details nicht abgebildet sind. Sollen sie alle berücksichtigt werden, würde das den Rahmen eines Bestimmungsbuches, das man mit auf Exkursionen ins Gelände nehmen kann, schlicht und einfach sprengen. Doch auch die Handbücher erweisen sich in der Praxis nicht selten als unzulänglich, weil noch so genaue Beschreibungen den Gesamteindruck, den eine (gute) Abbildung vermittelt, nicht ersetzen können. So blieb ein Zwischenbereich offen – und genau diesen soll das "Handbuch der Vogelbestimmung" ausfüllen! Das leistet es allein schon wegen der Abbildungsfülle: Im groben Durchschnitt entfallen gut 10 Abbildungen auf jede Art der europäischen Vögel! Die beachtliche Anzahl eingeschlossen, die als Irrgäste oder Randbewohner zwar in den Bereich der Westpaläarktis kommen, aber im engeren Gebiet von Europa nur ausnahmsweise einmal auftreten. Die Abbildungsfülle wird ergänzt von einem für ein Bestimmungsbuch außergewöhnlich detaillierten Text, der die Arten charakterisiert und sogar ungewöhnliche Farbvarianten berücksichtigt. Mehr als 600 Verbreitungskarten geben Aufschluß über das Vorkommen, und auch sie sind vergleichsweise groß und detailliert; dabei verhältnismäßig aktuell. Ein Werk der Superlative also!

In vieler Hinsicht ja, aber nicht in jeder Hinsicht. So "stört" der unterschiedliche Stil der sechs Illustratorinnen, die trotz zweifellos vorhandener Bemühungen doch keine Einheitlichkeit erzielten. Manche Tafeln sind brilliant, andere eher nur guter Durchschnitt. Auch kleinere Fehler sind verblieben. So sind bei den adulten Schwanzmeisen die Augenringe ähnlich wie beim Jungvogel rötlich gemalt anstatt zitronengelb und wegen der künstlerischen Wirkung wurde zu sehr vom Prinzip der direkten Vergleichbarkeit schwieriger Arten durch gleichartige Darstellung abgewichen. Ein Blatt mit Berichtigungen hat der Verlag bereits beigefügt; weitere Fehler(chen) werden wohl noch entdeckt werden. Daß gerade so farbenprächtige Vögel wie die Racken und Bienenfresser ein flauer Druck (oder schon eine schwache Farbvorlage) getroffen hat, ist schade! Solche Schwächen nehmen, insgesamt betrachtet, doch nur einen geringen Teil am Werk ein. Daher kann es zu Recht zu den bedeutendsten Fortschritten in der und für die Feldornithologie der Wende vom 20. zum 21. Jahrhundert gelten. Von den ernsthaft in der Vogelkunde Tätigen wird kaum jemand auf das "Handbuch der Vogelbestimmung" verzichten können. Es ist einfach zu wichtig und es bietet so viel mehr als auch sehr gute Feldführer, daß man es "haben muß"! Verzichten hätte der Verlag auf den Untertitel können, der die Unsitte britischer Vogelbücher (... birds of Britain and Europe) nachmacht und steigert: Als ob Europa nicht zur Westpaläarktis gehören würde! Eine nicht leicht zu nehmende Hürde hat der Preis des Werks aufgebaut. J. H. Reichholf

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