zoologische staatssammlung münchen

SPIXIANA

Zeitschrift für Zoologie

herausgegeben von der

ZOOLOGISCHEN STAATSSAMMLUNG MÜNCHEN

Band 18

1995

Verlag Dr. Friedrich Pfeil, München

ISSN 0341-8391

INHALT - CONTENTS

zoologische staatssammlung münchen

SPIXIANA

Zeitschrift für Zoologie

SPIXIANA • Band 18 • Heft 1 • 1-104 • München, 01. März 1995 • ISSN 0341-8391

SPIXIANA

ZEITSCHRIFT FÜR ZOOLOGIE

herausgegeben von der

ZOOLOGISCHEN STAATSSAMMLUNG MÜNCHEN

SPIXIANA bringt Originalarbeiten aus dem Gesamtgebiet der Zoologischen Systematik mit Schwerpunkten in Morphologie, Phylogenie, Tiergeographie und Ökologie. Manuskripte werden in Deutsch, Englisch oder Französisch angenommen. Pro Jahr erscheint ein Band zu drei Heften. Umfangreiche Beiträge können in Supplementbänden herausgegeben werden.

SPIXIANA publishes original papers on Zoological Systematics, with emphasis on Morphology, Phylogeny, Zoogeography and Ecology. Manuscripts will be accepted in German, English or French. A volume of three issues will be published annually. Extensive contributions may be edited in supplement volumes.

Manuskripte, Korrekturen und Besprechungsexemplare sind zu senden an die

Manuscripts, galley proofs, commentaries and review copies of books should be addressed to

Redaktion SPIXIANA
ZOOLOGISCHE STAATSSAMMLUNG MÜNCHEN
Münchhausenstraße 21, D-81247 München
Tel. (089) 8107-0 – Fax (089) 8107-300

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Spixiana : Zeitschrift für Zoologie / hrsg. von der Zoologischen Staatssammlung München. – München : Pfeil.
Erscheint jährlich dreimal. - Früher verl. von der Zoologischen Staatssammlung, München. - Aufnahme nach Bd. 16, H. 1 (1993)
ISSN 0341-8391
Bd. 16, H. 1 (1993) -
Verl.-Wechsel-Anzeige

Satz: Desktop Publishing mit PageMaker®
Druck: Druckerei Braunstein, München

ISSN 0341-8391

Printed in Germany

– Gedruckt auf chlorfrei gebleichtem Papier –

Verlag Dr. Friedrich Pfeil, P.O. Box 65 00 86, D-81214 München, FRG
Tel. (089) 18 80 58 – Fax (089) 18 68 71

SPIXIANA	**18**	1	1–9	München, 01. März 1995	ISSN 0341–8391

Polychelidae aus dem Ostatlantik und dem Arabischen Meer

(Crustacea, Decapoda, Reptantia, Polychelidae)

Von **Ludwig Tiefenbacher**

Tiefenbacher, L. (1995): Polychelidae from the Eastern Atlantic and the Arabian Sea (Crustacea, Decapoda, Reptantia, Polychelidae). – Spixiana **18/1:** 1-9

Some Polychelidae were caught by R.V. "Ombango" in 1960-1969 off the eastern coast of tropical Africa, by R.V. "Meteor" from the Arabian Sea in 1987, and by F.R.V. "Walther Herwig" north-east off Madeira in 1992. Out of these samples the Polychelidae-larvae *Eryoneicus alberti* Bouvier, 1905, *E. atlanticus* Strunck, 1914, *E. faxoni* Bouvier, 1905 and *E. spinoculatus* Bouvier, 1905 as well as the adults of *Polycheles typhlops typhlops* Heller, 1862 and *Stereomastis sculpta* (Smith, 1880) were identified. Some taxonomical aspects are discussed and our knowledge of the geographical distribution of some species has been extended. Notes are given to the nutrition of *Polycheles t. typhlops* and *Stereomastis sculpta*. The evidence of *Polycheles t. typhlops* in a depth of 4260 m is apparently, until now, the most extreme occurrence of Polychelidae.

Dr. Ludwig Tiefenbacher, Zoologische Staatssammlung, Münchhausenstraße 21, D-81247 München, Germany

Einleitung

Vertreter der Polychelidae werden nicht allzu häufig und dann meist nur in einzelnen Exemplaren gefangen. Unsere Kenntnisse über diese altertümliche Reptantia-Gruppe ist daher noch lückenhaft und jede Ergänzung muß wohl willkommen sein. Allein Bernard (1953) konnte erstmals auf der Basis reicherer Fänge der DANA-Expeditionen die meso- bis bathypelagischen Larven der Gruppe, die unter dem Gattungsnamen *Eryoneicus* seit der "Challenger"-Expedition durch Bate (1882) bekannt sind, eingehender bearbeiten. Selbie (1914), Sund (1915), Calman (1925) und Balss (1925) hatten deren Larvennatur schon erkannt, die bereits Bate (1888) bei der Beschreibung von "*Eryoneicus caecus*" vermutet hatte ("The possibility has occurred to me of its being a young and immature form of some species allied to *Polycheles*, ...). Die Frage der Zugehörigkeit der einzelnen beschriebenen Larven zu den adulten Formen am Meeresboden ist jedoch noch keineswegs durchwegs gelöst. Die adulten Formen sind unter den heute gültigen Gattungen *Polycheles* und *Stereomastis* beschrieben worden. Nach Heller's (1862) Beschreibung des ersten rezenten Vertreters der Familie aus dem Mittelmeer wurde eine größere Anzahl von Arten von der "Challenger"-Expedition durch Willemoes-Suhm (1873, 1875) vorgestellt (fide Balss 1957). Santucci (1932, 1934) machte erste und wohl einzige Beobachtungen an lebenden Exemplaren von *Polycheles typhlops* aus dem Mittelmeer.

Material und Methode

Das mir zur Bearbeitung vorliegende Material von A. Crosnier wurde von ihm in den Jahren 1960-1969 vor der Ostküste des tropischen Afrika auf Fahrten mit der "Ombango", dem Schiff des Centre O.R.S.T.O.M. (Office de la Recherche Scientifique et Technique Outre-Mer) vor Pointe-Noire gefangen und enthält die Arten *Eryoneicus alberti* Bouvier, 1905, *E. atlanticus* Strunck, 1914, *E. faxoni* Bouvier, 1905, und *E. spinoculatus* Bouvier, 1905. Die von mir auf der F.S. "Meteor"(III)-Expedition in das Arabische

Meer im Jahre 1987* eingebrachten Exemplare gehören ausschließlich zu *Eryoneicus spinoculatus* Bouvier, 1905. Die Exemplare von *Polycheles typhlops typhlops* Heller, 1862, und *Stereomastis sculpta* (Smith, 1880) brachte F.S. "Meteor"(II) 1982 von der Reise 60* vor der Küste NW-Afrikas mit, bzw. das eine Exemplar von *P. typhlops typhlops* fing M. Vobach auf F.F.S. "Walther Herwig", Reise 122, 1992 vor Madeira.

Herrn Prof.Dr.A.Crosnier vom Muséum National d'Histoire Naturelle (MNHN), Paris, darf ich an dieser Stelle für das Entleihen der von ihm gefangenen *Eryoneicus*-Exemplare herzlich danken. Nicht minder herzlich danke ich Herrn Prof. Dr. H. Thiel vom Institut für Hydrobiologie und Fischereiwissenschaft (Hamburg) für die Übergabe der auf der F.S. "Meteor"(II) (Reise 60)* gefangenen Polychelidae mit den dazugehörigen Fangdaten an die Zoologische Staatssammlung und Herrn Dr. M. Vobach von der Bundesforschungsanstalt für Fischerei (Hamburg) für die Zusendung des mit F.F.S. "Walther Herwig", Reise 122, gefangenen Exemplars von *Polycheles* mit den zugehörigen Fangdaten.

Tab. 1. Stationen von F.S. "Ombango", auf denen *Eryoneicus* gefangen wurde. (u.= ungefähr; ?= keine Angabe vorhanden; CH= Chalut demi-ballon, 41 Fuß; DR= Dredge; GS= Grand Schmidt-Netz, 4 m²; IKMT= Isaacs-Kidd-Midwatertrawl, 10 Fuß)

Stat.	Gerät/Nr.	Ort	Datum	Zeit	Fangtiefe (m)	MNHN-Nr.
309	IKMT 23	1°55'S/ 8°30'E	17.6.60	22.50	0-775	673
310	IKMT 24	1°30'S/ 6°58'E	18.6.60	19.25	0-850	675
324	GS 28	9°14'S/10°02'E	2.3.61	08.20	0-725	678
328	IKMT 13	11°37'S/10°15'E	4.3.61	20.30	0-725	676
391	IKMT 2	2°00'S/ 6°43'E	10.5.61	21.40	u.1600	669
393	IKMT 4	0°30'S/ 6°30'E	12.5.61	20.50	u.2300	677
?	IKMT	5°25'S/10°32'E	2.2.66	18.00	u.1500	672
(Wahrscheinlich Probestation vor Stat.394/13. Daten des Etiketts sind in der Stationsliste (siehe unten!) nicht enthalten.)						
394/26	CH	5°06'S/11°18'E	18.3.67	7.25	990-1005	674
394/58	CH	5°06'S/11°28'E	21.9.67	7.25	995-1005	671
415	DR	5°00'S/11°23'E	18.9.69	?	- 145	670
(Daten auf Etikett: Large de Pointe-Noire (Congo), 5°07'S/11°14'E)						
417	CH	5°06'S/11°18'E	18.11.69	17.00	800- 900	668

(Die Daten der Etiketten wurden nach der "Liste des stations de l'Ombango" (Crosnier & Forest, 1973) ergänzt.)

Tab. 2. Stationen im Arabischen Meer, auf denen *Eryoneicus spinoculatus* Bouvier, 1905, von F.S. "Meteor"(III) (Reise 5) mit dem IKMT gefangen wurde. (Fanggerät: IKMT-MN = Isaacs-Kidd-Midwatertrawl-Multinet)

Stat.	Hol	Ort	Datum	Zeit	Fangtiefe (m)
497	7/1	18°32'N/65°20'E	12.5.87	22.53	0-1100
497	7/5	18°32'N/65°20'E	12.5.87	22.53	0-1100
498	8/5	18°14'N/66°47'E	13.5.87	6.00	0-1100
502	10/1	18°56'N/66°35'E	14.5.87	1.10	0-1100

* Mit Unterstützung der Deutschen Forschungsgemeinschaft (DFG)

Tab. 3. Stationen im NO-Atlantik, auf denen von F.S. "Meteor"(II) (Reise 60) *Polycheles typhlops typhlops* Heller, 1862 bzw. *Stereomastis sculpta* (Smith, 1880) gefangen wurden. (KAD= Kastendredge; ST= Schließtrawl)

Stat.	Gerät/Nr.	Ort	Datum	Fangtiefe(m)
Abschnitt 1				
7	ST 248	34°53.2'N/ 6°50.1'W	22.01.82	408-453
19	ST 250	29°13.3'N/11°33.0'W	26.01.82	769-804
27	ST 251	29°12.2'N/11°26.5'W	27.01.82	430-501
Abschnitt 2				
46	KAD 256	25°20.5'N/16°09.0'W	5.02.82	u.400
47	ST 257	25°21.4'N/16°08.4'W	5.02.82	415-420
53	ST 258	21°15.8'N/17°48.5'W	7.02.82	787-807
58	ST 259	21°15.2'N/17°41.9'W	8.02.82	493-498
67	ST 262	17°18.1'N/16°45.7'W	10.02.82	376-395
70	ST 263	17°17.7'N/16°51.8'W	11.02.82	807-817
74	ST 264	17°22.2'N/16°55.0'W	12.02.82	1175-1205

Tab. 4. Station im NO-Atlantik, auf der mit F.F.S. "Walther Herwig" (Reise 122) *Polycheles typhlops typhlops* Heller, 1862 gefangen wurde (AG= Agassiztrawl).

Stat.	Gerät	Ort	Datum	Fangtiefe(m)
39	AG	34°02'N/14°36'W	26.03.92	4260

Die auf F.S. "Meteor"(II), - (III) und F.F.S. "Walther Herwig" gefangenen Tiere wurden an Bord mit 10%igem Formol fixiert und später an Land in 70%iges Äthanol überführt.

Da aus den Fängen von F.S. "Meteor"(II) (Reise 60) von einzelnen Stationen ein reicheres Material vorlag, wurden aus diesen einzelne mittelgroße Exemplare von *P. t. typhlops* und *St. sculpta* für Mageninhaltsuntersuchungen ausgewählt.

Eryoneicus alberti Bouvier, 1905

Das vorliegende ♀ (Carapaxlänge (Cpl): 17 mm) stammt von der "Ombango"-Station 394/26 (Tab. 1), also vom Kontinentalabhang unmittelbar vor Pointe-Noire. Die Rostralregion stimmt mit der von Bernard (1953) gegebenen Abbildung völlig überein, die von ihm angegebene Anzahl der Dornen (ohne Rostrum) auf der dorsalen Medianlinie des Carapax (2.p.-2.2.p.2.) und die Anzahl der Dornen auf dem Lateralkiel des Carapax (8,3,14) ebenfalls. Bouvier (1917) gibt sehr schöne Abbildungen von *E. alberti*. Die von ihm dargestellte Bedornung der Dorsal- und Ventralansicht des Carapax, der Lateralansicht des Abdomens und des 2.Pereiopoden läßt für das vorliegende Exemplar keinen Zweifel an der Übereinstimmung zu. Die Epimere des Abdomens tragen keine Dornen, jedoch ist der Rand der Epimere 4-6, wie auch Bouvier (1917) gezeichnet hat, leicht gesägt.

Über die Verbreitung von *E. alberti* im Atlantik läßt sich noch wenig aussagen. Es ist, außer den 3 Exemplaren, die Bouvier (1905, 1917) aus der Sargassosee bzw. westlich von Flores (Azoren) beschrieben hat, nur noch das Exemplar von den Kap Verden (Bernard (1953) ("DANA"-Expedition 1921; 17°55'N/24°35'W) bekannt. Das vorgestellte Exemplar ist hier das erste südlich des Äquators. Bernard führt aus den Pazifischen Gewässern fünf Exemplare bei Borneo und Mindanao und eines bei Neuseeland an. *E. alberti* ist also anscheinend auf warme Gewässer beschränkt.

Eine Zuordnung von *E. alberti* zu einem adulten Polycheliden ist bisher nicht gelungen.

Eryoneicus atlanticus Strunck, 1914

1982 beschrieb ich 1♂ und 3♀♀ dieser Art aus dem mittleren äquatorialen Atlantik. Ohne Kenntnis des Materials aus dem MNHN stellte ich fest:" Der Fang von Station 197(34) ist zudem jetzt der südlichste (0°00,5'N/21°59'W)". F.S "Ombango" hatte bereits, wie sich jetzt bei der Determination der Tiere ergab, in den Jahren 1961-69 auf den Stationen 324, 328, 391, 393, ?, 394/58, 415 und 417 (Tab. 1) 1♂, 13♀♀ und ein Exemplar, von dem nur der Carapax vorhanden ist, von *E. atlanticus* gefangen. Vor der südwestafrikanischen Küste zwischen der Insel Annobon (heute: Pagalu) und Pointe-Noire scheint die Art wohl außerhalb des Schelfgebietes mehrfach aufzutreten. Das ♀ von Station 328 ist nun der südlichste Nachweis von *E. atlanticus* (11°37'S/10°15'E).

Die Schließfänge von Stat. 394/58 und 417 liegen zwischen 800 und 1000 m Tiefe. Für die übrigen Fänge, die mit einem offenen Netz durchgeführt wurden, gilt, daß über die Aufenthaltstiefe der Tiere eigentlich keine Angabe gemacht werden kann. Dies ist weitgehend auch für alle bisherigen Nachweise und im besonderen für das Typusexemplar zu sagen (Lenz & Strunck (1914): "vert. 3000 m"). Auffallend ist in diesem Zusammenhang, daß das ♀ von Stat. 415 nur aus einer Tiefe von 145 m heraufgeholt wurde.

Die bisher bekannte Verbreitung von *E. atlanticus* reicht von der Biscaya (Bernard 1953) bis nun in das Gebiet Westafrikas vor der Congo-Mündung und nach Westen vom westlichen Atlantik zwischen den Bermudas und dem Festland bis zu den Antillen und offensichtlich durch den Kanal von Panama bis in den Golf von Panama (Bernard 1953).

Die 13♀♀ zeigen Carapaxlängen von 15-27 mm. Das ♂ von Stat. 417 ist nicht meßbar.

Hinsichtlich der Zuordnung dieser Larve schreibt Bernard (1953):" L'adulte, encore inconnu, doit être un *Stereomastis* inédit du groupe *sculpta*." und dies gilt bis heute.

Eryoneicus faxoni Bouvier, 1905

Auf Station 310 (Tab. 1) fing F.S. "Ombango" ein ♀ von *Eryoneicus*, das, obwohl es noch jung ist (Carapaxlänge: 15 mm), eindeutig *E. faxoni* zugeordnet werden muß. Auf dem 6. Segment finden sich keinerlei Dörnchen vor dem einzelnen Mitteldorn. Die bei *E. atlanticus* gut sichtbaren beiden Kiele mit 3-5 Dörnchen fehlen hier ganz. Dies stimmt völlig mit dem Bestimmungsschlüssel bei Bernard (1953) überein.

Beaubrun (1979) bezieht sich bei seinen Tiefenangaben u.a. auf Stephensen (1923) ("... au large du Cap Beddouza (ex Cap Cantin) par 2200 m de fond."). Stephensen schreibt aber: "Off Cap Cantin (West coast of Marocco, 2200 m,..." und in seinem Vorwort steht:" The implement of capture was in practically all cases the young-fish trawl...". Der Jungfischtrawl ist aber kein Schließnetz. Die Angabe bezieht sich also nur auf die Einsatztiefe des Netzes, nicht aber auf die Fangtiefe, aus der das Individuum heraufgeholt wurde. In gleicher Weise müssen auch die Tiefenangaben bei Bernard (1953) betrachtet werden.

Über die Verbreitung läßt sich sagen, daß *E. faxoni* offensichtlich vorwiegend in den tropischen und subtropischen Gewässern auftritt, hier aber wohl im gesamten Atlantik, im Indischen Ozean und im Ost-Pazifik, sowie im westlichen Mittelmeer (Bernard 1953, Beaubrun 1978).

Sund (1915) hielt *E. faxoni* der ähnlichen Bedornung des Carapax wegen für die Larve von "*Polycheles sculptus*" (= *Stereomastis sculpta* (Smith, 1880)). Bernard (1953) stimmt ihm aufgrund seines reicheren Materials von der Dana-Expedition 1928-30 hierin voll zu.

Eryoneicus spinoculatus Bouvier, 1905

Das ♀ von Station 309 (Tab.1) aus dem Atlantik (Carapaxlänge: 17 mm) stimmt mit den von Bernard (1953) vorgelegten Merkmalen völlig überein. Wenn wir zusätzlich die Bedornung der abdominalen Tergite berücksichtigen (1.1.2.2.2.1.), so wäre das Exemplar der Variation *hibernicus* (Selbie, 1914) zuzuordnen. Die drei ♂♂ und das eine nicht näher zu bestimmende Exemplar aus dem Arabischen Meer (Tab. 2.) gehören u.a. nach der Bedornung des Carapax (Carapaxlängen: 21,5 mm; 21,0 mm; 19,3 mm; X) ebenfalls eindeutig zu *Eryoneicus spinoculatus*. Die dorsal-mediane Bedornung der abdominalen Tergite (1.1.2.2.1.1.) weicht jedoch verglichen mit dem obigen Individuum ab, so daß die Tiere der Variation *indicus* (Alcock & Anderson, 1899) zuzuordnen wären. Auch weisen die drei ♂♂ einen festeren Carapax auf, den auch Bernard (1953) erwähnt ("... les types *indicus* de l'Océan Indien sont intéressant par leur forte taille,..."). Eine Unterscheidung der atlantischen von der indo-pazifischen Form der Art *E. spinoculatus* ist jedoch nicht gerechtfertigt. Sund (1915) stellte "*Eryoneicus hibernicus*" Selbie, 1914, als Larve zu "*Polycheles nanus*" (= *Stereomastis nana* (Smith, 1884)). Bernard (1953), der aufgrund seines reicheren Materials "*Eryoneicus hibernicus*" und "*Eryoneicus indicus*" der Larvenform *Eryoneicus spinoculatus* als Variationen zuordnet, stellte fest, daß "*Eryoneicus hibernicus*" nicht die Larve von *Stereomastis nana* (Smith, 1884) sein kann. Er schreibt: "La répartition, la croissance et la taille limite des larves rendent bien difficile une telle assimilation, possible à l'époque où l'on ne connaissait que 4 exemplaires atlantiques de *spinoculatus. Stereomastis nana,* bien plus petit que les *spinoculatus* aux deux derniers stades, n'est cité que de la côte est des Etats Unis, du golfe de Panama et du Cap de Bonne Espérance,...". Für die Adulten von *E. spinoculatus* ist seiner Meinung nach daher eine gemeinsame Form zu erwarten, die größer sein muß als *St.nana.* Letztere weist zudem eine von *E. spinoculatus* unterschiedliche Bedornung am lateralen Rand und am Telson auf. *Stereomastis andamanensis* Alcock, 1901, entspricht der Bedornung von *E. spinoculatus* viel mehr, und zwar sowohl hinsichtlich der dorsalen Dornen, der Bedornung der Seitenränder, wie auch des Abdomens. Die Variation *hibernicus* ist wohl eher als ein früheres, und somit kleineres Larvenstadium von *E. spinoculatus* und die Variation *indicus* als ein späteres und daher größeres anzusehen.

Ramadan (1938) führt von der John-Murray-Expedition 1933-34 ein ♀ von *Polycheles (= Stereomastis) andamanensis*, gefangen vor der Küste Südarabiens, an und ein ♂ aus der nördlichen Arabischen See. Die 4 oben angegebenen Exemplare von *Eryoneicus spinoculatus* aus der Arabischen See fügen sich hier passend ein. *E. spinoculatus* wird erstmals bis nahezu 19°N angetroffen.

Eryoneicus spinoculatus ist darüber hinaus von mehreren Fundorten aus dem Nordatlantik, aus der Straße von Gibraltar, aus der Karibik und dem Golf von Panama (Bernard 1953) und jetzt im Atlantik erstmals südlich des Äquators vor Westafrika nachgewiesen. Der Fund vor dem Kap der Guten Hoffnung (Bernard l.c.) stellt eine Verbindung zu den Vorkommen in der Arabischen See her. Hieran schließen sich die Funde vor Sri Lanka (Ceylon), aus dem Golf von Bengalen und der Südchinesischen, Sulu- und Celebes See bis nach Neu-Kaledonien und Neuseeland (Bernard l.c.). *E. spinoculatus* scheint also ein Kosmopolit zu sein.

Besonders ist noch hervorzuheben, daß die hier beschriebenen Exemplare von *E. spinoculatus* mit Sicherheit aus Tiefen unter 250 m stammen und damit aus Wassertiefen, in denen im Arabischen Meer weniger als 0,2 ml gelöster O_2/l zur Verfügung stehen. *E. spinoculatus* ist also in der Lage, in der Sauerstoffminimum-Schicht zu leben, obwohl keine Sonderbildungen wie vergrößerte Kiemen feststellbar sind (vgl. Tiefenbacher 1992).

Polycheles typhlops typhlops Heller, 1862

Untersuchtes Material. "Meteor"(II), Reise 60, Abschnitt 1: Stat. 7, 3♂♂ (Cpl: 23,5-29,0), 7♀♀ (Cpl: 24,2-32,4); Stat. 19, 2♂♂ (Cpl: 32,0-37,0), 1♀ (Cpl: 45,2); Stat. 27, 62♂♂ (Cpl 9,2-28,2), 32♀♀ (Cpl: 15,3-34,0), 12x (Cpl: 15,1-22,8).
"Meteor"(II), Reise 60, Abschnitt 2: Stat. 46, 1♂ (Cpl: 24,2), 1♀ (Cpl: 21,2); Stat. 47, 6♂♂ (Cpl: 17,3-24,5), 5♀♀ (21,0-31,6), 1♀ ov. (Cpl: 34,2); Stat. 53, 2♂♂ (Cpl: 24,0-28,3); Stat. 58, 5♂♂ (Cpl: 13,8-15,1); Stat. 67, 8♂♂ (Cpl: 12,3-20,2), 7♀♀ (Cpl: 18,0-32,2), 3x (nicht meßbar).
"Walther Herwig", Reise 122: Stat. 39, 1♂ (Cpl: 63,0).

Cpl: Carapaxlänge

Die vorliegenden Exemplare von *Polycheles typhlops typhlops* zeigen die typische Bedornung von Carapax und Abdomen, wie sie auch Bouvier (1917) so trefflich abgebildet hat. Holthuis (1952) beschreibt an Hand von 13 Exemplaren, gefangen vor Port Gentil (Gabun) und Ambrizette (Congo), hiervon abweichend die Subspecies *Polycheles typhlops perarmatus*, die sich u.a. durch eine auffallend höhere Anzahl der Dornen am Hinterrand des Carapax und auch an den Vorder- und Hinterrändern der Abdominalsegmente von der Nominatform offensichtlich deutlich unterscheidet. Beaubrun (1979) gibt für die Verbreitung von *Polycheles typhlops typhlops* an: "dans l'Atlantique oriental, depuis l'Irlande jusqu'aux îles du Cap Vert. En Méditerranée, elle a été récoltée depuis les côtes espagnoles jusqu'au sud de l'Asie mineure." Er berichtet, daß *Polycheles t. typhlops* längs der gesamten Marokkanischen

Küste am Atlantik auftritt. Hier fügen sich auch die 3♂♂ ein, die Türkay (1976) von der Meteor-Expedition, Reise 9c, beschreibt (31°1'N/10°16'W). De Man (1916) nennt schon Exemplare vor Bali und Balss (1925) vor Sansibar, Pemba und vor Port Nias vor Sumatra und Ramadan (1938) ergänzt diese mit Funden aus dem Golf von Aden und aus dem Gebiet der Malediven, Barnard (1950) gibt die Art vor Natal an und in jüngster Zeit konnten Chan & Yu (1989) 4♂♂ von *Polycheles t.typhlops* vor Taiwan nachweisen. *Polycheles t. typhlops* ist somit nicht nur, wie Türkay vermerkt "auf die gemäßigten Breiten beschränkt", sondern ist genauso in den Subtropen und Tropen zu finden. Um zumindest vor Afrika die möglichen Grenzen zwischen der Nominatform und der Unterart feststellen zu können, wären Fänge im Golf von Guinea und vor Kamerun erforderlich. Anzumerken wäre hier noch, daß die oben angeführten Fänge von *Eryoneicus* durch die "Ombango" recht gut zu den Fundorten von Holthuis (1952) passen. Leider ist aber das Material zu gering, um mit einiger Berechtigung Larve und mögliches adultes Tier einander zuzuordnen.

Auffallend ist, daß alle *Polycheles t. typhlops* bisher in Küstennähe gefangen wurden. Beaubrun (l.c.) gibt wohl daher auch an, daß die Tiere üblicherweise zwischen 300 und 400 m leben und zitiert, wie auch Chan & Yu (l.c.), Dieuzeide's (1929) Angabe von 2055 m als tiefsten bekannten Fund.

Die von F.S.Meteor(II) im Auftriebsgebiet vor der Küste Westafrikas zwischen Marokko und der Südgrenze von Mauretanien eingebrachten Exemplare wurden aus Tiefen von 380-800 m gefangen (vgl. Tab. 3), die größte Anzahl jedoch zwischen 400 und 500 m eingebracht. Für die Annahme, diesen Tiefenbereich als bevorzugten Aufenthaltsbereich zu betrachten, ist die Anzahl der Fänge jedoch zu gering. Das größte hier (Station 19) gefangene Exemplar ist ein ♀ mit einer Carapaxlänge von 45,2 mm und einer Gesamtlänge von 103,5 mm aus einer Tiefe von 769-804 m. Besonders zu erwähnen ist noch das einzige mir vorliegende eiertragende Weibchen von Station 47 (Carapaxlänge 34 mm; Gesamtlänge 79,5 mm) mit zahllosen kleinen, angehefteten Eiern.

Polycheles t. typhlops ist ein Benthosbewohner, der unter anderem von Aas lebt, worauf schon Santucci (1932, 1934) hingewiesen hat ("... il *Polycheles [typhlops]* si nutra preferibilmente di organismi morti che cadono sul fondo."). Im Bereich des Auftriebs, einem Gebiet hoher Primärproduktion und folglich reicher Biomasse in den oberen Wasserschichten, wie hier vor der Küste Westafrikas, bringt der ständige "Regen" organischen Materials in die Tiefe auch hier günstigere Lebensbedingungen. Um einen Einblick in den Speisezettel von *Polycheles t. typhlops* zu erhalten, wurde ein Exemplar von Station 27 (Meteor (II), Reise 60) geöffnet und der Mageninhalt auf Speisereste untersucht. Neben den erwarteten aus kugelig aufgetriebenen Kammern bestehenden Globigerinen-Schalen in großer Anzahl fanden sich auch Foraminiferen mit typisch planspiralen, "nautilusartig" gekammerten, feinporigen Schalen. Hierzu kommen Spiculae (zum Teil vierstrahlig), die eindeutig auf den Verzehr von Schwämmen (Porifera) schließen lassen. Ob es sich dabei wirklich nur um abgestorbene Exemplare handelte, bleibt offen. Einzelne kleine Bruchstücke von Mollusken-Schalen gelangten wohl mehr zufällig mit dem Sediment in den Magendarm. Daß *Polycheles t. typhlops* offensichtlich auch tote Fische verzehrt, zeigte sich an Kieferteilen und mehreren Wirbelkörpern in ursprünglicher Anordnung mit ansitzenden Neural- und Haemalbögen, sowie an mehreren vollständig erhaltenen Schuppen. Aas gehört also zum Speiseplan, deckt aber wohl nicht den Nahrungsbedarf (Abb. 1, 2). *Polycheles t. typhlops* ist wohl vordringlich Sedimentfresser, der bei Gelegenheit auch Aas verzehrt. Die mit dichten Haarsäumen versehenen Mundwerkzeuge und die zwar bezahnten, aber doch breit schaufelartig ausgebildeten, Mandibeln sprechen dafür.

Daß *Polycheles t. typhlops* auch noch weiter seewärts, als durch diese Fänge belegt, auftreten und nicht nur im küstennahen Bereich leben kann, zeigt das von F.F.S. "Walther Herwig" nördlich der Seine-Bank gefangene Exemplar. Ob an der Seine-Bank das Phänomen des Auftriebs wenigstens zeitweise während des Jahreslaufes auftritt, entzieht sich leider meiner Kenntnis. Doch selbst wenn dies der Fall wäre, haben wir in der Rekordtiefe von 4260 m nur noch äußerst kümmerliche Lebensbedingungen zu erwarten. Thiel (1972) schreibt hierzu: "Quantitative Untersuchungen der Macrofauna liegen aus verschiedenen Tiefseegebieten vor. Sie zeigen die Verringerung der Biomasse mit der Tiefe deutlich", und er gibt für das Makrobenthos der "küstenfernen Regionen" an, daß hier die Werte der Biomasse "unter 1 g/m^2 liegen." Er zitiert darüber hinaus: "Vinogradova (1962) gibt als mittlere Biomasse 0,2 g/m^2 für das Tiefseemakrobenthos an." Der Fang des ♂ von *Polycheles t. typhlops* aus der genannten Tiefe muß also wohl als ein besonderer Glücksfall angesehen werden. Das Exemplar ist mit einer Carapaxlänge von 63,0 mm und einer Gesamtlänge von 136 mm zudem meines Wissens nach das größte bisher bekannte der Art.

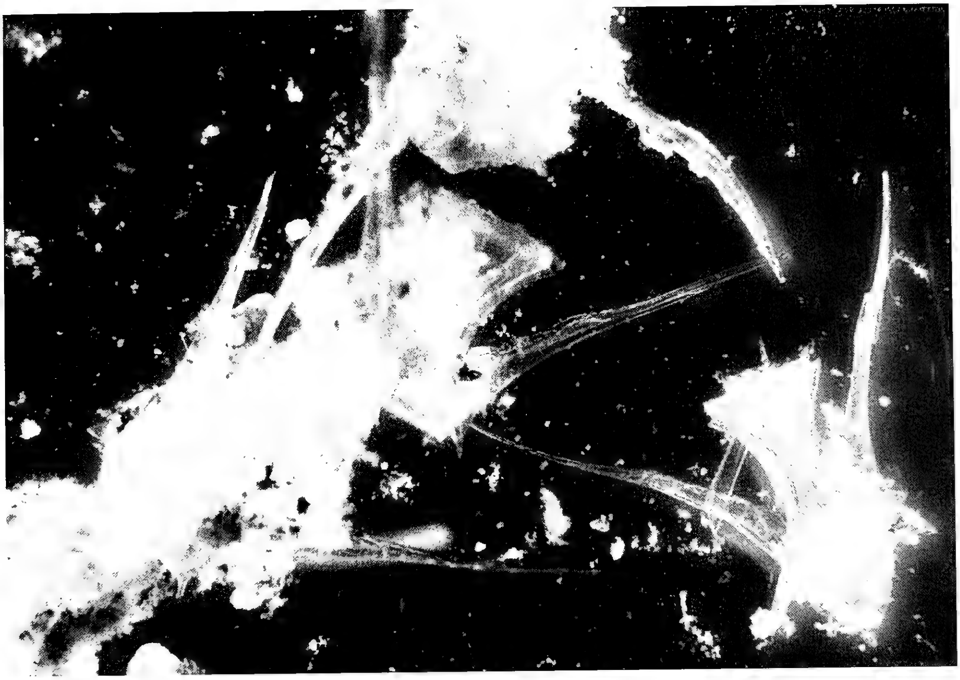


Abb. 1. Wirbelkörper mit ansitzenden Neural- und Haemalbögen eines Fisches aus dem Mageninhalt von *Polycheles t. typhlops*.

Abb. 2. Stücke der Kiefer eines Fisches aus dem Mageninhalt von *Polycheles t. typhlops*.

Stereomastis sculpta (Smith, 1880)

Untersuchtes Material. "Meteor"(II), Reise 60, Abschnitt 2: Stat. 70, 5♀♀ (Cpl: 25,2-38,0); Stat. 74, 14♂♂ (22,2-26,3), 18♀♀ (22,3-44,2).

Die Exemplare von *Stereomastis sculpta* sind nach Selbie (1914) und Bouvier (1917) allein aufgrund der Bedornung von Carapax und Abdomen eindeutig zu bestimmen. Das größte Exemplar ist ein Weibchen von Station 74 (Carapaxlänge 44,2; Gesamtlänge 110,5 mm). Die beiden Fänge wurden vor dem Süden Mauretaniens aus Tiefen zwischen 807 m und 1205 m eingeholt. Sivertsen & Holthuis (1956) geben Fundtiefen zwischen 380m und 2865 m an. Auffallend ist bei den vorliegenden Fängen, daß sie an Polycheliden ausschließlich *Stereomastis sculpta* enthielten, obwohl in unmittelbarer Nähe auf Station 67, die geographisch zwischen den Stationen 70 und 74, nur etwas näher zur Küste, liegt (siehe Tab. 3), eine Reihe von *Polycheles typhlops typhlops* gefangen wurden. Letztere stammen aber aus Tiefen von 376-395 m. Dies würde darauf hindeuten, daß *Polycheles t. typhlops* geringere Tiefen bevorzugt, wenn nicht die oben erwähnten Fänge einzelner Exemplare dieser Art aus erheblich größeren Tiefen heraufgeholt worden wären. Ob letztere extreme Ausnahmen sind, müssen künftige Fänge zeigen. Daß *Stereomastis sculpta* schon von Sund (1915) für das adulte Stadium von *Eryoneicus faxoni* gehalten wurde, wurde bereits oben erwähnt.

Stereomastis sculpta ist von mehreren Stellen des Nord- und Südatlantik, aus dem Mittelmeer, vor Ostafrika, aus der Arabischen See und aus dem Malaiischen Archipel bekannt (Sivertsen & Holthuis 1956).

Wie bei *Polycheles t. typhlops* wurde auch von *Stereomastis sculpta* ein Exemplar auf seinen Mageninhalt untersucht (Station 74, Meteor(II), Reise 60). Die Hauptmasse des Mageninhalts bestand hier aus angedauter Muskulatur nicht zu bestimmender Herkunft. Dazwischen fanden sich einzelne Foraminifera zu den Textulariidae und Nonionidae gehörig, sowie einzelne Globigerinen vom *Orbulina*-Typ. In großer Menge fanden sich kleine Kotpillen, die in der Form an Ameisenpuppen erinnerten, jedoch nur eine Länge von etwa 1 mm erreichten (Abb. 3). An größeren geformten Teilen fanden sich mehrere Stücke von Antennengeiseln offensichtlich eines Penaeiden, die noch nicht angedaut waren. *Steromastis sculpta* hat also wohl einen *Polycheles t. typhlops* vergleichbaren Speiseplan.

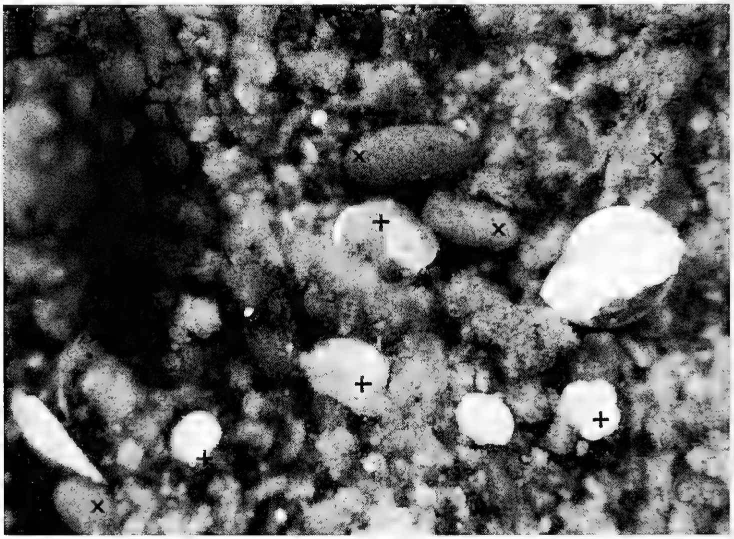


Abb. 3. Kotpillen unbekannter Herkunft (X) und Globigerinen-Schalen (+) aus dem Mageninhalt von *Stereomastis sculpta*.

Literatur

Alcock, A. & A. R. S. Anderson 1899. An Account of the Deep-sea Crustacea dredged during the Surveying-season of 1897-98. In: Natural History Notes from H.M. Royal Indian Marine Survey Ship 'Investigator', Commander T. H. Heming, R. N., commanding. Ser. III, No. 2. - Ann. Mag. Nat. Hist. **3**, sér. 3: 278-292

Balss, H. 1925. Macrura der Deutschen Tiefsee-Expedition (Valdivia). 1. Palinura, Astacura, und Thalassinidea. - Ergebn. Dtsch. Tiefsee-Exp. **20**: 189-216

-- 1957. Decapoda. VIII. Systematik. - In Bronn's Klassen und Ordnungen des Tierreichs 5, Abt. I, Buch **7**, Lief. 12: 1505-1672

Barnard, K. H. 1950. Descriptive catalogue of South African Decapod Crustacea. - Ann. S. Afr. Mus. **38**: 1-837

Bate, C. Sp. 1882. *Eryoneicus*, a new genus allied to *Willemoesia*. - Ann. Mag. nat. Hist **10**, (5): 456-458

-- 1888. Report on Crustacea Macrura dredged by H.M.S. Challenger during the years 1873-1876. - Rep. Voy. Challenger, Zool. **24**: I-XC, 1-942

Beaubrun, P. 1979 (1978). Crustacés décapodes marcheurs des côtes marocaines (sections des Astacidea, Eryonidea, Palinura, Thalassinidea). - Bull. Inst. Sci. Rabat **3**: 1-110

Bernard, F 1953. Decapoda Eryonidae (*Eryoneicus* et *Willemoesia*). - "Dana-Rep." **37**: 1-93

Bouvier, E.-L. 1905. Sur les Palinurides et les Eryonides recueillies dans l'Atlantique oriental par les expéditions françaises et monégasques. - C. R. Acad. Sci. Paris **140**, (8): 479-482

-- 1917. Crustacés Décapodes (Macroures Marcheurs) provenant des campagnes des yachts Hirondelle et Princesse Alice (1885-1915). - Résult. Camp. sci. Monaco **50**: 1-140

Calman, W. T. 1925. On Macrurous Decapod Crustacea collected in South African Waters by the S.S."Pickle". With a note on specimens of the genus *Sergestes* by H. J. Hansen. - Fish. Mar. Biol. Surv. Rep. **4**, Special Rep 3, Cape Town: 1-26

Dieuzeide, R. 1929. Sur un crustacé abyssal, *Polycheles typhlops* C. Heller. - Bull. Stn. Agric. Pêche Castiglione **1**: 105-108

Holthuis, L. B. 1952. Crustacés Décapodes, Macrures. - Exp. océanogr. Belge. Eaux côt. afric. Atl. Sud, Rés. sci. **3**, (2): 1-88

Lenz, H. & K. Strunck 1914. Die Decapoden der Deutschen Südpolar-Expedition 1901-1903. I. Brachyuren und Macruren mit Ausschluß der Sergestiden. - Deutsche Südpolar-Exp. **15**, Zool. 6: 259-345

Man, J. G. de 1916. The Decapoda of the Siboga Expedition. Part III. Families Eryonidae, Palinuridae, Scyllaridae and Nephropsidae. - Siboga-Exp. **39a**, (Lief. 76): 1-122

Ramadan, M. 1938. The Astacura and Palinura. - John Murray Exp. 1933-34. Sci. Rep. **5**: 123-145

Santucci, R. 1932. La biologia del Fondo a "Scampi" nel Mare Ligure.-7.Per la conoscenza del *Polycheles typhlops* Heller del Mediterraneo. - Boll. Mus. Lab. Zool. Anat. Comp. Genova **12**, (56): 1-3

-- 1934. Un crostaceo abissale cieco sui fondi a "Scampi" del Mare Ligure. - Il Corriere della Pesca, Genova **8**, (2): 1-8

Selbie, C. M. 1914. The Decapoda Reptantia of the Coast of Ireland. Part I. Palinura, Astacura and Anomura (except. Paguridea). - Fish Ireland, Sci. Invest. **1914/I**: 1-116

Sivertsen, E. & L. B. Holthuis 1956. Crustacea Decapoda (The Penaeidea and Stenopodidea excepted). - Rep. sci. Res. "Michael Sars" North Atlant. Deep-Sea Exp. 1910, **5**, (12): 1-54

Stephensen, K. 1923. Decapoda-Macrura excl. Sergestidae. - Rep. Dan. Oceanogr. Exp. 1908-10 to the Mediterranean and adjacent Seas, **2** Biol., D. 3.: 1-85

Sund, 0. 1915. *Eryoneicus - Polycheles*. - Nature, London, **95**: 372

Thiel, H. 1972. Meiofauna und Struktur der benthischen Lebensgemeinschaft des Iberischen Beckens. - "Meteor" Forsch.-Ergebnisse, Reihe D, **12**: 36-51

Tiefenbacher, L. 1982. *Eryoneicus* aus Fängen von F.S."Meteor" im mittleren äquatorialen Atlantik (Decapoda, Reptantia, Polychelidae). - Spixiana **5**, (1): 47-50

-- 1992. Beiträge zur Kenntnis der Natantia des Arabischen Meeres und zu ihrer horizontalen und vertikalen Verbreitung unter Berücksichtigung der Sauerstoffminimum-Schicht (Crustacea, Decapoda, Natantia). - Spixiana **15**, (2): 113-136

Türkay, M. 1976. Decapoda Reptantia von der portugiesischen und marokkanischen Küste. Auswertung der Fahrten 8, 9c (1967), 19 (1970), 23 (1971) und 36 (1975) von F.S."Meteor". - "Meteor" Forsch.-Ergebnisse, Reihe D, **23**: 23-44

Buchbesprechungen

1. Ruttner, F.: Naturgeschichte der Honigbienen. - Ehrenwirth Verlag München. 1992. ISBN 3-431-03184-6. 360 S., 500 z.T. farbige Abb.

Unser Wissen über das Leben der Bienen hat sich seit Karl von Frisch mit Hilfe moderner Technik wie der Fotografie, der computerisierten Meßtechnik, der Elektronenmikroskopie und Biochemie umfassend erweitert. So wird dem Leser in diesem Buch das Leben der Bienen in aller Welt auf der Grundlage exakter Forschung mittels vieler Farbbilder und eines leicht lesbaren, allgemein verständlichen Textes in anschaulicher Form nahegebracht. Alle Honigbienenarten und -unterarten und die meisten Bienenrassen sind farbig dargestellt - ein Novum in der Literatur.

In 14 Kapiteln werden alle Taxa abgehandelt, auch die in ihrem Verhalten sehr unterschiedlichen Rassen. Der Autor beschreibt das interessante Sozialleben der Honigbienen, ihre Biologie, Herkunft und Verbreitung, die Besiedelung neuer Gebiete, geschichtliche Aspekte und natürlich die Bedeutung für den Imker. Ein wichtiger Abschnitt in diesem Buch ist der wissenschaftlichen Erforschung der Honigbienen gewidmet. Systematische und taxonomische Probleme werden erklärt, so z.B. auch, warum die Art nicht *Apis mellifica* L. sondern *Apis mellifera* L. heißen muß. Die Evolution der Bienen wird auch aus biochemischer und molekulargenetischer Sicht beleuchtet, um ein umfassenderes Bild der Abstammung zu erhalten. Den geographischen Rassen sind mehrere Kapitel gewidmet, in denen u.a. erläutert wird, wie sie sich in den unterschiedlichsten klimatischen Gebieten halten und verhalten. Diese Angaben sind besonders für den Imker eine Fundgrube, da sie helfen können, eine effektivere Honigproduktion zu erzielen. Sehr nützlich sind in diesem Zusammenhang auch die Informationen zu Parasitismus und Krankheiten der Bienen.

Die Monographie gehört zu den umfangreichsten Werken, die bisher über Honigbienen veröffentlicht wurden. Sie ist sehr schön und größtenteils farbig illustriert und mit vielen textbegleitenden Detailabbildungen versehen, die den interessierten Leser, den Imker, Biologen und Studierenden auf leicht begreifliche Weise informieren. E. Diller

2. Dumpert, K.: Das Sozialleben der Ameisen. - Pareys Studientexte Nr. 18. 2., neubearbeitete Auflage. Verlag Paul Parey, Berlin und Hamburg. 1994. ISBN 3-489-63636-8. 258 S., 94 Abb.

Vor mehr als 15 Jahren erschien die 1. Auflage über diese interessante und biologisch sensible Insektengruppe. In der Zwischenzeit wurden viele neue Einzelheiten über das Leben der Ameisen veröffentlicht. Das mehrere Seiten umfassende Literaturverzeichnis zeigt, daß der Autor über viele Jahre umfangreiche Studien betrieben hat, um in seine Arbeit die modernsten Forschungsergebnisse einzubringen. So wird auch deutlich, daß man sich von den früher angewandten konservativen Experimentiermethoden gelöst hat und heute hauptsächlich nach chemischen, ethologischen, physiologischen und ökologischen Erklärungen für die Sozialstrukturen der Ameisen sucht.

Die wichtigsten Themen werden in 11 Kapiteln abgehandelt: Besonderheiten der Ameisen, Einteilung und Stammesgeschichte, Orientierung, Kommunikation, Kastenunterschiede und Arbeitsteilung, Koloniegründung, Zusammenleben mit anderen Ameisenarten, Zusammenleben mit anderen Athropoden, Nester der Ameisen, Ernährung sowie Verteidigungsmechanismen und Wehrverhalten. Der Band informiert nicht nur über eine einzelne Ameisengattung, wie sonst meist üblich, sondern behandelt die Formicidae der ganzen Welt. Er vermittelt eine breite Wissensgrundlage, die weit über das Interesse des Hymenopterologen hinausgeht und ist daher auch für den weniger spezialisierten Leser attraktiv. E. Diller

3. Masuda, H. & Allen, G.: Meeresfische der Welt. - Groß-Indopazifische-Region. - Tetra Verlag Melle. 1993. ISBN 3-89356-170-6. 528 S., 137 Taf., über 1700 Abb.

Weltweit sind bisher etwa 25 000 Fischarten beschrieben. So war es für die Autoren dieses Buches, das ursprünglich in Japan erschien, natürlich unerläßlich, sich auf eine bestimmte, allerdings besonders artenreiche Faunenregion zu beschränken, um die dort im Salzwasser vorkommenden Fischarten möglichst ausführlich darstellen zu können. Das mit über 1 700 farbigen Abbildungen versehene Werk wendet sich an einen breiten Leserkreis, da es sowohl meeresbiologisch interessante Fischgruppen wie auch die im Meeresaquarium häufig gehaltenen Arten berücksichtigt. Ziel der Autoren ist es, für Taucher, Aquarianer und Biologen eine Bestimmungsgrundlage für ihr Interessensgebiet zu schaffen. Eine sehr kurze Einführung verschafft einen Überblick über Lebensraum, Lebenszyklus und Verbreitung der Meeresfische, wirtschaftlich bedeutende Arten und wichtigste morphologische Merkmale eines Fisches, abgerundet durch eine detaillierte Karte der berücksichtigten biogeographischen Region. Der Hauptteil des Buches ist der systematischen Abhandlung der einzelnen Fischarten gewidmet. In 43 Kapiteln werden etwa 2 000 Spezies dargestellt. Das Buch lebt von den oft superben Fotos, während der begleitende Text auf den Umfang von Abbildungsunterschriften konzentriert ist. Trotzdem enthält er für jede Art neben dem wissenschaftlichen und, falls bekannt, auch dem deutschen Namen, Angaben zu Größe, Vorkommen und Nahrungswahl. Die Tiere sind meist gestochen scharf aufgenommen und daher leicht nach den Bildern zu bestimmen. Sehr nahverwandte oder nicht gut unterscheidbare Arten sind auf Tafeln zusammengestellt, um die Bestimmung zu erleichtern. Dieser informative Prachtband ist jedem, der sich für die behandelte Faunenregion und für Meeresfische interessiert, wärmstens zu empfehlen - und dazu noch erstaunlich preiswert. J. Diller

SPIXIANA	18	1	11–14	München, 01. März 1995	ISSN 0341–8391

Parahestiasula obscura, gen. nov., spec. nov. from Nepal

(Insecta, Mantodea, Hymenopodidae)

By **Francesco Lombardo**

Lombardo, F. (1995): *Parahestiasula obscura*, gen. nov., spec. nov. from Nepal (Insecta, Mantodea, Hymenopodidae). – Spixiana **18/1**: 11-14

Parahestiasula obscura, a new species of a new genus belonging to the family Hymenopodidae is described. It is characterized by the presence of three strong processes on the fastigium of the vertex and has markedly lobed median and expecially posterior femurs.

Dr. F. Lombardo, Dipartimento di Biologia Animale, Università di Catania, via Androne 81, I-95124 Catania, Sicily, Italy.

Introduction

Continuing the study of Mantodea of the Zoologische Staatssammlung München I have identified a small series of Mantodea, formed by one ♂ and five ♀♀, belonging to the family Hymenopodidae, which, due to their peculiar features, are to be ascribed to a new species of a new genus.

Parahestiasula, gen. nov.

A small-sized genus in which both sexes are winged. Head big, the forehead has three strong tubercules, a sinuous carina is present between them and the basis of the ocelli. The fastigium of the vertex bents forward, with a bulky cone-shaped pointed tubercule placed in the middle of each eye. A transverse frontal pentagonal scutellum with a tiny tooth on its apex can be observed.

The pronotum is short, its length and width are identical, and it is strongly compressed posteriorly; the prozone has two big humps, a large supracoxal dilatation and a medially carinated metazone.

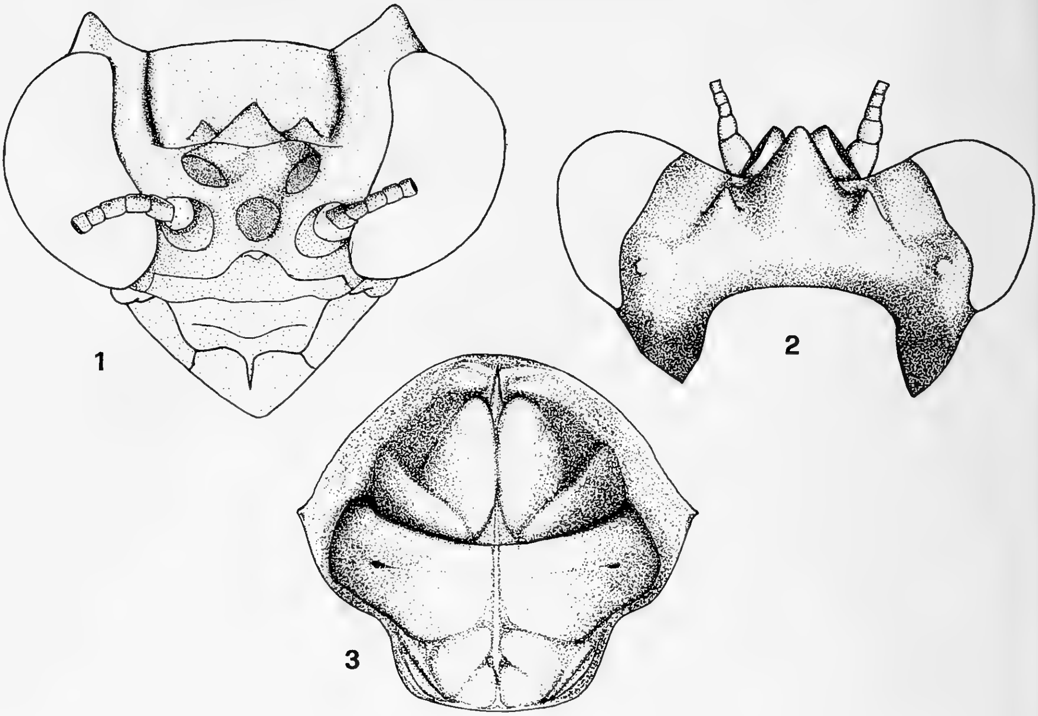
The hind legs have strongly dilated femurs provided with 4 external spines, with the two basal ones closer to each other, and 4 discoidal spines. The mid femurs are short, their external margin is slightly lobed at the basis; the posterior femurs are longer than the median ones, with a small but clearly distinguished lobe placed at the basis of the lower margin.

The flight organs are well developed and extend well beyond the apex of the abdomen.

The abdomen is moderately dilated, the supragenital lamina has a markedly rounded apex.

This genus is very similar to *Hestiasula*, but it differs from it in 1. the presence of the three big tubercules on the forehead (in *Hestiasula* the forehead is either muticate or it has only one more or less developed tubercule); 2. the presence of two big cone-shaped tubercules on the fastigium of the vertex, medially placed vis-a-vis the eyes (in *Hestiasula* these tubercules are never so much developed); and also in that the hind legs have a clearly distinguishable lobe on their lower margin (in *Hestiasula* this character has never been observed).

The copulatory apparatus, though maintaining the same morphological model, shows as well substantial differences as shown in figs. 6-11.



Figs 1-3. *Parahestiasula obscura*, spec. nov. 1. Anterior view of head; 2. posterior view of head; 3. pronotum.

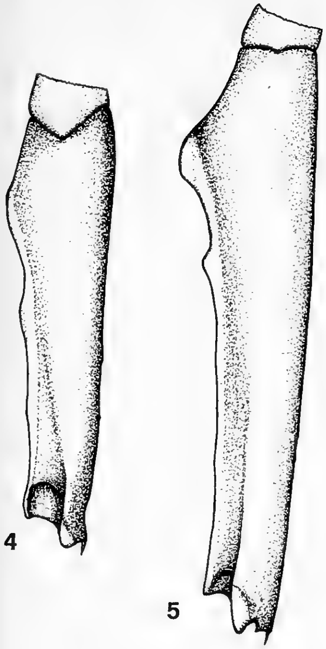
Parahestiasula obscura, spec. nov.

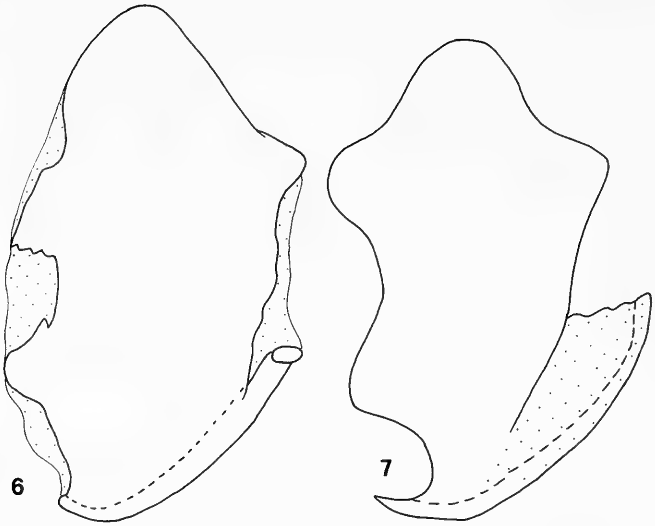
Types. Holotype: Nepal, 1♂, Rapti Tal Monahari Kola, Belwa 350 m, 7-12.5.1967 (ZSM) (leg. Dierl-Forster-Schacht). - Paratypes: 5♀♀, same data (ZSM).

Description

Male. Head (fig. 1) 1.44 times larger than the pronotum, brown with small black spots which tend to merge, forming wide blackish areas. The eyes big, subspherical and protruding; the forehead, along the medial margin of the eyes, is markedly grooved and bears three strong processes, the middle one is clearly more developed and has a pyramidal shape (fig. 2). The fastigium of the vertex is bent forward, with two big cone-shaped pointed tubercules placed close to the medial margin of the eyes. Ocelli wide, fairly sharp and placed on a prominent basis. A sinuous carina is placed above them, this carina fades away and becomes undistinguishable as it approaches the median margin of the eyes. The antennae are long with a brown scape and the flagellum is initially ochre and then becomes darker. One can observe a transverse frontal pentagonal scutellum with a concave upper margin at the basis of the antennae, while the apex is slightly bent forward to form a tiny tooth, the discoidal area shows a fossette delimited by two lateral carinae.

Pronotum (fig. 3) short, almost as long as large, brown, scattered with thin and long hairs, markedly constrained posteriorly and with a well-visible longitudinal median carina; the front margin is markedly rounded, while the lateral margins are finely denticulate. One can observe a wide sharp-cornered supercoxal dilatation with a small marginal tooth. Prozone almost as long as the metazone and separated from it by a deep supercoxal groove. Two big humps protrude on the two sides of the median carina. The metazone bears a median carina, with 4 scarcely protruding humps, 2 of which are placed in front of the posterior margin of the pronotum, while the other two are placed on the two sides of the supercoxal groove.





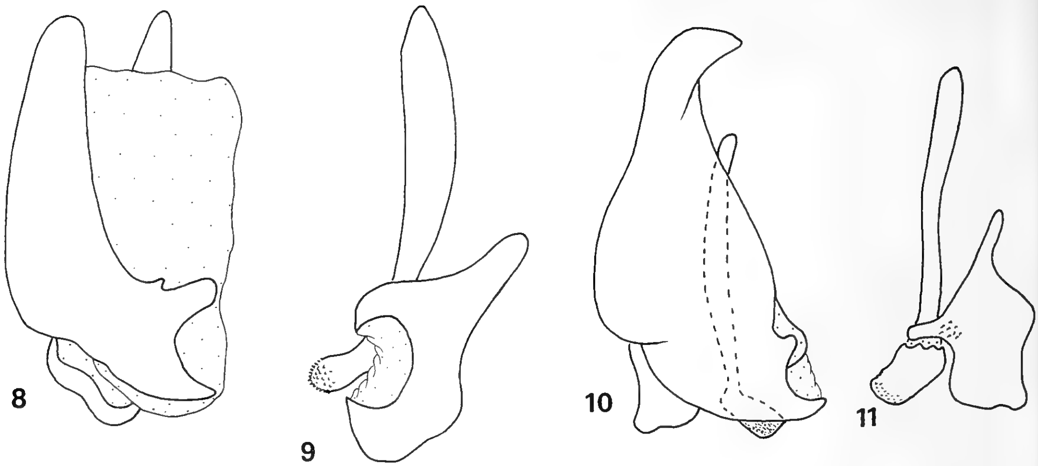
Figs 4-5. *Parahestiasula obscura*, spec. nov. 4. Middle femur; 5. posterior femur.
Figs 6-7. Ventral phallomere. 6. *Parahestiasula obscura*, nov. spec.; 7. *Hestiasula pictipes* (Wood-Mason).

Fore legs strong, coxae extend well beyond the posterior margin of the pronotum; they are prism-shaped with a triangular section, they are all brown but for the inner face which is reddish-brown. Out of the three margins, the mid and the external ones have a series of small black tubercules that become visible only under high magnification and from which a setula arises; the internal genital lobes diverge. The femurs are markedly dilated, their length is twice their width; the outer face is brown with many black spots tending to merge. A series of lined black tubercules are observed in the non-dilated portion; they are bright black inside, but for a yellowish round spot placed in front of the talon groove and many small black spots on an ochre background placed at the apex of the tubercules; the upper margin is irregularly rounded and provided with small black tubercules. Both the external and the discoidal spines have only a black apex, while the internal ones are totally black. Tibias darkish on the outside and black on the inside; they are provided with 12 ochre-coloured external spines with black apex and 10 internal black spines. Tarsi brown with black spots on the outside, and black on the inside. Mid and posterior legs rather short, their colour is ochre with dark veins; both mid and posterior coxae have a pyramidal shape. Mid femurs cylindrical, they are slightly larger at their basis and bear many hairs of different lengths; a carina follows the lateral margin throughout its length, with two undistinguished lobes at the basis of the femur (fig. 4). The posterior femurs have an expanded basis as well, a longitudinal carina is placed on the lower margin and expands into a small but clearly visible lobe just before the basis (fig. 5). Mid and posteror tibiae pubescent, expanded for ⅔ of their basal portion. Posterior tarsi short with the metatarsal joint shorter than the others taken together.

Abdomen dilated with shiny black tergites, with the exception of the lateral portions where they are light brown. Sterna brown with black spots; a carina is placed medially and it protrudes in the posterior portion of each segment.

Supranal plate small, trapezoidal, it leaves most of the underlying genital lamina uncovered. Cerci short and pubescent; all joints cylindrical with the exception of the last one which is cone-shaped.

Flight organs well developed; tegmens narrow and with a rounded apex; the costal area is opaque and brown, the discoidal and anal areas are transparent; both in the main venations and in the secondary ones darker areas alternate with lighter ones.



Figs 8-11. Left phallomere. 8-9. *Parahestiasula obscura*. spec. nov.; 10-11. *Hestiasula pictipes* (Wood-Mason).

The ventral phallomere of the copulatory apparatus is twice as long as large and the distal process is limited to a tiny tooth (fig. 6). The left phallomere has a well developed dorsal lamina (fig. 8) with a large groove at the apex of the right margin; the ventral lamina (fig. 9) is smaller than the former one, it has the shape of a stumpy club deeply grooved on its left margin; the phalloid apophysis is well developed and has a rod-like appearance, with a markedly rounded and knurled distal margin (fig. 9).

Measurements. Width of head 3.8 mm; length of pronotum 2.8 mm; length of metazone 1.4 mm; width of supra-coxal dilatation 1.4 mm; length of anterior coxa 3.6 mm; length of anterior femur 5.3 mm; width of anterior femur 2.7 mm; length of tegmina 16 mm.

Female. Both shape and chromatic model are very similar to those of the male. The only differences worth noticing concern the size, which is slightly larger; in one specimen the tooth of the frontal scutellum shows a shallow groove in the middle.

Measurements. Width of head 4.3 mm; length of pronotum 3.4-3.6 mm; length of metazone 1.6-1.7 mm; width of supra-coxal dilatation 3.4-3.5 mm; length of anterior coxae 4.7-4.9 mm; length of anterior femora 6.3-6.8 mm; width of anterior femora 2.9-3.5 mm; length of tegminae 18-19 mm.

SPIXIANA	**18**	1	15–43	München, 01. März 1995	ISSN 0341–8391

New species and new records of the genera *Fortagonum* Darlington and *Collagonum*, gen. nov. from New Guinea

(Insecta, Coleoptera, Carabidae, Agoninae)*

By **Martin Baehr**

Baehr, M. (1995): New species and new records of the genera *Fortagonum* Darlington and *Collagonum*, gen. nov. from New Guinea (Insecta, Coleoptera, Carabidae, Agoninae). – Spixiana **18/1:** 15-43

The genus *Fortagonum* Darlington from New Guinea is newly delimited. The following 7 new species are being described: *Fortagonum acuticolle*, spec. nov., *F. bisetosiceps*, spec. nov., *F. denticulatum*, spec. nov., *F. depressum*, spec. nov., *F. latum*, spec. nov., *F. spinosum*, spec. nov., and *F. unipunctatum*, spec. nov. A complete new key to all known species of this genus is given. Following species are transferred from *Fortagonum* to a new genus *Collagonum*, gen. nov.: *Fortagonum limum* Darlington, *F. hornabrooki* Darlington, *F. distortum* Darlington, *F. laticolle* Baehr, and *F. ophthalmicum* Baehr. Additional 4 species and 1 subspecies of this genus are newly described: *Collagonum convexum*, spec. nov., *C. riedeli*, spec. nov., *C. robustum*, spec. nov., *C. violaceum*, spec. nov., and *C. laticolle macrops*, subspec. nov. New records of *C. laticolle laticolle* (Baehr) are dealt with and the male genitalia of this species are for the first time described.

Both genera of odd-shaped, mountain-living agonine beetles are widely distributed throughout New Guinea, but most species have apparently very restricted ranges. Even in its restricted sense *Fortagonum* is a genus of convenience that may be further divided in certain species-groups of very uniform structure. However, further splitting in new genera is at present not advisible in view of the weak generic concepts within the New Guinean Agoninae, especially those related to *Fortagonum* in its new sense. The high degree of similarity in body shape as well as in structure of the male genitalia within both genera and in the different species-groups of *Fortagonum* is evidence of a rather recent evolution of the numerous species. In most species, however, chetotaxy is highly characteristic. There are several morphological trends, mostly reductions, within both genera, the evolutionary significance of which is largely unknown due to the extremely poor knowledge about habits and life history of the species.

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

Introduction

The genus *Fortagonum* Darlington comprises at present 16 species from both political divisions of New Guinea. The genus was originally erected for five rather differently shaped species (Darlington 1952) that are characterized at the same time by a reduced number of fixed setae on head, pronotum, and elytra and by reduced wings. Later Darlington (1971) described additional species some of them possess an even more irregular body shape. Recently I described three additional new species, two of them winged, discussed the definition of the genus on the basis of these new species, and included two

* Results of the entomological explorations of A. Riedel in New Guinea in 1992, 1993, and 1994.

winged species originally described by Darlington as species of the related genus *Altagonum* Darlington (Baehr 1992).

Unfortunately, Darlington's (1952, 1971) treatments suffer from the failure to investigate the male genitalia that are rather differently shaped and are in some species highly modified. Moreover most species are so far known from single or few specimens only, therefore the male genitalia of only five species have been described and at present they are not very useful for the identification of the species.

With respect to body shape the genus *Fortagonum* in its old sense can be divided into two fairly clear-cut groups: The first group includes species of rather oodine shape with more or less fusiform, anteriorly markedly narrowed pronotum, but also some rather narrow species with laterally convex, anteriorly and posteriorly about equally narrowed pronotum. This group contains winged and wingless species and has generally a reduced number of supraorbital, pronotal, and elytral setiferous punctures. However, body shape, form of the mandibles, shape of aedeagus, as well as the wing-and-seta formula (Darlington 1952, 1971, Baehr 1992) are rather varied in this group, so it could perhaps be further divided into subgroups of closer relationships. The second group includes species with distorted, very wide, and laterally evenly rounded pronotum with wide, explanate lateral margins, but with rather elongate, parallel elytra, with full or reduced set of fixed setae, and with or without wings. The species of this rather homogeneous group are very similar in external structure and all species of which males are known possess a highly characteristic and specialized aedeagus. On the basis of these striking external and genitalic features the species of this latter group are herewith excluded from *Fortagonum* and a new genus *Collagonum*, gen. nov. is erected for them. Although the species of this genus are externally highly similar and the male genitalia (as far as they are known) are also very similar, chetotaxy of head, pronotum, and elytra, however, expressed in the wing-and-seta formula, is generally different between species and allows the identification.

Some species of the genus *Fortagonum* in its restricted sense are also rather similar and are mainly distinguished by their chetotaxy. Unfortunately male genitalia are described from very few species only, hence their significance for species distinction is still uncertain, but may be very useful according to the striking differences seen in the few examined species. In view of the division of the genus in the mentioned species-groups the question arises, whether it should be divided in even more genera. Such further subdivision might prove to be the appropriate way in the future, but at the present state of knowledge of the Agonine fauna of New Guinea as a whole, and especially of the generic limits within the genera related to *Fortagonum*, I think it useful not to create new genera apart from the very peculiar *Collagonum*, but for the present to accept Darlington's genera, even when some of these seem to be rather genera of convenience than well etablished taxonomic units.

Measurements

Measurements were made under a stereo microscope using an ocular micrometer. Length has been measured from tip of labrum to apex of elytra, hence, measurements may slightly differ from those of Darlington. Length of pronotum for width/length ratio has been measured from middle of apex to base.

Characters

The main differentiating characters are in the chetotaxy that is expressed in a wing-and-seta formula first used by Darlington (1952, 1971) and followed by Baehr (1992), further in body shape, and in shape and structure of the aedeagus when this is known. Shape of aedeagus, as well as presence and number of sclerotized teeth inside the internal sac, seem to yield very useful differentiating characters. Because in almost all of Darlington's species the male genitalia have not been examined or males are still unknown, comparison is at present possible only for most species described herein or in my previous paper (Baehr 1992), and it is generally possible in more species of *Collagonum* than of *Fortagonum* proper.

Deposition of types

The holotypes of the new species are presented to the Zoologische Staatssammlung München (ZSM), but some are deposited as permanent loan in the collection of the author (ZSM-CBM).

Genus *Fortagonum* Darlington

Darlington, 1952, p. 247, figs 14, 64-66.
Darlington 1971, p. 316, figs 70-76.
Baehr 1992, p. 74, figs 1-6.

This genus is characterized by the rather heavy build of most species and by the following wing-and-seta formula in which presence/absence of wings (+w/–w), of supraorbital setae, pronotal setae, and discal elytral setae (+/–) are expressed in the above order. () means that the usual state is sometimes varied, +– means that within the genus both states are present to about the same ratio:

+w–w (–)(+) – +– +– +– +–

This formula clearly indicates a considerable variation of states within this genus that is, in this respect, not well founded. Moreover, the most closely related genus *Altagonum* Darlington has basically the same wing-and-seta formula, when all exceptions that occur within both genera are considered: +w (+)+ – (+) +– (+) (+). Hence, contrary to Darlington's opinion, both genera are not unequivocally differentiated by the wing-and-seta formula alone, but rather by body shape in combination with some genitalic characters.

Updated key to the species of the genus *Fortagonum* Darlington
(partly adapted from Darlington 1971)

Since the generic limits of *Fortagonum* Darlington are newly defined, a complete new key is presented that replaces the previous key in Baehr (1992).

1. Wings present .... 2.
– Wings absent .... 6.
2. Both pairs of supraocular setae absent; elytra bisetose, apex spined, striae slightly crenulate, intervals depressed. Vogelkop, extreme western Irian Jaya .... *depressum*, spec. nov.
– At least posterior supraocular seta present .... 3.
3. Both supraorbital setae present. Eastern Irian Jaya .... *bisetosiceps*, spec. nov.
– Anterior supraorbital seta absent .... 4.
4. Elytra unisetose (only median seta present); prothorax narrower, little wider than long. Central eastern Irian Jaya .... *denticulatum*, spec. nov.
– Elytra bisetose (median and posterior setae present); prothorax wider, distinctly wider than long. Distribution different .... 5.
5. Pronotum wider, sides more straight, anterior angles more protruding. Extreme western Irian Jaya .... *subconicolle* (Darlington)
– Pronotum narrower, sides more convex, anterior angles less protruding. Central Papua New Guinea .... *bigemum* (Darlington)
6. Both supraocular setae absent; anterior angle of pronotum laterally slightly produced. Short, wide, convex species. Central Irian Jaya .... *bufo* Darlington
– Posterior supraocular seta present; anterior angle of pronotum different. Variously shaped species .... 7.

7. Elytra usually trisetose, rarely unilaterally unisetose or bisetose; mandibles never straight and very elongate. Species from central Papua New Guinea .... 8.
– Elytra asetose, or unisetose, or bisetose; either mandibles straight and very elongate, **or** more or less fusiform species. Species from central and eastern Irian Jaya .... 11.

8. Posterior pronotal seta present .... 9.
– Posterior pronotal seta absent .... 10.

9. Margin of pronotum wide; wide, fusiform species. .... *oodinum* Darlington
– Margin of pronotum narrow; rather narrow, barely fusiform species .... *antecessor* Darlington

10. Pronotum wider, but less conical; elytra weakly iridescent .... *fortellum* Darlington
– Pronotum narrower, but rather conical; elytra markedly iridescent .... *okapa* Darlington

11. Posterior pronotal seta present; elytra unisetose or bisetose .... 12.
– Posterior pronotal seta absent; elytra asetose .... 14.

12. Pronotum laterally regularly convex, base as wide as apex, basal angles rounded off, apex very protruding (Fig. 2); elytra bisetose, anterior seta absent. Eastern central Irian Jaya .... *acuticolle*, spec. nov.
– Pronotum laterally feebly convex, base much wider than apex, basal angles rectangular and obtuse, apex less protruding (Figs 9, 10); elytra unisetose, only median seta present. Eastern Irian Jaya .... 13.

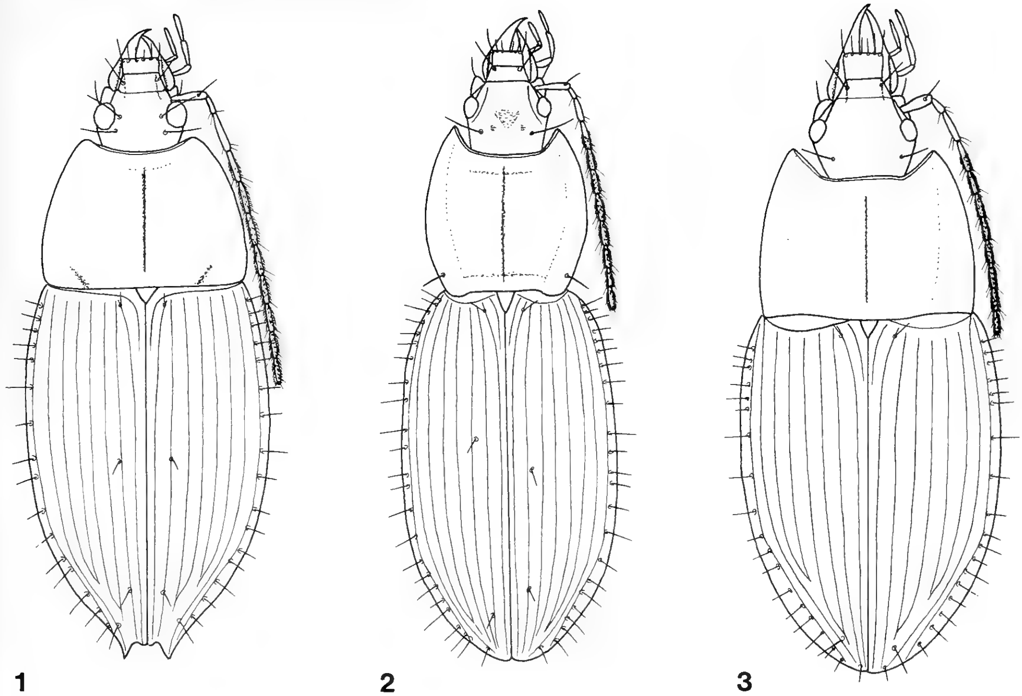
23. Apex of elytra not spinose, though sutural angle faintly denticulate, elytra slightly wider; pronotum barely narrowed towards base (Fig. 9). Area east of mountain range to the west of valley of Borme River .... *unipunctatum*, spec. nov.
– Apex of elytra elongately spinose opposite 3rd interval, sutural angle not denticulate, elytra slightly narrower; pronotum distinctly narrowed towards base (Fig. 10). Area west of mountain range to the west of valley of Borme River .... *spinosum*, spec. nov.

14. Mandibles not unusually elongate; apex of elytra distinctly spinose opposite 3rd interval; short and wide, markedly fusiform species. Central Irian Jaya .... *curtum* Baehr
– Mandibles straight and markedly elongate; apex of elytra not spinose; either rather elongate, not markedly fusiform species, or short and wide species with almost parallel lateral borders of pronotum .... 15.

15. Basal margin of elytra not interrupted at 3rd interval; prothorax $<1.8 \times$ as wide as head .... 16.
– Basal margin of elytra interrupted at 3rd interval; prothorax $>2 \times$ as wide as head .... 17.

16. Rather wide, almost parallel species; pronotum $>1.25 \times$ as wide as long. Central Irian Jaya .... *forceps* Darlington
– Narrow, fusiform species with evenly rounded lateral margins of pronotum; pronotum c. $1.1 \times$ as wide as long. Central Irian Jaya .... *formiceps* Darlington

17. Pronotum wider at base, ratio width of base/width of apex c. 1.8, sides more curved; elytra rather elongate. Central Irian Jaya .... *cychriceps* Darlington
– Pronotum narrower at base, ratio width of base/width of apex c. 1.65, sides more parallel; elytra rather short. Central eastern Irian Jaya .... *latum*, spec. nov.



Figs 1-3. Habitus. 1. *Fortagonum bisetosiceps*, spec. nov. ♀ holotype. 2. *F. acuticolle*, spec. nov. ♂ holotype. 3. *F. latum*, spec. nov. ♀ holotype. Lengths: 10.3 mm, 13.2 mm, 11.2 mm.

The species

Fortagonum bisetosiceps, spec. nov.

Figs 1, 4, 30

Types. Holotype: ♀, Irian Jaya, Jayawijaya-Pr., Bommela 1750 m, 30.8.-1.9.1992, leg. A. Riedel (ZSM-CBM).

Diagnosis. Distinguished by the conical, dorsally evenly convex pronotum without any trace of a marginal channel, by presence of wings, presence of both supraorbital setae, absence of both pronotal setae, absence of the anterior discal seta, and by the distinctly spined elytra.

Description

Measurements. Length: 10.3 mm; width: 4.35 mm. Ratios. Width/length of pronotum: 1.47; width base/apex of pronotum: 1.78; width pronotum/head: 2.12; width elytra/pronotum: 1.23; length/width of elytra: 1.56.

Wing-and-seta formula: +w ++ — −++.

Colour. Black, elytra with faint violaceous lustre. Lateral margins of pronotum reddish translucent, labrum, mouth parts, antenna, and tibiae and tarsi dark reddish-piceous, 3rd antennomere dark in middle. Lower surface black.

Head. Narrow compared with prothorax. Neck rather wide, somewhat imbedded in prothorax. Eyes fairly large, laterally not much projecting, orbits distinct, evenly curved. Clypeal suture distinct. Labrum rectangular, apex feebly concave. Mandibles elongate, straight, but not porrect. Antenna very elongate, delicate, surpassing base of pronotum by about three segments, median antennomeres c. 5 × as long as wide. Both palpi elongate, basal maxillary palpomere thickened. No furrow medially of eyes, though a shallow furrow above antennal base present. Both supraocular setae present, posterior seta in front of posterior margin of eye. Clypeus and anterior part of frons with short, shallow, parallel furrows, frons evenly convex, absolutely smooth. Microreticulation isodiametric, superficial. Surface glossy.

Prothorax. Wide, dorsally evenly convex, markedly conical, widest in posterior third, laterally evenly convex, strongly narrowed to apex, slightly narrowed to base. Anterior angles feebly projecting, widely rounded off. Apex moderately excised. Lateral margin convex throughout, not bordered, without any trace of a marginal channel. Basal angles rounded off. Base almost straight. Disk with shallow, v-shaped sulcus in apical third, base near basal margin with a shallow, circular impression on either side. Median line incomplete, in middle rather distinct, ending far from apex and base. Apex markedly bordered, base not bordered. Both marginal setae absent. Disk impunctate, with some fine transverse wrinkles. Microreticulation superficial, near apex and base isodiametric and more conspicuous than on disk, laterally consisting of very fine longitudinal meshes, on disk almost wanting. Surface on disk glossy.

Elytra. Moderately elongate, dorsal surface rather convex, lateral borders faintly rounded, in middle almost parallel. Preapical sinuosity almost absent. Widest diameter slightly in front of middle. Shoulders wide, angulate but not dentate, apex with distinct triangular spine opposite 3rd interval. Striae deep, impunctate, intervals slightly convex. Anterior discal seta absent, median and posterior setae situated at 2nd stria. 16 marginal setae and 1 preapical seta at 7th stria present. Intervals impunctate. Microreticulation almost wanting. Surface glossy, rather iridescent. Wings present.

Lower surface. Prosternal process short, rounded behind coxae, posteriorly depressed, laterally bordered. Proepisternum smooth. Mesepisternum very sparsely punctate. Metepisternum elongate, c. 2 × as long as wide at anterior border. Epipleurae anteriorly moderately wide, smooth. Abdomen impunctate, though laterally with numerous fine wrinkles and shallow impressions. Microreticulation dense, isodiametric. ♀ sternum VII quadrisetose, apex regularly curved.

Legs. Thin and elongate. 4th tarsomere medially faintly excised. 5th tarsomere asetose beneath. Vestiture of ♂ anterior tarsus unknown.

♂ genitalia. Unknown.

♀ genitalia. Stylomere 2 elongate, little curved, with obtuse apex, with 3 ventral ensiform setae, a dorsal ensiform seta and one nematiform seta in a deep furrow moderately close to apex. Apex of stylomere 1 ventrally with 6-7 setae near base of stylomere 2. Lateral plate with c. 10 setae at or near margin.

Variation. Unknown.

Distribution (Fig. 30). Eastern central Irian Jaya. Known only from type locality.

Habits. Collected in rain forest in median altitude.

Relationships. This species is certainly closely related to those species that were originally included in the genus *Altagonum*, namely *F. bigemum* (Darlington) and *F. subconicolle* (Darlington). The crucial point would be the aedeagus that is hitherto unknown in all three species.

Etymology. The name refers to the presence of both supraorbital setae.

Fortagonum acuticolle, spec. nov.

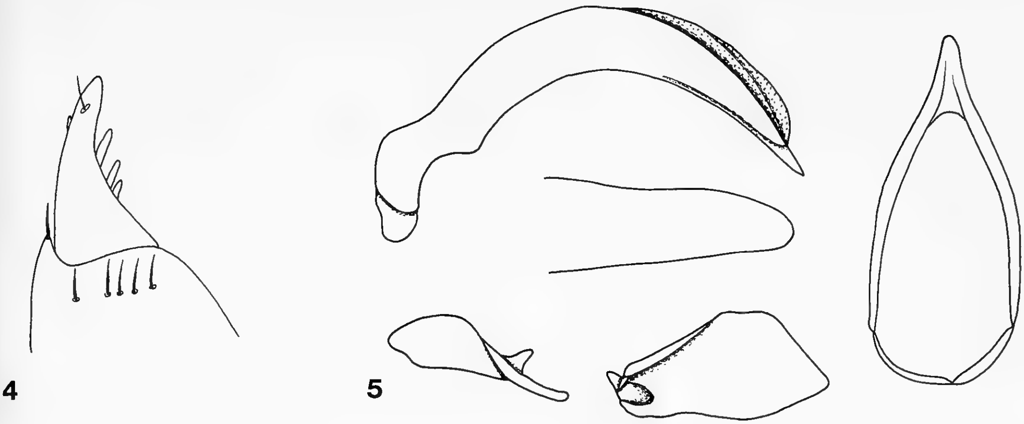
Figs 2, 5, 30

Types. Holotype: ♂, Irian Jaya, Jayawijaya-Pr. Diuremna, 1900-2100 m, 9.-11.IX.1992, leg. A. Riedel (ZSM-CBM).

Diagnosis. Distinguished by absence of wings, rather narrow, elliptic pronotum with deep marginal channel and rounded basal angles that is at base as wide as at apex, fairly elongate elytra with depressed disk behind shoulders, rounded apex, and convex intervals, and by absence of the anterior supraocular seta and the anterior pronotal seta.

Description

Measurements. Length: 13.2 mm; width: 5.2 mm. Ratios. Width/length of pronotum: 1.18; width base/apex of pronotum: c. 1.10; width pronotum/head: 1.75; width elytra/pronotum: 1.30; length/width of elytra: 1.63.



Figs 4, 5. Genitalia. 4. *Fortagonum bisetosiceps*, spec. nov. ♀ stylomeres. 5. *F. acuticolle*, spec. nov. ♂ aedeagus, apex of aedeagus, parameres, and genital ring.

Wing-and-seta formula: –w –+ –+ +++.

Colour. Black. Mouth parts, antenna, and tarsi dark piceous, tibiae piceous, 1st-3rd antennomeres black. Lower surface black.

Head. Rather wide compared with prothorax. Neck rather wide, barely imbedded in prothorax. Eyes rather small, laterally little projecting, orbits indistinct, slightly oblique. Clypeal suture distinct. Labrum rectangular, apex feebly concave. Mandibles elongate, straight, but not porrect. Antenna elongate, surpassing base of pronotum by about two segments, median antennomeres c. 3 × as long as wide. Both palpi elongate, basal maxillary palpomere thickened. No furrow medially of eyes, though a shallow furrow above antennal base present. Only the posterior supraocular seta present, far removed from posterior margin of eye. Clypeus and anterior part of frons with short, shallow, somewhat irregular furrows, surface of clypeus irregular. Frons in middle with a somewhat trifold impression, laterally with another shallow depression that bears some sharp, oblique-transverse strioles. Inside of eyes with few short, sharp lines. Whole surface of head rather irregular. Microreticulation posteriorly highly superficial, almost wanting, anteriorly more distinct, about isodiametric, surface around the depressions with sparse and fine puncturation, moderately glossy.

Prothorax. Rather narrow and elongate, about elliptic, laterally evenly convex, base as wide as apex, widest diameter in middle. Disk convex, lateral margins somewhat explanate, upturned, lateral channel deep. Anterior angles markedly projecting, obtuse at apex. Apex deeply excised, in middle straight. Basal angles widely rounded off, somewhat projecting over middle of base. Base in middle straight. Disk convex with very shallow, rather transverse sulcus in apical fourth, base near basal margin with a deep, circular impression on either side and with a very shallow transverse impression. Median line incomplete, fine, ending far from apex and base, situated in a weak impression. Apex distinctly bordered, lateral margin bordered in anterior half, base not bordered. Anterior marginal seta absent, posterior seta apparently situated near lateral margin far removed from basal angle (though setae absent, only vague traces of the pore present!). Disk impunctate, microreticulation barely visible. Surface glossy.

Elytra. Moderately narrow and elongate, dorsal surface moderately convex, distinctly impressed behind shoulders. Lateral borders in middle almost straight. Apex regularly rounded. Widest diameter about in middle. Shoulders wide, angulate but not dentate, though basal border deeply concave. Apex without any spine or denticle. Striae deep, intervals convex. All discal setae present, anterior seta situated at 3rd stria, median and posterior setae at 2nd stria. 19-20 marginal setae present. Intervals impunctate. Microreticulation highly superficial, consisting of extremely fine, transverse lines. Surface moderately glossy, not iridescent. Wings absent.

Lower surface. Prosternal process short, evenly rounded behind coxae, posteriorly moderately depressed, triangular, ventrolaterally bordered. All episterna irregularly and superficially punctate, with very fine microreticulation, rather dull. Metepisternum fairly shortened, c. 1.3 × as long as wide at anterior border. Epipleura anteriorly moderately wide, rugose. Abdomen impunctate, though laterally with several fine, elongate wrinkles and shallow impressions. Microreticulation fine, dense, isodiametric. ♂ sternum bisetose, apex regularly curved.

Legs. Rather thin and elongate. 4th tarsomere medially faintly excised. 5th tarsomere asetose beneath. 1st-3rd tarsomeres of ♂ anterior tarsus biseriately squamose.

♂ genitalia. Genital ring rather narrow and parallel, symmetric, with very elongate apex. Aedeagus narrow, very strongly curved, lower surface markedly concave. Apex short, widely rounded off. Internal sac in holotype almost invisible, apparently no sclerotized pieces present. Both parameres elongate, left paramere with angulate apex, right paramere with attenuate, on lower surface excised apex.

♀ genitalia. Unknown.

Variation. Unknown.

Distribution (Fig. 30). Eastern central Irian Jaya. Known only from type locality.

Habits. Collected in rain forest in median altitude.

Relationships. Rather isolated species, perhaps next related with species like *F. formiceps* Darlington, but without possessing porrect mandibles.

Etymology. The name refers to the acute anterior angles of the pronotum.

Fortagonum latum, spec. nov.

Figs 3, 6, 30

Types. Holotype: ♀, Irian Jaya, Jayawijaya-Pr. Langda, 2100-2300 m, 27.-28.8.1992, leg. A. Riedel (ZSM-CBM).

Diagnosis. Distinguished by absence of wings, short and wide body shape, wide, posteriorly parallel pronotum with wide marginal channel, elongate, straight, porrect mandibles, and absence of anterior supraocular seta, both pronotal seta, and all discal setae.

Description

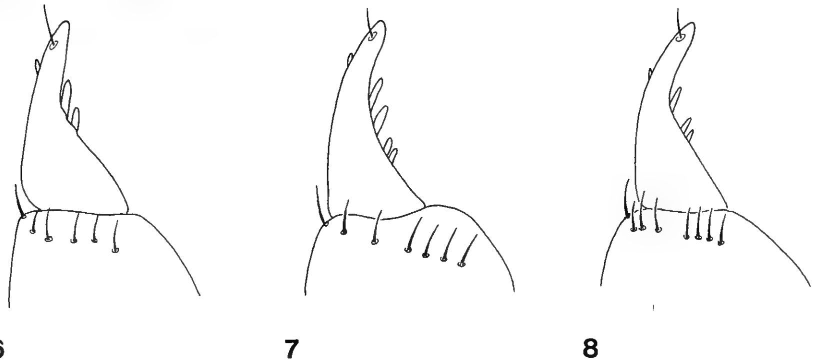
Measurements. Length: 11.2 mm; width: 4.95 mm. Ratios. Width/length of pronotum: 1.38; width base/apex of pronotum: 1.62; width pronotum/head: 2.09; width elytra/pronotum: 1.16; length/width of elytra: 1.37.

Wing-and-seta formula: –w –+ — –––.

Colour. Black. Lateral margins of pronotum reddish translucent, labrum, mouth parts, antenna, and tibiae and tarsi dark reddish-piceous, femora dark piceous. Lower surface black.

Head. Narrow compared with prothorax. Neck rather wide, somewhat imbedded in prothorax. Eyes small, laterally barely projecting, orbits elongate, distinctly longer than eyes, evenly curved. Clypeal suture moderately distinct. Labrum rectangular, apex feebly biconcave. Mandibles very elongate, straight, porrect. Antenna moderately elongate, surpassing base of pronotum by about two segments, median antennomeres <3 × as long as wide. Both palpi very elongate, basal maxillary palpomere thickened. No furrow medially of eyes, though a shallow furrow above antennal base present. Only posterior supraocular seta present, far removed from posterior margin of eye. Clypeus and anterior part of frons with several short, shallow, parallel furrows, frons anteriorly with two circular impressions, in middle evenly convex, absolutely smooth. Microreticulation isodiametric, very fine, rather superficial. Surface glossy.

Prothorax. Wide, square, at apex very wide, posterior half parallel, slightly narrowed to apex. Disk evenly convex, lateral margins widely explanate. Anterior angles markedly projecting, obtuse at apex. Apex deeply excised, in middle convex. Lateral margin anteriorly weakly convex, with wide, shallow marginal sulcus. Basal angles rectangular, at apex obtusely rounded. Base laterally straight, in middle very faintly produced. Disk convex with extremely shallow, v-shaped sulcus in apical fourth, base near basal margin with a deep, circular impression on either side and with a very shallow transverse impression. Median line incomplete, fine, ending far from apex and base. Apex and lateral margins distinctly bordered, base not bordered. Both marginal setae absent. Disk impunctate. Microreticulation very fine, on disk highly superficial, near apex and base isodiametric and more conspicuous, on disk consisting of fine transverse lines. Surface glossy.



Figs 6-8. ♀ stylomeres. 6. *Fortagonum latum*, spec. nov. 7. *F. unipunctatum*, spec. nov. 8. *F. spinosum*, spec. nov.

Elytra. Short and wide, dorsal surface rather convex though depressed on disk, lateral borders in anterior half almost straight. Preapical sinuosity absent, lateral margin in posterior half evenly convex. Widest diameter about in middle. Shoulders wide, angulate but not dentate, apex rounded off. Striae deep, impunctate, intervals faintly convex. Discal setae absent. 18 marginal setae and 1 preapical seta at 7th stria present. Intervals impunctate. Microreticulation almost wanting. Surface highly glossy, rather iridescent. Wings absent.

Lower surface. Prosternal process very short, straight, posteriorly depressed, ventrolaterally bordered. Proepisternum smooth. Mesepisternum impunctate. Metepisternum short, shorter than wide at anterior border. Whole epipleura wide, almost smooth. Abdomen impunctate, though laterally with some fine, elongate wrinkles and shallow impressions. Microreticulation dense, isodiametric, very superficial. ♀ sternum VII quadrisetose, apex regularly curved.

Legs. Thin and elongate. 4th tarsomere medially faintly excised. 5th tarsomere asetose beneath. Vestiture of ♂ anterior tarsus unknown.

♂ genitalia. Unknown.

♀ genitalia. Stylomere 2 elongate, almost straight, with obtuse apex, with 2 ventral ensiform setae, a dorsal ensiform seta and one nematiform seta in a deep furrow moderately close to apex. Apex of stylomere 1 ventrally with 6 setae near base of stylomere 2. Lateral plate with 5-6 setae at or near margin.

Variation. Unknown.

Distribution (Fig. 30). Eastern central Irian Jaya. Known only from type locality.

Habits. Collected in rain forest in median altitude.

Relationships. This species is certainly very closely related to the rather similarly shaped *F. cychriceps* Darlington that has the same wide, quadrate pronotum and similarly porrect mandibles.

Etymology. The name refers to the wide body shape.

Fortagonum unipunctatum, spec. nov.

Figs 7, 9, 30

Types. Holotype: ♀, Irian Jaya, Jayawijaya-Pr. Borme, 1500-2000 m, 4.8.1992, leg. A. Riedel (ZSM). - Paratype: 1♀, same data (CBM).

Diagnosis. Distinguished by absence of wings, conical pronotum with wide marginal channel, short and convex elytra, and absence of anterior supraocular seta, anterior pronotal seta, and anterior and posterior discal setae. Further distinguished from most closely related *F. spinosum*, spec. nov. by not spinose elytra, denticulate sutural angles, narrower though basally comparatively wider pronotum, and slightly shorter and wider elytra.

Description

Measurements. Length: 12.5 mm; width: 5.5 mm. Ratios. Width/length of pronotum: 1.34-1.37; width base/apex of pronotum: 1.65-1.70; width pronotum/head: 1.82-1.85; width elytra/pronotum: 1.35-1.38; length/width of elytra: 1.47-1.50.

Wing-and-seta formula: –w –+ –+ –+–.

Colour. Black. Lateral margins of pronotum reddish translucent, labrum, mouth parts, antenna, and tarsi dark reddish-piceous, 1st-3rd antennomeres mostly dark. Lower surface black.

Head. Narrow compared with prothorax. Neck rather wide, somewhat imbedded in prothorax. Eyes fairly large, laterally moderately projecting, orbits distinct, evenly curved. Clypeal suture distinct. Labrum rectangular, apex feebly concave. Mandibles elongate, straight, but not porrect. Antenna elongate, surpassing base of pronotum by about three segments, median antennomeres slightly <4 × as long as wide. Both palpi elongate, basal maxillary palpomere thickened. No furrow medially of eyes, though a shallow furrow above antennal base present. Only posterior supraocular seta present, in front of posterior margin of eye. Clypeus and anterior part of frons with short, shallow, parallel furrows, frons evenly convex, absolutely smooth. Microreticulation isodiametric, distinct. Surface moderately glossy.

Prothorax. Wide, conical, widest in posterior third, laterally evenly though feebly convex, strongly narrowed to apex, very slightly narrowed to base. Disk evenly convex, lateral margins widely explanate. Anterior angles rather projecting, obtuse at apex. Apex regularly and deeply excised. Lateral margin convex throughout, not bordered, with wide, shallow marginal channel. Basal angles rectangular, obtuse only at the very apex. Base laterally straight, in middle somewhat produced. Disk convex with extremely shallow, v-shaped sulcus in apical fourth, base near basal margin with a deep, circular impression on either side and with a shallow transverse impression. Median line incomplete, fine, ending far from apex and base. Apex distinctly bordered, base not bordered. Posterior marginal seta present, situated on disk of lateral explanation far removed from posterior and lateral margins. Disk impunctate. Microreticulation very fine, though rather distinct, near apex and base isodiametric and more conspicuous than on disk, on disk consisting of fine transverse lines. Surface moderately glossy.

Elytra. Rather short and wide, dorsal surface markedly convex, lateral borders evenly rounded. Preapical sinuosity extremely feeble. Widest diameter about in middle. Shoulders wide, angulate but not dentate, apex with extremly faint, obtuse denticle opposite 3rd interval. Sutural angle with minute denticle. Striae deep, impunctate, intervals slightly convex. Anterior and posterior discal setae absent, median seta situated at 2nd stria. 18-19 marginal setae and 1 preapical seta at 7th stria present. Intervals impunctate. Microreticulation almost wanting. Surface glossy, rather iridescent. Wings absent.

Lower surface. Prosternal process short, angulate behind coxae, posteriorly markedly depressed, triangular, ventrolaterally and posterolaterally bordered. Proepisternum smooth. Mesepisternum impunctate. Metepisternum short, c. 1.2 × as long as wide at anterior border. Epipleura anteriorly very wide, rugose. Abdomen impunctate, though laterally with numerous fine, elongate wrinkles and shallow impressions. Microreticulation dense, isodiametric. ♀ sternum VII quadrisetose, apex regularly curved.

Legs. Thin and elongate. 4th tarsomere medially faintly excised. 5th tarsomere asetose beneath. Vestiture of ♂ anterior tarsus unknown.

♂ genitalia. Unknown.

♀ genitalia. Stylomere 2 elongate, little curved, with obtuse apex, with 4 rather spaced ventral ensiform setae, a dorsal ensiform seta and one nematiform seta in a deep furrow moderately close to apex. Apex of stylomere 1 ventrally with c. 7 setae near base of stylomere 2. Lateral plate with 8-10 setae at or near margin.

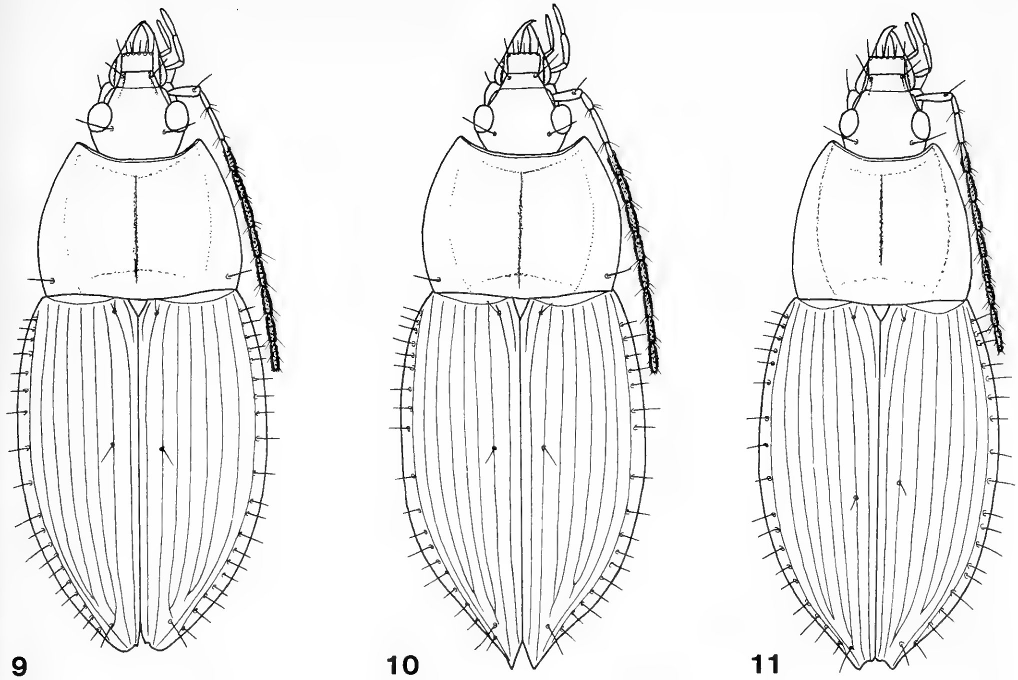
Variation. Little variation noted due to limited material. In paratype pronotum slightly more narrowed towards base and elytra more distinctly denticulate.

Distribution (Fig. 30). Eastern central Irian Jaya east of the mountain ridge on the western margin of the valley of the Borme River. Known only from type locality.

Habits. Collected in rain forest in median altitude.

Etymology. The name refers to the presence of the median discal elytral puncture only.

Relationships. Certainly very closely related to *F. spinosum*, spec. nov. but slightly more plesiomorphic.



Figs 9-11. Habitus. 9. *Fortagonum unipunctatum*, spec. nov. ♀ holotype. 10. *F. spinosum*, spec. nov. ♀ holotype. 11. *F. denticulatum*, spec. nov. ♂ holotype. Lengths: 12.5 mm, 12.8 mm, 11.2 mm.

Fortagonum spinosum, spec. nov.

Figs 8, 10, 30

Types. Holotype: ♀, IRIAN JAYA, Jayawijaya-Pr., N. Bime 2000-2070 m, 21.IX.1993, leg. A. Riedel (ZSM-CBM).

Diagnosis. Distinguished by absence of wings, conical pronotum with wide marginal channel, short and convex elytra, and absence of anterior supraocular seta, anterior pronotal seta, and anterior and posterior discal setae. Further distinguished from most closely related *F. unipunctatum*, spec. nov. by spinose elytra, not denticulate sutural angle, wider though basally comparatively narrower pronotum, and slightly longer and narrower elytra.

Description

Measurements. Length: 12.8 mm; width: 5.4 mm. Ratios. Width/length of pronotum: 1.41; width base/apex of pronotum: 1.54; width pronotum/head: 1.92; width elytra/pronotum: 1.28; length/width of elytra: 1.54.

Wing-and-seta formula: –w –+ –+ –+–.

Colour. Black. Lateral margins of pronotum reddish translucent, labrum, mouth parts, antenna, and tarsi dark reddish-piceous, 1st-3rd antennomeres faintly infuscate. Lower surface black.

Head. Very narrow compared with prothorax. Neck rather wide, somewhat imbedded in prothorax. Eyes fairly large, laterally moderately projecting, orbits distinct, evenly curved. Clypeal suture distinct. Labrum rectangular, apex feebly concave. Mandibles elongate, straight, but not porrect. Antenna elongate, surpassing base of pronotum by about three segments, median antennomeres slightly >4 × as long as wide. Both palpi elongate, basal maxillary palpomere thickened. No furrow medially of eyes, though a shallow furrow above antennal base present. Only posterior supraocular seta present, on same level with posterior margin of eye. Clypeus and anterior part of frons with short, shallow, parallel furrows, frons evenly convex, absolutely smooth. anteriomedially of eyes with some longitudinal strioles. Microreticulation isodiametric, distinct. Surface moderately glossy.

Prothorax. Wide, rather conical, widest in posterior two fifth, laterally evenly though feebly convex, strongly narrowed to apex, fairly narrowed to base. Disk evenly convex, lateral margins widely explanate. Anterior angles rather projecting, obtuse at apex. Apex regularly and deeply excised. Lateral margin convex throughout, not bordered, with wide, shallow marginal channel. Basal angles about rectangular, obtuse only at the very apex. Base laterally straight, in middle somewhat produced. Disk convex with extremely shallow, v-shaped sulcus in apical fourth, base near basal margin with a deep, circular impression on either side and with a shallow transverse impression. Median line incomplete, fine, ending far from apex and base. Apex distinctly bordered, base not bordered. Posterior marginal seta present, situated on disk of lateral explanation far removed from posterior and lateral margins. Disk impunctate. Microreticulation very fine, though rather distinct, near apex and base isodiametric and more conspicuous than on disk, on disk consisting of fine transverse lines. Surface moderately glossy.

Elytra. Rather short and wide, dorsal surface markedly convex, lateral borders evenly rounded. Preapical sinuosity extremely feeble. Widest diameter about in middle. Shoulders wide, angulate but not dentate, apex with rather elongate, acute, slightly upturned spine opposite 3rd interval. Sutural angle without denticle. Striae deep, impunctate, intervals slightly convex. Anterior and posterior discal setae absent, median seta situated at 2nd stria. 18-19 marginal setae and 1 preapical seta at 7th stria present. Intervals impunctate. Microreticulation almost wanting. Surface glossy, rather iridescent. Wings absent.

Lower surface. Prosternal process short, angulate behind coxae, posteriorly markedly depressed, triangular, ventrolaterally and posterolaterally bordered. Proepisternum smooth. Mesepisternum coarsely but superficially punctate. Metepisternum rather short, c. 1.3 × as long as wide at anterior border. Epipleura anteriorly very wide, rugose. Abdomen impunctate, though laterally with numerous fine, elongate wrinkles and shallow impressions. Microreticulation dense, isodiametric. ♀ sternum VII quadrisetose, apex regularly curved.

Legs. Thin and elongate. 4th tarsomere medially faintly excised. 5th tarsomere asetose beneath. Vestiture of ♂ anterior tarsus unknown.

♂ genitalia. Unknown.

♀ genitalia. Stylomere 2 elongate, little curved, with obtuse apex, with 3 rather spaced ventral ensiform setae, a dorsal ensiform seta and one nematiform seta in a deep furrow moderately close to apex. Apex of stylomere 1 ventrally with c. 8 setae near base of stylomere 2. Lateral plate with 7-8 setae at or near margin.

Variation. Unknown.

Distribution (Fig. 30). Eastern central Irian Jaya west of the mountain ridge on the western margin of the valley of the Borme River. Known only from type locality.

Habits. Collected in rain forest in median altitude.

Etymology. The name refers to the markedly spinose apex of the elytra.

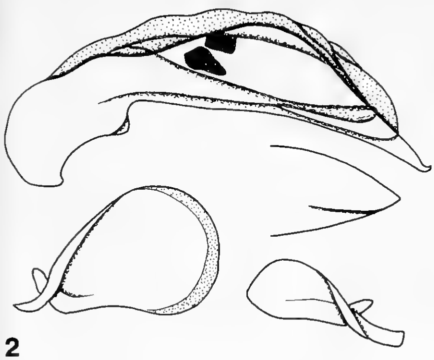
Relationships. Certainly very closely related to *F. unipunctatum*, spec. nov., but slightly more apomorphic. The decision, whether this is actually a separate species or merely a subspecies of *F. unipunctatum* will not be solved until males of both taxa are available.

Fortagonum denticulatum, spec. nov.

Figs 11-13, 30

Types. Holotype: ♂, IRIAN JAYA, Jayawijaya-Pr., Bime 1600-1900 m, 11.IX.1993, leg. A. Riedel (ZSM-CBM). - Paratype: 1♀, IRIAN JAYA, Jayawijaya-Pr., Galbok (w. Nalca), 1700-1800 m, 3.X.1993, leg. A. Riedel (CBM).

Diagnosis. Distinguished by presence of wings, rather narrow, conical pronotum with wide marginal channel, fairly elongate, convex elytra, and absence of anterior supraocular seta, both pronotal seta, and anterior and posterior discal setae.



12

13

Figs 12, 13. *Fortagonum denticulatum*, spec. nov. 12. ♂ aedeagus, apex of aedeagus, parameres, and genital ring. 13. ♀ stylomeres.

Description

Measurements. Length: 11.2-11.5 mm; width: 4.6-4.7 mm. Ratios. Width/length of pronotum: 1.32-1.34; width base/apex of pronotum: 1.53-1.60; width pronotum/head: 1.76-1.89; width elytra/pronotum: 1.31-1.32; length/width of elytra: 1.58-1.59.

Wing-and-seta formula: +w −+ — −+−.

Colour. Glossy black. Lateral margins of pronotum reddish translucent, labrum, mouth parts, antenna, and tarsi dark reddish-piceous, 1st-3rd antennomeres more or less infuscate. Lower surface black.

Head. Moderately narrow compared with prothorax. Neck rather wide, somewhat imbedded in prothorax. Eyes fairly large, laterally moderately projecting, orbits distinct, evenly curved. Clypeal suture distinct. Labrum rectangular, apex feebly concave. Mandibles elongate, straight, but not porrect. Antenna elongate, surpassing base of pronotum by about three segments, median antennomeres c. 3-3.5 × as long as wide. Both palpi elongate, basal maxillary palpomere thickened. No furrow medially of eyes, though a shallow furrow above antennal base present. Only posterior supraocular seta present, at posterior margin of eye. Clypeus and anterior part of frons with short, shallow, parallel furrows, frons evenly convex, absolutely smooth. Microreticulation isodiametric, somewhat superficial. Surface glossy.

Prothorax. Moderately wide, conical, widest in posterior third, laterally evenly though feebly convex, strongly narrowed to apex, moderately narrowed to base. Disk evenly convex, lateral margins widely explanate. Anterior angles rather projecting, obtuse at apex. Apex regularly and deeply excised. Lateral margin convex throughout, not bordered, with wide, shallow marginal channel. Basal angles rectangular, at apex obtusely rounded. Base laterally straight, in middle very faintly produced. Disk convex with extremely shallow, v-shaped sulcus in apical fourth, base near basal margin with a deep, circular impression on either side and with a very shallow transverse impression. Median line incomplete, fine, ending far from apex and base. Apex distinctly bordered, base not bordered. Both marginal setae absent. Disk impunctate. Microreticulation very fine, on disk highly superficial, near apex and base isodiametric and more conspicuous, on disk consisting of very fine transverse lines. Surface glossy.

Elytra. Rather narrow and elongate, dorsal surface markedly convex, lateral borders in middle almost straight. Preapical sinuosity extremely feeble. Widest diameter about in middle. Shoulders wide, angulate but not dentate, apex with short triangular spine opposite 3rd interval. Sutural angle with minute denticle. Striae deep, impunctate, intervals slightly convex. Anterior and posterior discal setae absent, median seta situated at 2nd stria. 18 marginal setae and 1 preapical seta at 7th stria present. Intervals impunctate. Microreticulation almost wanting. Surface highly glossy, rather iridescent. Wings present.

Lower surface. Prosternal process short, obtusely dentate behind coxae, posteriorly markedly depressed, triangular, ventrolaterally and posterolaterally bordered. Proepisternum smooth. Mesepisternum coarsely punctate. Metepisternum moderately elongate, c. 1.5 × as long as wide at anterior border. Epipleura anteriorly moderately wide, rugose. Abdomen impunctate, though laterally with several fine, elongate wrinkles and shallow impressions. Microreticulation dense, isodiametric, very superficial. ♂ sternum bisetose, in middle excised, ♀ sternum VII quadrisetose, apex regularly curved.

Legs. Thin and elongate. 4th tarsomere medially faintly excised. 5th tarsomere asetose beneath. 1st-3rd tarsomeres of ♂ anterior tarsus biseriately squamose.

♂ genitalia. Genital ring rather parallel, at apex asymmetric. Aedeagus stout, slightly curved, lower surface almost straight. Apex short and acute, with very small terminal hook. Lower surface near apex with a short carina. Internal sac in middle at top on either side with a small, odd-shaped, sclerotized plate. Left paramere very wide, almost circular.

♀ genitalia. Stylomere 2 elongate, little curved, with obtuse apex, with 3 large ventral ensiform setae, a dorsal ensiform seta and one nematiform seta in a deep furrow moderately close to apex. Apex of stylomere 1 ventrally with c. 6 setae near base of stylomere 2. Lateral plate with 3-4 setae at or near margin.

Variation. Little variation noted due to limited material, though pronotum varies slightly in shape and relative width.

Distribution (Fig. 30). Eastern central Irian Jaya.

Habits. Collected in rain forest in median altitude.

Relationships. This species is rather closely related to *F. unipunctatum*, spec. nov. and *F. spinosum*, spec. nov., but is slightly more apomorphic than both species.

Etymology. The name refers to the denticulate apex of the elytra.

Fortagonum depressum, spec. nov.

Figs 14, 17, 31

Types. Holotype: ♂, IRIAN JAYA, Manokwari-Prov. Testega-Meydoudga, 1000-1350 m, 10.IV.1993, leg. A. Riedel (ZSM-CBM). - Paratype: 1 ♀, Irian Jaya, Pr. Manokwari, Iba, 1300 m, 7.-8.4.1993, leg. A. Riedel (CBM).

Diagnosis. Distinguished by presence of wings, rather narrow, faintly conical pronotum with wide marginal channel, fairly elongate, convex elytra with slightly crenulate striae and depressed intervals, presence of a short spine opposite 3rd interval, and absence of both supraocular setae, both pronotal setae, and the anterior discal seta.

Description

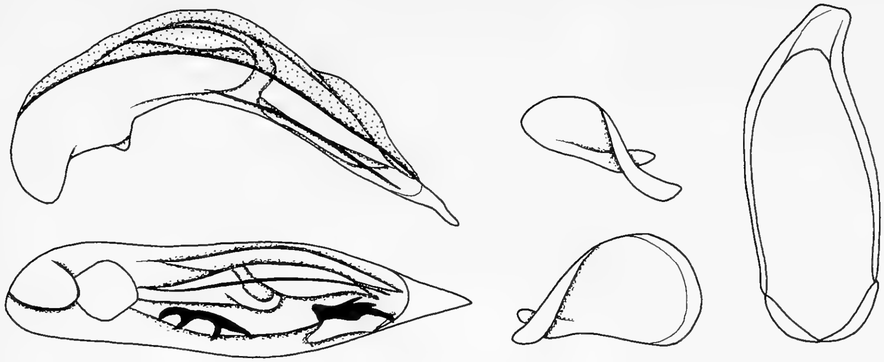
Measurements. Length: 10.7-11.4 mm; width: 4.35-4.60 mm. Ratios. Width/length of pronotum: 1.44-1.48; width base/apex of pronotum: 1.63; width pronotum/head: 1.87-1.91; width elytra/pronotum: 1.28-1.32; length/width of elytra: 1.62-1.65.

Wing-and-seta formula: +w — -- -++.

Colour. Iridescent black. Lateral margins of pronotum reddish translucent, labrum, mouth parts, antenna, and tarsi dark reddish-piceous, tibiae piceous, 1st-3rd antennomeres more or less infuscate. Lower surface black.

Head. Moderately narrow compared with prothorax. Neck rather wide, somewhat imbedded in prothorax. Eyes fairly large, laterally moderately projecting, orbits distinct, evenly curved. Clypeal suture distinct. Labrum rectangular, apex feebly concave. Mandibles elongate, straight, but not porrect. Antenna elongate, surpassing base of pronotum by about three segments, median antennomeres c. 4 × as long as wide. Both palpi elongate, basal maxillary palpomere thickened. No furrow medially of eyes, though a shallow furrow above antennal base present. No supraocular setae present. Clypeus and anterior part of frons with short, shallow, parallel furrows, inside of eyes with few elongate, fine though sharp lines, frons evenly convex. Microreticulation isodiametric, highly superficial, surface with sparse and extremely fine puncturation, glossy.

Prothorax. Moderately wide, conical, widest in posterior third, laterally evenly though feebly convex, strongly narrowed to apex, moderately narrowed to base. Disk evenly convex, lateral margins widely explanate. Anterior angles markedly projecting, obtuse at apex. Apex regularly and deeply



14

Fig. 14. *Fortagonum depressum*, spec. nov. ♂ aedeagus, parameres, and genital ring.

excised. Lateral margin convex throughout, not bordered, with wide, shallow marginal channel. Basal angles rectangular, at apex obtusely rounded. Base laterally straight, in middle very faintly produced. Disk convex with shallow, v-shaped sulcus in apical fourth, base near basal margin with a deep, circular impression on either side and with a very shallow transverse impression. Median line incomplete, fine, ending far from apex and base. Apex distinctly bordered, base not bordered. Both marginal setae absent. Disk impunctate, though with some fine, transverse wrinkles, in marginal channel and especially around basal grooves with irregular, rugose wrinkles. Microreticulation very fine, on disk highly superficial, near apex and base isodiametric and more conspicuous. Surface glossy apart from the rugose parts.

Elytra. Rather narrow and elongate, dorsal surface markedly convex, lateral borders in middle almost straight. Preapical sinuosity extremely feeble. Widest diameter about in middle. Shoulders wide, angulate but not dentate, apex with short triangular spine opposite 3rd interval that is slightly curved inwards. Sutural angle without denticle. Striae deep, faintly crenulate, intervals markedly depressed. Anterior discal seta absent, median seta situated on 3rd interval, posterior seta at 2nd stria. 17-19 marginal setae and 1 preapical seta at 7th stria present. Intervals impunctate. Microreticulation absent. Surface highly glossy, rather iridescent. Wings present.

Lower surface. Prosternal process short, evenly rounded behind coxae, posteriorly markedly depressed, triangular, ventrolaterally and posterolaterally bordered. Proepisternum finely, transversely striolate, distinctly microreticulate, dull. Mesepisternum densely and coarsely punctate. Metepisternum moderately elongate, c. 1.5 × as long as wide at anterior border, coarsely punctate. Epipleura anteriorly moderately wide, very rugose. Abdomen impunctate, though laterally with several fine, elongate wrinkles and shallow impressions. Microreticulation strong, dense, isodiametric. ♂ sternum bisetose, apex in middle excised, ♀ sternum VII quadrisetose, apex regularly curved.

Legs. Thin and elongate. 4th tarsomere medially faintly excised. 5th tarsomere asetose beneath. 1st-3rd tarsomeres of ♂ anterior tarsus biseriately squamose.

♂ genitalia. Genital ring narrow, rather parallel, at apex asymmetric. Aedeagus moderately elongate, rather curved, lower surface gently bisinuate, with elongate median carina on upper surface and a lateral carina on either margin, surface in cross-section triangular. Apex rather elongate, acute, with extremely small terminal knob. Internal sac on left side at bottom with two strongly sclerotized, denticulate plates or groups of plates, respectively, one tridentate plate in front, two closely adjacent unidentate plates behind middle. Left paramere very wide, almost circular.

♀ genitalia. Unknown, since in the single ♀ the apex of the abdomen is damaged.

Variation. Little variation noted due to limited material.

Distribution (Fig. 31). Vogelkop, extreme western Irian Jaya.

Habits. Collected in rain forest in median altitude.

Relationships. This species is rather remotely related to the three preceding species.

Etymology. The name refers to the markedly depressed elytral intervals.

Genus *Collagonum*, gen. nov.

Fortagonum Darlington, 1952 (part), p. 247.
Fortagonum, Darlington 1971 (part), p. 316, figs 75-76.
Fortagonum, Baehr 1992 (part), p. 74, figs 2, 3, 5, 6.

Diagnosis. The genus is characterized by the presence of a deep sulcus medially of the eyes, the wide, distorted pronotum with wide, explanate lateral margins, rather elongate, parallel, apically not spined or dentate elytra, the characteristic aedeagus with elongate, markedly sclerotized, curved, rod-like apex, the comparatively short ♀ stylomere, and the following wing-and-seta formula:

+w–w –+ +– –(+) +– +– +–

Description

Genus of Agoninae, delimited by the following character states: Colour black, almost always with bluish or purplish hue on the elytra. Head rather elongate with long, wide neck, moderately large, usually distinctly protruding eyes, a deep sulcus medially of eyes that completely divides the eye from frons, and elongate, though not porrect mandibles. Mentum with very elongate, acute median tooth. Other mouthparts like in related genera, but penultimate segments of both palpi shorter than in *Fortagonum*. Antenna moderately elongate, median segments usually <3 × as long as wide. Prothorax wide, distorted, laterally evenly rounded, with wide, markedly explanate lateral margins, shortly angulate or obtuse basal angles, and deeply excised apex. Elytra usually rather elongate, parallel, with evenly rounded shoulders, rounded, not denticulate nor spinose apex, and weak preapical sinuosity. Elytral striae deep, smooth, intervals convex. Marginal channel with 20-21 lateral setae, two apical setae and one preapical seta near 7th stria, disk with 3 or 0 setae, in latter case very rarely the median seta unilaterally present. Fully winged or wings shortened. In winged species metepisternum c. 2.5 × as long as wide, in species with reduced wings <2 × as long as wide. Prosternal process very short, rounded, behind procoxae depressed. Legs elongate, 5th tarsomeres asetose beneath, claws large, smooth. ♂ sternum VII evenly rounded at apex, bisetose. Aedeagus elongate, markedly curved, apex extended in an elongate, curved, strongly sclerotized rod with acute apex. Orificium very elongate, without sclerotized teeth within. ♀ stylomere 1 with some elongate setae at apex, stylomere 2 moderately elongate, dentiform, slightly curved, with 2-3 ventro-lateral ensiform setae, a dorsomedian ensiform seta, and an apical nematiform seta originating in a groove.

Distribution. Central Papua New Guinea, eastern central Irian Jaya, both New Guinea. The species inhabit montane rain forest in median altitudes and are mainly collected under logs and by sieving leaf litter.

Type species: *Fortagonum laticolle* Baehr, 1992, by present designation.

Etymology. From latin *collum* = neck, and *Agonum*. The name refers to the conspicuous shape of the pronotum.

The genus includes thus far the following species: *Collagonum limum* (Darlington, 1952), *C. hornabrooki* (Darlington, 1971), *C. distortum* (Darlington, 1971), *C. laticolle* (Baehr, 1992), and *C. ophthalmicum* (Baehr, 1992), as well as the four new species and one new subspecies described below.

Key to the species of the genus *Collagonum*, gen. nov.

1. Wings present .... 2.
– Wings absent .... 7.

2. Both pairs of supraocular setae absent .... 3.
– At least posterior supraocular seta present .... 5.

3. Eyes laterally abruptly produced; pronotum at apex much narrower than at base. Central Irian Jaya .... *ophthalmicum* (Baehr)
– Eyes laterally not as abruptly produced; pronotum at apex only slightly narrower than at base .... 4.

4. Both pronotal setae absent. Eastern Irian Jaya .... *robustum*, spec. nov.
– Posterior pronotal seta present. Eastern Irian Jaya .... *riedeli*, spec. nov.

5. Wider species; pronotum wider, laterally more rounded, with shorter, more convex anterior angles. Central Papua New Guinea .... *violaceum*, spec. nov.
– Narrower species; pronotum narrower, laterally less rounded, with longer, more acute anterior angles. Central and eastern Irian Jaya .... *laticolle* (Baehr) 6.

6. Eyes smaller, laterally more abruptly protruding, almost devoid of distinct orbits (Fig. 15). Area west of mountain range to the west of valley of Borme River .... *laticolle laticolle* (Baehr)
– Eyes larger, laterally less abruptly protruding, with distinct, oblique orbits (Fig. 16). Area east of mountain range to the west of valley of Borme River .... *laticolle macrops*, subspec. nov.

7. Eyes laterally abruptly produced; elytra asetose, or (rarely) unilaterally unisetose .... 8.
– Eyes laterally not as abruptly produced; elytra trisetose .... 9.

8. Both supraocular setae present; posterior pronotal seta present; frons conspicuously swollen. Central Papua New Guinea .... *distortum* (Darlington)
– Anterior supraocular seta absent; posterior pronotal seta absent; frons not swollen. Central Papua New Guinea .... *limum* (Darlington)

9. Both supraocular setae present; prothorax narrower, <1.5 × as wide as long. Central eastern Irian Jaya .... *convexum*, spec. nov.
– Anterior supraocular seta absent; prothorax wider, c. 1.7 × as wide as long. Central Papua New Guinea .... *hornabrooki* (Darlington)

Collagonum laticolle (Baehr) (comb. nov.)

Fortagonum laticolle Baehr, 1992, p. 77, figs 2, 5.

Diagnosis. Elongate, violaceous species with wide, laterally markedly convex, distorted pronotum. Distinguished from related species by presence of wings and absence of anterior supraorbital seta and anterior pronotal seta, and from the most closely related *C. violaceum*, spec. nov. by narrower pronotum with longer, more acute anterior angles, and longer and narrower elytra.

This species was described from a single female from central Irian Jaya. Because males have been now discovered, the ♂ genitalia are herewith described.

Newly collected material reveals that the species includes two slightly different subspecies in two closely adjacent areas, divided only by a mountain range west to the Borme river. They are mainly distinguished by the larger, though laterally less abruptly protruding eyes, the slightly more rounded anterior angles of the pronotum, and the slightly wider elytra in the new subspecies *C. laticolle macrops*.

Collagonum laticolle laticolle (Baehr) (comb. nov.)

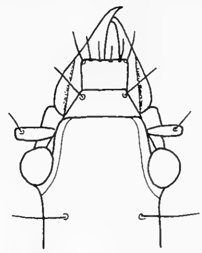
Figs 15, 19, 30

Fortagonum laticolle Baehr, 1992, p. 77, figs 2, 5.

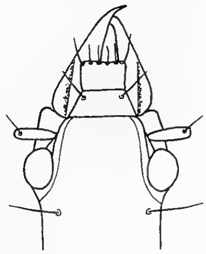
New records: 1♂, Irian Jaya, Jayawijaya Prov., Diuremna, 1900-2100 m, 9.-11.9.1992, leg. A. Riedel (CBM); 1♂, IRIAN JAYA, Jayawijaya-Pr., Bime 1600-1900 m, 11.IX.1993, leg. A. Riedel (CBM); 1♂, IRIAN JAYA, Jayawijaya-Pr., Gabok (W. Nalca) 1700-1800 m, 3.X.1993, leg. A. Riedel (CBM); 1♂, IRIAN JAYA, Panai-Prov., Mulia (n) to Dowome, 2200-2250 m, 8.VII.1994, leg. A. Riedel (CBM).

Description of some additional characters

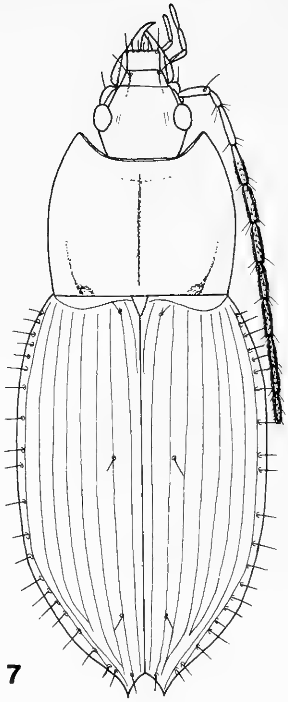
Measurements. Length: 11.2-12.1 mm; width: 4.15-4.70 mm. Ratios. Width/length of pronotum: 1.50-1.57; width base/apex of pronotum: 1.49-1.55; width pronotum/head: 1.80-1.86; width elytra/pronotum: 1.15-1.19; length/width of elytra: 1.62-1.69.



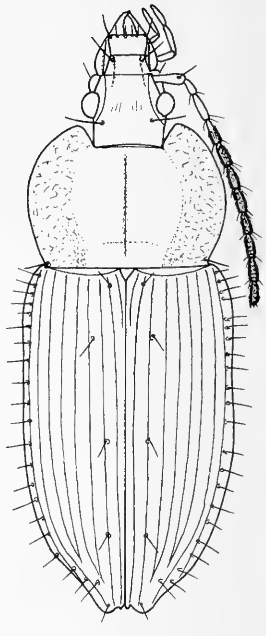
15



16



17



18

Figs 15, 16. Head. 15. *Collagonum laticolle laticolle* (Baehr). 16. *C. laticolle macrops*, subspec. nov.
Figs 17, 18. Habitus. 17. *Fortagonum depressum*, spec. nov. ♂ holotype. 18. *Collagonum violaceum*, spec. nov. Lengths: 10.7 mm, 12.3 mm.

♂ genitalia. Sternum VII bisetose and at apex regularly rounded. Genital ring fairly wide, moderately asymmetric, apex narrow, fairly short. Aedeagus slightly curved, apical part extended to an elongate, strongly sclerotized rod that is down-turned in a very weak though still visible angle. Apex with acute, lancet-shaped tip without lateral hooks. Internal sac without sclerotized plates or teeth. Both parameres rather elongate, right paramere at apex rather convex.

Variation. Some sexual variation noted within the nominate subspecies, because the males are comparatively longer and narrower, especially concerning their elytra.

Distribution (Fig. 30). Eastern central Irian Jaya west of the mountain ridge on the western margin of the valley of the Borme River. The new records enlarge the recorded range of this species slightly eastwards and westwards through the central highlands of Irian Jaya.

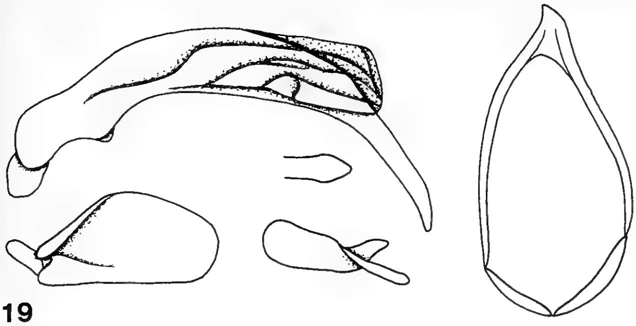
Note. In the original description of this species the wing-and-seta formula must be read **+w** instead of erroneous **−w** (misprint!), because the species is fully winged as mentioned in the key and the description.

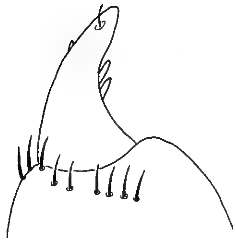
Collagonum laticolle macrops, subspec. nov.

Figs 16, 20, 30

Types. Holotype: ♂, Irian Jaya, Jayawijaya Prov., Borme, 1500-2000 m, 14.8.1992, leg. A. Riedel (ZSM). - Paratypes: 3♂♂, 1♀, same data (CBM); 2♀♀, Irian Jaya, Jayawijaya Prov., Taramlu, 1700 m, 6.IX.1993, leg. A. Riedel (CBM).

Diagnosis. Distinguished from the nominate subspecies by larger, though laterally less abruptly protruding eyes, slightly more rounded anterior angles of the pronotum, and slightly wider elytra.


19


20

Figs 19, 20. Genitalia. 19. *Collagonum laticolle laticolle* (Baehr). ♂ aedeagus, apex of aedeagus, parameres, and genital ring. 20. *C. laticolle macrops*, subspec. nov. ♀ stylomeres.

Description

Measurements. Length: 11.5-12.5 mm; width: 4.4-4.7 mm. Ratios. Width/length of pronotum: 1.46-1.55; width base/apex of pronotum: 1.52-1.56; width pronotum/head: 1.73-1.83; width elytra/pronotum: 1.15-1.22; length/width of elytra: 1.65-1.70.

Wing-and-seta formula: +w −+ −+ +++.

Colour. Similar to nominate subspecies.

Head. Largely similar to nominate subspecies, though eyes larger, but not so abruptly projecting, and sulcus medially of eyes less deep.

Prothorax. Largely similar to nominate subspecies, though generally slightly narrower and with slightly less protruding anterior angles.

Elytra. Largely similar to nominate subspecies, though generally slightly wider and shorter.

Lower surface. Similar to nominate subspecies.

Legs. Similar to nominate subspecies.

♂ genitalia. Similar to nominate subspecies.

♀ genitalia. Stylomere 2 moderately elongate, slightly curved, with obtuse apex, with 2 ventral ensiform setae, a dorsal ensiform seta and one nematiform seta in a deep furrow rather close to apex. Apex of stylomere 1 ventrally with c. 9 setae near base of stylomere 2. Lateral plate with c. 4 setae at or near margin.

Variation. Little variation noted.

Distribution (Fig. 30). Eastern central Irian Jaya east of the mountain ridge on the western margin of the valley of the Borme River.

Habits. Collected in rain forest in median altitude.

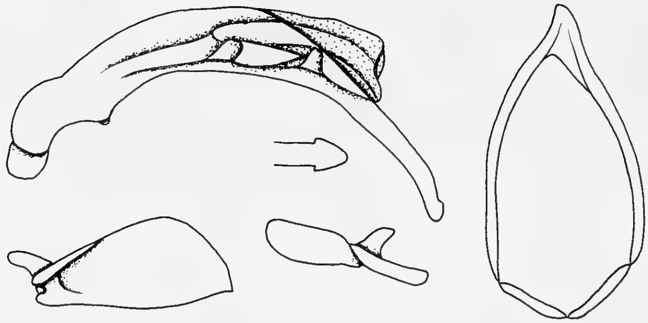
Etymology. The name refers to the larger, though less abruptly projecting eyes of this subspecies.

Collagonum violaceum, spec. nov.

Figs 18, 21, 22, 31

Types. Holotype: ♂, PNG, Morobe Pr. Aseki, 1500-1650 m, 14.9.1992, leg. A. Riedel (ZSM). - Paratypes: 2♂♂, 2♀♀, same data (CBM).

Diagnosis. Elongate, violaceous species with wide, laterally markedly convex, distorted pronotum. Distinguished from related species by presence of wings and absence of anterior supraorbital seta and anterior pronotal seta, and from the most closely related *C. laticolle* (Baehr) by wider pronotum with shorter, more rounded anterior angles, and shorter and wider elytra.



21

22

Figs 21, 22. *Collagonum violaceum*, spec. nov. 21. ♂ aedeagus, apex of aedeagus, parameres, and genital ring. 22. ♀ stylomeres.

Description

Measurements. Length: 12.1-12.7 mm; width: 4.6-4.8 mm. Ratios. Width/length of pronotum: 1.68-1.75; width base/apex of pronotum: 1.61-1.68; width pronotum/head: 2.0-2.03; width elytra/pronotum: 1.06-1.09; length/width of elytra: 1.60-1.62.

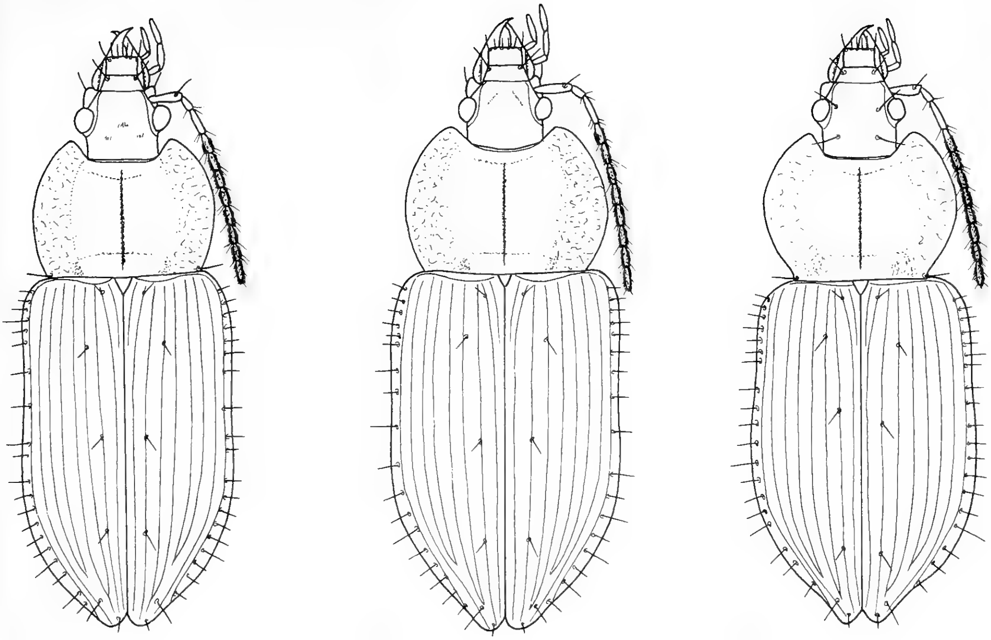
Wing-and-seta formula: +w –+ –+ +++.

Colour. Black with a distinct violet-blue iridescence on the elytra. Lateral borders of pronotum reddish translucent, labrum, mouth parts, antenna, and tarsi dark piceous. 1st-3rd antennomeres more or less distinctly infuscate. Lower surface black.

Head. Narrow compared with prothorax. Neck rather narrow, elongate behind eyes. Eyes rather large, strongly, though not abruptly protruding, orbits almost absent. Clypeal suture distinct. Labrum moderately elongate, apex straight. Mandibles moderately elongate, straight. Antenna moderately elongate, surpassing base of pronotum by about two segments, median antennomeres <3 × as long as wide. Both palpi elongate, basal maxillary palpomere thickened. Furrow above antennal base and inside of eyes deep, conspicuous. Anterior supraocular seta absent, posterior seta situated slightly behind posterior margin of eye. Frons rather evenly convex, impunctate, laterally with a shallow groove that is crossed by some oblique wrinkles. Microreticulation extremely superficial, isodiametric. Surface glossy.

Prothorax. Very wide, laterally very broadly deplanate, evenly curved, much more evenly narrowed to apex than to base. Widest diameter about in middle. Anterior angles remarkably projecting, at apex widely rounded off. Apex deeply excised, excision almost straight. Lateral margin convex to basal angles which bear a very small denticle. Base laterally straight, in middle feebly produced. Disk fairly convex, lateral parts broadly deplanate, slightly upturned. In anterior third with a shallow, slightly v-shaped depression, median line distinct, attaining neither apex nor base, base with a shallow transverse depression. Basal grooves deep, large, about circular. Apex bordered, lateral margins not bordered, base bordered in middle. Anterior marginal seta absent, posterior marginal seta situated right on posterior angle. Lateral channel and basal grooves coarsely and irregularly punctate-vermiculate, though punctures rather superficial. Disk impunctate, almost smooth. Microreticulation near apex and base about isodiametric, in middle extremely superficial, barely visible, consisting of extremely fine transverse lines. Surface on disk glossy, rather iridescent.

Elytra. Elongate, moderately wide, rather parallel, dorsal surface convex, lateral borders almost straight in anterior 3/5, behind shoulders even faintly concave, towards apex evenly rounded. Widest diameter well behind middle. Preapical sinuosity rather shallow. Shoulders wide, rounded. Apex with a short, rounded projection opposite 3rd interval. Sutural angle with a very small denticle. Striae deep, impunctate, intervals convex. Discal setae short, inconspicuous, anterior seta near 3rd stria, median and posterior setae near 2nd stria. 20-21 marginal setae and 3 apical setae present, two of the latter situated on apical border, one near 7th stria. Intervals impunctate. Microreticulation very superficial, consisting of extremely fine, dense, transverse lines. Surface markedly iridescent. Fully winged.



23 24 25

Figs 23-25. Habitus. 23. *Collagonum riedeli*, spec. nov. 24. *C. robustum*, spec. nov. 25. *C. convexum*, spec. nov. Lengths: 11.5 mm, 12.0 mm, 11.5 mm.

Lower surface. Prosternum very short, not surpassing procoxae, rounded off, posteriorly depressed, ventrally bordered. Proepisternum almost impunctate, with dense microreticulation. Mesepisternum rather densely, though somewhat superficially punctate. Metepisternum elongate, c. 2.5 × as long as wide at anterior border. Epipleura anteriorly moderately wide, posteriorly very narrow, moderately rugose. Abdomen impunctate, though laterally with some fine wrinkles. Microreticulation very distinct, isodiametric. ♂ sternum VII bisetose, ♀ sternum VII quadrisetose, in one ♀ even asymmetrically 6-setose, apex evenly rounded in both sexes.

Legs. Rather thin and elongate. 5th tarsomere asetose beneath. 4th tarsomere medially slightly excised. 1st-3rd tarsomeres of ♂ anterior tarsus biseriately squamose.

♂ genitalia. Genital ring moderately narrow, fairly symmetric, apex narrow, rather short. Aedeagus slightly curved, apical part extended to an elongate, strongly sclerotized rod that is downcurved without a distinct angle. Apex with obtusely convex, lancet-shaped tip with small lateral hooks. Internal sac without sclerotized plates or teeth. Both parameres rather elongate.

♀ genitalia. Stylomere 2 moderately elongate, slightly curved, with obtuse apex, with 3 ventral ensiform setae, a dorsal ensiform seta and one nematiform seta in a deep furrow moderately close to apex. Apex of stylomere 1 ventrally with c. 8 setae near base of stylomere 2. Lateral plate with c. 4 setae at or near margin.

Variation. Little variation noted.

Distribution (Fig. 31). Eastern central Papua New Guinea. Known only from type locality.

Habits. Collected in rain forest in median altitude.

Relationships. This species is certainly most closely related to the western *C. laticolle* (Baehr), though it is in some respects slightly less apomorphic.

Etymology. The name refers to the distinct violaceous tint of the elytra.

26 27

Figs 26, 27. ♀ stylomeres. 26. *Collagonum riedeli*, spec. nov. 27. *C. convexum*, spec. nov.

Collagonum riedeli, spec. nov.

Figs 23, 26, 30

Types. Holotype: ♀, Irian Jaya, Jayawijaya-Pr., Bommela, 1750 m, 30.8.-1.9.1992, leg. A. Riedel (ZSM). - Paratype: 1♀, same data (CBM).

Diagnosis. Elongate, violaceous species with wide, laterally markedly convex, distorted pronotum. Distinguished from related species by presence of wings and absence of both supraorbital seta and the anterior pronotal seta.

Description

Measurements. Length: 11.5-11.9 mm; width: 4.3-4.5 mm. Ratios. Width/length of pronotum: 1.55; width base/apex of pronotum: 1.53-1.56; width pronotum/head: 1.79-1.88; width elytra/pronotum: 1.16-1.19; length/width of elytra: 1.60-1.63.

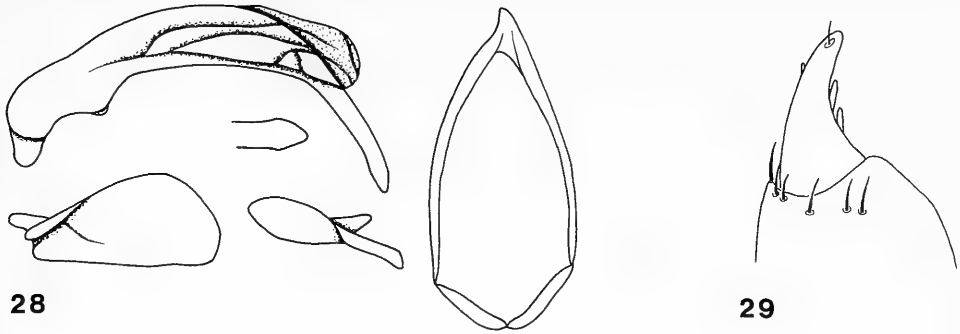
Wing-and-seta formula: +w — –+ +++.

Colour. Black with slight violet-blue iridescence on the elytra. Lateral borders of pronotum reddish translucent, labrum, mouth parts, antenna, and tarsi dark piceous. 1st-3rd antennomeres more or less distinctly infuscate. Lower surface black.

Head. Rather narrow compared with prothorax. Neck rather narrow, elongate behind eyes. Eyes rather large, strongly, though not abruptly protruding, orbits almost absent. Clypeal suture distinct. Labrum moderately elongate, apex straight. Mandibles moderately elongate, straight. Antenna moderately elongate, surpassing base of pronotum by about one segment, median antennomeres c. 2.5 × as long as wide. Both palpi elongate, basal maxillary palpomere thickened. Furrow above antennal base and inside of eyes deep, conspicuous. Both supraocular setae absent. Frons rather evenly convex, impunctate, in middle with a very slight, triangular impression, laterally with a very shallow groove. Microreticulation distinct, isodiametric. Surface moderately glossy.

Prothorax. Wide, laterally broadly deplanate, laterally evenly curved, much more narrowed to apex than to base. Widest diameter about in middle. Anterior angles remarkably projecting, at apex rounded off. Apex deeply excised, excision almost straight. Lateral margin convex to basal angles which bear a very small denticle. Base laterally straight, in middle feebly produced. Disk fairly convex, lateral parts broadly deplanate, slightly upturned. In anterior fourth with a shallow, slightly v-shaped depression, median line distinct, attaining neither apex nor base, base with a shallow transverse depression. Basal grooves deep, large, about circular. Apex bordered, lateral margins not bordered, base bordered in middle. Anterior marginal seta absent, posterior marginal seta situated right on posterior angle. Lateral channel and basal grooves coarsely and irregularly punctate-vermiculate, though punctures superficial. Disk impunctate, almost smooth. Microreticulation near apex and base about isodiametric, in middle rather superficial, consisting of very fine transverse lines. Surface on disk glossy, rather iridescent.

Elytra. Elongate, moderately wide, almost parallel, dorsal surface convex, lateral borders almost straight in anterior 3/5, behind shoulders even faintly concave, towards apex evenly rounded. Widest diameter well behind middle. Preapical sinuosity rather shallow. Shoulders wide, rounded. Apex with



28

29

Figs 28, 29. *Collagonum robustum*, spec. nov. 28. ♂ aedeagus, apex of aedeagus, parameres, and genital ring. 29. ♀ stylomeres.

a short, rounded projection opposite 3rd interval. Sutural angle without denticle. Striae deep, impunctate, intervals convex. Discal setae short, inconspicuous, anterior seta near 3rd stria, median and posterior setae near 2nd stria. 20 marginal setae and 3 apical setae present, two of the latter situated on apical border, one near 7th stria. Intervals impunctate. Microreticulation highly superficial, consisting of extremely fine, dense, transverse lines. Surface rather iridescent. Fully winged.

Lower surface. Prosternum very short, not surpassing procoxae, rounded off, posteriorly depressed, ventrally bordered. Proepisternum almost impunctate, with dense microreticulation and with some longitudinal strioles. Mesepisternum rather densely, though somewhat superficially punctate. Metepisternum elongate, c. 2.5 × as long as wide at anterior border. Epipleura anteriorly moderately wide, posteriorly very narrow, moderately rugose. Abdomen impunctate, though laterally with some fine wrinkles. Microreticulation very distinct, isodiametric. ♀ sternum VII quadrisetose, apex evenly rounded.

Legs. Rather thin and elongate. 5th tarsomere asetose beneath. 4th tarsomere medially slightly excised. Vestiture of ♂ anterior tarsus unknown.

♂ genitalia. Unknown.

♀ genitalia. Stylomere 2 moderately elongate, fairly curved, with obtuse apex, with 3 ventral ensiform setae, a dorsal ensiform seta and one nematiform seta in a deep furrow rather close to apex. Apex of stylomere 1 ventrally with 6-7 setae near base of stylomere 2. Lateral plate with 7-8 setae at or near margin.

Variation. Some variation noted in relative shape of pronotum.

Distribution (Fig. 30). Eastern central Irian Jaya. Known only from type locality.

Habits. Collected in rain forest in median altitude.

Relationships. This species is most closely related to *C. laticolle* (Baehr) and *C. violaceum*, spec. nov., and *C. robustum*, spec. nov., respectively, and takes an intermediate position between both groups of species.

Etymology. The name is a patronym in honour of the collector of all species mentioned in this paper.

Collagonum robustum, spec. nov.

Figs 24, 28-30

Types. Holotype: ♂, Irian Jaya, Jayawijaya-Pr., Langda, 2100-2300 m, 27.-28.8.1992, leg. A. Riedel (ZSM). - Paratypes: 1♂, 1♀, same data (CBM).

Diagnosis. Elongate, violaceous species with wide, laterally markedly convex, distorted pronotum. Distinguished from related species by presence of wings and absence of both supraorbital setae and both pronotal setae.

Description

Measurements. Length: 11.9-12.4 mm; width: 4.45-4.75 mm. Ratios. Width/length of pronotum: 1.54-1.58; width base/apex of pronotum: 1.44-1.51; width pronotum/head: 1.83-1.94; width elytra/pronotum: 1.09-1.14; length/width of elytra: 1.60-1.63.

Wing-and-seta formula: +w — –– +++.

Colour. Black with slight violet-blue iridescence on the elytra. Lateral borders of pronotum reddish translucent, labrum, mouth parts, antenna, and tarsi dark piceous. 1st-3rd antennomeres more or less distinctly infuscate. Lower surface black.

Head. Narrow compared with prothorax. Neck rather narrow, elongate behind eyes. Eyes rather large, strongly, though not abruptly protruding, orbits almost absent. Clypeal suture distinct. Labrum moderately elongate, apex straight. Mandibles moderately elongate, straight. Antenna moderately elongate, surpassing base of pronotum by about one segment, median antennomeres c. 2.5 × as long as wide. Both palpi elongate, basal maxillary palpomere thickened. Furrow above antennal base and inside of eyes deep, conspicuous. Both supraocular setae absent. Frons rather evenly convex, impunctate, in middle with a very slight, triangular impression, laterally with a very shallow groove. Microreticulation distinct, isodiametric. Surface moderately glossy.

Prothorax. Wide, laterally broadly deplanate, evenly curved, much more narrowed to apex than to base. Widest diameter about in middle. Anterior angles remarkably projecting, at apex rounded off. Apex deeply excised, excision almost straight. Lateral margin convex to basal angles which bear a very small denticle. Base laterally straight, in middle feebly produced. Disk fairly convex, lateral parts broadly deplanate, slightly upturned. In anterior fourth with a shallow, slightly v-shaped depression, median line distinct, attaining neither apex nor base, base with a shallow transverse depression. Basal grooves deep, large, about circular. Apex bordered, lateral margins not bordered, base bordered in middle. Both marginal setae absent. Lateral channel and basal grooves coarsely and irregularly punctate-vermiculate, though punctures superficial. Disk impunctate, almost smooth. Microreticulation near apex and base about isodiametric, in middle rather superficial, consisting of very fine transverse lines. Surface on disk glossy, rather iridescent.

Elytra. Elongate, moderately wide, almost parallel, dorsal surface convex, lateral borders almost straight in anterior 3/5, behind shoulders even faintly concave, towards apex evenly rounded. Widest diameter well behind middle. Preapical sinuosity rather shallow. Shoulders wide, rounded. Apex with a short, rounded projection opposite 3rd interval. Sutural angle without denticle. Striae deep, impunctate, intervals convex. Discal setae short, inconspicuous, anterior seta near 3rd stria, median and posterior setae near 2nd stria. 20 marginal setae and 3 apical setae present, two of the latter situated on apical border, one near 7th stria. Intervals impunctate. Microreticulation rather distinct, consisting of fine, dense, transverse lines. Surface slightly iridescent. Fully winged.

Lower surface. Prosternum very short, not surpassing procoxae, rounded off, posteriorly depressed, ventrally bordered. Proepisternum almost impunctate, with dense microreticulation. Mesepisternum rather densely, though superficially punctate. Metepisternum elongate, c. 2.5 × as long as wide at anterior border. Epipleura anteriorly moderately wide, posteriorly very narrow, moderately rugose. Abdomen impunctate, though laterally with some fine wrinkles. Microreticulation distinct, isodiametric. ♂ sternum VII bisetose, ♀ sternum VII quadrisetose, apex evenly rounded in both sexes.

Legs. Rather thin and elongate. 5th tarsomere asetose beneath. 4th tarsomere medially slightly excised. 1st-3rd tarsomeres of ♂ anterior tarsus biseriately squamose.

♂ genitalia. Genital ring rather narrow, symmetric, apex narrow, fairly short. Aedeagus slightly curved, apical part extended to an elongate, strongly sclerotized rod that is downcurved in a weak though distinct angle. Apex obtusely angulate with a somewhat lancet-shaped tip but without lateral hooks. Internal sac without sclerotized plates or teeth. Both parameres rather elongate.

♀ genitalia. Stylomere 2 moderately elongate, fairly curved, with obtuse apex, with 2 ventral ensiform setae, a dorsal ensiform seta and one nematiform seta in a deep furrow rather close to apex. Apex of stylomere 1 ventrally with 6-7 setae near base of stylomere 2. Lateral plate with c. 6 setae at or near margin.

Variation. There is some variation in shape, because the holotype has slightly wider pronotum and wider and shorter elytra.

Distribution (Fig. 30). Eastern central Irian Jaya. Known only from type locality.

Habits. Collected in rain forest in median altitude.

Relationships. This species is probably most closely related to *C. riedeli*, spec. nov.

Etymology. The name refers to the robust build of prothorax and elytra.

Collagonum convexum, spec. nov.
Figs 25, 27, 30

Types. Holotype: ♀, IRIAN JAYA, Jayawijaya-Pr., N. Bime 2000-2070 m, 21.IX.1993, leg. A. Riedel (ZSM-CBM).

Diagnosis. Moderately elongate, black species with wide, laterally markedly convex, distorted pronotum. Distinguished from related species by absence of wings, comparatively short and markedly convex elytra, presence of both supraorbital setae, and absence of anterior pronotal seta.

Description

Measurements. Length: 11.5 mm; width: 4.35 mm. Ratios. Width/length of pronotum: 1.45; width base/apex of pronotum: 1.38; width pronotum/head: 1.90; width elytra/pronotum: 1.18; length/width of elytra: 1.5.

Wing-and-seta formula: –w ++ –+ +++.

Colour. Black, labrum, mouth parts, and tarsi reddish-piceous, antenna piceous. Lower surface black.

Head. Narrow compared with prothorax. Neck rather narrow, elongate behind eyes. Eyes moderately large, strongly, though not abruptly protruding, orbits short, obliquely convex. Clypeal suture distinct. Labrum moderately elongate, apex straight. Mandibles moderately elongate, straight. Antenna moderately elongate, surpassing base of pronotum by about one segment, median antennomeres <2.5 × as long as wide. Both palpi elongate, basal maxillary palpomere thickened. Furrow above antennal base and inside of eyes rather deep, conspicuous. Both supraocular setae present, posterior setae situated shortly behind posterior margin of eye. Frons rather evenly convex, impunctate, in middle with a very slight, transverse impression. Microreticulation distinct, isodiametric. Surface moderately glossy.

Prothorax. Rather wide, laterally broadly deplanate, evenly curved, slightly more narrowed to apex than to base. Widest diameter about in middle. Anterior angles remarkably projecting, at apex rounded off. Apex deeply excised, excision narrow, almost straight. Lateral margin markedly convex, hence apex and base both rather narrow. Basal angles with a very small concavity, but without denticle. Base laterally straight, in middle feebly produced. Disk fairly convex, lateral parts broadly deplanate, slightly upturned. In anterior fourth with a shallow, slightly v-shaped depression, median line distinct, almost attaining apex, but not base, base with a shallow transverse depression. Basal grooves deep, large, about circular. Apex bordered, lateral margins not bordered, base bordered in middle. Anterior marginal seta absent, posterior seta situated right on basal angle. Lateral channel and basal grooves irregularly and rather superficially punctate-vermiculate. Disk impunctate, almost smooth. Microreticulation near apex and base about isodiametric, in middle rather superficial, consisting of fine transverse lines and meshes. Surface on disk moderately glossy, but not iridescent.

Elytra. Rather short and fairly wide, posteriorly distinctly widened, dorsal surface markedly convex, lateral borders slightly oblique in anterior half, towards apex evenly rounded. Widest diameter well behind middle. Preapical sinuosity rather shallow. Shoulders wide, evenly rounded. Apex with a short, rounded projection opposite 3rd interval. Sutural angle with an obtuse denticle. Striae deep, impunctate, intervals convex. Discal setae short, inconspicuous, anterior seta near 3rd stria, median and posterior setae near 2nd stria. 20 marginal setae and 2 apical setae present, one of the latter situated on apical border, the other near 7th stria. Intervals impunctate. Microreticulation rather distinct, consisting of fine, dense, transverse lines and meshes. Surface modserately glossy, not iridescent. Wingless.

Lower surface. Prosternum very short, not surpassing procoxae, rounded off, posteriorly depressed, ventrally bordered. Proepisternum impunctate, with dense microreticulation. Mesepisternum rather sparsely, superficially punctate. Metepisternum moderately elongate, <2 × as long as wide at anterior border. Epipleura anteriorly rather wide, posteriorly moderately narrow, rather rugose. Abdomen impunctate, though laterally with some fine wrinkles. Microreticulation distinct, isodiametric. ♀ sternum VII quadrisetose, apex evenly rounded.

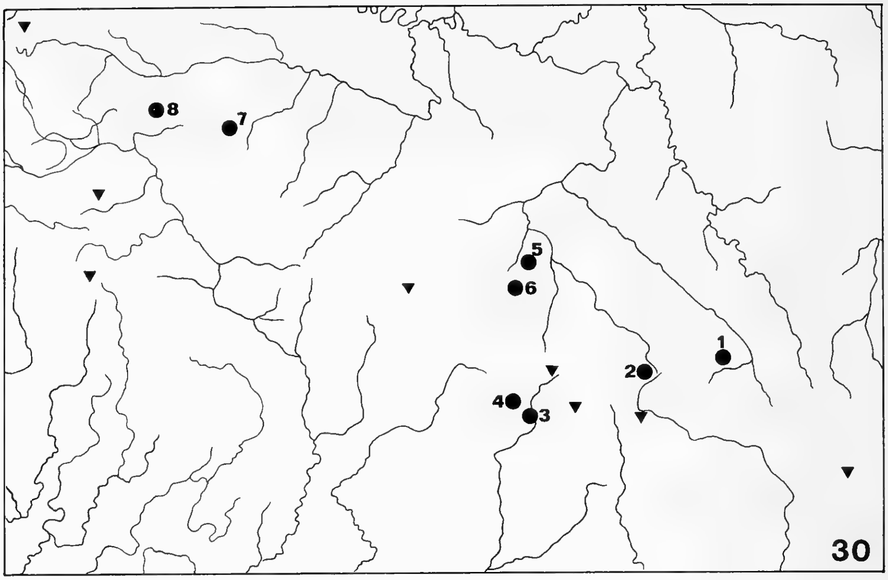


Fig. 30. Localities of recently collected *Fortagonum* and *Collagonum* material in central and eastern central Irian Jaya, including the species mentioned in Baehr (1992). Eastern (right) margin is the PNG/IJ border, western (left) margin lies slightly west of Gn. Trikora (Wilhelmina Top), upper (northern) margin is crossed by the Idenburg River, lower (southern) margin meets at the right border about the former Papua/New Guinea border. Triangels denote the highest mountains. For position of cut within New Guinea see fig. 31. Localities: 1. Borme area (*F. unipunctatum, C. laticolle macrops*); 2. Bime area (*F. spinosum, F. denticulatum, C. laticolle laticolle, C. convexum*); 3. Langda area (*F. latum, C. robustum*); 4. Bommela area (*F. bisetosiceps, C. riedeli*); 5. Diuremna area (*F. acuticolle, C. laticolle laticolle*); 6. Nalca area (*F. denticulatum, C. laticolle laticolle*); 7. Ilugwa area (*F. bufo, C. laticolle laticolle*); 8. Baliem area, pass Valley (*F. curtum, C. ophthalmicum*).

Legs. Rather thin and elongate. 5th tarsomere asetose beneath. 4th tarsomere medially slightly excised. Vestiture of ♂ anterior tarsus unknown.

♂ genitalia. Unknown.

♀ genitalia. Stylomere 2 moderately elongate, slightly curved, with obtuse apex, with 2 ventral ensiform setae, a dorsal ensiform seta and one nematiform seta in a deep furrow moderately close to apex. Apex of stylomere 1 ventrally with c. 6 setae near base of stylomere 2. Lateral plate with c. 15 setae at or near margin.

Variation. Unknown.

Distribution (Fig. 30). Eastern central Irian Jaya. Known only from type locality.

Habits. Collected in rain forest in median altitude.

Relationships. This is a very isolated species and altogether perhaps the most plesiomorphic species within the genus.

Etymology. The name refers to the short, convex shape of the elytra.

Discussion

The present descriptions of several new species and subspecies of the previous genus *Fortagonum* Darlington from both political divisions of New Guinea demonstrate once more the inadequate knowledge of the carabid fauna of the mountains of New Guinea. This extremely montaneous island is apparently inhabited by large numbers of locally distributed, generally closely related, to some extent wingless species that mainly populate the montane forests in median altitude throughout the whole island. This statement is not only true for the highly evloved genera *Fortagonum* and *Collagonum*,

Fig. 31. Distributions. *Fortagonum depressum*, spec. nov.: ●; *Collagonum violaceum*, spec. nov.: ■. The rectangle denotes the outline of the area enlarged in fig. 30.

but also for related agonine genera, some of which are perhaps even more diverse in terms of species, but the numerous species are likewise very locally distributed. It is also true for other, non-agonine genera, e.g. the lebiine genus *Demetrida* (Darlington 1968, 1971) or the pentagonicine genus *Scopodes* (Baehr 1994).

The agonine fauna of New Guinea is very rich and diverse, as stated by Darlington (1971), and due to better exploration it appears to be even considerably richer than Darlington imagined. Although several highly peculiar genera live in New Guinea, the generic limits are rather weak and become even weaker, as the fauna is being better studied. In the future, when the fauna is more adequately recorded, revisors will have to decide, in which way they will accomplish the large number and high diversity of the agonine fauna. Certainly the present generic concept of the New Guinean agonines is not really satisfying, because it includes too many genera of convenience the true generic limits and relationships of which are not yet known. A future revisor therefore must decide for either a very wide generic concept, in which, for example, the genera *Altagonum* Darlington, *Iridagonum* Darlington, *Montagonum* Darlington, *Nebriagonum* Darlington, and *Fortagonum* Darlington should be included in a single genus, and a more limited concept in which even more genera should be distinguished than at present. I do not know, however, which concept will be preferable. For the present I think it the best to keep most of the present genera without any change or subdivision in subgenera, even when this would seem advisible.

Concerning the genus *Fortagonum* such subdivision is made in the case of the species with a wide, distorted pronotum that also differ clearly from the remaining species in some other characters: e.g. the deep cleft inside of the eyes that divides the eyes from the frons; the elongate, parallel elytra with rounded shoulders; the peculiar aedeagus.

Within the genera *Fortagonum* and *Collagonum* several trends exist that are to a large part reductions: e.g. reduction of wings that is accompanied by shortening of the hind body; reduction of the fixed setae of head, pronotum, and elytra that may eventually lead to the total loss of all supraorbital, pronotal and discal setae; reduction of the microreticulation that leads to a glossy, rather iridescent surface. Other trends in both genera or the one or the other genus only are: lengthening of the mandibles that is commonly connected with a rather small and narrow head; enlargement of eyes that may eventually lead to markedly protruding eyes; reduction of eyes to such extent that they eventually barely project over the lateral margins of the head; development of spinose elytral apex.

Distribution of most of these trends, however, within the genus *Fortagonum* is remarkably heterobathmic. For example, reduction of wings is not always connected with reduction of fixed setae, but both states have been certainly evolved several times within the genus. Perhaps the predisposition for these reductions is generally present, but whether and to what extent they will be realized in the single species is different.

Unfortunately the evolutionary significance of most trends is obscure, because very little is known about the habits and life histories of the species. The only knowledge we have about the biology of *Fortagonum* and *Collagonum* species are the poor collecting records of the recently captured species. All have been collected under logs or in the leaf litter of montane rain forests in median altitude. Virtually nothing, however, is known about the time of daily activity, feeding habits, diet, reproduction etc. And we do not even posses the slightest idea about the population density.

Certainly one would assume that a small head and long, porrect mandibles, or else a small head together with a markedly fusiform prothorax would be adaptations to the habits of eating snails in view of the cychriform shape of head and prothorax. Because virtually nothing is known about diet and feeding habits, however, the significance of this body shape is at present absolutely unknown. What significance the reduction of the fixed setae, or the laterally extremely protruding eyes, or the spinose elytra, or the wide, distorted pronotum have, is likewise completely obscure. With regard to the characteristic shape and structure of many species, however, investigation of the habits and life histories should be a very rewarding task.

The high similarity in external and genitalic characters of many species of both mentioned genera is certainly due to close relationships of the respective species, and it is the consequence of rather recent evolution or differentiation of most species that may be caused by the recent orogenetic events in New Guinea. Recent uplift in terms of geological time of the central mountains and increased erosion caused a marked dismembering of the highlands and so reinforced separation of beetle populations and eventually evolution of new taxa. Examples for these events are seen in the *F. unipunctatum-spinosum*-lineage and in the differentiation of *C. laticolle* in two subspecies. Both pairs of taxa have their bound in the valley of the Borme River or the mountain ridge to the west of this rather small, but deeply cut river. The rather feebly taxonomic differentiation of both pairs of taxa points to a fairly recent speciation that may be occurred as late as in or even after the last glaciation period.

References

Baehr, M. 1992. On some agonine beetles of the genus *Fortagonum* DARLINGTON from New Guinea (Coleoptera, Carabidae, Agoninae). - Mitt. Münch. Ent. Ges. **82**: 73-81

– – 1994. Revision of the genus *Scopodes* Erichson from New Guinea (Insecta, Coleoptera, Carabidae, Pentagonicinae). - Spixiana **17**: 97-155

Darlington, P. J. Jr. 1952. The carabid beetles of New Guinea. Part 2. The Agonini. - Bull. Mus. comp. Zool. **107**: 89-252

– – 1968. The Carabid Beetles of New Guinea. Part III. Harpalinae (Continued): Perigonini to Pseudomorphini. - Bull. Mus. comp. Zool. **137**: 1-253

– – 1971. The carabid beetles of New Guinea. Part IV. General considerations; analysis and history of fauna; taxonomic supplement. - Bull. Mus. comp. Zool. **142**: 129-337

Alphabetical checklist of the species of the genus *Fortagonum*

Alphabetical checklist of the species of the genus *Collagonum*

4. Nicolai, B.: Atlas der Brutvögel Ostdeutschlands. Mecklenburg/Vorpommern, Brandenburg, Sachsen-Anhalt, Sachsen, Thüringen. - Gustav Fischer Verlag, Jena - Stuttgart, 1993. ISBN 3-334-60440-3. 314 S., 249 Abb., davon 208 Verbreitungskarten.

Der vorliegende Atlas enthält die Ergebnisse der Brutvogelkartierung Ostdeutschlands von 1978 bis 1982, die von mehr als 780 Mitarbeitern zusammengetragen wurden. Für das Gebiet der ehemaligen DDR fehlte bisher ein aktuelles, flächendeckendes Verbreitungsbild der Brutvögel, und nur für wenige ausgewählte Arten gab es umfassendere Angaben. Ziel dieses Buches ist es nicht nur, Verbreitungskarten, -muster und -grenzen aufzuzeigen, sondern außerdem durch eine Analyse der Struktur der Avifauna einen Beitrag zum Naturschutz und eine fundierte Grundlage für weitere faunistische Untersuchungen zu leisten. Der Atlas enthält für über 200 Brutvogelarten Verbreitungsbilder, Häufigkeitskarten und kurze Texte mit Angaben zu Faunentyp, Status und Brutbestandssituation (bei vielen Arten sogar bis 1990/91). Diese Informationen werden durch eine Bewertung der Vogelarten hinsichtlich Gefährdungsgrad und Schutzwürdigkeit ergänzt.

Das Buch bietet dem Leser einen guten Überblick über die Vogelwelt einer großen Region. Als Basis-Information für den praktischen Natur- und Artenschutz, die Bewertung von Lebensräumen und für landschaftsplanerische Maßnahmen kann es nicht hoch genug eingeschätzt werden. Hoffentlich ist es nicht eines Tages traurige Dokumentation einer Vogelvielfalt vergangener Zeiten. J. Diller

5. Geisel, O.: Die Krankheiten von Steinmarder *Martes foina* (Erxleben, 1777) und Baummarder *Martes martes* (Linné, 1758),- unter besonderer Berücksichtigung pathologischer Organbefunde. - Advances in Veterinary Medicine - Fortschritte der Veterinärmedizin, Nr. 43. 1992. Paul Parey, Berlin - Hamburg. ISSN 0931-4229, ISBN 3-489-52516-7. 134 Seiten, 78 Abbildungen, 11 Tabellen.

In dieser Monographie werden die bisher publizierten Kenntnisse über die Krankheiten der Marder zusammengefaßt und durch Untersuchungsergebnisse des Verfassers an umfangreichem Sektionsmaterial ergänzt. Neben Angaben zu Krankheitsverlauf, Diagnostik und Bekämpfung sind besonders die pathologischen Organveränderungen berücksichtigt. Zudem werden die Todes- und Krankheitsursachen bei Mardern aus Bayern an Hand eigener Erhebungen des Autors dargestellt. Dem veterinärmedizinischen Teil ist ein allgemeines Kapitel vorangestellt, das über Systematik, Lebens- und Verhaltensweisen der Marder, Morphologie, Anatomie und jagdliche Bedeutung informiert. Das Buch dürfte nicht nur für Tierärzte und Pelztierzüchter, sondern auch für Zoologen und Jäger von Nutzen sein. J. Diller

6. Goulet, H. & J. T. Huber (Eds.): Hymenoptera of the world: An identification guide to families. - Research Branch, Agriculture Canada, Publication 1894/E. Ottawa, Ontario 1993. VII und 668 S. (Großformat).

An diesem umfassenden, großzügigen Buch haben neben den beiden Herausgebern neun weitere ausgezeichnete Spezialisten bestimmter Hymenopteren-Gruppen mitgearbeitet. Dem Andenken an einen von ihnen, dem verstorbenen W. R. M. Mason, ist das Werk gewidmet. Es umfaßt 16 Kapitel, jeweils mit eigenem Literatur-Verzeichnis. Auf vier einleitende Kapitel 1."Introduction", 2. "Order Hymenoptera", 3. "Structure" (mit illustriertem "Glossary" der einzelnen Merkmale) und 4. "Use of keys" folgt ein Schlüssel zu den Superfamilien der Hymenoptera und anschließend (6-16) die Kapitel zu den einzelnen Superfamilien. Jedes hiervon umfaßt Schlüssel zu den Familien und Subfamilien (in denen zahllose Textfiguren auf die entscheidenden Merkmale hinweisen), Diagnosen und weitere Angaben zu den Taxa und großzügige ganzseitige Habituszeichnungen je eines Vertreters, oder Taxons. Das Buch ist überaus bequem zu benutzen, und die Kompetenz der Verfasser garantiert höchste Genauigkeit. So wird es für viele Jahre grundlegend für einen Überblick über die Vielfalt der Hautflügler und hilfreich für deren Bestimmung sein. E. Haeselbarth

7. Burke, T., Dolf, G. Jeffreys, A.J. Wolff, R.: DNA Fingerprinting: Approaches and Applications. - Birkhäuser Verlag, Basel, 1991. 400 S.

Kaum ein Zweig der Molekularbiologie hat so rasende Fortschritte und Erfolge vorzuweisen, wie das erst vor etwa acht Jahren entwickelte DNA fingerprinting. Der Erfolg liegt sicher an den enormen Einsatzmöglichkeiten, sei es in der molekulargenetischen Grundlagenforschung, in der Medizin, in Taxonomie, Evolution und Populationsökologie, bis hin zur Aufklärung von Verbrechen. Die 29 Originalarbeiten dieses Bandes sind in folgende Sektionen gegliedert: "Molecular genetics of hypervariable DNA", "Population genetics and evolutionary biology", "Economically important animals and plants" und "Implementation of DNA typing", wobei für den Zoologen vor allem die Sektionen 2 und 3 von Interesse sind. Dieses empfehlenswerte Fachbuch spiegelt den aktuellen Wissensstand auf diem modernen Gebiet wider; ein Folgeband über spezielle Einsatzmöglichkeiten in der zoologischen Forschung wäre wünschenswert. R. Gerstmeier

SPIXIANA	**18**	1	45–48	München, 01. März 1995	ISSN 0341–8391

A new genus of Odacanthinae from New Guinea

(Insecta, Coleoptera, Carabidae)*

By **Martin Baehr**

Baehr, M. (1995): A new genus of Odacanthinae from New Guinea (Insecta, Coleoptera, Carabidae). – Spixiana **18/1:** 45-48

Crassacantha bidens, gen. nov., spec. nov. from the Vogelkop, Irian Jaya, western New Guinea is described. The genus *Crassacantha*, gen. nov. is presumably next related to the Oriental-Australian genus *Dicraspeda* Chaudoir.

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

Introduction

Within a sample of Carabid beetles, collected by A. Riedel on different occasions and in different parts of Irian Jaya (New Guinea), a specimen of Odacanthinae was found that could not be identified by use of any of the current generic tables of the Oriental-Australian Odacanthinae (Sloane 1917, 1923, Liebke 1938, Jedlicka 1963, Darlington 1968). Hence it belongs to a new genus. Since I have seen examples of almost all Australian and New Guinean and of most Oriental Odacanthine genera, the mentioned new genus is being described, although it is based on this unique specimen.

The Australian-New Guinean Odacanthine fauna is very rich in structurally rather plesiomorphic genera (for lists of genera and species see Darlington 1968, Moore et al. 1987) that exhibit at the same time certain apomorphic characters, e. g. the spinose elytral apices in several species of different genera, or the loss of the elytral striation in certain species. In particular spinose elytra seem a rather common character in the Odacanthinae from New Guinea (Darlington 1968) and may represent an adaptation to arboricolous habits.

However, the fauna of the Australian region presumably comprises a larger amount of plesiomorphic genera and species than the faunas of the other regions, and with the genus *Porocara* it includes even the most primitive odacanthine genus at all, both in morphology and ecology (Baehr 1986, in press). Highly evolved genera like *Colliuris*, *Casnoidea* and others, however, so common in the other regions, are comparatively rarer in the Australian region.

Measurements

Measurements have been made with a stereo microscope by use of an ocular micrometer. Length has been measured from apex of labrum to tip of elytra including the elytral spines. Hence, measurements may slightly differ from those of other authors, especially Darlington (1968).

* Results of the entomological explorations of A. Riedel in New Guinea 1991.

Location of type

The holotype of the new species is presented to the Zoologische Staatssammlung, München, but is retained as permanent loan in the working collection of the author (ZSM-CBM).

Genus *Crassacantha*, gen nov.

Diagnosis. Genus of Odacanthinae, characterized by following characters: head large with very large eyes; distinct carina medially of the eyes present; mental tooth large, acute, triangular, of almost same length as wings of mentum; glossa elongate, apically slightly incised, bisetose; paraglossae narrow, apically free and much surpassing the glossa; lacinia large, at apex dentate; mandible elongate; antenna with 3rd and 4th antennomeres of equal length; prothorax short and wide, rather globular, with indistinct and posteriorly interrupted lateral margin; no deep and wide lateral channel on prothorax present; elytra short and wide, dorsally very convex; 4th tarsomere barely excised.

Etymology. The name is a combination of latin *crassa* (= thick, stout) and the genus name *Odacantha* and refers to the stout build of the single known species.

Type species: *Crassacantha bidens*, spec. nov. by monotypy.

Relationships. This new genus is presumably closely related to the genus *Dicraspeda* Chaudoir and is distinguished from the latter only by the more robust build, the even larger head, the dorsally convex, laterally not channeled prothorax, and the more convex elytra. It is more plesiomorphic with respect to the absence of the lateral channel of the prothorax, but more apomorphic with regard to the reduction of the lateral margin of the prothorax. It may be an offspring of an common ancestor of both, *Dicraspeda* and *Crassacantha*.

Crassacantha bidens, spec. nov.

Figs 1, 2

Types. Holotype: ♀, Irian Jaya, Manokwari-Pr., Membey, 800-1200 m, 31.8.1991, leg. A. Riedel (ZSM-CBM).

Diagnosis. With characters of the genus. Further characterized by completely black colour, glossy surface, dark appendages, and highly convex elytra with punctate though not impressed striae, dentate external apices, and a pair of dehiscent spines at the sutural angle.

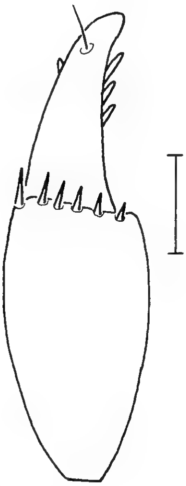
Description

Measurements. Length: 7.0 mm. Ratios. Width/length of pronotum: 1.09; width of head/width of pronotum: 1.13; length/width of elytra: 1.51.

Colour. Upper and lower surfaces black. Mouth parts piceous. Antenna piceous, base of 3rd and 4th antennomeres dark reddish. Femora black, tibiae and tarsi piceous.

Head. Large, moderately convex. Eyes very large, laterally markedly projecting, orbits considerably less than half as long as eyes, fairly convex, forming an angle of c. 125° with the neck. Clypeus separated by a fine suture, labrum large, anteriorly straight, 6-setose. Palpi of average size. Mandibles elongate, at apex curved. Medially of eye with a strong ridge, medially of this with an irregularly sinuate furrow from apex of frons to about posterior two thirds of eye, this furrow forming a deep groove near clypeal suture. Frons slightly convex, surface regular. Neck separated from vertex by a deep, transverse furrow. Posterior supraorbital seta situated slightly in front of posterior margin of eye. Antenna presumably rather elongate, broken behind 2nd and 4th antennomeres, respectively. Surface of head including labrum without micrireticulation, impunctate and impilose, highly glossy.

Prothorax. Very convex, rather globose, slightly wider than long, surface convex. Widest part in front of middle, margin strongly rounded throughout, just in front of posterior angles faintly concave. Lateral border line fine, indistinct, posteriorly interrupted, situated well on disk, hence proepipleura and proepisternum visible from above from apex to near base. Apex almost straight, anterior angles



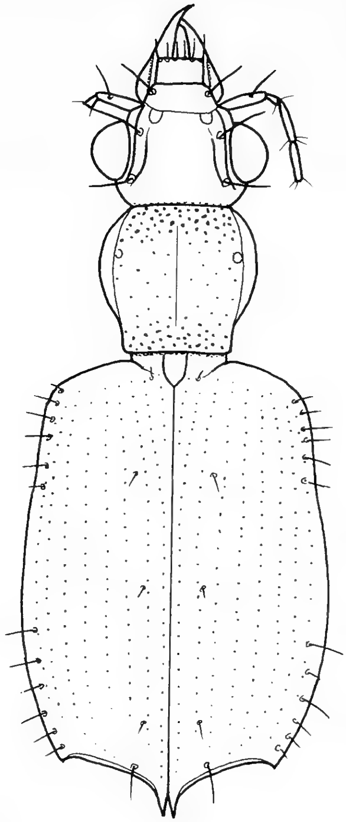


Fig. 1. *Crassacantha bidens*, gen. nov., spec. nov. ♀ stylomere 1 and 2. Scale: 0.1 mm.
Fig. 2. *Crassacantha bidens*, gen. nov., spec. nov. Habitus. Length: 7.0 mm.

rounded off, barely visible. Base faintly excised, posterior angles right, though at apex obtuse. Lateral margin without a channel. Surface with a faintly impressed median line that is abbreviated near apex and base, without well developed anterior and posterior transverse sulci. The anterior lateral seta situated slightly in front of widest part, pore slightly removed from border line, seta broken on either side. The posterior lateral seta and pore absent. Surface without microreticulation, apex, base and lateral parts with moderately sparse, coarse punctures, disk with very scattered, much finer punctures. Surface with some very weak transverse strioles, highly glossy.

Elytra. Rather short and wide, posteriorly slightly widened, lateral margin in anterior third distinctly compressed. Surface markedly convex, behind middle with a wide, rather shallow, circular impression on either side. Shoulders wide, slightly oblique, shoulder angle slightly protruding, but obtuse. Marginal channel moderately wide, becoming wider and deeply sulcate near posterior angles. Apex oblique, slightly concave, outer apical angle short, acute, slightly projecting, inner angle forming an elongate, dehiscent spine opposite the suture. Apex with coarse border line. Striae marked by rows of modetately fine punctures, barely impressed, punctures becoming slightly finer towards apex, intervals extremely faintly convex. Third interval with three setiferous punctures, the first in middle between 2nd and 3rd striae, the median and apical ones adjacent to 2nd stria, punctures small, inconspicuous, setae rather inconspicuous. Surface without microreticulation, impunctate and impilose, highly glossy. Winged.

Lower surface. Proepisternum with rather sparse though coarse puncturation. Metepisternum elongate, almost 3 × as long as wide. Abdominal sterna impunctate and impilose apart from a pair of ambulatory setae on each sternite. Terminal sternum (in female) with two pairs of ambulatory setae.

Legs. Fairly elongate. 5th tarsomere rather densely setose on lower surface. 4th tarsomere but little excised at apex. Male anterior tarsus unknown.

♂ genitalia. Unknown.

♀ genitalia. Stylomere 1 with a row of c. 6 slightly ensiform setae at apex. Stylomere 2 elongate, almost straight, apex obtuse, not curved, with 3 ventral ensiform setae in apical half, 1 dorsal ensiform setae below apex, and short 1 nematiform seta originating in a groove. Lateral plate densely setose at apex.

Variation. Unknown.

Distribution. Vogelkop, western Irian Jaya. Known only from type locality.

Habits. Largely unknown. Collected in median altitude, presumably in rain forest.

Etymology. The name refers to the bidentate apex of the elytra.

References

Baehr, M. 1986. Revision of the Australian ground-beetle genus *Porocara* Sloane (Coleoptera: Carabidae: Odacanthinae). - Aust. J. Zool. **34**: 717-731

– – (in Press). The ground beetle genus *Casnoidea* Castelnau. Taxonomy, phylogeny, zoogeography (Insecta, Coleoptera, Carabidae, Odacanthinae). - Invertebr. Zoology

Darlington, P. J. Jr. 1968. The Carabid beetles of New Guinea. Part III. Harpalinae continued. Perigonini to Pseudomorphini. - Bull. Mus. Comp. Zool. **137**: 1-253

Jedlicka, A. 1963. Monographie der Truncatipennen aus Ostasien. Lebiinae - Odacanthinae - Brachyninae (Coleoptera, Carabidae). - Ent. Abh. Staatl. Mus. Tierkunde Dresden **28**: 269-579

Liebke, M. 1938. Denkschrift über die Carabiden-Tribus Colliurini. - Festschrift für Prof. Dr. Embrik Strand **4**: 37-141

Moore, B. P., T. A. Weir & J. E. Pyke. 1987. Rhysodidae and Carabidae. In: Zoological Catalogue of Australia, **4**: 17-320. - Austr. Governm. Publ. Serv., Canberra

Sloane, T. G. 1917. Carabidae from tropical Australia (New genera and species, notes and synonymy, and synoptic tables. Tribes Scaritini, Harpalini, Odacanthini, Lebiini, and Helluonini). - Proc. Linn. Soc. New South Wales **42**: 406-438

– – 1923. Studies in Australian Entomology. No. XVIII. New genera and species of Carabidae. (Scaritini, Pterostichini, Merizodini, Bembidiini, Trechini, Odacanthini, Panagaeini, Licinini, and Lebiini). - Proc. Linn. Soc. New South Wales **48**: 17-39

SPIXIANA	18	1	49–64	München, 01. März 1995	ISSN 0341-8391

Taxonomic remarks on Italian Cixidia with description of two new species*

(Insecta, Homoptera, Auchenorrhyncha, Achilidae)

By **Vera D'Urso** and **Adalgisa Guglielmino**

D'Urso V. & A. Guglielmino (1995): Taxonomic remarks on Italian Cixidia with description of two new species (Homoptera Auchenorrhyncha, Achilidae). – Spixiana **18/1:** 49-64

This paper redescribes and illustrates *Cixidia marginicollis* (Spinola, 1839) and recognizes *C. italica* (Wagner, 1959) as its synonym. It describes and illustrates two new species, *C. sikaniae,* spec. nov. from Sicily and *C. pilatoi,* spec. nov. from the Italian peninsula. The distinctiveness of the three species is based on the general appearance, the colour pattern, and the shape of vertex, frons, pronotum, pygofer structure, anal tube, aedeagus of ♂♂ and VII abdominal sternite of ♀♀.

Prof. Vera D'Urso, Dipartimento di Biologia animale, Universitá di Catania, via Androne 81, 95124 Catania, Italy.

Dr. Adalgisa Guglielmino, Dipartimento di Protezione delle Piante, Università della Tuscia, via. S. Camillo De Lellis, 01100 Viterbo, Italy.

Introduction

The achilid genus *Cixidia* Fieber, 1866 is considered difficult and one that is in need of revision. At present 12 species have been reported in the Palaearctic region. Two species are present in the Maritime Territory of Russia: *C. kasparyani* Anufriev, 1983 and *C. ussuriensis* (Kusnezov, 1928); one in Japan: *C. okunii* (Matsumura, 1914); one in North Europe: *C. confinis* (Zetterstedt, 1828); one in Central-North Europe and Siberian Asia: *C. lapponica* (Zetterstedt, 1840); one from the areas of South Europe to the Turanic region: *C. parnassia* (Stål, 1858). Six species are found round the Mediterranean Sea: *C. advena* (Spinola, 1839) is a North Mediterranean species; *C. genei* (Spinola, 1839) is a West Mediterranean species; *C. italica* (Wagner, 1959) is an Italian species from Campania and Sicily; *C. marginicollis* (Spinola, 1839) is a Central-South European-Mediterranean species; *C. maroccana* Anufriev, 1969 is endemic to Morocco; *C. mersinica* (Dlabola, 1987) is endemic to Anatolia.

This paper redescribes *C. marginicollis* and reviews the Italian species of *Cixidia* related to it. *C. marginicollis* was described by Spinola (1839) from material from Sicily as *Elidiptera marginicollis.* He illustrated the general appearance of the body, head and face. Metcalf (1948) placed this species in the genus *Epiptera* Metcalf. Anufriev (1969) redescribed the species and illustrated the ♂ genitalia without having seen the holotype, basing his description on specimens from Moldavia. Moreover, he stated that the genus *Epiptera* Metcalf, 1922 was a synonym of *Cixidia* Fieber, 1866. Following Anufriev's paper, Logvinenko (1975) and Dlabola (1987) based their identification of *C. marginicollis* on his redescription.

In 1959 Wagner described *Epiptera italica* from specimens collected on Mount Etna and reported a ♀ of the same species in Campania.

* Financial assistance was provided by the 60 % MURST

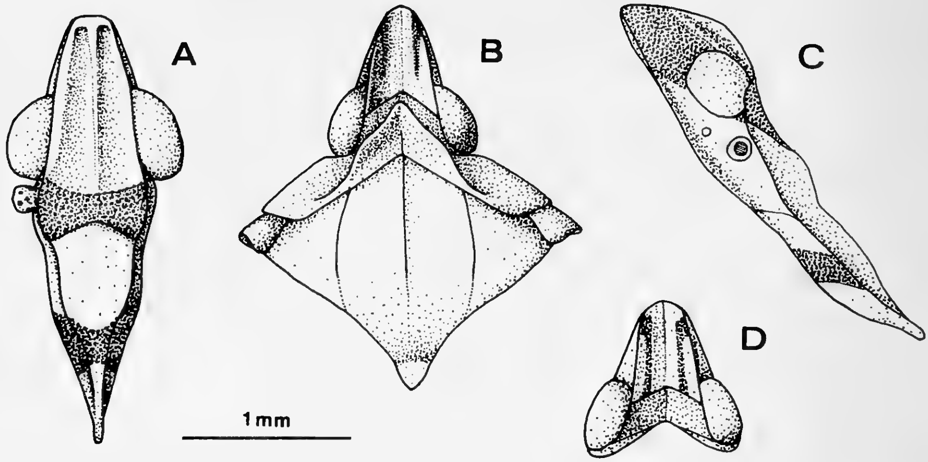


Fig. 1. *Cixidia marginicollis* (Spinola). ♂ holotype (Sicily). A. Face; C. head, lateral view; D. head, dorsal view. B. ♂ (Sicily, C. da Paviglione). Head and thorax, dorsal view.

We have compared the holotypes of *C. marginicollis* and *C. italica*. They did not show any significant differences, thus *C. italica* (Wagner, 1959) should be considered as a synonym of *C. marginicollis* (Spinola, 1839).

In the light of this new synonymy, the critical reevaluation of the bibliographic information on *C. marginicollis* and the direct examination of our specimens and others we have been seen, allow us to state that: 1. a new species, *Cixidia sikaniae*, is present on Mt Etna (Sicily) in addition to *C. marginicollis*. The former can be easily distinguished by the shape and colour of the face and vertex, and the male and female genital morphology; 2. the specimens from peninsular Italy belong to a new species, *Cixidia pilatoi*. It can be readily identified by the external morphology and both male and female genitalia; 3. the descriptions and figures of non-Italian specimens of *C. marginicollis* published by Anufriev (1969), Logvinenko (1975), and Dlabola (1987), cannot be attributed to this species, but to one or more taxa which have not been defined as yet. They resemble *C. pilatoi* very closely but direct examination is required before they can be assigned to this or other species. Confirmation of all records of *C. marginicollis* outside Italy is required since none of the authors have given illustrations that allow certain identification.

Abbreviations of museums, institutions and collections where the material examined is deposited: DG: D'Urso and Guglielmino's collection, Catania; IZ: Istituto di Zoologia, Sezione Museo, Entomologia, Roma; MCSN: Servadei's collection c/o Museo Civico di Storia Naturale, Verona; MCZ: Luigioni's collection c/o Museo Civico di Zoologia, Roma; MRSN: Spinola's collection c/o Museo Regionale di Scienze Naturali, Torino; ZSM: Zoologische Staatssammlung, München.

Cixidia marginicollis (Spinola, 1839)
(Figs 1-6)

Elidiptera marginicollis Spinola, 1839: 309.
Epiptera italica Wagner, 1959: 70-72 (D'Urso & Guglielmino, 1993: 18).

Types. Holotype: ♂, Sicile, D. Grohmann, *Elidiptera marginicollis* Spin. (MRSN). - Italy, Sicily, 1♂, 1♀, Mt. Etna: Ragala (Pedara), 800 m, 2.6.49, leg. Hartig, det. Wagner as *Epiptera italica*, on *Quercus cerris*, (IZ); 14♂♂, 17♀♀, Mt. Etna: Contrada Paviglione (Maletto), 1200 m, U.T.M. VB 9183, 16.6.92, leg. D'Urso, Guglielmino; 9♂♂, 1♀, 3.7.92, leg. D'Urso, Guglielmino; 3♂♂, 3♀♀, 20.7.92, leg. D'Urso, Guglielmino; 1♂, 2♀♀, 20.10.92, leg. D'Urso, Guglielmino; 1♂, 1♀, 14.7.93, leg. D'Urso, Guglielmino; on *Pinus pinaster*, *Quercus* gr. *pubescens*, *Q. ilex*, (DG, ZSM); 2♂♂, Mt. Etna: Contrada Giarrita (S. Alfio), 1350 m, U.T.M. WB 0880, 15.7.92, leg. D'Urso, on *Quercus cerris* (DG).

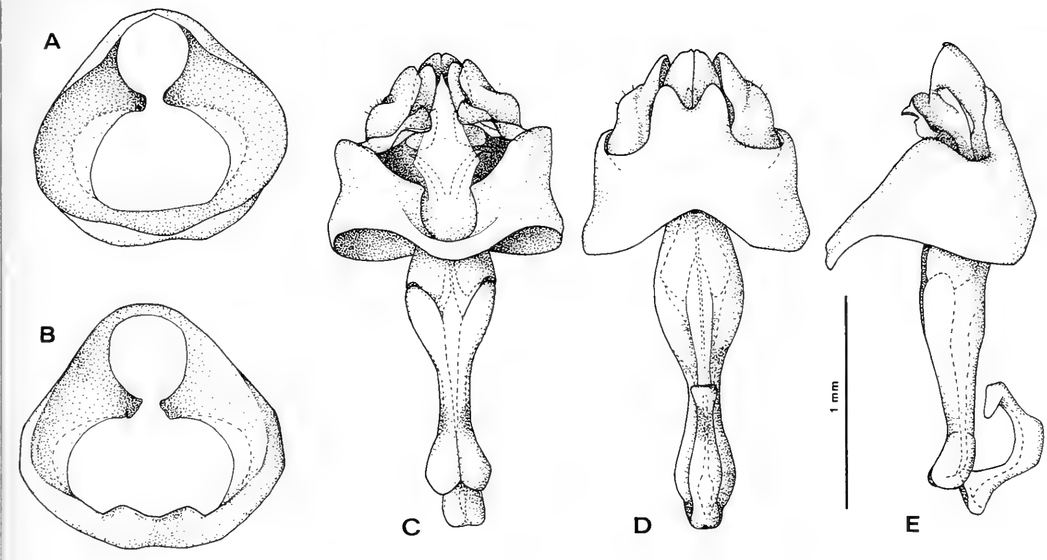


Fig. 2. *Cixidia marginicollis* (Spinola). ♂ holotype. A-B. Pygofer. A. Anterior, B. posterior view; C-E. Genital block. C. Dorsal, D. ventral, E. lateral view.

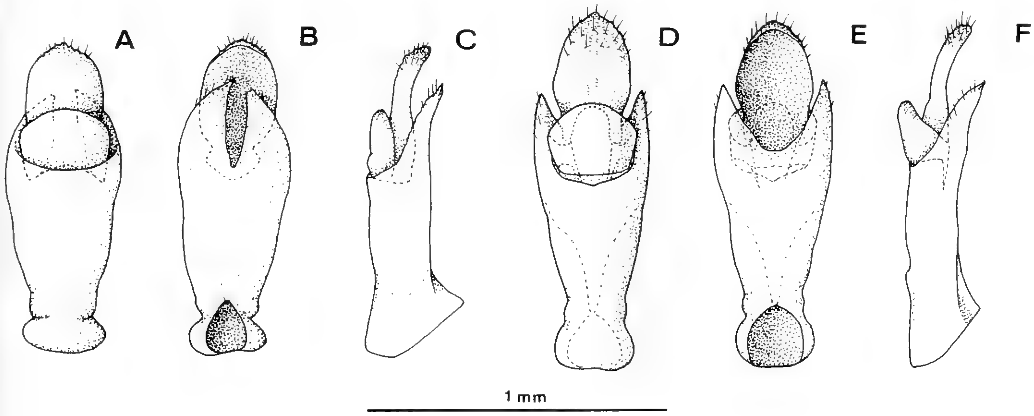


Fig. 3. *Cixidia marginicollis* (Spinola). ♂ holotype. A-C. Anal tube. A. Dorsal, B. ventral, C. lateral view. D-F. ♂ (Sicily, C. da Paviglione). D-F. Anal tube. D. Dorsal, E. ventral, F. lateral view.

Description

Measurements. Males. Total body length (including tegmina): 6.16-7.80 mm; length of vertex: 0.45-0.52 mm; width of vertex: 0.38-0.45 mm; width of head: 0.77-0.92 mm; lenght of pronotum: 0.32-0.37 mm; width of pronotum:1.47-1.82 mm; length of mesonotum: 1.22-1.47 mm; width of mesonotum (including tegulae): 1.77-2.17 mm. - Females. Total body length (including tegmina): 8.60-9.90 mm; length of vertex: 0.55-0.67 mm; width of vertex: 0.45-0.65 mm; width of head: 0.92-1.12 mm; length of pronotum: 0.38-0.50 mm; width of pronotum: 1.87-2.07 mm; length of mesonotum: 1.50-1.65 mm; width of mesonotum (including tegulae): 2.20-2.25 mm.

Body rather flattened. All specimens observed macropterous. Fore wings much longer than the abdomen and as long as the hind wings. Both sexes dark brownish black, mottled with yellow specks.

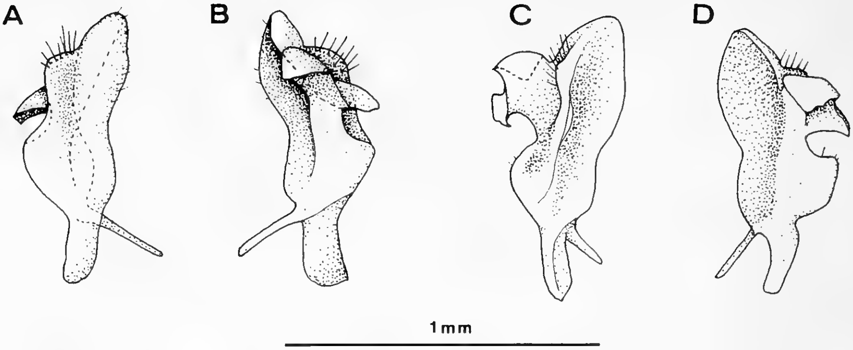


Fig. 4. *Cixidia marginicollis* (Spinola). ♂ holotype. A-D. Left stylus. A. Ventral, B. dorsal, C. lateral, D. inner view.

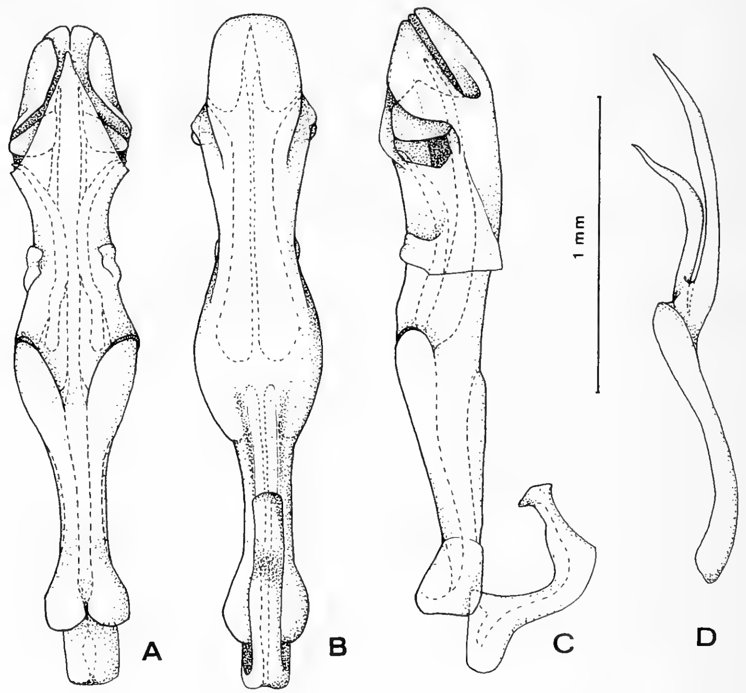


Fig. 5. *Cixidia marginicollis* (Spinola). ♂ holotype. A-C. Aedeagus. A. Dorsal, B. ventral, C. lateral view. D. ♂ (Sicily, C. da Paviglione). Penis left rod, lateral view.

Vertex (Figs 1B-D) trapezoidal, its median length greater than the width on the level of the eyes; parabolic anterior margin and distinctly carinated lateral elevated margins making the vertex markedly concave; longitudinal medial ridge indistinct. Frons (Figs 1A,C) elongated, forming an acute angle with the vertex; widest in the third basal and slightly narrowed near the eyes. Its lateral margins carinated with a longitudinal medial carina originating just below the frons apex. This carina very distinct in the upper half (wide, jutting out and rounded at its source), becoming gradually less evident and disappearing near the basal margin. Clypeus (Fig. 1A) with carinated lateral margins which are less pronounced than those on frons. In lateral view, head (Fig. 1C) narrow and very elongated. Ocelli small, situated about half way between the eyes and the lateral margin of frons.

Pronotum (Fig. 1B) short and wide with carinated margins. Median portion protruding anteriorly, subtriangular, narrow with rounded apex. Median carina evident in the posterior $^3/_4$. Lateral carinae prominent, arcuate, diverging, and bent laterally, not reaching the posterior margin of pronotum.

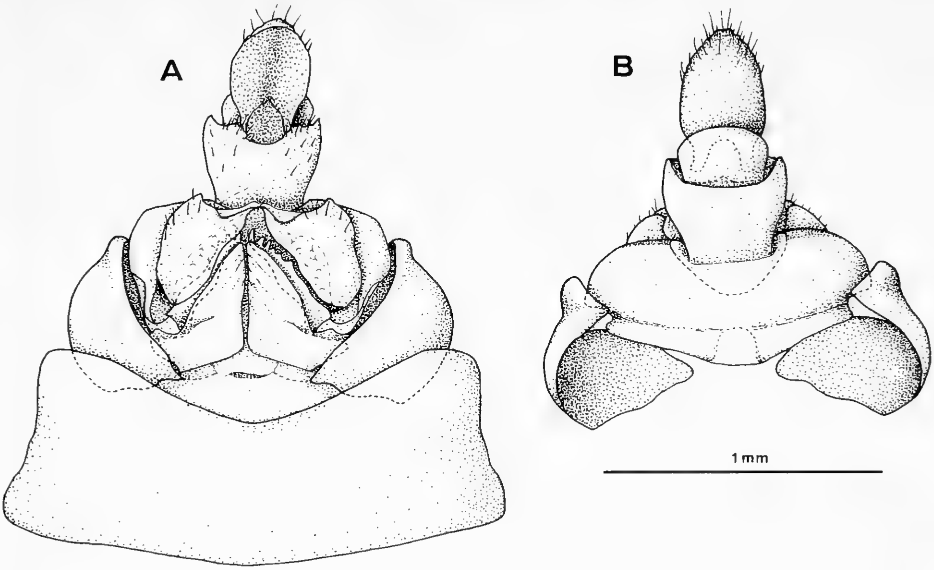


Fig. 6. *Cixidia marginicollis* (Spinola). ♀ (Sicily, C. da Paviglione). A-B. Genital block. A. Ventral, B. dorsal view.

Mesonotum (Fig. 1B) broad, slightly concave in the third portion between the lateral carinae; median carina distinct only in the anterior $^2/_3$ and smoothing out caudally. Lateral carinae slightly arcuate with convexity directed towards the exterior, evident in the anterior and just perceptible in the posterior half.

Head yellowish with dark brown, almost black bands (Figs 1A-D). A broad transversal band running along the base of the frons; another band present at the base of the postclypeus and extending laterally over the whole width of the lorae. A third band extending to the edges of the head; as broad as the eye, originating at the apex of the head, reaching the eye and then extending onto the pronotal laterodorsal and lateroventral portions (where it is very wide), and until the tegula. Vertex presenting two dark brown longitudinal stripes which merge anteriorly with the lateral face bands, sometimes reaching the posterior margin. Pronotum mainly yellowish with some brown dorsal mottling in addition to the previously described lateral bands. Mesonotum brown and densely spotted with yellow between the lateral carinae, while mottled in the lateral portions. Posterior mesonotal extremity yellow, with a yellow spot on the distal end of each lateral carina.

Fore wings with few accessory transverse veins in the apical portion of the corium, brown flecked with yellow; the same colour present on the nerves which become progressively yellowish towards the corial apex. One yellow spot on the claval apex. Hind wing membrane and veins uniformly darkish brown. Legs uniformly brownish. Abdominal segments brown dorsally and yellowish-brown ventrally; with a more or less broad pale border.

♂ genitalia. Pygofer ring-shaped (Figs 2A-E). In dorsal view (Fig. 2C) its posterior margin with a deep medial elliptical notch, varying in width, extending almost to the anterior margin. This notch in articular contact with the anal tube. Anterior margin prominent and very convex at this notch. Ventrally (Fig. 2D), pygofer with a prominent, subrectangular median lobe; at the distal extremity markedly forked with rounded apices. Anterior margin of the pygofer with a medial, obtuse-angled notch. Anal tube (Figs 3A-F) slightly flattened, long and thin, narrowing immediately after the base and then gradually broadening towards the apex, with protruding and pointed posterolateral angles; ventral surface without swelling. Styli (Figs 4A-D) very complex, principally composed of a vaguely ellipsoidal, medially very concave portion with a characteristic convoluted extroflexion that arises from about halfway of the dorsal margin. Their proximal extremity divided in two diverging branches, the medial one being thinner and the lateral stronger and shorter.

Aedeagus complex, as in all Achilidae; following Anufriev's nomenclature (1969), made up of a periandrium with lobes (two ventral, two lateral, one dorsal) and a penis proper (made of symmetrical rods) contained within the periandrium. In *C. marginicollis*, aedeagus (Figs 5A-C) slender with two narrowings. Lateral lobes subtrapeziodal, with a narrow base; just shorter than the ventral ones and well sclerified; a markedly swollen, sclerified mammillary process originating from their internal surface. Ventral lobes broad and fused medially, forming an elongated rectangular plate; but not fused in the apical portion where they each present distinctly rounded extremities. Ventral lobes strongly sclerified. Periandrial dorsal lobe flattened, slightly sclerified, triangular in shape with a pointed apex, and shorter than the lateral lobes. Two sclerified lateral bands on the periandrial wall at the distal narrowing; the dorsal portion of each band forming a very sclerified articular process by means of which the aedeagus articulates dorsally with the posterodorsal angles of the pygofer. Laterally and ventrally with a membrane connecting the periandrium with the pygofer walls and styli at the level of the two longitudinal bands. Styli joined and connected with the pygofer by means of a membranous septum perpendicular to the main aedeagal axis dividing the pygofer into anterior and posterior chambers. Each rod of penis proper (Fig. 5D) markedly sclerified and divided in two branches with pointed extremities, with the ventral branch longer than the dorsal, prolonged posteriorly and only the dorsal tip slightly bent dorsally. The dorsal branch strongly bent dorsally and externally. The genital block dark brown, with more or less widespread yellow areas along the posterior margin of the pygofer, especially in the ventral portion and in some areas of the styli.

♀ genitalia (Figs 6A-B). Seventh abdominal sternum subrectangular with rounded posterior angles, posteriorly with a wide, shallow medial notch. Valvifer VIII very convex, semicupped in shape. Main portion of gonapophyse VIII conspicuously sclerified, with half a dozen teeth which become longer and stronger towards the apex. Genital block more or less deep brown.

Geographical distribution. At present the species has been recorded with certainty only in Sicily. In a description of *C. italica*, Wagner reports a ♀ collected in Campania shown to him by Linnavuori. We have not been able to examine this specimen and although Wagner's description is probably correct, the presence of *C. marginicollis* in peninsular Italy requires further confirmation. However, all records of *C. marginicollis* from the Italian peninsula reported in Servadei's catalogue (1967) are *C. pilatoi*. Confirmation is needed for all records outside the Italian peninsula.

Biological and ecological remarks. Adults, larvae and nymphs were collected on Mt Etna under the bark of felled trunks of *Pinus pinaster*, *Quercus* gr. *pubescens*, *Q. cerris*, and *Q. ilex*, in presence of hypha of club fungi *(Trichaptum fusco-violaceum* (Ehrenb. ex Fr.) Ryv. on *Pinus)*. Eggs are laid in this environment in the summer and larvae hatch in summer and at the beginning of autumn (end of September - October). They overwinter mainly as 3rd and 4th instar nymphs. *C. marginicollis* cohabitates with *C. sikaniae.*

Cixidia sikaniae, spec.nov.
(Figs 7-12)

Types. Holotype: ♂, Italy, Sicily, Mt. Etna: Contrada Paviglione (Maletto), 1200 m, U.T.M. VB 9183, 3.7.92, leg. D'Urso, Guglielmino (DG). - Allotype: 1♀, same data (DG). - Paratypes: 19♂♂, 13♀♀, same data; 14♂♂, 13♀♀, 16.6.92, leg. D'Urso, Guglielmino; 3♂♂, 3♀♀, 20.7.92, leg. D'Urso, Guglielmino; 4♂♂, 3♀♀, 14.7.93, leg. D'Urso, Guglielmino; on *Pinus pinaster*, *Quercus* gr. *pubescens*, *Q. ilex* (DG and ZSM); 1♀, Italy, Sicily, Mt. Etna: Pineta versante occidentale, 1700 m, 13.8.1949, leg. Hartig, det. Wagner as *Epiptera* sp. (IZ).

Description

Measurements. Males. Total body length (including tegmina): 9.06-10.30 mm; length of vertex: 0.65-0.70 mm; width of vertex: 0.65-0.72 mm; width of head: 1.12-1.30 mm; lenght of pronotum: 0.50-0.55 mm; width of pronotum: 1.97-2.17 mm; length of mesonotum: 1.62-1.85 mm; width of mesonotum (including tegulae): 2.20-2.47 mm. - Females. Total body length (including tegmina): 10.40-11.40 mm; length of vertex: 0.70-0.75 mm; width of vertex: 0.70-0.80 mm; width of head: 1.25-1.35 mm; length of pronotum: 0.55-0.60 mm; width of pronotum: 2.22-2.50 mm; length of mesonotum: 1.77-2.00 mm; width of mesonotum (including tegulae): 2.37-2.75 mm.

Body similar to *C. marginicollis* but larger and thinner. Greyish-brown in colour with light yellow speckled markings.

Vertex (Fig. 7B) trapezoidal, as broad as long or little broader than long; its anterior margin parabolic,

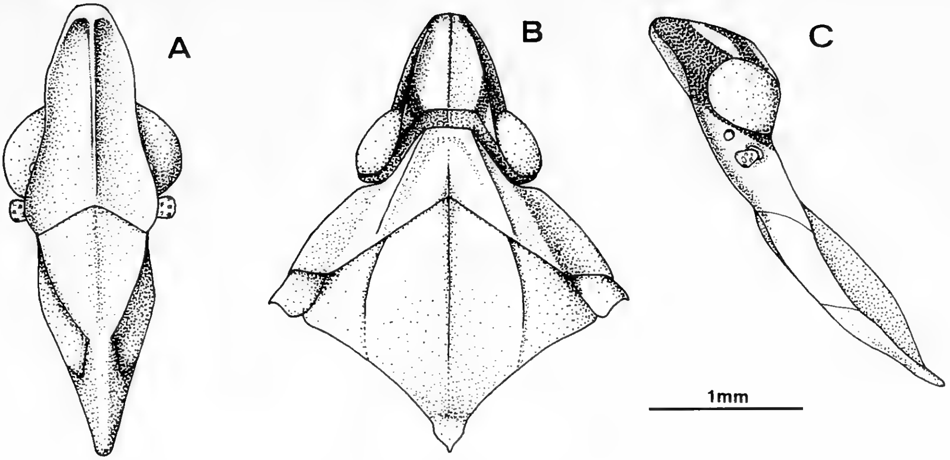


Fig. 7. *Cixidia sikaniae*, spec. nov. ♂ holotype (Sicily, C. da Paviglione). A. Face; B. head and thorax, dorsal view; C. head, lateral view.

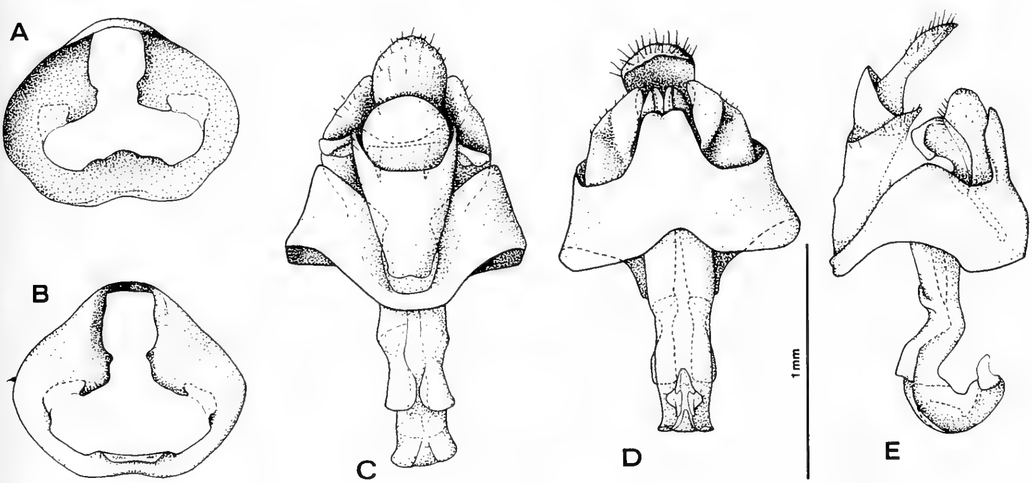


Fig. 8. *Cixidia sikaniae*, spec. nov. ♂ holotype. A-B. Pygofer. A. Anterior, B. posterior view. C-E. Genital block. C. Dorsal, D. ventral, E. lateral view.

and carinated lateral margins elevated dorsally towards the base. Vertex narrower and less concave than observed in *C. marginicollis*, with marked longitudinal medial groove. Prolonged frons (Fig. 7A) as in *C. marginicollis*, but less narrow and tapered, slightly dilated near the apical portion. Medial carina thinner and sharper along the total length of the frons. Clypeus with an almost imperceptible longitudinal medial carina. In lateral view (Fig. 7C) head narrow, lateral margin of frons between the eye and head apex slightly concave. Large ocelli nearer to the eye than to the frons lateral margin.

Protruding medial portion of pronotum (Fig. 7B) broad, trapezoidal in shape with straight anterior margin. Medial carina evident in the posterior $^3/_4$; lateral carinae almost straight, somewhat diverging posteriorly, not reaching the posterior margin.

Mesonotum (Fig. 7B) substantially resembling *C. marginicollis*, but more pointed posteriorly, with more arcuate lateral carinae.

Head more or less darkish yellow, with scattered brown marks (Figs A-C). Frons, clypeus and lorae uniformly yellow ochre. Lateral carinae of frons dark brown, speckled with pale yellow, particularly in the apical portion, and in the apical portion of the frontal medial carina. Genae and temples pale

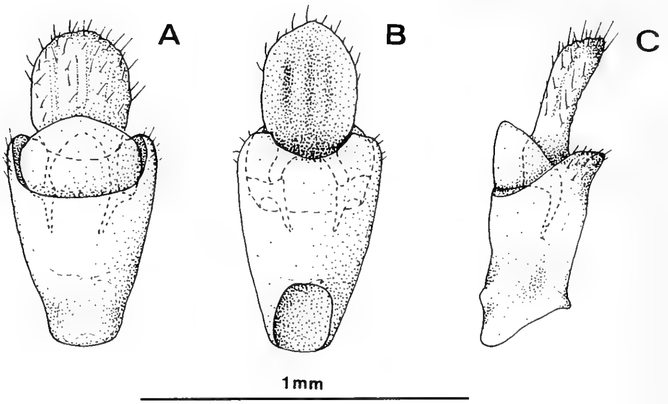


Fig. 9. *Cixidia sikaniae*, spec. nov. ♂ holotype. A-C. Anal tube. A. Dorsal, B. ventral, C. lateral view.

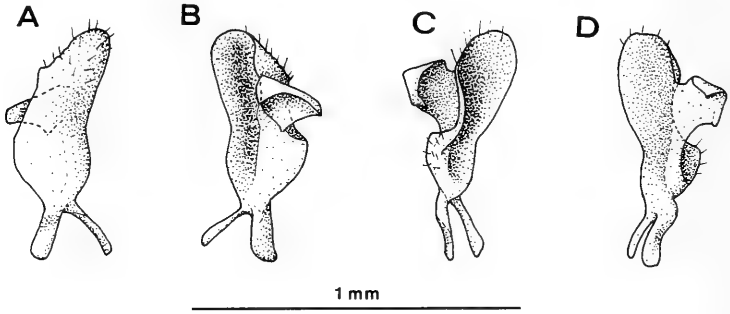


Fig. 10. *Cixidia sikaniae*, spec. nov. ♂ holotype. A-D. Left stylus. A. Ventral, B. dorsal, C. lateral, D. inner view.

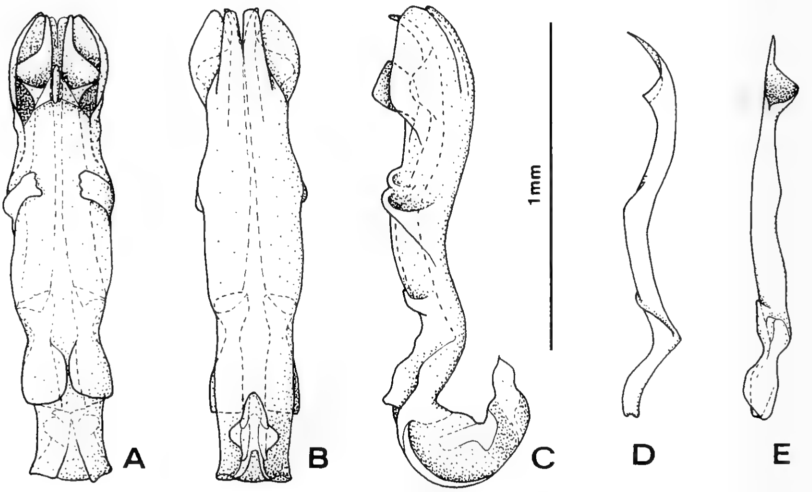


Fig. 11. *Cixidia sikaniae*, spec. nov. ♂ holotype. A-C. Aedeagus. A. Dorsal, B. ventral, C. lateral view. ♂ paratype (Sicily, C. da Paviglione). D-E. Penis left rod. D. Lateral, E. dorsal view.

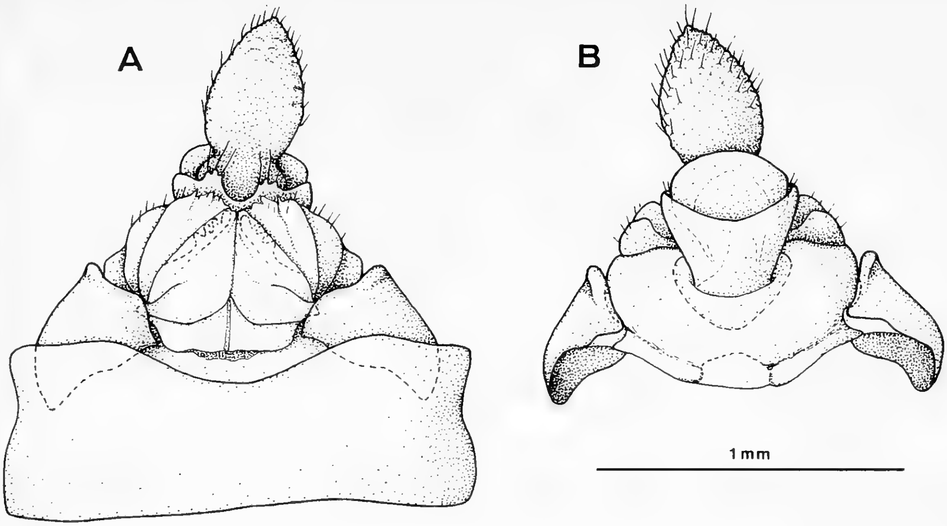


Fig. 12. *Cixidia sikaniae*, spec. nov. ♀ allotype (Sicily, C. da Paviglione). A-B. Genital block. A. Ventral, B. dorsal view.

yellow. On each side of head, a dark brown band with rare yellow spots that is just narrower than the eye diameter, steming from the apex of the head (sometimes overlapping into the vertex), reaching the posterior extremity of the head, and running along the lateroventral portions of the pronotum and of the tegula. Another much narrower, parallel band (always absent in *C. marginicollis*) originating about halfway the lateral margin of the vertex and reaching the eye. Lateral carina of vertex presenting two narrow, longitudinal bands which are in continuation with each of the two narrower bands on the side of the face; these bands reaching the posterior margin.

Pronotum brown and totally mottled with yellow, its lateroventral margin pale yellow with previously described broad, dark bands. Colouring of mesonotum similar, with indistinct yellowish marks on the posterior part and on the distal extremities of the lateral carinae.

Fore wings thinner than in *C. marginicollis*, with a higher number of accessory transverse veins on the corium. Their brown colouring less intense than in *C. marginicollis* with very large merging yellowish spots; but more uniformly brown at the apex. As in *C. marginicollis*, the apical veins becoming paler distally, and bearing a yellow spot on the claval apex. The more external subapical cells generally with 1-2 brown spots, the more external apical cells with a dark brown border. Hind wings with a light brown membrane bearing slightly darker veins.

Legs uniformly ochre; colour of abdomen as in *C. marginicollis*.

♂ genitalia. Genital block (Figs 8A-E) substantially smaller than in, and pygofer rather similar to, *C. marginicollis*. In dorsal view (Fig. 8C) lateral pygofer margins almost straight, tending to converge posteriorly, and anterior margin more angular than in *C. marginicollis*. Ventral medial lobe (Fig. 8D) subtrapezoidal with faintly notched distal extremity. Anterior margin median notch narrower and more rounded than in *C. marginicollis*. Large, broad stunted anal tube (Figs 9A-C) without narrowing just after the base. Somewhat protruding, rather rounded posterolateral angles. Styli (Figs 10A-D) resembling those of *C. marginicollis*, but with narrower ellipsoidal portions and a more rounded posterior edge. Aedeagus (Figs 11A-C) short, stunted and less sclerified than in *C. marginicollis*. In dorsal view, of almost the same width along its entire length. Lateral lobes uniformly concave medially, as long as the ventral ones, subtrapezoidal in shape and with a larger base than in *C. marginicollis*. Ventral lobes narrow with rounded distal extremity, fused only at the base. Dorsal lobe short and very narrow, extending to the sagittal plane; in lateral view nearly quadrangular, rather axe-like in shape and very sclerified. No processes present between the dorsal and lateral lobes; aedeagus connected to the pygofer and styli as in *C. marginicollis*. Penis rods (Figs 11D-E) not forked as in *C. marginicollis*, but with a spoon-shaped distal portion prolonged medially in a narrow, pointed protrusion. Genital block uniformly light brown.

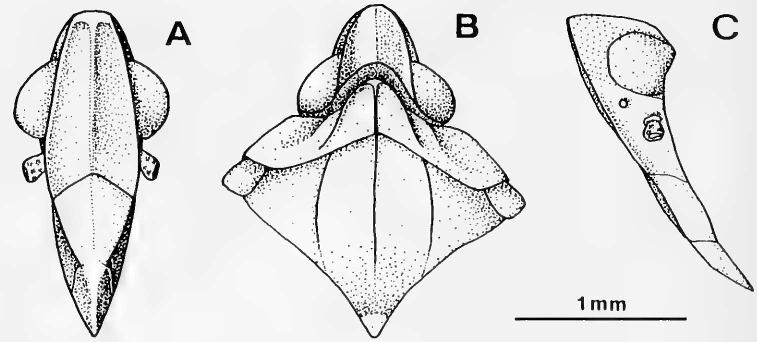


Fig. 13. *Cixidia pilatoi*, spec. nov. ♂ holotype (Calabria, Camigliatello). A. Face; B. head and thorax, dorsal view; C. head, lateral view.

♀ genitalia (Figs 12A-B). Genital block smaller than in *C. marginicollis*, with the notch on posterior margin of the VIII abdominal segment confined to the medial portion. In addition, the gonapophysis VIII differing from *C. marginicollis* in its lower number of sclerified teeth which are all of about the same size and shape.

Geographical distribution. At present, the species is known only from Mt Etna (Sicily).

Biological and ecological remarks. The biological and ecological cycle of *C. sikaniae* resembles that of *C. marginicollis* with which it was found living together.

Derivatio nominis. "Sikania" is the ancient name of Sicily.

Cixidia pilatoi, spec.nov.
(Figs 13-18)

Types. Holotype: ♂ , Italy, Calabria: Camigliatello, 23.7.1950, det. Servadei as *Epiptera marginicollis* (MCSN). - Allotype: ♀, Italy, Tuscany: Tombolo, 4.1932, leg. Nicotra, det. Luigioni as *marginicollis* (MCZ). - Paratypes: 1♀, Italy, Trentino: Castel Toblino, V. Sarca, 22.7.1963, det. Servadei as *E. marginicollis* (MCSN); 1♀, Val Lagarina, Lizzana, 12.7.1951, det. Servadei as *E. marginicollis*, on *Quercus* (MCSN); 1♀, Italy, Apulia: Foresta Umbra, 10.7.1955, leg. det. Servadei as *E. marginicollis* (MCSN); 1♂, Italy, Abruzzi: Pescasseroli, 23.6.1927, leg. det. Luigioni as *Helicoptera marginicollis* (MCZ); 1♂, Italy, Latium: Tuscolo, 5.6.1931, leg. Luigioni, det. Lallemand as *marginicollis* (MCZ).

Description

Measurements. Males. Total body length (including tegmina): 6.66-8.53 mm; length of vertex: 0.35-0.40 mm; width of vertex: 0.47-0.55 mm; width of head: 0.87-1.05 mm; lenght of pronotum: 0.27-0.30 mm; width of pronotum: 1.60-1.87 mm; length of mesonotum: 1.25-1.55 mm; width of mesonotum (including tegulae): 1.82-2.20 mm. - Females. Total body length (including tegmina): 8.53-9.20 mm; length of vertex: 0.37-0.42 mm; width of vertex: 0.55-0.57 mm; width of head: 1.05-1.12 mm; length of pronotum: 0.32-0.35 mm; width of pronotum: 1.87-2.00 mm; length of mesonotum: 1.55-1.72 mm; width of mesonotum (including tegulae): 2.17-2.35 mm.

General appearance as *C. marginicollis* and *C. sikaniae*, similar in size to the former. Reddish brown in colour with yellow specks.

Vertex (Fig. 13B) trapezoidal, short, broader than long; its surface almost flat, less concave than in *C. marginicollis*. Parabolic anterior margin with faint medial groove. Lateral carinae less elevated than in *C. marginicollis*. Face (Fig. 13A) shorter than in the other two species. Shape of frons as in *C. marginicollis*, but with a more uniform appearance, being less flared in the basal third and narrowing progressively towards the apex with regular margins; lateral carinae less protruding. Medial carina of frons and clypeus resembling that of *C. sikaniae*. In lateral view (Fig. 13C), anterior margin of frons slightly convex. Ocelli nearer to the eye than to the lateral margin of frons.

Pronotum and mesonotum (Fig. 13B) like in *C. marginicollis*, but the pronotal medial carina devel-

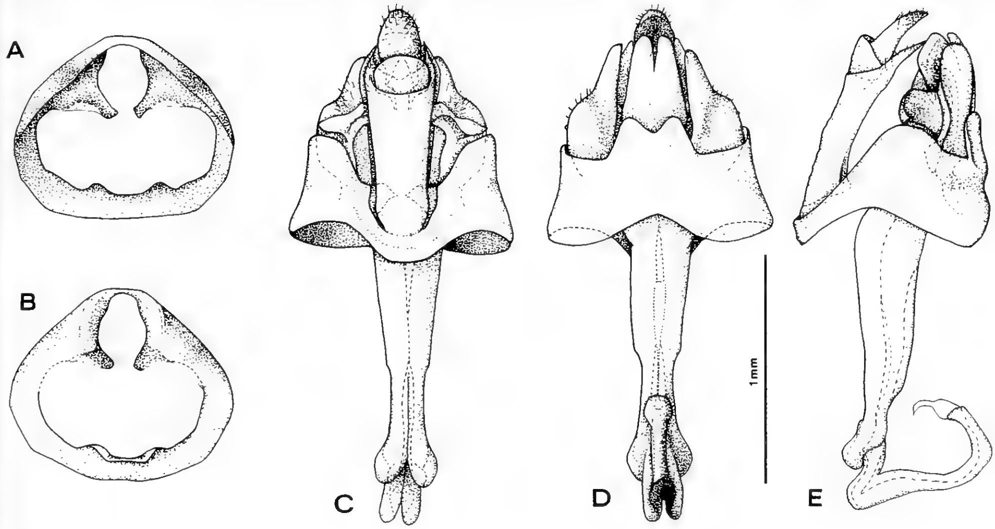


Fig. 14. *Cixidia pilatoi*, spec. nov. ♂ holotype. A-B. Pygofer. A. Anterior, B. posterior view. C-E. Genital block. C. Dorsal, D. ventral, E. lateral view.

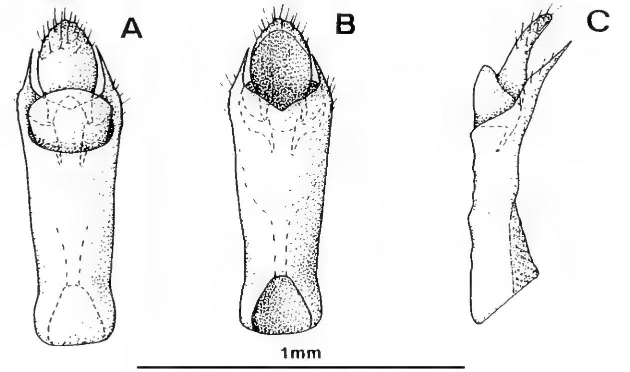


Fig. 15. *Cixidia pilatoi*, spec. nov. ♂ holotype. A-C. Anal tube. A. Dorsal, B. ventral, C. lateral view.

oped along its whole length and the lateral carinae less sinuous.

Colour of head ochre with a scantly evident ochre-brownish band (Fig. 13C) of about the same width as the eye diameter, running from the apex of the head to the tegula, just traced on the pronotum and tegula. Clypeus and lorae presenting faint ochre-brownish markings. Vertex of the same colour as the lateral band, with some yellowish marks.

Pronotum more or less intensely ochre-brownish in colour, lighter in the dorsal portion; carinae somewhat lighter with an ochre band along the lateroventral margins. Mesonotum reddish-brown with slightly lighter carinae and ochre posterior extremity; poorly defined ochre marks at the distal extremities of lateral carinae.

Fore wings very similar to those in *C. marginicollis*, brown, flecked with light ochre, becoming more uniformly brown towards the apex. A yellow spot present on the claval apex. Hind wings brownish-ochre with darker veins.

Legs ochre-brownish. Abdominal segments more or less intensely brown in colour with lighter posterior margins.

♂ genitalia. Genital block (Figs 14A-E) slightly smaller than in *C. marginicollis* but proportionately

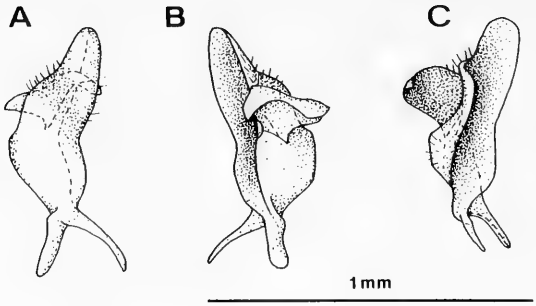


Fig. 16. *Cixidia pilatoi*, spec. nov. ♂ holotype. A-D. Left stylus. A. Ventral, B. dorsal, C. lateral, D. inner view.

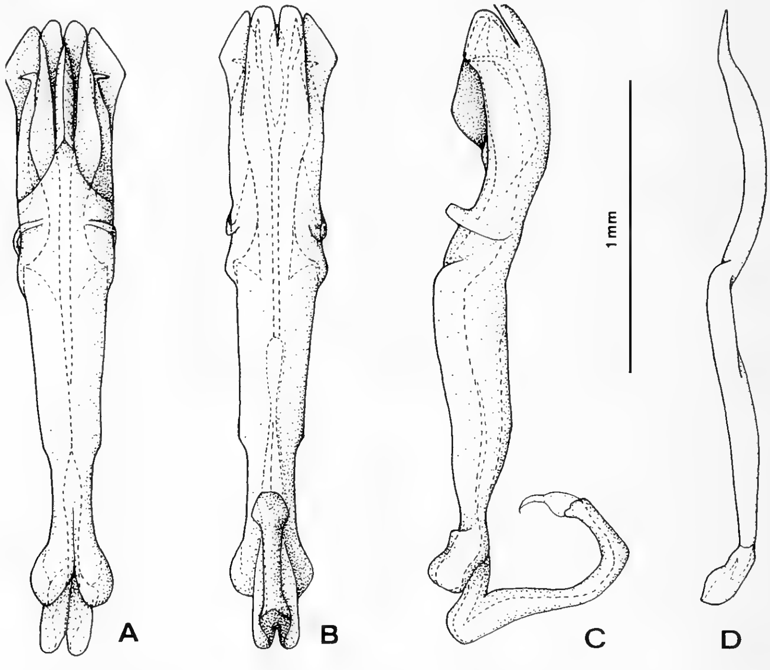


Fig. 17. *Cixidia pilatoi*, spec. nov. ♂ holotype. A-C. Aedeagus. A. Dorsal, B. ventral, C. lateral view. D. ♂ (Lazio, Tuscolo). Penis left rod, lateral view.

larger than in *C. sikaniae*. Pygofer resembling that of *C. marginicollis*, but with subtrapezoidal, broad and short ventral medial lobe (Fig. 14D) with a broader and shallower distal notch and a less prominent notch on the ventral anterior margin. Anal tube thin (Figs 15A-C), with almost parallel lateral margins, imperceptibly broadened in the distal portion, and very long, thin, pointed posterolateral angles. Styli (Figs 16A-D) substantially similar to those of *C. marginicollis* but presenting a narrow ellipsoidal portion; posterior extremity longer and less tapered at the apex. Elongated aedeagus (Figs 17A-C) as in *C. marginicollis* but more slender, in dorsal view with more regular margins, slightly narrowed proximally, but progressively broadening distally. Articular processes of pygofer very developed and prominent dorsally. Lateral lobes as long as, or just shorter than, the ventral ones; similar to those in *C. sikaniae*, albeit smaller, almost quadrangular and somewhat diverging; their inner surface with a very sclerified, long, spine-like process (mammillary in *C. marginicollis* and absent in *C. sikaniae*), bearing a dorsally very bent distal portion and an apex pointing laterally. Ventral lobes like those in *C. sikaniae*, but slightly broader and fused in the proximal ⅔. Dorsal lobe resembling that of *C. sikaniae*,

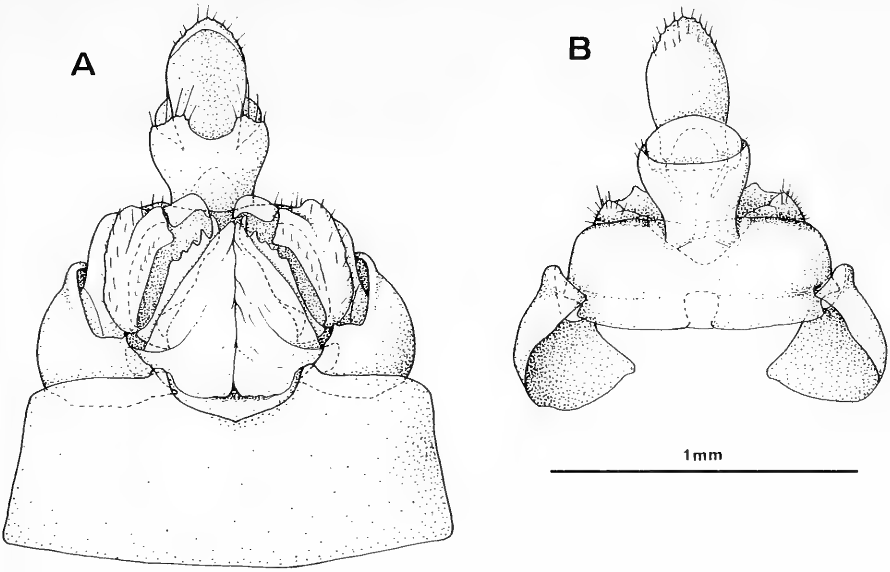


Fig. 18. *Cixidia pilatoi*, spec. nov. ♀ allotype (Tuscany, Tombolo). A-B. Genital block. A. Ventral, B. dorsal view.

but longer. Each rod of penis proper (Fig. 17D) not divided in two branches, with a posteriorally extended spine-like distal portion.

♀ genitalia. Genital block (Figs 18A-B) similar in size to *C. sikaniae*, differing from both previously described species in its proportionately longer VII abdominal sternite, without sinuous lateral margins, on the posterior margin bearing a characteristic notch that is deeper in the medial part, and two small, rounded lobes at the sides of this notch. Teeth of the gonapophysis VIII resembling those present in *C. marginicollis*, but the apical one stronger and more prominent.

Geographical distribution. All records published by Castellani (1953) for Tuscany, Abruzzo, and Lazio as *Helicoptera marginicollis*, and by Servadei (1956, 1960, 1967) for Trentino, Tuscany, Latium, Abruzzo, Apulia, and Calabria as *Helicoptera marginicollis* and *Epiptera marginicollis* refer to this species. Probably, also the specimens reported by Servadei (1956, 1967) for Emilia and defined as *Epiptera marginicollis* refer to this species, although we have not had the opportunity to examine the specimens. As to our knowledge, *C. pilatoi* is present on peninsular Italy, but absent from Sicily. However, signalations of *C. marginicollis* published from South Europe might also refer to *C. pilatoi*, and the distribution area of this species might be much more extended.

Biological and ecological remarks. We have not collected specimens of *C. pilatoi* but they probably share the same way of life and requirements of *C. marginicollis* and *C. sikaniae*.

Derivatio nominis. We dedicate this species to Prof. Giovanni Pilato, esteemed zoologist, friend and teacher.

Discussion

The three species differ not only in their general appearance and size, but also in their colour and pattern, the shape of vertex, frons, and pronotum, and very clearly in the genital morphology of males (ventral lobe of pygofer, anal tube, aedeagus) and females (especially VII sternite). The main distinctive characters are summarized in table 1.

It is not easy to establish relationships between the three species, and those between them and other *Cixidia* species in the Palaearctic region. The species found in Sicily, i.e. *C. marginicollis* and *C. sikaniae*, are very distinct. In fact, they resemble each other only in the shape of the ♀ VII abdominal sternite. Affinities between these two species and *C. pilatoi* are difficult to define, as can be seen in table 1, which shows that they display variously combined characters. Both species from Sicily do not share signif-

Table 1. Summary of the main distinctive characters in *Cixidia marginicollis* (Spinola), *C. sikaniae*, spec. nov., and *C. pilatoi*, spec. nov.

	C. marginicollis	*C. sikaniae*	*C. pilatoi*
General appearance of body	small and wide	large and slender	as in *marginicollis*
Colour	dark brown with yellowish specks	like *marginicollis* but less intense	reddish-brown with yellowish specks
Head bands	blackish-brown – transverse band at base of frons – transverse band at base of clypeus extending on lorae – wide lateral band running from apex of head to tegula – 2 narrow longitudinal bands on vertex	blackish-brown – absent – absent – 2 bands at side of head, the broader one extends to tegula – 2 narrow bands on the vertex lateral carinae	brown-ochre – absent – absent – band at side of head which can just be perceived running to tegula – absent
Vertex	longer than broad, narrow and concave	as broad as long, less concave	broader than long, flattened
Frons	slender, wide at base	squatter due to a slight distal dilatation; base wide	more regularly tapered at apex; base not so wide
Facial medial carina	very evident, protruding, rounded apically, smoothing out near clypeus	thin, sharper, just outlined on clypeus	as in *sikaniae*
Pronotal medial portion	subtriangular, narrow, with rounded extremity	trapezoidal and broad	as in *marginicollis* but wider
Pronotal lateral carinae	sinuous; distal extremities bent externally	straight	as in *marginicollis* but less sinuous and not so bent
Male genital block size /Body size	large	small	medium
Pygofer ventral lobe	subrectangular, long, with markedly notched apex	subtrapezoidal, long, with faintly notched apex	subtrapezoidal, short, broad, with shallow distal notch
Anal tube	long, thin, with sub-basal narrowing; protruding and pointed posterolateral angles	large, broad, stunted; short, rather rounded, posterolateral angles	long, thin, columnar; very long, thin, pointed, posterolateral angles
Aedeagus	long, with 2 narrowings (proximal and distal) in dorsal view	short, stunted, without narrowings	long, slender; slight proximal narrowing
Periandrial lateral lobes	subtrapezoidal, with a narrow base; little shorter than the ventral ones; with mammillar processes	subtrapezoidal, with wide base; as long as the ventral ones; without processes	subquadrangular, small, diverging; as long as the ventral ones or little shorter; with spine-like processes
Periandrial ventral lobes	broad, fused medially for almost the entire length	narrow; fused only at the base	narrow; fused in the proximal $^2/_3$
Periandrial dorsal lobe	large, flattened, triangular; slightly sclerified	narrow, short, extended on the sagittal plane; very sclerified	as in *sikaniae* but longer
Penis rods	forked in 2 spine-like branches	not forked, spoon-shaped subdistal portion	not forked, spine-like
Female seventh abdominal sternum	wide, shallow, medial posterior notch	as in *marginicollis* but less wide	posterior notch, deep medially, with rounded lobes at its sides

icant characters with any of the species described from outside Italy. However, as to judge from descriptions and especially figures in the literature, *C. pilatoi* likenes the specimens from Moldavia (Anufriev, 1969) and Ukraine (Logvinenko, 1975) which these authors erroneously attributed to *C. marginicollis*. Similarities mainly concern the anal tube (narrow, long, columnar with very pointed posterolateral angles) and the aedeagus (in so far as can be deduced from the figures that only show the dorsal view of its distal portion). Generally the pygofer ventral lobe is depicted with a shallower notch than present in *C. pilatoi*. These authors give no information on the ♀ genital structure. As we were not able to examine specimens from Moldavia and Ukraine directly, at present it cannot be established whether they should be attributed to *C. pilatoi*. Since various authors have referred to Anufriev's descriptions (1969) when they identified specimens found in diverse Palaearctic localities as *C. marginicollis*, specimens from those localities should be reexamined to obtain correct diagnosis. There are clear but less evident affinities between *C. pilatoi* and *C. kasparyani* Anufriev, 1983 and *C. mersinica* (Dlabola, 1987). The shape of the anal tube and overall morphology of pieces of the aedeagus of *C. kasparyani* resemble those of *C. pilatoi*, but these two species clearly differ in the orientation of the penis rods, the fine morphology of the periandrial lobes, and the shape of the pygofer ventral lobe. They also present differences in the vertex (shorter than in *C. pilatoi*) and general colour. In addition, the Anatolian species *C. mersinica* loosely resembles *C. pilatoi* in overall aedeagus and anal tube morphology, but differs in the fine structure of the rods of penis proper, lobes of aedeagus, posterolateral angles of anal tube, and median lobe of pygofer.

Anufriev (1969) identifies two subgenera for the Palaearctic species of *Cixidia*: *Cixidia* s.str. (type species: *Cixius confinis* Zett.) and *Epiptera* Metcalf, 1922 (type species: *Flata opaca* Say). The two subgenera are separated on the basis of the following characters: *Cixidia* s. str.: vertex and frons forming an almost right angle; lateral lobes of periandrium without inner processes; apices of penis rods spoonlike; anal tube with noticeable swelling on ventral surface; *Epiptera*: vertex and frons forming an acute angle; lateral lobes of periandrium with inner processes; penis rods at apex not broadened; anal tube without noticeable swelling on ventral surface. *C. pilatoi* and *C. marginicollis* can be included in the subgenus *Epiptera* on the basis of the above-mentioned characters. However, *C. sikaniae* cannot be included in any of the two subgenera. In fact, the angle between vertex and frons, and the anal tube without ventral swelling liken it to *Epiptera*, while the periandrial lobes without inner processes resemble *Cixidia* s. str. Moreover, the penis rods are broadened subapically and not apically. It must be emphasized that also *C. advena* (Spinola, 1839) cannot be included in either of the two subgenera as the components of its aedeagus are so different that they even raise doubts about its belonging to the genus *Cixidia*. These observations suggest that a review of the genus defining the characters and species attributed to it, should precede any separation of subgenera in *Cixidia*.

Acknowledgments

We would like to thank all the colleagues who sent us specimens used in this study, especially Dr. M. Daccordi (Museo Civico di Storia Naturale, Verona), Dr. P. M. Giachino (Museo Regionale di Scienze Naturali, Torino), Prof. A. Vigna Taglianti and Dr. E. Piattella (Dipartimento di Biologia Animale e dell'Uomo, Roma), Dr. V. Vomero (Museo Civico di Zoologia, Roma). We also wish to thank Prof. A. Tirrò (Istituto di Patologia Vegetale, Catania) for identification of the fungus *Trichaptum fusco-violaceum*, Mrs Moira Macpherson for translating a former draft of the manuscript, Dr. M. Wilson (National Museum of Wales, Cardiff) and Dr. Reinhard Gerecke (Zoologische Staatssammlung, München) for critical reading a former draft of this manuscript.

References

Anufriev, G. A. 1969. Studies on some palearctic Achilidae (Homoptera, Auchenorrhyncha). - Bull. Acad. Pol. Sci. **17**: 173-178

Castellani, O. 1953. Contributo alla conoscenza della fauna emitterologica d'Italia. Hemiptera Homoptera. - Boll. Ass. Romana Ent. **8**: 1-11

Dlabola, J. 1987. Neue ostmediterrane und iranische Zikadentaxone (Homoptera, Auchenorrhyncha). - Acta Ent. Bohemoslov. **84**: 295-312

D'Urso, V. & A. Guglielmino 1993. Taxonomic remarks on some species of *Cixidia* (Homoptera, Auchenorrhyncha), p. 18 in Drosopoulos, Petrakis, Claridge, & de Vrijer (Ed.): Proceedings of the 8th Auchenorrhyncha Congress. 112 pp. Delphi

Logvinenko, V. N. 1975. Fulgoroidea. In Fauna Ukrainy **20**: 1-287, Kyiv

Metcalf, Z. P. 1948. General Catalogue of the Hemiptera. IV. Fulgoroidea. 10. Achilidae. 85 pp. Northampton

Servadei, A. 1956. Gli Omotteri (Hemiptera Homoptera Auchenorhyncha) del promontorio garganico. - Mem. Biogeogr. Adriatica **3**: 196-243

– – 1960. Gli Omotteri (Hemiptera Homoptera Auchenorrhyncha) della Calabria. - Mem. Mus. civ. Stor. nat. Verona **8**: 301-333

– – 1967. Rhynchota (Heteroptera, Homoptera Auchenorrhyncha). Catalogo topografico e sinonimico. Fauna d'Italia **9**: 1-851, Bologna

Spinola, M. 1839. Essai sur les Fulgorelles, sous-tribu de la tribu des Cicadaires, ordre des Rhyngotes. - Ann. Soc. ent. Fr. **8**: 133-337

Wagner, W. 1959. Ueber neue und schon bekannte Zikadenarten aus Italien (Hemiptera-Homoptera). - Fragm. Ent. **3**: 67-86

SPIXIANA	**18**	1	65–73	München, 01. März 1995	ISSN 0341–8391

Revision der *Laena*-Arten Mittelasiens

(Insecta, Coleoptera, Tenebrionidae)

Von **Wolfgang Schawaller** *

Schawaller, W. (1995): Revision of the *Laena* species from Middle Asia (Insecta, Coleoptera, Tenebrionidae). – Spixiana **18/1:** 65-73

The species of the genus *Laena* Latreille, 1829 from Middle Asia are revised. The distribution is summarized on a map. *Laena chatkalica*, spec. nov. from the Kirghizian Chatkalskij Alatau is described as new, *Laena edda* Reitter, 1906 is considered as a new synonym of *Laena alaiensis* Reitter, 1906. *Laena auliensis* Reitter, 1902 is a new synonym of *Laena hirtella* Solsky, 1881, and *Laena spaethi* Schuster, 1916 is a new synonym of *Laena leonhardi* Schuster, 1916. *Laena lebedevi* Roubal, 1929 remained as nomen dubium.

Dr. Wolfgang Schawaller, Staatliches Museum für Naturkunde, Rosenstein 1, D-70191 Stuttgart, Germany.

1. Einleitung

Die Gattung *Laena* Latreille, 1829 ist von Osteuropa über den Kaukasus, Mittelasien und den Himalaya bis nach Japan im Osten und bis Malaysia im Süden verbreitet. Aus Mittelasien sind schon seit längerer Zeit einige Arten beschrieben (Schuster 1916), deren Wiedererkennung aber bislang Schwierigkeiten bereitete. Neu gesammeltes Material in Kirgisien und Südost-Kasachstan gab den Anlaß, die Arten dieser Region (Karte siehe Abb. 44) zu revidieren. Dabei konnte der Status von *Laena lebedevi* Roubal wegen unzugänglichem Typenmaterial nicht geklärt werden, weshalb dieses Taxon als nomen dubium eingestuft werden muß.

Artkriterien und die Problematik der Verwandtschaftsbeziehungen innerhalb der artenreichen Gattung wurden schon kurz behandelt (Schawaller im Druck). Die mittelasiatischen Arten bilden anhand des Aedoeagus-Baues drei Gruppen (*dilutella*-Gruppe, *turkestanica*-Gruppe, *alaiensis*-Gruppe), deren Monophylie deshalb aber noch nicht bewiesen ist. *Laena dilutella* ist auch ökologisch von den beiden anderen Artengruppen geschieden, denn sie scheint in tiefgelegenen, waldlosen Steppengebieten weit verbreitet vorzukommen, während alle anderen Arten offensichtlich auf kleinere Areale in montanen und subalpinen Waldformationen oder in alpinen Hochlagen beschränkt sind.

In Mittelasien (Abb. 44) leben nördlich des Fergana-Beckens wesentlich mehr *Laena*-Arten als südlich davon, wenn man gleichen Erkundungszustand voraussetzt. Die alten Angaben Kokand, Fergana und Margelan am Talboden dieses Beckens beziehen sich wohl meist auf die angrenzenden Bergketten. Das Fergana-Becken ist der aufgefüllte Rest des Tethys-Meeres und trennt die paläozoischen Ketten des Tien-Shan im Norden von der jüngeren alpiden Faltung des Pamir im Süden. Da man annehmen kann, daß die flügellosen *Laena*-Arten über nur begrenzte Möglichkeiten zur Ausbreitung verfügen und daher auch heute noch im Gebiet ihrer Entstehung leben, ist es wahrscheinlich, daß die unterschiedliche Besiedlungsdichte der mittelasiatischen Gebirge in Zusammenhang steht mit deren unterschiedlicher Orogenese im Norden und Süden des Fergana-Beckens.

* Contribution to Tenebrionidae, no. 9. For no. 8 see: Entomofauna 15, 1994, 261-280.

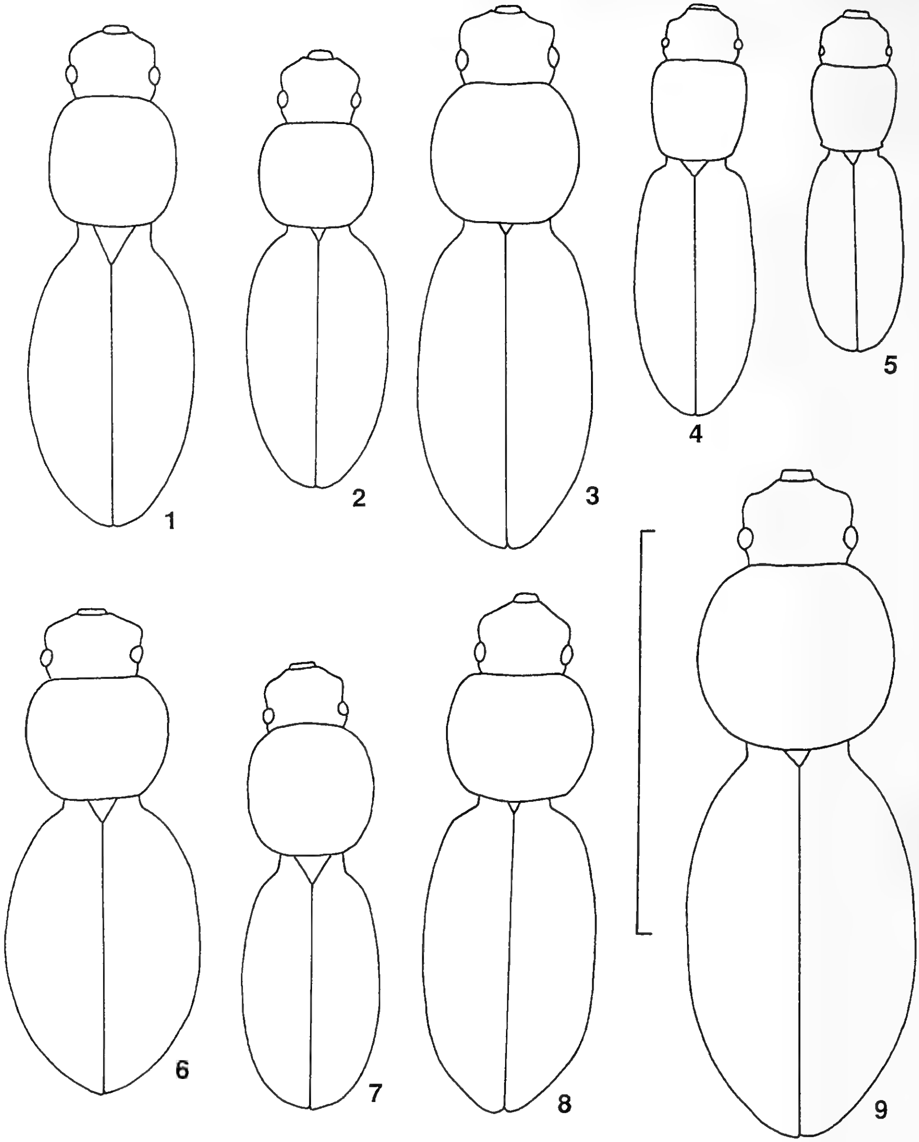


Abb. 1-9. Körperumrisse der mittelasiatischen *Laena*-Arten (Maßstrich 5 mm). 1. *alaiensis*, ♂ Fergana. 2. *alaiensis*, ♂ Holotypus von *edda*, syn. nov. 3. *hirtella*, ♂ Holotypus von *auliensis*, syn. nov. 4. *hauseri*, ♀ Holotypus. 5. *dilutella*, ♂ Syrganak. 6. *brevipennis*, ♂ Medeo. 7. *chatkalica*, spec. nov., ♂ Holotypus. 8. *dentitibia*, ♂ Syntypus Buchara. 9. *holdhausi*, ♂ Syntypus Wernyi.

Material

GFT	Sammlung G. Frey, Tutzing, z.Zt. München.
RGT	Sammlung R. Grimm, Tübingen.
SMNS	Staatliches Museum für Naturkunde, Stuttgart.
TMB	Természettudományi Muzeum, Budapest.
ZMUM	Zoologisches Museum der Lomonosov Universität, Moskau.
ZSM	Zoologische Staatssammlung, München.

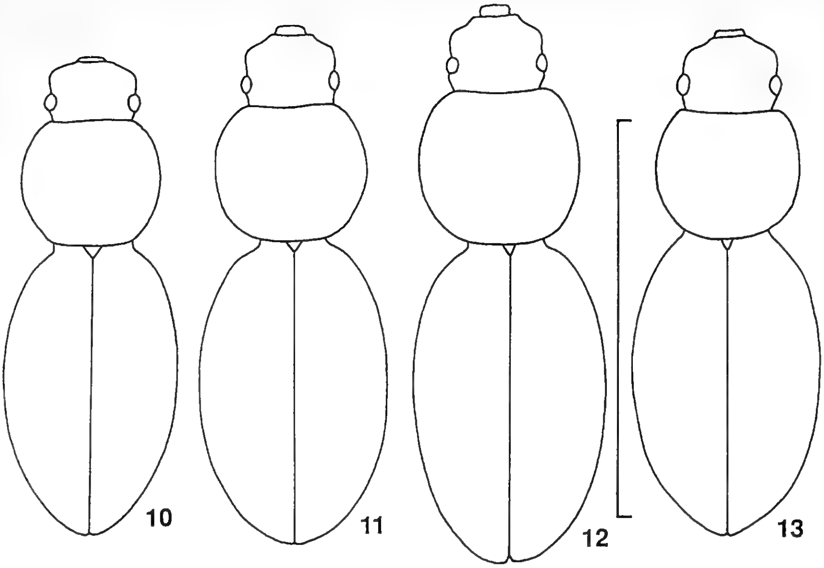


Abb. 10-13. Körperumrisse der mittelasiatischen *Laena*-Arten (Maßstrich 5 mm). 10. *leonhardi*, ♂ Syntypus Issyk-Kul. 11. *leonhardi*, ♂ Syntypus von *spaethi*, syn. nov. Kuldscha. 12. *robusta*, ♂ Turkestan. 13. *turkestanica*, ♂ Ketmen-Tjube.

Dank

Für die Ausleihe danke ich recht herzlich Dr. R. Grimm (Tübingen), Dr. O. Merkl (Budapest), Dr. N. Nikitsky (Moskau) und Dr. G. Scherer (München). Dr. A. Kirejtshuk (St. Petersburg) suchte in der Sammlung des Zoologischen Institutes vergeblich nach Typenmaterial von *Laena hirtella* Solsky. Die neuen Aufsammlungen des Verfassers in Kirgisien und Kasachstan wurden mit einer Reisebeihilfe der Deutschen Forschungsgemeinschaft unterstützt.

2. Die Arten

2.1. *Laena alaiensis* Reitter, 1906

Laena edda Reitter, 1906, syn.nov.

Material: 1 Syntypus (von *alaiensis*) & 8 Expl., Turkestan, Fergana (GFT); 4 Expl., Turkestan, Fergana (ZSM); ♂ Holotypus (von *edda*), Turkestan, Aulie Ata, Irkestan, 28.IV.1903 leg. C. Aris (TMB); 13 Expl., Kirgisien, Ferganskij Alatau, Yarodar, 1400-1500 m, 16.-19.V.1993 leg. W. Schawaller (SMNS).

Beschreibung. Kopfscheitel punktiert, Punkteabstand 1-5facher Punktdurchmesser, fast alle Punkte mit langer Borste. Augendurchmesser aus etwa 7-8 Facetten bestehend. Pronotum glänzend oder schwach chagriniert; Punkte etwas kleiner und zerstreuter als auf dem Kopf, Borsten etwas kürzer als auf dem Kopf; ohne Seitenrandung, aber eine Punktreihe deutet einen Rand an; Propleuren wie Pronotum punktiert, aber spärlicher beborstet oder ganz ohne Borsten; Vorder- und Hinterrand ungerandet; Pronotumform Abb. 1-2. Elytren mit 10 Punktreihen, Punkte so groß wie auf Pronotum; 2. Punktreihe mit 25-30 Punkten; fast jeder Punkt mit einer Borste von der Länge des 2-4fachen Punktdurchmessers; Zwischenräume glänzend oder schwach chagriniert, eben, überall mit abstehenden Borsten von 3-6facher Länge wie die Durchmesser der Reihenpunkte; 9. Zwischenraum hinter den Schultern mit 1 und vor dem Ende mit 1-2 wenig vorragenden Porenpunkten. Schenkel ohne Auszeichnungen, Vordertibia beim ♂ und ♀ schwach s-förmig gebogen (Abb. 14-15) oder gerade (Abb. 16-17). Aedoeagus Abb. 30-32. Körperlänge 4.5-6.8 mm.

Anmerkung. In der größeren Serie von Yarodar befinden sich ♂♂ mit stärker s-förmig gebogener Vordertibia (Abb. 15) und andere ♂♂ mit fast gerader Tibia (Abb. 16), andere Unterschiede sind nicht feststellbar. Es spricht also alles dafür, daß es sich hierbei um eine infraspezifische Variation handelt. Der ♂ Holotypus von *edda* unterscheidet sich mit gerader Tibia (Abb. 17) vom untersuchten Syntypus von *alaiensis* nur in diesem Merkmal, weshalb ich *edda* Reitter, 1906: 447 als Synonym von *alaiensis* Reitter, 1906: 446 betrachte. Schuster (1916) betont die starke äußere Ähnlichkeit von *edda* mit *turkestanica*, dort ist aber der Aedoeagus signifikant anders gebaut.

Verbreitung. Alai-Kette südlich Fergana (locus typicus von *alaiensis*), Aulie Ata (= Dzambul) (locus typicus von *edda*), Ferganskij Alatau nördlich des Fergana-Beckens.

Habitat. In Yarodar in der Bodenstreu des montanen *Juglans*-Waldes.

2.2. *Laena hirtella* Solsky, 1881

Laena auliensis Reitter, 1902, syn.nov.

Material: ♀ Holotypus (von *hirtella*), ohne Fundort-Etikett, Nr. 26 coll. Solsky (ZMUM); ♂ Holotypus (von *auliensis*), Aulie (TMB).

Beschreibung. Kopfscheitel punktiert, Punkteabstand 1-3facher Punktdurchmesser, fast alle Punkte mit langer Borste. Augendurchmesser aus etwa 8 Facetten bestehend. Pronotum schwach chagriniert; Punkte etwas kleiner und zerstreuter als auf dem Kopf, Borsten etwas kürzer als auf dem Kopf; Seiten mit ganz schwacher Kante, nicht deutlich gerandet; Propleuren wie Pronotum punktiert, Borsten etwas kürzer; Vorder- und Hinterrand ungerandet; Pronotumform Abb. 3. Elytren mit 10 Punktreihen, Punkte so groß wie auf Pronotum; 2. Punktreihe mit 32-36 Punkten; fast jeder Punkt mit einer Borste von der Länge des 2-4fachen Punktdurchmessers; Zwischenräume schwach chagriniert, eben, fast überall mit Borsten von 6-10facher Länge wie die Durchmesser der Reihenpunkte; 9. Zwischenraum hinter den Schultern mit 1 und vor dem Ende mit 2 wenig vorragenden Porenpunkten. Schenkel und Tibia (Abb. 18) ohne Auszeichnungen. Aedoeagus Abb. 33. Körperlänge 6.9-7.0 mm.

Anmerkung. Der ♀ Holotypus von *hirtella* Solsky, 1881 unterscheidet sich in keinem Punkt signifikant vom ♂ Holotypus von *auliensis* Reitter, 1902, weshalb *auliensis* als Synonym zu *hirtella* gestellt wird. Damit wird die Vermutung von Schuster (1916) bestätigt.
Die Art ähnelt sehr *turkestanica*, nur sind bei *hirtella* die Flügeldecken etwas schlanker (Abb. 3, 13) und die Behaarung ist immer deutlich länger.

Verbreitung. Locus typicus von *hirtella* ist nach der Beschreibung Kokand im Fergana-Becken, der Typus trägt jedoch kein Fundort-Etikett. Wahrscheinlich stammt der Typus nicht vom Talboden des Fergana-Beckens selbst, sondern von einer der umliegenden Bergketten. Locus typicus von *auliensis* ist Aulie-Ata (= Dzambul). Weitere Funde sind bislang nicht bekannt.

2.3. *Laena brevipennis* Reitter, 1901

Material: 1 Syntypus, Alatau, leg. J. Sahlberg (GFT); 1 Expl., Turkestan, Wernyi (GFT); 1 Expl., Semirjetschensk, Wjernji (GFT); 1 Expl., Turkestan, Semirjetschensk (ZSM); 1 Expl., Ala-Tau, Wernoje, VI.1907 leg. F. Hauser (ZSM); 1 Expl., Dsungarei, Karlyk-Tag (ZSM); 1 Expl., Kasachstan, Transili Alatau, 30 km S Alma-Ata, Medeo, 1600-1800 m, 6.-9.VII.1981 leg. K. Majer (RGT).

Beschreibung. Kopfscheitel punktiert, Punkteabstand 0.5-4facher Punktdurchmesser, fast alle Punkte mit langer Borste. Augendurchmesser aus etwa 8 Facetten bestehend. Pronotum glänzend oder schwach chagriniert; Punkte und Beborstung wie auf dem Kopf; ohne Seitenrandung; Propleuren wie Pronotum punktiert und beborstet; Vorder- und Hinterrand ungerandet; Pronotumform Abb. 6. Elytren mit 10 Punktreihen, Punkte so groß wie auf Pronotum; 2. Punktreihe mit 26-30 Punkten; fast jeder Punkt mit einer Borste von der Länge des 3-4fachen Punktdurchmessers; Zwischenräume glänzend oder schwach chagriniert, eben, überall mit abstehenden Borsten von etwa gleicher Länge wie die Punktborsten; 9. Zwischenraum hinter den Schultern mit 1 und vor dem Ende mit 2 wenig vorragenden Porenpunkten. Schenkel und Tibia (Abb. 19) ohne Auszeichnungen. Aedoeagus Abb. 34-35. Körperlänge 4.8-6.0 mm.

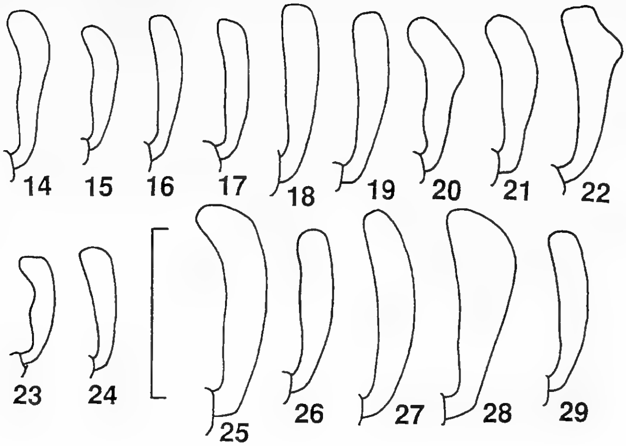


Abb. 14-29. Rechte Vordertibien der mittelasiatischen *Laena*-Arten (Maßstrich 1 mm). 14. *alaiensis*, ♂ Fergana. 15. *alaiensis*, ♂ Yarodar. 16. *alaiensis*, ♂ Yarodar. 17. *alaiensis*, ♂ Holotypus von *edda*, syn. nov. 18. *hirtella*, ♂ Holotypus von *auliensis*, syn. nov. 19. *brevipennis*, ♂ Medeo. 20. *chatkalica*, spec. nov., ♂ Holotypus. 21. *chatkalica*, spec. nov., ♀ Paratypus Sary-Celek. 22. *dentitibia*, ♂ Syntypus Buchara. 23. *dilutella*, ♂ Syrganak. 24. *hauseri*, ♀ Holotypus. 25. *holdhausi*, ♂ Syntypus Wernyi. 26. *leonhardi*, ♂ Syntypus Issyk-Kul. 27. *leonhardi*, ♂ Syntypus von *spaethi*, syn. nov. Kuldscha. 28. *robusta*, ♂ Turkestan. 29. *turkestanica*, ♂ Ketmen-Tjube.

Verbreitung. Offensichtlich nur im Transili (= Zailijskij) Alatau südlich Alma Ata (= Verni, Wernyi oder Wernoje) und nordöstlich davon im Dsungarskij Alatau. Die alte Fundangabe Alatau bedeutet nur "Bergkette" und ist daher nicht eindeutig, in diesem Fall ist die Zuordnung zum Transili Alatau aber sehr wahrscheinlich.

2.4. *Laena chatkalica*, spec. nov.

Typen. Holotypus: ♂, Kirgisien, Chatkalskij Alatau, Sary-Celek Reservat, 1950 m, 28.V.1993 leg. W. Schawaller (SMNS). - Paratypen: 1♀, zusammen mit Holotypus (SMNS); 2♀♀, Kirgisien, Chatkalskij Alatau, Sary-Celek Reservat, 1400-1600 m, 27.-31.V.1993 leg. W. Schawaller (SMNS).

Derivatio nominis: Benannt nach der Chatkalskij Bergkette, woher die Typenserie stammt.

Beschreibung. Kopfscheitel punktiert, Punkteabstand 1-3facher Punktdurchmesser, fast alle Punkte mit langer Borste. Augendurchmesser aus etwa 9 Facetten bestehend. Pronotum schwach chagriniert, Punkte und Beborstung wie auf dem Kopf; Seiten mit feiner Randkante; Propleuren wie Pronotum punktiert, aber mit viel kürzeren Borsten; Vorder- und Hinterrand ungerandet; Pronotumform Abb. 7. Elytren mit 10 Punktreihen, Punkte so groß wie auf Pronotum; 2. Punktreihe mit 32-36 Punkten; fast jeder Punkt mit einer Borste von der Länge des 3-5fachen Punktdurchmessers; Zwischenräume schwach chagriniert, eben, fast überall mit Borsten von 4-6facher Länge wie die Durchmesser der Reihenpunkte; 9. Zwischenraum hinter den Schultern mit 1-2 und vor dem Ende mit 2 wenig vorragenden Porenpunkten. Schenkel ohne Auszeichnungen, Vordertibia beim ♂ innen ausgerandet und außen vorgewölbt (Abb. 20), beim ♀ innen nur schwach ausgerandet und außen nur wenig vorgewölbt (Abb. 21). Aedoeagus Abb. 36. Körperlänge 4.8-6.0 mm.

Anmerkung. Die Vordertibien sind auffallend sexualdimorph und ähneln beim ♂ denen von *dentitibia*, allerdings ist bei dieser Art der Aedoeagus anders gebaut (Parameren gestreckter). Der Aedoeagus von *chatkalica*, spec.nov. zeigt eine gewisse Ähnlichkeit mit dem von *holdhausi*, dort zeigt aber die Vordertibia keinen Sexualdimorphismus, die Körperlänge ist deutlich größer, die Punktreihen auf den Flügeldecken sind dichter und die Beborstung ist etwas kürzer. Auch wenn man der Ausbildung des Vordertibien-Baues eine gewisse Variabilität zubilligt (siehe Anmerkung bei *alaiensis*), scheinen die Unterschiede zu gravierend und rechtfertigen wohl die Zuordnung zu 2 verschiedenen Arten.

Verbreitung. Nur vom locus typicus im Chatkalskij Alatau bekannt.

Habitat. In der Bodenstreu eines subalpinen Waldes von *Picea schrenckiana*.

2.5. *Laena dentitibia* Reitter, 1901

Material: 1♂ Syntypus, Buchara (GFT).

Beschreibung. Kopfscheitel punktiert, Punkteabstand 0.5-2facher Punktdurchmesser, fast alle Punkte mit langer Borste. Augendurchmesser aus etwa 8 Facetten bestehend. Pronotum chagriniert; Punkte etwas kleiner und zerstreuter als auf dem Kopf, Borsten etwas kürzer als auf dem Kopf; Seiten stumpf gekantet, aber ohne deutliche Randung; Propleuren wie Pronotum punktiert, aber ohne Borsten; Vorder- und Hinterrand ungerandet; Pronotumform Abb. 8. Elytren mit 10 Punktreihen, Punkte so groß wie auf Pronotum; 2. Punktreihe mit 38 Punkten; fast jeder Punkt mit einer Borste von der Länge des 3-4fachen Punktdurchmessers; Zwischenräume schwach chagriniert, eben, überall mit abstehenden Borsten von gleicher Länge wie die Punktborsten; 9. Zwischenraum hinter den Schultern mit 1 und vor dem Ende mit 2 wenig vorragenden Porenpunkten. Schenkel ohne Auszeichnungen, Vordertibia beim ♂ (♀ unbekannt) außen mit stumpfen Zahn (Abb. 22). Aedoeagus Abb. 37. Körperlänge 6.3 mm.

Verbreitung. Nur vom locus typicus Buchara bekannt, wobei diese alte Angabe sich wohl eher auf den ganzen Bezirk Buchara bezieht und nicht auf die engere Umgebung des Ortes selbst.

2.6. *Laena dilutella* Solsky, 1881

Material: 2 Expl., Margelan (GFT); 1 Expl., Turkestan, Steppe Kuruk-Kel, leg. F. Hauser (GFT); 1 Expl., Taschkent (GFT); 2 Expl., Uzbekistan, Aman-Kutan, 20.V.1974 leg. Rataj (SMNS); 1 Expl., Aman-Kutan, 22.VII.1931 leg. A. G. Lebedev (ZSM); 2 Expl., Süd-Kasachstan, Berg Syrganak, 27.V.1964 leg. N. G. Skopin (ZSM); 1 Expl., Turkmenien, Kaachra, 29.III.1977 leg. V. G. Dolin (TMB); 8 Expl., Kirgisien, Karaunkur-Tal SW Charvak, 900-1000 m, 18.V.1993 leg. W. Schawaller (SMNS).

Beschreibung. Kopfscheitel punktiert, Punkteabstand 1-3facher Punktdurchmesser, fast alle Punkte mit langer Borste. Augendurchmesser aus etwa 6 Facetten bestehend. Pronotum glänzend; Punkte und Beborstung wie auf dem Kopf; Seitenrand fein, aber vollständig; Propleuren wie Pronotum punktiert, aber ohne Borsten; Vorder- und Hinterrand ungerandet; Pronotumform Abb. 5. Elytren mit 10 Punktreihen, Punkte so groß wie auf Pronotum; 2. Punktreihe mit 30-33 Punkten; fast jeder Punkt mit einer Borste von der Länge des 2-3fachen Punktdurchmessers; Zwischenräume glänzend, eben, überall mit abstehenden Borsten von 4-6facher Länge wie die Durchmesser der Reihenpunkte; 9. Zwischenraum ohne Porenpunkte. Schenkel ohne oder mit sehr schwachem Zahn, Vordertibia bei ♂ und ♀ innen mit deutlicher Ausrandung (Abb. 23). Aedoeagus Abb. 38. Körperlänge 3.5-4.5 mm.

Verbreitung. Die Art besiedelt ein größeres Arael in Mittelasien von Turkmenien im Westen bis nach Kirgisien und Uzbekistan im Osten, dort aber wohl nur in den tieferen Tälern (wie z.B. im Fergana-Becken); locus typicus ist "Turkestan". Die Angabe Afghanistan bei Schuster (1916) erscheint mir zweifelhaft, vielleicht handelt es sich dabei um eine andere Art.

Habitat. Im Karaunkur-Tal südwestlich Charvak in der Steppenzone mit vereinzelten Büschen von *Pistacia vera* unter Steinen.

2.7. *Laena hauseri* Reitter, 1906

Material: ♀ Holotypus, Turkestan, Mts. Ghissar, 1898 leg. F. Hauser (TMB).

Beschreibung. Kopfscheitel punktiert, Punkteabstand 1-3facher Punktdurchmesser, fast alle Punkte mit langer Borste. Augendurchmesser aus etwa 8 Facetten bestehend. Pronotum glänzend; Punkte und Beborstung wie auf dem Kopf; Seiten mit ganz schwacher Kante, aber nicht deutlich gerandet; Propleuren wie Pronotum punktiert, aber mit kürzeren Borsten; Vorder- und Hinterrand ungerandet; Pronotumform Abb. 4. Elytren mit 10 Punktreihen, Punkte so groß wie auf Pronotum; 2. Punktreihe mit 40 Punkten; fast jeder Punkt mit einer Borste von der Länge des 1-2fachen Punktdurchmessers;

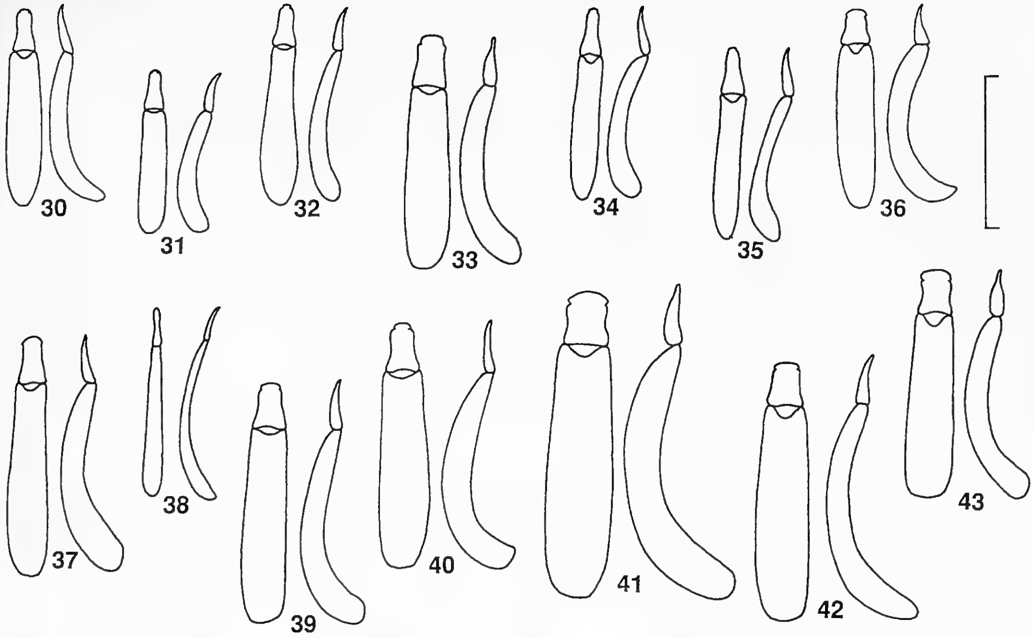


Abb. 30-43. Aedoeagi der mittelasiatischen *Laena*-Arten (Maßstrich 1 mm). 30. *alaiensis*, Fergana. 31. *alaiensis*, Yarodar. 32. *alaiensis*, Holotypus von *edda*, syn. nov. 33. *hirtella*, Holotypus von *auliensis*, syn. nov. 34 *brevipennis*, Syntypus Alatau. 35. *brevipennis*, Medeo. 36. *chatkalica*, spec. nov., Holotypus. 37. *dentitibia*, Syntypus Buchara. 38. *dilutella*, Syrganak. 39. *leonhardi*, Syntypus Issyk-Kul. 40. *leonhardi*, Syntypus von *spaethi*, syn. nov. Kuldscha. 41. *holdhausi*, Syntypus Wernyi. 42. *robusta*, Turkestan. 43. *turkestanica*, Ketmen-Tjube.

Zwischenräume glänzend, eben, nur an den Seiten und am Spitzenabfall mit Borsten von 3-4facher Länge wie die Durchmesser der Reihenpunkte; 9. Zwischenraum hinter den Schultern mit 2-3 und vor dem Ende mit 5-6 nicht vorragenden Porenpunkten. Schenkel und Tibia (Abb. 24) ohne Auszeichnungen. Aedoeagus unbekannt. Körperlänge 5.0 mm.

Verbreitung. Nur vom locus typicus, dem Ghissar (= Hissar) Alai bekannt.

2.8. *Laena holdhausi* Schuster, 1916

Material: 2 Syntypen, Turkestan, Wernyi (GFT); 1 Expl., Turkestan, Wernyi (ZSM); 2 Expl., Kasachstan, Zailijskij (= Transili) Alatau, Almatinka Reservat S Alma-Ata, 2700-2800 m, 7.-8.VI.1993 leg. W. Schawaller (SMNS).

Beschreibung. Kopfscheitel punktiert, Punkteabstand 1-4facher Punktduchmesser, fast alle Punkte mit langer Borste. Augendurchmesser aus etwa 9 Facetten bestehend. Pronotum chagriniert, Punkte etwas kleiner und zerstreuter als auf dem Kopf, Borsten etwas kürzer als auf dem Kopf; Seiten verrundet; Propleuren etwas größer und zerstreuter punktiert als Pronotum, mit kurzen Borsten; Vorder- und Hinterrand ungerandet; Pronotumform Abb. 9. Elytren mit 10 Punktreihen, Punkte so groß wie auf Pronotum; 2. Punktreihe mit 40-44 Punkten; fast jeder Punkt mit einer Borste von der Länge des 3-4fachen Punktdurchmessers; Zwischenräume chagriniert, eben, besonders an den Seiten und am Spitzenabfall mit Borsten von 3-4facher Länge wie die Durchmesser der Reihenpunkte; 9. Zwischenraum hinter den Schultern mit 1 und vor dem Ende mit 2 wenig vorragenden Porenpunkten. Schenkel ohne Auszeichnungen, Vordertibia beim ♂ und ♀ innen etwas ausgerandet (Abb. 25). Aedoeagus Abb. 41. Körperlänge 7.5-8.3 mm.

Verbreitung. Offensichtlich auf den Transili Alatau südlich Alma-Ata (= Wernyi) beschränkt.

Habitat. Im Almatinka Reservat in der Bodenstreu eines subalpinen Waldes von *Picea schrenckiana*.

2.9. *Laena leonhardi* Schuster, 1916

Laena spaethi Schuster, 1916 syn.nov.

Material: 1 Syntypus (von *leonhardi*), Turkestan, leg. V. Plason (GFT); 1 Syntypus (von *leonhardi*), Turkestan, Issyk-Kul, 17.IV.1901 leg. Rikbeil (GFT); 2 Syntypen (von *spaethi*), Ostturkestan, Kuldscha, Juldus (GFT); 4 Expl., Kirgisien, Terskej Alatau, Ak-Su bei Przewalsk, 2100-2600 m, 14.-18.VI.1993 leg. W. Schawaller (SMNS).

Beschreibung. Kopfscheitel punktiert, Punkteabstand 1-5facher Punktdurchmesser, fast alle Punkte mit langer Borste. Augendurchmesser aus 9-10 Facetten bestehend. Pronotum glänzend, Punkte etwas größer und zerstreuter als auf dem Kopf, Borsten wesentlich kürzer als auf dem Kopf oder ganz fehlend (? abgerieben); Seiten verrundet; Propleuren wie Pronotum punktiert und beborstet; Vorder- und Hinterrand ungerandet; Pronotumform Abb. 10-11. Elytren mit 10 Punktreihen, Punkte so groß wie auf Pronotum; 2. Punktreihe mit 36-39 Punkten; Punkte ohne oder höchstens mit Mikroborsten, die nicht länger als die Punktdurchmesser sind; Zwischenräume glänzend, eben, vereinzelt mit Mikroborsten; 9. Zwischenraum hinter den Schultern mit 1 und vor dem Ende mit 2 wenig vorragenden Porenpunkten. Schenkel und Tibia (Abb. 26-27) ohne Auszeichnungen. Aedoeagus Abb. 39-40. Körperlänge 5.0-7.0 mm.

Anmerkung. Die untersuchten Typen von *leonhardi* und *spaethi* unterscheiden sich nicht spezifisch. Schuster (1916) trennte beide wegen angeblich unterschiedlicher Form des Pronotum und der Elytren, was nicht nachvollziehbar ist (Abb. 10-11). Auch die Aedoeagi unterscheiden sich nicht (Abb. 39-40). Zudem liegt der locus typicus von *spaethi* (Kuldscha) nicht sehr entfernt von den Fundstellen der *leonhardi* (Aksu, Issyk-Kul). Ich betrachte daher *spaethi* Schuster, 1916: 613 als Synonym von *leonhardi* Schuster, 1916: 612.

Laena lebedevi Roubal, 1929 (locus typicus: Syr Darja, Ala-Tau) soll *leonhardi* und *spaethi* ähneln und sich nur durch die Form und die Beborstung unterscheiden, über den Aedoeagus ist nichts mitgeteilt. Leider war der Typus nicht verfügbar (keine Antwort aus dem Slowakischen Museum in Bratislava), so daß *lebedevi* als nomen dubium einzustufen ist.

Verbreitung. Locus typicus von *leonhardi* ist die Umgebung des Issyk-Kul und das ostturkestanische Aksu, von *spaethi* das ostturkestanische Kuldscha am Juldus. Der neue Nachweis aus dem östlichen Kirgisien von Ak-Su bei Przewalsk (nicht das ostturkestanische Aksu!) liegt ebenfalls in der Umgebung des Issyk-Kul. Die Art ist also offensichtlich auf die Grenzregion Kirgisien/Sinkiang beschränkt.

Habitat. In Ak-Su bei Przewalsk in der Bodenstreu eines montanen, forstlich beeinflussten Mischwaldes.

2.10. *Laena robusta* Reitter, 1906

Material: 2 Expl., Turkestan (GFT); 1 Expl., Turkestan (ZSM).

Beschreibung. Kopfscheitel punktiert, Punkteabstand 0.5-2facher Punktdurchmesser, fast alle Punkte mit langer Borste. Augendurchmesser aus etwa 10 Facetten bestehend. Pronotum chagriniert, Punkte und Beborstung wie auf dem Kopf; Seiten verrundet; Propleuren etwas gröber als Pronotum punktiert, mit kurzen Borsten; Vorder- und Hinterrand ungerandet; Pronotumform Abb. 12. Elytren mit 10 Punktreihen, Punkte etwas kleiner als auf Pronotum; 2. Punktreihe mit 40-42 Punkten; Punkte mit Mikroborsten, die selten länger sind als die Punktdurchmesser; Zwischenräume chagriniert, eben, besonders an den Seiten und am Spitzenabfall mit Borsten von 3facher Länge wie die Durchmesser der Reihenpunkte; 9. Zwischenraum hinter den Schultern mit 1 und vor dem Ende mit 2 wenig vorragenden Porenpunkten. Schenkel ohne Auszeichnungen, Vordertibia beim ♂ und ♀ außen am Ende verbreitert (Abb. 28). Aedoeagus Abb. 42. Körperlänge 7.0-7.8 mm.

Verbreitung. Samarkand (locus typicus) und Dongus-Tau (Schuster 1916).

2.11. *Laena turkestanica* Reitter, 1897

Material: 1 Expl., Turkestan, Fergana (GFT); 2 Expl., Turkestan, Sussamyr-Gebirge, Ketmen-Tjube, VI.1906 leg. F. Hauser (GFT), 1 Expl. (ZSM); 1 Expl., Kirgisien, Kirgisischer Alatau, 60 km S. Frunze (= Bishkek), Ala-Archa Tal,

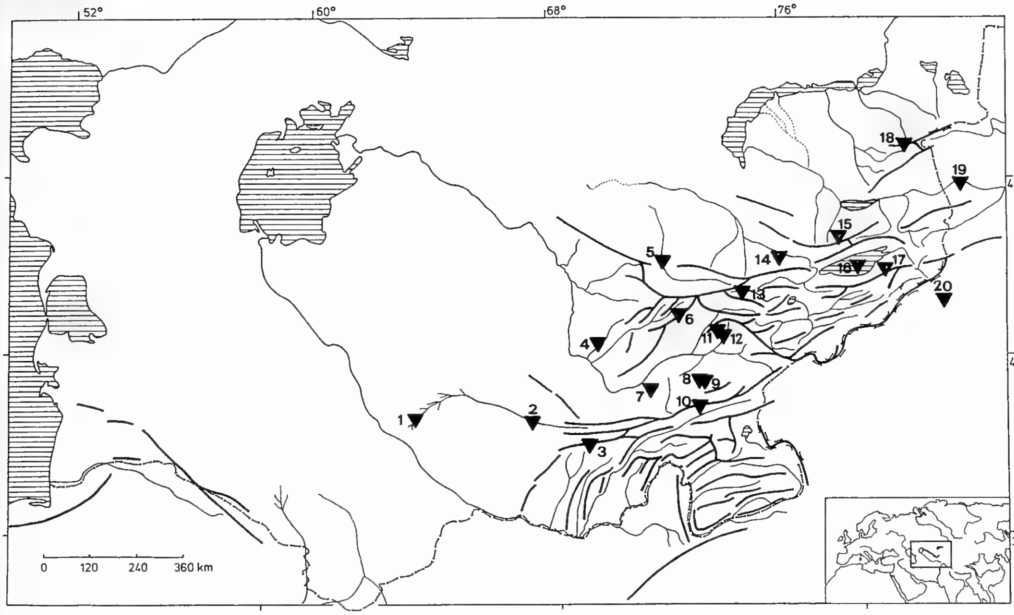


Abb. 44. Fundorte von *Laena*-Arten in Mittelasien. 1. Buchara *(dentitibia)*. 2. Samarkand *(robusta)*. 3. Ghissar Alai *(hauseri)*. 4. Taschkent *(dilutella)*. 5. Dzambul (= Aulie Ata) *(alaiensis, hirtella)*. 6. Sary-Celek (*chatkalica*, spec. nov.). 7. Kokand *(hirtella)*. 8. Margelan *(dilutella)*. 9. Fergana *(alaiensis, turkestanica)*. 10. Alai *(alaiensis)*. 11. Yarodar *(alaiensis)*. 12. Charvak *(dilutella)*. 13. Susamyr-Tal *(turkestanica)*. 14. Bishkek (= Frunze) *(turkestanica)*. 15. Alma-Ata (= Wernyi) *(brevipennis, holdhausi)*. 16. Issyk-Kul *(leonhardi)*. 17. Ak-Su bei Przewalsk *(leonhardi)*. 18. Dsungarskij Alatau *(brevipennis)*. 19. Yining (= Kuldscha) *(leonhardi)*. 20. Aksu *(leonhardi)*.

1800-2500 m, 30.VI.-3.VII.1981 leg. K. Majer (RGT); 1 Expl., Kirgisien, S Talasskij Alatau, oberes Susamyr-Tal, 2500 m, 2.VI.1993 leg. W. Schawaller (SMNS).

Beschreibung. Kopfscheitel punktiert, Punkteabstand 1-3facher Punktdurchmesser, fast alle Punkte mit langer Borste. Augendurchmesser aus etwa 8 Facetten bestehend. Pronotum glänzend oder schwach chagriniert, Punkte etwas kleiner und zerstreuter als auf dem Kopf, Borsten etwas kürzer als auf dem Kopf; Seiten verrundet; Propleuren wie Pronotum punktiert und beborstet; Vorder- und Hinterrand ungerandet; Pronotumform Abb. 13. Elytren mit 10 Punktreihen, Punkte so groß wie auf Pronotum; 2. Punktreihe mit 34-36 Punkten; fast jeder Punkt mit einer Borste von der Länge des 3-4fachen Punktdurchmessers; Zwischenräume glänzend oder schwach chagriniert, eben, fast überall mit Borsten von 3-4facher Länge wie die Durchmesser der Reihenpunkte; 9. Zwischenraum hinter den Schultern mit 1 und vor dem Ende mit 1-2 wenig vorragenden Porenpunkten. Schenkel und Tibia (Abb. 29) ohne Auszeichnungen. Aedoeagus Abb. 43. Körperlänge 5.5-6.8 mm.

Verbreitung. Die bisherigen Funde stammen aus einem Areal nördlich des Fergana-Beckens (Susamyr-Tal) und südlich davon (Alai, Angabe bei Schuster 1916).

Habitat. Im oberen Susamyr-Tal unter Steinen in alpiner *Caragana*-Steppe oberhalb der Waldzone.

3. Literatur

Schawaller, W. im Druck. Neue *Laena*-Arten (Coleoptera: Tenebrionidae) aus Malaysia. - Stuttgarter Beitr. Naturk. (A)
Schuster, A. 1916. Monographie der Coleopterengattung *Laena* Latreille. - Verh. zool.-bot. Ges. Wien **66**: 495-629

8. Gerstberger, M. & W. Mey (Hrsg.): Fauna in Berlin und Brandenburg, Schmetterlinge & Köcherfliegen. - Fördererkreis der naturwissenschaftlichen Museen Berlins e.V., 1993. 160 S., 12 ganzseitige farbige Abb. ISBN 3-926579-04-8.

Diese nach modernsten Gesichtspunkten konzipierte Neuerscheinung stellt eine vorbildliche Bereicherung auf dem Markt deutscher Faunen-Veröffentlichungen dar. Das Werk ist in drei Hauptteile untergliedert: Macrolepidoptera ("Großschmetterlinge"), Microlepidoptera ("Kleinschmetterlinge") und Trichoptera (Köcherfliegen). In den Artenverzeichnissen wird für jede Art neben dem gültigen wissenschaftlichen Artnamen auch die Gefährdungsdisposition nach den Roten Listen Berlins und Brandenburgs angegeben. Alle seit 1900 nachgewiesene Arten sind berücksichtigt.

Zusätzlich zur 1004 Arten umfassenden Liste der "Macrolepidoptera" findet der Leser bei 189 Arten besondere faunistische Hinweise, v.a. Erst- und Letztnachweise. Es folgt als Anhang eine Diskussion unsicherer bzw. alter Funde vor 1900, sowie ein arbeitserleichternder alphabetischer Artenindex. Das Bild wird durch eine auf das Untersuchungsgebiet zugeschnittene "Literaturauswahl" abgerundet. Die "Microlepidoptera" (1374 Arten) werden wie die Macrolepidopteren behandelt, die zahlreichen Anmerkungen finden sich hier in das Artenverzeichnis eingearbeitet, z.B. "Erstfund" oder "Keine aktuellen Funde" (Zäsurjahr 1950).

Die Darstellung der faunistischen Informationen zu den 152 Köcherfliegenarten erfolgt wie bei den Schmetterlingen. Sie werden von den sehr wertvollen Angaben über bevorzugte Gewässertypen sowie bei 27 Arten von speziellen faunistischen Kommentaren begleitet. In einem Anhang wird dem Leser in 12 ganzseitigen Farbfotos ein Überblick über die wichtigsten im Untersuchungsgebiet vorhandenen Biotoptypen an die Hand gegeben. Eine lobenswerte Veröffentlichung, die wegen ihrer Vorbildhaftigkeit viele Leser finden sollte, zumal auch der Preis (Selbstkostenpreis; Bezug am besten direkt beim Förderkreis, Schloßstr. 69A, 14059 Berlin) erstaunlich niedrig liegt. A. Hausmann

9. Smith, D. S., Miller, L. D. & J. Y. Miller: The butterflies of the West Indies and South Florida. - Oxford University Press, Oxford, New York, Tokyo, 1994. 264 S., 32 Farbtaf., Leinen. ISBN 0-19-857199-2.

Den Autoren ist es gelungen, in bibliographisch ansprechender Aufmachung eine umfassende Übersicht über die Tagfalter (incl. Hesperiidae) der Karibik an die Hand zu geben. Der Preis erscheint durchaus gerechtfertigt. Das behandelte Gebiet umfaßt die "westindischen Inseln" der Karibik, wobei allerdings einige periphere Inseln ausgeklammert wurden; so auch Trinidad und Tobago, deren Tagfalterfauna sich mit 650 Arten nahe an die Reichhaltigkeit der südamerikanischen Fauna anlehnt.

Im behandelten Gebiet dagegen nimmt sich die Tagfalterfauna mit ca. 350 Arten und zahlreichen Unterarten etwas bescheidener aus. Diese werden im Text Art für Art nach den Kriterien "Description, Range, Natural History, Subspecies, Discussion" ausführlich charakterisiert. Schwerpunkte hierbei Flügelfärbung, Verbreitungsmuster und Zuchten. Morphologische Details fehlen gänzlich. Exzellent die 33 Farbtafeln mit 662 abgebildeten Faltern, die meisten mit abgebildeter Flügelunterseite. Diese erlauben in fast allen Fällen eine problemlose und einwandfreie Artbestimmung. A. Hausmann

10. Kuchlein, J. H.: De kleine vlinders, handboek voor de faunistiek van de Nederlandse Microlepidoptera. - Pudok, Wageningen, 1993. 715 S. (Holländisch mit englischem Summary), ca. 1400 Verbreitungskarten, 168 Farbfotos auf 8 Farbtafeln, Großformat, gebunden (Karton). ISBN 90-220-1038-4.

Eine Neuerscheinung, deren Lektüre für alle europäischen Microlepidopterologen nicht nur ein Muß, sonder auch ein Genuß sein wird! Es werden die in den Niederlanden vorkommenden 1370 Arten von "Microlepidoptera im klassischen Sinne" behandelt, also entgegen den systematischen Verwandtschaftsbeziehungen ohne die Familien Hepialidae, Cossidae, Psychidae u.a. Dies ist aber durchaus sinnvoll, lag es doch in der Grundintention des Autors, die in den faunistischen Werken Lempke's (1936-1970) nicht abgehandelten Gruppen abzudecken.

Dem Autor gelingt es, in den einleitenden Kapiteln einen ebenso übersichtlichen wie auch tiefen Einblick in die Microlepidopterologie zu gewähren: Auf 140 engbedruckten Seiten werden die Kapitel "Morphologie, Ökologie, Taxonomie und Tiergeographie, Synökologie Mensch/Kleinschmetterlinge, Faunistik" so informativ behandelt, daß dies alleine schon publikationswerter Buchstoff wäre. Der nun folgende Bestimmungsschlüssel zu den Familien setzt eine relativ gute morphologische Übung voraus. Eine ganze Reihe von Arten ist auf den in Qualität kaum zu überbietenden Farbfotos dargestellt. Eine lückenlose Artbestimmung erlaubt das Werk allerdings nicht. Dies lag auch nicht in der Absicht des Verfassers, welcher gerade aus diesem Grund eine äußerst umfangreiche Liste weiterführender Literatur an die Hand gibt.

Den Kern des Werkes stellt die Faunenliste dar. Etwas irreführend hier die Rubrik "Ökologischer Status", worunter der Autor "Bodenständigkeit" bzw. "Seltenheit" versteht. Wertvoll vor allem die darauf folgenden ca. 60 Seiten mit faunistischen Anmerkungen zu den meisten Arten. Nicht zuletzt sind auch die instruktiven und optisch hervorragend erfaßbaren Verbreitungskarten (mit Flugzeitdiagrammen!) positiv hervorzuheben. Für den nicht sprachgewandten Entomologen dürfte die holländische Sprache ein bedeutendes Hindernis darstellen, das nur teilweise durch das lange englische Summary ausgeglichen wird.

Literatur: Lempke, B. J. (1936-1970): Catalogus der Nederlandse Macrolepidoptera: I-XI, Suppl. I-XVI. - Tijdschr. Ent. 79-113, 2196 pp. A. Hausmann

SPIXIANA	18	1	75–81	München, 01. März 1995	ISSN 0341–8391

Life history of the parasitic ant, *Epimyrma bernardi* Espadaler, 1982

(Insecta, Hymenoptera, Formicidae)

By **Alfred Buschinger**

Buschinger, A. (1995): Life history of the parasitic ant, *Epimyrma bernardi* Espadaler, 1982 (Insecta, Hymenoptera, Formicidae). – Spixiana **18/1:** 75-81

The ant genus *Epimyrma* comprises both actively dulotic species and "degenerate" slave-makers with reduced worker number, or lacking this caste completely. The sexuals of some species conduct mating flights, directly followed by colony foundation of the young queens, others mate inside the mother nests, the females hibernate there, and invade new host colonies in spring. The latter species usually produce rapid brood sexuals within the year of colony foundation. *Epimyrma bernardi* exhibits a novel blend of life history features: Sexuals mate in the nest where they remain until colony foundation in the following spring, but the first adult offspring emerges only after the next hibernation. It then comprises both sexuals and workers. Worker numbers are highly variably, suggesting that slave raids, though observed in the laboratory, are rare in the field and probably not obligatory. In contrast to the first report on this species (Espadaler 1982) the newly collected colonies of 1992 contained no dealate regular queens of the host species *Leptothorax gredosi.*

Prof. Dr. Alfred Buschinger, Institut für Zoologie, Fachbereich Biologie der Technischen Hochschule Darmstadt, Schnittspahnstraße 3, D-64287 Darmstadt, Germany.

Introduction

The ant genus *Epimyrma* is distributed around the Mediterranean with about ten species. They are social parasites of various *Leptothorax (Myrafant)* species, one *(E. kraussei)* coexists with *L. (Temnothorax) recedens*. Their life histories represent an unusually wide range of variation including the evolutionary transition from active slavery to a "degenerate" dulosis, and finally the loss of the *Epimyrma* worker caste (for a review see Buschinger 1989a). Young mated queens of all species singly penetrate colonies of the respective host species, and eliminate the host queen(s) by slowly throttling them to death. They are accepted by the host colony workers.

This may happen in summer or fall, immediately after a mating flight *(E. ravouxi, E. stumperi)*, or mating and dealation take place during fall within the mother colony, which the young queens then leave in early spring, after hibernation, searching for new host colonies to invade *(E. adlerzi, E. algeriana, E. corsica, E. kraussei)*. If an *Epimyrma* queen is successful, the host workers may rear her eggs and larvae to become *Epimyrma* workers in comparatively high numbers *(E. ravouxi, E. stumperi)*, during the first and following years after colony foundation. The *Epimyrma* workers then conduct slave raids on neighboring, independent host colonies, thus replenishing the slave stock in the *Epimyrma* colony. *Epimyrma* sexuals appear from the second or third year on and for up to 8-10 years.

In the degenerate slave-makers, the first sexuals, sometimes together with a few workers *(E. kraussei)*, emerge from rapid brood already in the year of colony foundation, and again in the second year, after which most colonies decline due to slave depletion. Workerless species (*E. adlerzi*, *E. corsica*, an undescribed species from Tenerife) have a comparable life history. *E. algeriana* is exceptional in that it combines intranidal mating with active slavery, and a marked polygyny.

For *Epimyrma bernardi,* Espadaler (1982) claims the unusual feature of coexistence of host and parasite queens, derived from a census of four field-collected colonies. Its as yet only known host species is *Leptothorax (Myrafant) gredosi* Espadaler & Collingwood, 1982. Buschinger (1989a) briefly reports that sexuals of *E. bernardi* mate in the mother colonies, and that colony foundation occurs after hibernation, with *Epimyrma* queens throttling and eliminating the functional host queens in the usual way. *E. bernardi* produces workers which in laboratory experiments were able to conduct normal slave raids. These data were obtained from three colonies collected by X. Espadaler in 1982 and handed over to the author alive.

Due to the very low number of available colonies, however, it was as yet impossible to assess whether slave raiding in this species is obligatory. *Epimyrma* workers were few or none in the first seven colonies collected in the field (Table 1). In September 1992 we collected another 12 colonies in the type locality of *E. bernardi,* Sierra de Gredos (Avila, Spain), the only loacality from which this species is known as yet. Dissectioning of *Epimyrma* and host species dealate females, and laboratory rearing of some colonies revealed that this species exhibits a particular blend of life history features not yet found in the other species investigated.

Materials and methods

For this paper all extant material of *E. bernardi* has been used and evaluated:
4 colonies collected on 22/23 July 1979 (Espadaler 1982);
3 colonies collected on 14 August 1982 (leg. Espadaler), handed over to the author in September 1982;
12 colonies collected on 20 September 1992 (leg. Buschinger and Douwes).

Tab. 1. Composition of field colonies of *Epimyrma bernardi.* #1-4: Data from Espadaler (1982); #5-7: Composition on 18 Sept. 1982 when the colonies were handed over to the author.

Col.#	*Epimyrma* adults				*Leptothorax gredosi*			date of coll.	collectors
	deal. ♀♀	alate ♀♀	♂♂	☿☿	♀♀	☿☿	♂♂		
1	–	–	–	2	many al.	many	–	22/23 July 79	Espadaler
2	1	–	–	–	1 deal.	many	–	22/23 July 79	Espadaler
3	3	–	–	4	"queens"	many	+	22/23 July 79	Espadaler
4	–	–	–	3	–	many	–	22/23 July 79	Espadaler
5	1	ca25	2	–	–	60	–	14 Aug 82	Espadaler
6	1	–	–	–	–	87	–	14 Aug 82	Espadaler
7	1	–	–	–	2 deal.	100	–	14 Aug 82	Espadaler
8	2	–	2	4	–	40	–	20 Sept 92	Buschinger & Douwes
9	1	–	–	–	–	74	–	20 Sept 92	Buschinger & Douwes
10	6	13	4	22	3*	273	–	20 Sept 92	Buschinger & Douwes
11	1	–	–	–	–	208	–	20 Sept 92	Buschinger & Douwes
12	–	–	–	15	–	111	–	20 Sept 92	Buschinger & Douwes
13	1	–	–	–	–	51	–	20 Sept 92	Buschinger & Douwes
14	1	–	–	–	–	199	–	20 Sept 92	Buschinger & Douwes
15	1	–	–	–	–	128	–	20 Sept 92	Buschinger & Douwes
16	7	12	3	24	–	148	–	20 Sept 92	Buschinger & Douwes
17	2	4	15	2	–	88	–	20 Sept 92	Buschinger & Douwes
18	1	–	–	–	–	382	–	20 Sept 92	Buschinger & Douwes
19	1	–	–	–	1**	ca300	–	20 Sept 92	Buschinger & Douwes

* 3 microgynes of *L. gredosi*
** mixture of an *Epimyrma*- and a free-living *L. gredosi* colony.

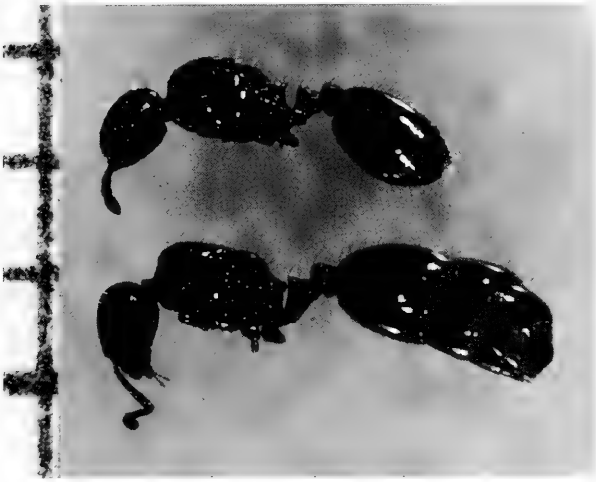


Fig. 1. Microgyne (top) and normal-sized macrogyne of *Leptothorax gredosi*, host species of *Epimyrma bernardi*. The size difference is not only due to the distended gaster of the macrogyne. The microgyne thorax is dorsally more vaulted, the mesonotum less prominent above the pronotum. Division of scale: 1 mm.

All colonies were aspirated as completely as possible, however, certain losses were inevitable because the nests are located beneath rocks in leaf litter and partially in the soil. Host colony density is locally high, sometimes two or even three discrete nests and colonies share one covering rock of 30-50 cm diameter. At least in one instance in 1992 an *Epimyrma* colony by chance was mixed with a neighboring but not parasitized host colony, and in one colony (not included in Table 1) an *Epimyrma* queen was seen in the field, but later lacked in the sample. Living colonies were reared according to Buschinger (1974) in 3-chambered plastic formicaries with a plaster floor, and in artificial nests made from a plastic frame between two microscopic slides. Food (honey and water 1:1, insect pieces) was provided ad libitum three times a week. Colonies were hibernated for 4-5 months in constant 10 °C. Spring was simulated during 2 weeks in a temperature rhythm of 10/20 °C (12:12 h), summer for about 4 months in 15/25 °C (10:14 h) with weak illumination during the warm hours. When the development of new pupae decreases the colonies go through another 2 weeks at 10/20 °C (12:12 h) into the next hibernation.

Dissectioning of females was done as described in Buschinger (1968) and Alloway et al. (1982). "A" denotes a fully fertile queen with long ovarioles and corpora lutea in their bases, and with a receptacle containing sperm; "b" is a newly mated young gyne with still short ovarioles and lacking corpora lutea; "d" are dealate or alate, not inseminated young gynes ("c" would be older, dealate but not inseminated specimens).

Results

1. The composition of field colonies of *Epimyrma bernardi*

Most colonies were censused soon after collecting (Table 1). Eleven out of the 16 colonies containing *Epimyrma* gynes at all had but one female, and none of these single-queen samples comprised *Epimyrma* workers, though one colony (# 5) had produced a high number of alates already. Most colonies having *Epimyrma* workers also contained alate young sexuals and/or multiple dealate gynes (# 3, 8, 10, 16, 17). Dissectioning of a representative sample of gynes (Table 2) revealed that the sole dealate females of colonies lacking both workers and young sexuals (# 9, 11, 18, 19) were inseminated and had long, well-developed ovaries containing corpora lutea in their bases. The ovaries appeared inactive and lacked white, growing oocytes, indicating that oviposition at the time of dissectioning (1st October 1992) had ceased already, the queens preparing for hibernation. Rearing of these colonies after hibernation (see section 2) revealed that their brood had comprised *Epimyrma* larvae.

Most probably these queens had penetrated their host colonies in the spring, 1992, and had laid eggs during the summer, but no workers or sexuals had developed until the fall of this year.

Colonies with multiple dealate gynes (# 8, 10, 16) contained both inseminated young females with short, inactive ovarioles ("b") and young virgins with ovaries in the same condition ("d"). In col. # 8 and # 10 the original queen ("A") either was lost during collecting, or had died before. The dealate, inseminated gynes suggest that intranidal mating had occurred, and that these gynes prepared to stay with the mother colonies until the following spring. Since males were still present in the colonies with alate and/or dealate d-females these virgins probably would have mated also before the winter.

Colony # 10 in addition to mated and virgin *Epimyrma* gynes contained three microgynes of the host species, *Leptothorax gredosi* (Fig. 1). Dissectioning revealed that these specimens were newly inseminated ("b"). Microgynes are sometimes produced in low number in L. gredosi nests, and apparently most or all gynes of this species, too, mate inside or in close vicinity of the nest, but later leave for independent colony foundation; functionally the *gredosi* colonies thus are monogynous.

Colony # 19, evidently a mixture of an *Epimyrma* and a free-living *L. gredosi* colony, contained a fully reproductive host species queen. The workers soon executed the *Epimyrma* queen, but reared its brood (see section 2). Functional host species queens thus were not found in normal *E. bernardi* colonies, though dealate *L. gredosi* females had been recorded in the colonies # 2, 3, and 7. Unfortunately they were not dissected, and I assume they were not reproductive.

Host worker numbers in the *E. bernardi* colonies varied considerably, as in other *Epimyrma* species (Buschinger & Winter, 1983). There was, however, no evidence of higher slave numbers in colonies containing *Epimyrma* workers (mean host workers: 132; range 40-273, n = 5) as compared to the newly founded ones without *Epimyrma* workers (mean host workers: 143; range 51-382, n = 9 colonies, # 19 excluded). Slave raiding, if it occurs at all, apparently does not markedly increase the slave number.

2. Production of workers and sexuals in *Epimyrma bernardi* colonies

The production of colonies with a sole *Epimyrma* queen was particularly interesting: Were *Epimyrma* larvae in their brood? What would be reared from these once-hibernated, first larvae of the queens?

All colonies produced males, gynes and workers (Table 3) except for colony # 13 which reared only workers and one male but no gynes. Probably the lack of gyne production in this nest was due to its low number of only 51 host workers.

Colonies having an *Epimyrma* queen yielded *Epimyrma* workers in numbers which would be sufficient for slave raiding (mean 37.6; range 13-54, n = 3 colonies), and also some males and gynes. Three colonies whose queens had been scarificed for dissectioning or (# 15) had died before the hibernation, produced gynes and males in comparable numbers, whereas only few workers were reared (males: 2-5; gynes; 5-27; workers: 4-5). These specimens evidently originated from hibernated larvae, whereas in the queenright colonies additional workers probably developed as rapid brood from eggs laid after the hibernation. Colony # 19 (the mixture of an *Epimyrma*- and a queenright *L. gredosi* colony) during brood rearing still contained the host species queen, whereas the *E. bernardi* queen had been executed before

Tab. 2. Results of dissectioning of dealate *Epimyrma bernardi* females. Colony numbers as in table 1.

Col.#	n deal. ♀♀	n diss. ♀♀	status of ♀♀	Comments
8	2	2	b, d	Queen (A) lacks
9	1	1	A	Ovaries of queen inactive, with corpora lutea
10	6	6	2b, 4d	Queen (A) lacks, 2 newly inseminated females
11	1	1	A	Queen (A) as in col. 9
16	7	7	A, 3b, 3d	Queen (A) with mated und unmated daughters
18	1	1	A	Queen (A) as in col. 9
19	1	1	A	Queen (A) as in col. 9

the hibernation. The colony reared five males and gynes each, and 25 workers from the *Epimyrma* brood, and numerous sexuals and workers of the host species. Probably the *L. gredosi* queen had an influence on caste formation of the *Epimyrma* brood, causing worker development of most of the female larvae. Most of the about 50 *L. gredosi* gynes in this colony were inseminated when a sample of them was dissected at the end of the rearing season.

Sexual production in the *Epimyrma* colonies was markedly gyne-biased, as far as can be deduced from the comparatively small number of colonies (0.36 ♂/♀, n = 7 colonies).

Little can be said as yet on the production of *E. bernardi* colonies in their third and following years. Rearing of colony # 5 and # 7, and of a number of laboratory-founded colonies with mated gynes from colony # 5, was not very successful despite host worker pupae were regularly added. The *Epimyrma* queens died in the first, second or third "summer". A few males, gynes and workers appeared in these colonies up to the summer following the queen's death, i. e. up to the fourth year.

Discussion

The parasitic ant genus *Epimyrma* with about ten species distributed around the Mediterranean, exhibits a stunning variety of life histories. Among the most intersting features is a reduction of worker number, combinded with a transition from the original slave-making to a derived, completely workerless condition, though the parasite queens still eliminate the host colony queens by throttling them to death (Buschinger 1989a). A second variable feature is mating behavior, which may be a mating flight (in most of the actively dulotic species), or intranidal mating and hence adelphogamy among the progeny of the usually only one mother queen. One slave-raiding speices, *E. algeriana*, combines intranidal mating with polygyny (Buschinger et al. 1990).

Epimyrma bernardi Espadaler, 1982 exhibits an as yet unknown blend of features. The sexuals mate during summer und fall within their mother colonies, which contain but one *Epimyrma* queen (monogyny). The markedly gyne-biased numerical sex ratio (0.36 ♂/♀) corroborates the observations. It corresponds to sex ratios in other adelphogamous *Epimyrma* species (*E. adlerzi*: 0.19; *E. algeriana*: 0.16-0.22; *E. corsica*: 0.08; *E. kraussei*: 0.3), whereas in the swarming *E. ravouxi* it is 1.5 ♂/♀ (Buschinger 1989a).

Dealate mated females most probably spend the winter within the mother colonies which they leave on foot in early spring, in search of suitable host colonies to invade: In the fall, 1992, we had found mated young gynes within the *Epimyrma* colonies, but no young queen just taking over a host colony. This process usually lasts for several weeks so that the chance is high in the right season to find a *Epimyrma* queen throttling the host colony queen in her nest. The observations on *E. bernardi* correspond well to those on other "degenerate slave-makers" of the genus which also invade host colonies after the hibernation *(E. adlerzi, E. corsica, E. kraussei)*. Having penetrated a *L. gredosi* colony the

Tab. 3. Production of presumably newly founded *Epimyrma bernardi* colonies lacking *Epimyrma* workers. Three colonies contained an *Epimyrma* queen, in four colonies the queen was absent during brood rearing.

Queenright colonies					Queenless colonies				
Col.#	production of				Col.#	production of			
	♂♂	♀♀	☿☿			♂♂	♀♀	☿☿	
13	1	–	13		9	3	7	4	
14	6	10	54		11	5	27	5	
18	6	24	46		15	2	5	4	
					19	5	5	25	
Σ	13	34	113	Σ 160	Σ	15	44	38	Σ 97

♀/☿ ratio queenright: 1:3.32; queenless: 1:0.86
♂/♀ ratio queenright: 1:2.6; queenless: 1:2.9
♂/♀ ratio total: 1:2.78

E. bernardi queen eliminates the host queen, and begins to lay eggs. In the year of colony foundation, however, no adult *Epimyrma* progeny is reared, which is different from the "degenerate slave-makers" mentioned above. The latter produce a first batch of sexuals as rapid brood until late summer of the very year of colony foundation. *E. bernardi* instead hibernates again with her first brood of larvae, from which adults emerge in the following year, as the rearing experiments have revealed (Table 3).

This first brood comprises both sexuals and a few workers, as is the case with most populations of the "degenerate slave-maker", *E. kraussei* (Buschinger 1989b). Worker numbers in field colonies of *E. bernardi,* however, are rarely sufficient for effective slave-raiding (Table 1). I presume therefore that the higher worker numbers produced in queenright laboratory colonies (Table 3) are an artifact. Due to good laboratory conditions with respect to food and temperature regime a batch of rapid brood workers was reared, whereas in the field, according to our observations in a number of Mediterranean Leptothoracini, brood rearing decreases during the hot and dry summer season.

I suggest that *E. bernardi,* as *E. kraussei,* is a "degenerate slavemaker" which in the field will conduct slave raids only occasionally, if at all. The fact that colonies with *E.* workers have not more slaves than colonies lacking *E.* workers support this assumption. In the "degenerate slavemaker", *E. kraussei,* slave numbers decrease with increasing numbers of *E.* workers, whereas in the actively dulotic *E. ravouxi* colonies with more slavemaker workers usually also have more slaves (Buschinger & Winter 1983).

Another correspondence to *E. kraussei* refers to population structure: Most of the 19 *E. bernardi* colonies, i.e. at least 10, were in their first year, containing no young sexuals or workers when collected between end of July and 20. September (Table 1). Some of the colonies comprising sexuals and workers probably were in their second year, and a few which already lacked the *Epimyrma* queen perhaps were in the third year. Life expectancy of *E. bernardi* colonies thus is low, two or three years, as in the other "degenerate slavemakers" or workerless species (Buschinger 1989a).

A final problem refers to the presence of dealate host species females in some of the *E. bernardi* colonies (Table 1). Espadaler (1982) observed one "dealated queen" in colony # 2, and "many queens of *Leptothorax*" in colony # 3. He suggested therefore that *E. bernardi* might not kill the host colony queens. Also colony # 7 originally comprised two dealate *L. gredosi* females. All these "queens", however, were not dissected and their reproductive status thus is unknown. Most of the colonies listed in Table 1 contained no dealate or alate host species females, and laboratory observations have revealed that *E. bernardi* is able to throttle and to eliminate the host colony queens as do all other *Epimyrma* species. The host species, *L. gredosi,* however, exhibits a feature which is unusual in other free-living *Leptothorax (Myrafant)* species, and which may explain the presence of dealate host females in some of the *Epimyrma* colonies: *L. gredosi* sexuals mate within or near to the mother nest, and at least some of the mated females remain there over winter. In spring they fight each other and try to leave from the colony (unpubl. observations). In four out of six unparasitized *L. gredosi* colonies collected together with the *E. bernardi* colonies in September, 1992, I found several dealate, recently mated *gredosi* females alongside always one fully fertile queen. Also alate females and gredosi males were still present. If the *E. bernardi* queen in the year of colony foundation does not completely inhibit the rearing of gynes and males from the remaining host species brood in the nest, some *L. gredosi* sexuals may eclose and mate there in the presence of an *Epimyrma* queen. The throttling behavior of the latter apparently is directed only against fully reproductive host queens. Furthermore, *L. gredosi* colonies sometimes produce microgynes in low numbers, alate females or specimens with reduced wings, which are smaller than ordinary gynes. *Epimyrma* colony # 10 (Table 1) contained three such microgynes which were inseminated but not egg-laying. I presume they would have left the *Epimyrma* colony after the winter. Coexistence of *Epimyrma bernardi* with reproductive host species queens thus appears improbable.

Acknowledgements

I am grateful to Xavier Espadaler, Barçelona, for providing his *Epimyrma* colonies of 1982, and for precise informations on the *E. bernardi* site. Thanks are due to Per Douwes, Lund, who helped to collect the new material during a joint research trip to Spain.

References

Alloway, T. M., A. Buschinger, M. Talbot, R. Stuart & C. Thomas 1982. Polygyny and polydomy in three North American species of the ant genus *Leptothorax* Mayr (Hymenoptera: Formicidae). - Psyche **89**: 249-274

Buschinger, A. 1968. Mono- und Polygynie bei Arten der Gattung *Leptothorax* Mayr (Hymenoptera, Formicidae). - Ins. Soc. **15**: 217-226

-- 1974. Experimente und Beobachtungen zur Gründung und Entwicklung neuer Sozietäten der sklavenhaltenden Ameise *Harpagoxenus sublaevis* (Nyl.). - Ins. Soc. **21**: 381-406

-- 1989a. Evolution, speciation, and inbreeding in the parasitic ant genus *Epimyrma* (Hymenoptera; Formicidae). - J. evol. biol. **2**: 265-283

-- 1989b. Workerless *Epimyrma kraussei* Emery 1915, the first parasitic ant of Crete. - Psyche **96**: 69-74

-- , K. Jessen & H. Cagniant 1990. The life history of *Epimyrma algeriana*, a slavemaking ant with facultative polygyny (Hymenoptera, Formicidae). - Zool. Beitr. N. F. **33**: 23-49

-- & U. Winter. Population studies of the dulotic ant, *Epimyrma ravouxi*, and the degenerate slavemaker, *E. kraussei* (Hymenoptera: Formicidae). - Entomol. Gener. **8**: 251-266

Espadaler, X. 1982. *Epimyrma bernardi* n. sp., a new parasitic ant (Hymenoptera, Formicidae). - Spixiana **5**: 1-6

11. Ciba Foundation Symposium 182, Germ Line Development, 1994. - John Wiley and Sons, Chichester, New York, Brisbane, Toronto, Singapore.

Dieses Buch ist eine Zusammenfassung der Vorträge, die anläßlich eines viertägigen wissenschaftlichen Symposiums gehalten wurden. Das Thema ist die Entwicklung der Keimbahn. Die Keimbahn ist die Zellinie im Körper eines vielzelligen Organismus, die die Fortpflanzung sichert und die Verbindung zwischen den Generationen herstellt. Sie sind potentiell unsterblich. Bei sich sexuell fortpflanzenden Organismen findet in den Keimzellen Differenzierung in Ei bzw. Samen statt und die Rekombination der Erbmaterials. Die Artikel behandeln Keimbahnentwicklung in solchen Exoten wie der Grünalge Volvox sowie klassischen Versuchstierchen der Entwicklungsbiologie wie dem Fadenwurm *Caenorhabditis*, der Fruchtfliege *Drosphila* und der Maus.

Veranstalter des Kongresses war die Ciba Foundation, eine von der Schweizer pharmazeutischen Firma CIBA-Geigy 1947 gegründete Stiftung, deren erklärtes Ziel es ist, wissenschaftliche Zusammenarbeit in Biologie, Medizin und Chemie zu fördern. Eine der Aktivitäten dieser Stiftung ist das Organisieren von Symposien mit wenigen erlesenen Teilnehmern, die die gemeinsame Zeit zu intensivem Erfahrungsaustausch nutzen. Dieser Zweck der Symposien spiegelt sich natürlich auch in dem zusammenfassenden Buch wider. Es handelt sich um Aufsätze, die knapp und präzise die Ergebnisse wissenschaflicher Forschung zusammenfassen, geschrieben von Spezialisten für ein eingeweihtes Publikum. Wer hier eine leicht verständliche allgemeine Einführung in das Forschungsgebiet sucht, wird wohl enttäuscht werden. Ohne ein Lehrbuch an der Seite, um einige basale Fakten nachzuschlagen, bin ich nicht ausgekommen. Und wie meistens bei solchen Büchern, deren einzelne Kapitel von unterschiedlichen Autoren geschrieben werden, variiert die Qualität der Artikel und das Vergnügen beim Lesen.

Die Stärken des Buches liegen in einem anderen Bereich: es werden nicht nur die Zusammenfassungen der Vorträge selbst, sondern auch die anschließenden Diskussionen dokumentiert. Dies hat einen interessanten Effekt: geschriebene wissenschaftliche Artikel sind in der Regel Detail-orientiert, sie werden hieb-und-stichfest formuliert. Außerdem verstecken sich oft ganze Gedankengebäude hinter knappen Formulierungen. In den Diskussionen dagegen werden Probleme und ungelöste Fragen angesprochen, Spekulationen sind erlaubt und werden sogar gefragt. Dies gibt viel direkter den Blick frei auf mögliche Entwicklungen in der Zukunft und die Denkweise des Forschungsfeldes. Gerade die Teile, in denen allgemeine Konzepte oder die Evolution der Differenzierung von Soma und Keimbahn diskutiert werden, sind mit Gewinn zu lesen. B. Wetterauer

12. Riedmann, M.: The Pinnipeds. Seals, Sea Lions, and Walruses. - University of Chicago Press, Berkeley and Los Angeles, 1990. 439 S., zahlr. Abb. u. Tab.

Das Buch ist eine ausführliche und aktuelle Naturgeschichte der gesamten Ordnung bzw. Unterordnung Pinnipedia. Nach zwei einleitenden Kapiteln über Anpassungen an Schwimmen und Tauchen sowie über Evolution und Systematik werden alle biologischen Themen wie Physiologie, Ökologie, Fortpflanzung, Verhalten, Nahrungserwerb, Feinde und Wanderungen ausführlich und auf den neuesten Forschungsergebnissen basierend abgehandelt. Sogar die Verwendung von Seelöwen für strategische Aufgaben in der U.S.-Marine - z.B. bei der Bergung von Seeminen - wird erwähnt. Der trotz seiner wissenschaftlichen Seriosität anschaulich abgefaßte Text wird durch zahlreiche Zeichnungen und Fotos ergänzt. Das Buch vermittelt eine Fülle an faszinierender Information. Darüberhinaus ist es der Autorin gelungen, durch ihren fesselnden und engagierten Schreibstil etwas von dem Enthusiasmus, den sie selbst für diese Tiere empfindet, auf den Leser zu übertragen. R. Kraft

13. Corbet, G. B. & J. E. Hill: The mammals of the Indomalayan region: a systematic review. - Oxford University Press, Oxford, New York, Toronto usw. (Natural History Museum Publications), 1992. - 488 S., 45 Abb., 273 Tab., 177 Verbreitungskarten.

Die Säugetiere der Indomalayschen Region wurden bisher nur in Checklists erfaßt, eine zusammenfassende Darstellung mit detaillierten Beschreibungen und Bestimmungsschlüsseln fehlte. Mit dem vorliegenden Buch wird diese Lücke geschlossen. Das behandelte Gebiet reicht vom Indusbecken im Westen über die Indonesischen Inseln bis zu den Philippinen, Molukken und Ryukyu-Inseln im Osten. Im Norden schließt es den Himalaya und S-China bis zum 35° N ein. In diesem Gebiet leben über 1000 Säugetierarten, deren Merkmale, Verbreitung und taxonomische Stellung ausführlich beschrieben werden, wobei auch die Wale und Seekühe berücksichtigt werden. Bestimmungsschlüssel, Synonymielisten, Verbreitungskarten, Tabellen mit Körper- und Schädelmaßen sowie Habitus- und Schädelzeichnungen machen das Werk zu einem wertvollen Handbuch für die behandelte Region.

Alle Informationen stammen sozusagen aus erster Hand, denn die Autoren haben nicht nur die gesamte einschlägige Literatur kritisch revidiert (das Literaturverzeichnis enthält über 3000 Zitate!), sondern durch ihre eigene, jahrzehntelange Forschungsarbeit wesentlich zur Kenntnis der indomalayschen Säugetierfauna beigetragen. Der Spezialist wird zwar feststellen, daß viele taxonomische Fragen noch auf Klärung warten, was auch die Autoren nicht verschweigen. Das Buch ist jedoch eine umfassende Darstellung des aktuellen Kenntnisstandes und will gleichzeitig zu weiterer Forschung anregen. R. Kraft

SPIXIANA	**18**	1	83–103	München, 01. März 1995	ISSN 0341–8391

Einige Neubeschreibungen und Wiederbeschreibungen von Opiinae

(Insecta, Hymenoptera, Braconidae)

Von **Maximilian Fischer**

Fischer, M. (1995): Some new descriptions and redescriptions of Opiinae (Insecta, Hymenoptera, Braconidae). – Spixiana **18/1:** 83-103

The following species from Africa, New Guinea, Australia, Tasmania, and Argentina are described as new or are redescribed: *Opius (Baeocentrum ?) africanus* (Szépligeti) (Tansania), *O. (Baeocentrum) kuruandensis*, spec. nov. (Queensland), *O. (Baeocentrum) minutus* (Szépligeti) (Kenya), *O. (Baeocentrum) salmossi*, spec. nov. (Queensland), *O. (Aulonotus) bogianus*, spec. nov. (New Guinea), *O. (Utetes) curtilosus*, spec. nov. (New Guinea), *O. (Utetes) traventatus*, spec. nov. (New Guinea), *O. (Utetes) wauanicus*, spec. nov. (New Guinea), *O. (Rhogadopsis) miniaceus* (Brèthes) (Argentina), *Diachasma tasmaniae*, spec. nov. (Tasmania). Their taxonomic position is discussed. Morphological details are figured. A key for identification of the Old World species of the subgenus *Baeocentrum* Schulz of the genus *Opius* Wesmael is proposed. Following Wharton (1987) the subgeneric name *Baeocentrum* Schulz is used instead of *Phlebosema* Fischer, 1972, and *Rhogadopsis* Brèthes instead of *Lissosema* Fischer, 1972.

Hofrat Univ.-Doz. Mag. Dr. Maximilian Fischer, Naturhistorisches Museum, Burgring 7, A-1014 Wien, Österreich

Einleitung

Im folgenden Beitrag werden einerseits mehrere Arten auf der Grundlage von Material aus dem American Entomological Institute in Gainesville, Florida, neu beschrieben; andererseits konnten *Opius (Baeocentrum) minutus* (Szépligeti) und *Opius (Rhogadopsis) miniaceus* (Brèthes) wiederbeschrieben und ins System eingeordnet werden. Auch eine Redeskription von *Opius (Baeocentrum?) africanus* (Szépligeti) wird versucht. Ein exaktes Einordnen dieser Art in ein System erscheint derzeit allerdings nicht möglich.

Die Grundlage für die taxonomische Arbeit an den Opiinae der Welt bilden die drei Beiträge des Autors (Fischer 1972, 1977, 1987). Der vorliegende Beitrag betrifft überwiegend Opiinae der Alten Welt außerhalb der paläarktischen Region. Gegenstand von Opiinen aus solchen Gebieten, vor allem indoaustralische Formen, sind die Publikationen von Fischer (1971a, 1971b, 1972, 1978, 1987, 1988, 1989 1990a, 1990b, 1991). Auch Papp (1985) hat einen Beitrag zur Kenntnis gebracht. Die Artikel von Fischer (1982, 1984) bringen Vorschläge zur subgenerischen Gliederung von Teilgruppen der Gattung *Opius* Wesmael s.l.

Danksagung

Ich danke allen Kollegen, die durch Bereitstellen von Exemplaren zum Gelingen dieses Artikels beigetragen haben, so Mme. J. Casevitz-Weulersse (Paris) und den Herren T. Kronestedt (Stockholm), D. Wahl (Gainesville), A. Roig Alsina (Buenos Aires). Danken will ich auch R. Wharton, der durch seinen Beitrag (1987) wesentlich zum Gewinnen wichtiger Erkenntnisse zum System der Opiinae beigetragen hat.

Methoden

Die Beschreibungen werden ähnlich wie in anderen Publikationen des Autors abgefaßt, und es werden in etwa auch die gleichen Abkürzungen verwendet:

Kopf: G1, G2 usw. = 1., 2. usw. Geißelglied; Gm = ein mittleres, Gv = das vorletzte Geißelglied. - Vorderflügel: r1, r2, r3 = die 3 Abschnitte des Radius (r), cq1, cq2 = 1. und 2. Cubitalquerader, nr = rücklaufende Ader (vielfach bezeichnet "m-cu"); d = Discoideus; nv = Nervulus; np = Parallelnerv; R = Radialzelle; Cu2 = 2. Cubitalzelle; B = Brachialzelle. - Hinterflügel: r′ = Radius; b′ = Basalader; cu′ = Cubitus; nr′ = rücklaufender Nerv. - Metasoma: T1 = 1. Metasomaltergit; T2+3 = die beiden verschmolzenen folgenden Tergite.

Abkürzungen der im Text erwähnten Sammlungen

AEIG	American Entomological Institute, Gainesville, Fla.
MACN	Museo Argentino Ciencias Naturales (Museo "Bernardino Rivadavia")
MNHP	Museum National de l'Histoire Naturelle, Paris
NHRS	Naturhistoriska Risksmuseet, Stockholm

Subgenus *Baeocentrum* Schulz

Brachycentrus Szépligeti 1907: 35. - Species typica: "*M. minutus* nov. spec." (präokkupiert).
Baeocentrum Schulz 1911: 1-220.
Opius Subgenus *Phlebosema* Fischer 1972: 350. - Species typica: *Opius discreparius* Fischer.

Schlüssel zu den Arten der Alten Welt

1. Thorax 1.5-2 × so lang wie hoch .... 2.
– Thorax 1.33 × so lang wie hoch .... 8.

2. Augenränder nach unten divergierend, nahe den Fühlerbasen eingedellt, Thorax 1.9 × so lang wie hoch. 4.4 mm. Neu-Guinea .... *sinocis* Fischer, ♀
– Augenränder parallel oder gebogen, nicht eingedellt, Thorax 1.5 × so lang wie hoch .... 3.

3. T2+3 stark sklerotisiert, T2 unregelmäßig längsgestreift. Bohrer nicht vorstehend. 2.1 mm. Zaire .... *scleroticus* Fischer, ♀♂
– T2+3 nur lederig, nicht besonders stark sklerotisiert. Bohrer in der Regel wenigstens halb so lang wie das Metasoma .... 4.

4. Fühler etwa 40gliedrig. Bohrer so lang wie das Metasoma oder nur ♂ bekannt .... 5.
– Fühler 26-29gliedrig. Bohrer nur halb so lang wie das Metasoma oder überhaupt nicht vorstehend .... 6.

5. T2 vorn fein längsstreifig, nur hinten und seitlich fein retikuliert. Hierher vielleicht .... *africanus* (Szépligeti), ♀
– T2 mehr oder weniger gleichmäßig feiner oder gröber runzelig .... 7.

6. Thorax 1.5 × so lang wie hoch. Vordere Furche der Seite des Pronotums breit quergestreift. Hintere Randfurche des Mesopleurums gekerbt. 3.6 mm. Südafrika .... *colombina* Fischer, ♀
– Thorax 1.8 × so lang wie hoch. Seite des Pronotums fein lederig, ohne gekerbte Furchen. Hintere Randfurche des Mesopleurums einfach. 2.4 mm. Kenia .... *minutus* (Szépligeti), ♂ (nec. *minutus* Granger 1949!)

7. Kopf dunkel. Bohrer halb so lang wie das Metasoma. 2.4 mm. Tansania .... *pusillus* (Szépligeti), ♀♂
– Kopf rotbraun. Bohrer versteckt. 1.9 mm. Ruanda .... *papagena* Fischer, ♀

8. nr interstitial .... 9.
– nr antefurkal .... 13.

9. Propodeum fein runzelig, mit einer darüber gelagerten, netzartigen Skulptur. Bohrer so lang wie das T1 .... 10.
– Propodeum mit gegabeltem Mittelkiel. Bohrer fast so lang wie das Metasoma .... 11.

10. Thorax 1.25 × so lang wie hoch. Taster, Hüften und Trochanteren weiß. Fühler mehr als 30gliedrig. 2.2 mm. Queensland .... *salmossi* spec. nov., ♂
– Thorax 1.4 × so lang wie hoch. Taster, Hüften und Trochanteren nicht weiß. Fühler etwa 23gliedrig. 1.3 mm. Nepal .... *sabhayanus* Fischer, ♀

11. Adern im Schnittfeld von nr und cq1 verdickt. 4 mm. Madagaskar ... *distinguendus* Granger, ♀♂
– Adern des Vorderflügels an dieser Stelle nicht verdickt .... 12.

12. Augen nehmen die ganzen Kopfseiten ein, Schläfen fast fehlend. Bohrerklappen nur wenig vorstehend. 5.3 mm. N. Queensland .... *kuruandensis* spec. nov., ♀
– Augen nehmen nicht die ganzen Kopfseiten ein, wenn auch ziemlich groß. Bohrer so lang wie das Metasoma. 5 mm. Kamerun .... cf. *inquirendus* Silvestri, ♀

13. Kopf schwarz oder nur Gesicht, Schläfen und Augenränder rot .... 14.
– Kopf rot bis gelb, nur das Ocellarfeld schwarz .... 15.

14. Metasoma gelbrot. Kopf ganz schwarz. 5.2 mm. Togo .... *bisulcatus* Szépligeti, ♀
– Metasoma überwiegend schwarz, nur die Nähte hell. Gesicht, Schläfen und Augenränder gelb. 3.1 mm. Tansania, Kenia .... *efoveolatus* Szépligeti, ♀♂

15. Wenigstens die basale Hälfte des T2 fein lederig .... 16.
– Metasoma hinter dem T1 vollkommen glatt .... 17.

16. Propodeum tief runzelig, mit weit hinter der Mitte gegabeltem Mittelkiel. r3 1.8 × so lang wie r2. 3-3.5 mm. Senegal .... *dexter* Silvestri, ♀♂
– Propodeum nur fein runzelig, ohne Mittelkiel. r3 2.7 × so lang wie r2. 1.8 mm. Philippinen .... *sapamoroanus* Fischer, ♂

17. Flügelmembran hyalin. 5 mm. Kamerun .... *inquirendus* Silvestri, ♀
– Flügelmembran braun. 6 mm. Nigeria .... *palpalis* Szépligeti, ♀

Opius (Baeocentrum ?) africanus (Szépligeti)
Abb. 1-4

Atoreuteus africanus Szépligeti, 1908: 36 (♀).

Coeloreuteus africanus, Roman 1910: 112; Brues 1926: 377; Shenefelt 1975: 1193 (lit.).

Opius africanus, Wharton 1987: 64, nov. comb. (nec. *Opius africanus* Szépligeti 1910).

Typen. Holotypus: ♀, Kilimandjaro, Sjöstedt, 1905-6, sept., Kibonoto 1300-1900 m, ♀ *Atoreuteus africanus* Szépl. C. van Achterberg, 1978. Holotype. Dazu "39 78" (NHRS).

Das Exemplar ist stark beschädigt. Es fehlen Fühler, mehrere Beine und die Flügel fast vollständig. Durch das Mesoscutum dringt die Insektennadel. Da wichtige Merkmale nicht festgestellt werden können, ist eine sichere Beurteilung nicht möglich. Außer Zweifel steht, daß es sich um eine Art der Gattung *Opius* Wesmael s.l. handelt. Am ehesten ist sie der Untergattung *Baeocentrum* Schulz zuzuordnen, wenn die Dorsalgrube des Mesoscutums fehlt und der nr antefurkal ist. Auf einen antefurkalen nr kann geschlossen werden, weil die Gattung *Coeloreuteus* mit *Exothecus* verglichen wird. Im Falle eines postfurkalen nr käme *Gastrosema* Fischer in Frage. Sollte auf dem Mesoscutum eine Dorsalgrube sein, dann müßte die Form zur Untergattung *Utetes* gestellt werden, was dem Autor eher weniger wahrscheinlich erscheint.

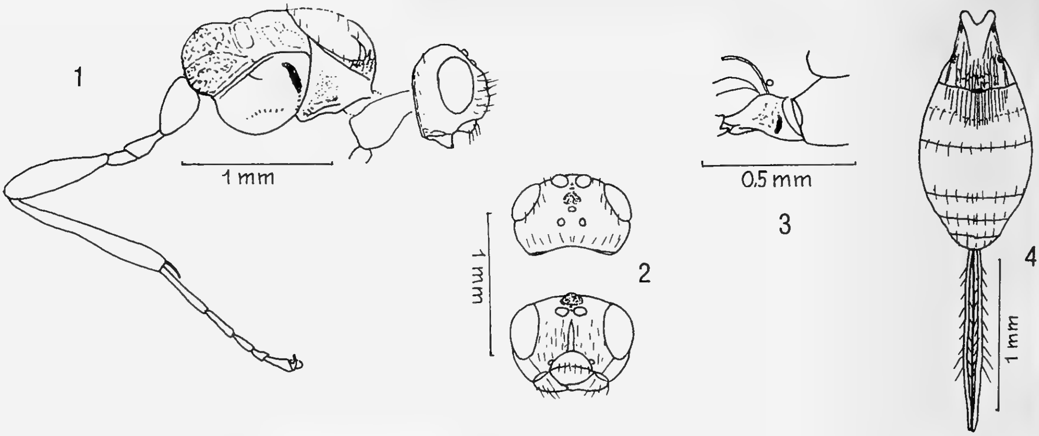


Abb. 1-4. *Opius (Baeocentrum ?) africanus* Szépligeti. 1. Kopf, Thorax und Hinterbein lateral. 2. Kopf dorsal und frontal. 3. Mandibel und Umgebung. 4. Metasoma dorsal.

Bei Einordnung in *Baeocentrum* kämen als Vergleichsarten *Opius minutus* (Szépligeti) und *colombina* Fischer in Betracht.

Beschreibung. Der vorhandene Rest des ♀ Exemplares kann wie folgt beschrieben werden.

Körperlänge. 3.6 mm.

Kopf. 1.7 × so breit wie lang, 1.9 × so breit wie das Gesicht, 1.25 × so breit wie das Mesoscutum; Augen kaum vorstehend, 1.5 × so lang wie die Schläfen, an den Schläfen fast so breit wie an den Augen, Abstand der Toruli von den Augen so groß wie ihr Durchmesser, der Abstand voneinander etwas kleiner; Hinterhaupt kaum gebuchtet; Stirn vor den Augen mit einem rundlichen Eindruck fast von der Breite des Ocellarfeldes, davor eine schwache Längsfurche, Oberseite kahl; Ocellen kaum vortretend, der Abstand zwischen ihnen wenig größter als ein Ocellendurchmesser, der Abstand eines äußeren Ocellus vom Augenrand wenig größer als das Ocellarfeld breit. Gesicht 1.5 × so breit wie hoch, Mittelkiel stumpf, schwach behaart, Haarpunkte nicht erkennbar, Augenränder parallel. Clypeus 2.5 × so breit wie hoch, stark gewölbt, Epistomalnaht gleichmäßig gebogen und einfach, unten deutlich eingezogen, keine erkennbaren Haarpunkte. Tentorialgruben voneinander 2 × so weit entfernt wie von den Augen. Subokularnaht schwach. Mund weit offen, Mandibeln an ihren Basen nicht erweitert, aber von der Spitze zur Basis stark und gleichmäßig verbreitert. Wangen so lang wie die basale Mandibelbreite. Ein Auge in Seitenansicht 2 × so hoch wie lang, so lang wie die Schläfe unten breit, letztere unten wenig breiter als oben.

Thorax. 1.5 × so lang wie hoch, wenig höher als der Kopf, Oberseite nur schwach gewölbt. Mesoscutum 1.2 × so breit wie lang, vor den Tegulae ziemlich gleichmäßig gerundet, Mittellappen kaum heraustretend, Notauli vorn ausgebildet, reichen auf die Scheibe, erlöschen hier, die schwachen Randfurchen entfernen sich vor den Tegulae wenig vom Seitenrand und ziehen zu den Notauli. Vorderekken runzelig punktiert und behaart. Existenz der Dorsalgrube und Beschaffenheit der Praescutellarfurche wegen der Nadelung nicht untersuchbar. Postaxillae glatt. Seitenfelder des Metanotums innen runzelig. Propodeum und Metapleurum ziemlich gleichmäßig, dicht runzelig, matt. Seite des Pronotums oben glatt, unten fein retikuliert, vordere Furche schwach skulptiert, unten stärker. Sternaulus schmal, fein gekerbt, beiderseits verkürzt, die übrigen Furchen einfach. Hinterschenkel 4.5 × so lang wie breit, Hintertarsus so lang wie die Hinterschiene, deren längerer Enddorn gekrümmt, ein Drittel so lang wie der Basitarsus.

Flügel. Nur der Rest eines Vorderflügels vorhanden. Stigma keilförmig, r entspringt weit vor der Mitte, r1 halb so lang wie das Stigma breit, r2 1.75 × so lang wie cq1 (?), r3 nach außen geschwungen. 2 × so lang wie r2, R reicht an die Flügelspitze.

Metasoma. T1 so lang wie hinten breit, hinten 1.8 × so breit wie vorn, Seiten konvergieren nach vorn fast geradlinig, das mediane Feld dicht längsstreifig bis netzartig, Dorsalkiele reichen zur Mitte und

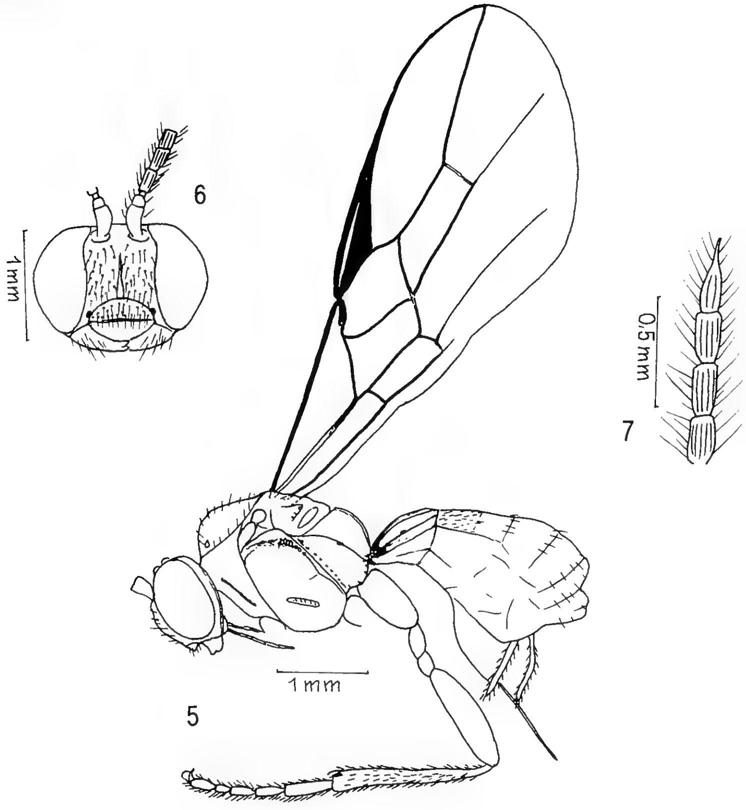


Abb. 5-7. *Opius (Baeocentrum) kuruandensis*, spec. nov. 5. Körper lateral. 6. Kopf frontal. 7. Spitze eines Fühlers.

verschwinden in der Skulptur, die lateralen Felder überwiegend glatt, Spirakel nur auf kleinen Hökkern. T2 vorn fein längsstreifig, hinten und seitlich wie auch der Rest des Metasoma glatt. Der vorstehende Teil der Bohrerklappen fast so lang wie das Metasoma, das distale Viertel ohne Haare, Bohrerspitze ohne deutliche präapikale Kerbe.

Färbung. Bräunlichgelb. Dunkler sind: Oberseite des Kopfes verschwommen, Mesoscutum überwiegend, Propodeum, Mesopleurum über dem Sternaulus, Metasternum, Metapleurum, T1 und die hinteren Ränder der T3 bis T5. Gelb: Clypeus, Wangen, Mundwerkzeuge, Propleuren, Beine, Tegulae und wahrscheinlich die ganze Flügelnervatur. Flügelmembran wahrscheinlich hyalin.

Opius (Baeocentrum) kuruandensis, spec. nov.

Abb. 5-7

Typen. Holotypus: ♂, Australia, N. Qld., Kuruanda 300 m. Jan.-Feb. 1984, J. Sédlacek, Holotype (AEIG).

Taxonomische Stellung. Die Art ist in das Subgenus *Baeocentrum* Schulz einzuordnen. Der Schlüssel nach Fischer (1987) führt sie bei Gabel 7 zu cf. *inquirendus* Silvestri. Die Arten sind wie folgt zu unterscheiden:

kuruandensis, spec. nov. Augen nehmen die ganzen Kopfseiten ein, Schläfen fast fehlend; Bohrerklappen nur wenig vorstehend; 5.3 mm; N. Queensland.

inquirendus Silvestri. Augen zwar ziemlich groß, nehmen jedoch nicht die ganzen Kopfseiten ein; Bohrer so lang wie das Metasoma; 5 mm; Kamerun.

Von *distinguendus* Granger von Madagaskar unterscheidet sich die neue Art u.a. durch das Flügelgeäder, das keine verdickten Aderabschnitte aufweist.

O. inquirendus Silvestri ist überhaupt nur unsicher einzuordnen, da es offensichtlich kein Originalmaterial mehr gibt und die Originalbeschreibung ungenügend ist.

Namenserklärung. Es wurde eine Benennung nach dem Locus typicus gewählt.

Beschreibung. ♀.

Körperlänge. 5.3 mm.

Kopf. 2.2 × so breit wie lang, 2.5 × so breit wie das Gesicht, 1.33 × so breit wie das Mesoscutum, 2 × so breit wie das T1 hinten; Augen groß, nehmen fast die ganzen Kopfseiten ein, stark vorstehend, 7 × so lang wie die Schläfen, diese also fast fehlend, Abstand der Toruli voneinander und von den Augen kleiner als ihr Durchmesser, Hinterhaupt fast gerade; Oberseite seitlich und am Hinterhaupt mit feinsten, kaum merklichen, kurzen Haaren ohne erkennbare Haarpunkte; Ocellen vortretend, der Abstand zwischen ihnen bedeutend kleiner als ein Ocellendurchmesser, der Abstand eines seitlichen Ocellus vom Augenrand kleiner als das Ocellarfeld breit. Gesicht so breit wie hoch, schütter und fein, aber deutlich haarpunktiert, Mittelkiel oben scharf, unten verschwommen, Augenränder nur schwach gebogen, parallel, nahe den Fühlerbasen eingedellt. Clypeus 3 × so breit wie hoch, quergewölbt, unterer Rand schwach eingezogen, schütter, deutlich lang haarpunktiert, Epistomalnaht ziemlich gleichmäßig gebogen, ausgenommen in der Mitte gekerbt. Tentorialgruben klein, nahe bei den Augen, von diesen nur um den eigenen Durchmesser entfernt. Wangen fast fehlend. Mund offen, Labrum kahl, Mandibeln an den Basen nicht erweitert, gegen die Basis nur schwach verbreitert, Maxillartaster so lang wie die Kopfhöhe. Fühler 1.5 × so lang wie der Körper, gegen die Spitze dünner werdend, 58gliedrig; Geißelglieder kurz und eng aneinanderschließend, Endglied mündet in eine Spitze, G1 1.3 ×, G2 1.3 ×, G3 1.2 ×, G4 1.2 × Gm 1.3 ×, Gv 2.5 × so lang wie breit; G1-G4, Gm, Gv = 13, 13, 12, 12, 9, 10; jedes Geißelglied nur nahe der Spitze und nahe der Basis mit einem Borstenkranz, die Borsten länger als die Geißelglieder breit, in Seitenansicht 4 bis 6 Sensillen sichtbar.

Thorax. 1.25 × so lang wie hoch, 1.4 × so hoch wie der Kopf, Oberseite stark gewölbt. Mesoscutum 1.2 × so breit wie lang, Seitenlappen gerundet, vorn schwach gerundet, Mittellappen nicht heraustretend, Notauli nur als unscheinbare Grübchen ausgebildet, also fast ganz fehlend, Dorsalgrube wegen der Nadelung nicht untersuchbar, jedoch mit hoher Wahrscheinlichkeit fehlend, Seiten nur an den Tegulae gerandet, nur unscheinbare Haare ohne erkennbare Haarpunkte am Absturz, an den gedachten Notauli und an den Seiten. Praescutellarfurche kurz, mit 3 Falten, schmäler als das Scutellum breit. Scutellum so breit wie lang. Postaxillae nur hinten schwach gekerbt. Metanotum glatt. Propodeum glatt, Seiten gerandet, Spirakel außerhalb des Randes, mit starkem, gegabeltem Mittelkiel. Sternaulus schmal, schwach gekerbt, beiderseits stark verkürzt, alle übrigen Furchen der Thoraxseite einfach, nur die vordere Furche des Metapleurums schmal gekerbt. Metapleurum gleichmäßig gewölbt, glatt, kein Stigmaleindruck. Hinterschenkel 4 × so lang wie breit, Hintertarsus so lang wie die Hinterschiene.

Flügel. Stigma breit, schief dreieckig, r entspringt vor der Mitte, r1 zweidrittel so lang wie das Stigma breit, r2 1.75 × so lang wie cq1, r3 schwach nach außen geschwungen, 1.9 × so lang wie r2, R reicht an die Flügelspitze, cq1 1.5 × so lang wie cq2, nr interstitial, Cu2 fast parallelseitig, d 2.2 × so lang wie nr, nr um die halbe eigene Länge postfurkal, B geschlossen, 2.5 × so lang wie breit, np entspringt unter der Mitte von B; r′ und nr′ fehlen, cu′ über b′ hinaus stark verlängert.

Metasoma. T1 1.25 × so lang wie hinten breit, hinten 2 × so breit wie vorn, nach vorn geradlinig verjüngt, glatt, Seiten gerandet, Dorsalkiele reichen an den Hinterrand, das mediane Feld etwas erhaben. T2 so lang wie T3, unscheinbare Haare über das T2 schütter verteilt, die restlichen Tergite einreihig behaart, Hypopygium reicht nicht über die Metasomaspitze hinaus, Bohrerklappen nur eine Spur vorstehend, in Seitenansicht so lang wie das T1.

Färbung. Schwarz: Fühler, Kopf, Mandibelspitzen, Hinterschienen, Hintertarsen und Metasoma hinter dem T1. Gesicht braun untermischt. Rötlichgelb: Anellus, Mundwerkzeuge, Thorax, Tegulae, alle Beine und das T1. Weiß: Hinterränder der T3 und T4 und Unterseite des Metasoma an der Basis. Braun: T4-T6 an den Basen; Flügelnervatur und Flügelmembran.

♂. Unbekannt.

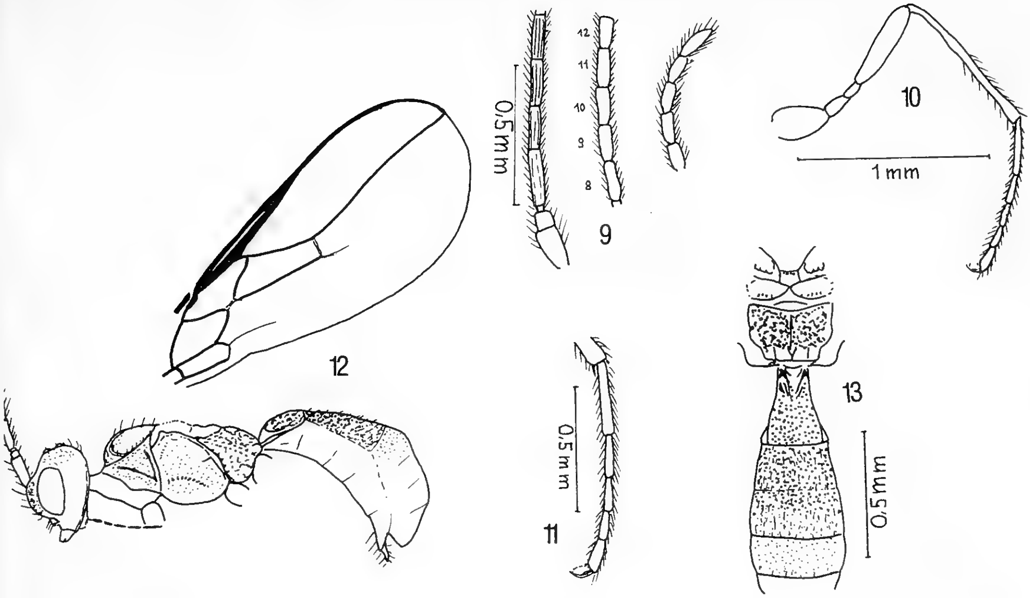


Abb. 8-13. *Opius (Baeocentrum) minutus* (Szépligeti). 8. Kopf, Thorax und Metasoma lateral. 9. Basis, Mitte und Spitze eines Fühlers. 10. Hinterbein. 11. Hintertarsus. 12. Vorderflügel. 13. Teil des Thorax und des Metasoma dorsal.

Opius (Baeocentrum) minutus (Szépligeti)
Abb. 8-13

Brachycentrus minutus Szépligeti, 1907: 35, ♂ (nec. ♀!). - Terra typica: "Rivière Dobi (Afrique orientale anglaise)" (Typus: MNHP).

Baeocentrum minutum, Schulz 1911.

Opius minutus (Szépligeti), Wharton 1987: 61, 62 (comb. nov.)

Typen, darunter Holotypus. ♀, Kenia, wie folgt bezeichnet: Museum Paris, Riv. Dobi, Maurice de Rothschild 1905. - Mai. - Type. - *Brachycentrus minutus* Szép. Type V. Szépligeti det. 1907. - ♂ *Brachycentrus minutus* Szépl. C. van Achterberg, 1978, Holotype. - Lectotype. *Brachycentrus minutus* Szépligeti designated by Wharton 1986 (MNHP).

Anmerkung. Wie bereits früher erkannt, handelt es sich um eine Angehörige der Opiinae, und Wharton (1987) stellte richtig fest, daß die Art dem Subgenus *Phlebosema* Fischer zuzuordnen ist. Dieser Name ist aus Prioritätsgründen ein Synonym von *Baeocentrum* Schulz.

Taxonomische Stellung. Der Schlüssel für die Arten der afro-indo-australischen Regionen nach Fischer (1987) führt die Art in die Nähe von *Opius colombina* Fischer, von dem sie sich durch folgende Merkmale unterscheidet:

minutus (Szépligeti). Thorax 1.8 × so lang wie hoch. Seite des Pronotums und Mesopleurums feinst lederig, Furchen der Seite des Pronotums und hintere Randfurche des Mesopleurums einfach. Hinterschenkel 4 × so lang wie breit. Körper rötlichgelb, nur ein Feld um die Ocellen dunkel. 2.4 mm. Kenia.

colombina Fischer. Thorax 1.5 × so lang wie hoch. Seite des Pronotums und Mesopleurums glatt. Vordere Furche der Seite des Pronotums breit und verworren gekerbt, hintere Randfurche des Mesopleurums gekerbt. Hinterschenkel 3 × so lang wie breit. Thorax und Metasoma hinten dunkelbraun, vordere Hälfte des Metasomas rötlichbraun, Kopf und Propodeum gelb. 3.6 mm. Südafrika.

Beschreibung. ♂.

Körperlänge. 2.4 mm.

Kopf. 1.8 × so breit wie lang, 1.8 × so breit wie das Gesicht, 1.3 × so breit wie das Mesoscutum, 2 × so breit wie das T1 hinten; Augen 1.5 × so lang wie die Schläfen wenig vorstehend, an den Schläfen gerundet, Abstand der Toruli voneinander und von den Augen so groß wie ihr Durchmesser, Hinterhaupt nur sehr schwach gebuchtet, Oberseite feinst retikuliert, glänzend, feinste, kurze, schütter verteilte Härchen ohne erkennbare Haarpunkte seitlich und am Scheitel; Ocellen wenig vortretend, der Abstand zwischen den Ocellen so groß wie ein Ocellendurchmesser, der Abstand eines seitlichen Ocellus vom Auge so groß wie das Ocellarfeld breit. Gesicht 1.1 × so breit wie hoch, fein lederig, unscheinbar behaart, Mittelkiel glänzend, nach unten schwach verbreitert, Augenränder parallel. Clypeus 3 × so breit wie hoch, nur schwach gewölbt und mit unscheinbaren längeren Haaren, Epistomalnaht gleichmäßig gebogen, einfach, unterer Rand eingezogen. Tentorialgruben voneinander 2 × so weit entfernt wie von den Augen. Wange so lang wie die Mandibel an ihrer Basis breit. Subokularnaht schwach. Mund offen, Mandibeln an der Basis nicht erweitert, Maxillartaster so lang wie die Kopfhöhe. Ein Auge in Seitenansicht 2 × so hoch wie lang, so lang wie die Schläfe breit, letztere parallel. Fühler 1.4 × so lang wie der Körper, 35gliedrig, Geißelglieder langgestreckt, gegen das Ende wenig schmäler; G1 4 ×, G2 und G3 3.5 ×, G4 3 ×, G15 2.5 ×, Gv 3 × so lang wie breit; G1-G4, G12, Gv = 18, 15, 15, 13, 11, 9; in Seitenansicht 2 oder 3 Sensillen sichtbar, die gleichmäßig verteilten Haare überwiegend kürzer als die Geißelglieder breit.

Thorax. 1.8 × so lang wie hoch, 1.3 × so hoch wie der Kopf, Oberseite flach. Mesoscutum 1.3 × so breit wie lang, feinst lederig bis glänzend, Notauli vorn tief, glatt, vorn gerandet, reichen auf die Scheibe, Dorsalgrube wahrscheinlich fehlend (wegen der Nadelung nicht untersuchbar), Seiten überall gerandet, Randfurchen gehen in die Notauli über, nur der Verlauf der Notauli und die Seiten mit feinen Haaren. Praescutellarfurche kurz, nicht tief, mit 3 Leistchen. Scutellum so breit wie lang, hinten breit an das Metanotum stoßend. Postaxillae hinten und Seitenfelder des Metanotums mit einigen Kerben. Propodeum dicht runzelig, Mittelkiel äußerst fein angedeutet, hinten mit einigen Längsfalten und jederseits mit 2 glatten Zellen, Seiten schwach gerandet, Spirakel unauffällig, Seite des Pronotums fein lederig, ohne gekerbte Furchen. Mesopleurum feiner lederig, Sternaulus schmal, gekerbt, beiderseits verkürzt, vordere und hintere Mesopleuralfurche einfach. Metapleurum schwach runzelig, vordere Furche gekerbt, kurz und schütter behaart. Hinterschenkel 4 × so lang wie breit, Hintertarsus so lang wie die Hinterschiene.

Flügel. Stigma schmal, keilförmig, r entspringt aus dem basalen Drittel, r1 einviertel so lang wie das Stigma breit, eine gerade Linie mit r2 bildend, r2 1.7 × so lang wie cq1, r3 nach außen geschwungen, 2.5 × so lang wie r2, R reicht an die Flügelspitze, cq1 2 × so lang wie cq2, Cu2 distad schwach verjüngt, nr antefurkal, d so lang wie nr, nv um die eigene Breite postfurkal, B geschlossen, 3 × so lang wie breit, np entspringt aus der Mitte von B; r' und nr' fehlen, cu' über b' hinaus verlängert.

Metasoma. T1 1.2 × so lang wie hinten breit, vorn halb so breit wie hinten, nach vorn geradlinig verjüngt, gewölbt, nur ganz seitlich flach, dicht runzelig, Dorsalkiele vorn entwickelt, Stigmen unscheinbar. T2 ungefähr so lang wie T3, T2+3 fein, dicht körnig skulptiert, hinten und das T3 feinst lederig, die folgenden Tergite glatt; feine, kurze unauffällige Haare über die ganze Oberfläche verteilt.

Färbung. Rötlichgelb. Dunkel: Fühlergeißeln und ein Fleck um das Ocellarfeld. Gelb: Taster, alle Beine und die Flügelnervatur. Flügelmembran hyalin.

♀. Vom ♂ kaum verschieden. Bohrer kurz.

Opius (Baeocentrum) salmossi, spec. nov.

Abb. 14, 15

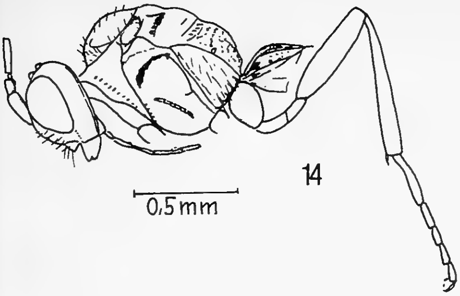
Typen. Holotypus: ♂, Australia: Qld. Mossman Gorge, 30 m. Feb. 23, 1984, L. Masner SS. Rain forest undergrowth, Holotype (AEIG).

Taxonomische Stellung. Die Art ist dem Subgenus *Baeocentrum* Schulz zuzuordnen. Der Schlüssel nach Fischer (1987) führt sie zu *sabhayanus* Fischer, und sie kann von dieser wie folgt unterschieden werden:

salmossi, spec. nov. Thorax 1.25 × so lang wie hoch. Taster, Hüften und Trochanteren weiß. Fühler mehr als 30gliedrig. 2.2 mm. Queensland.

sabhayanus Fischer. Thorax 1.4 × so lang wie hoch. Taster, Hüften und Trochanteren nicht weiß. Fühler etwa 23gliederig. 1.3 mm. Nepal.

Anmerkung. *O. sabhayanus* Fischer ist an dieser Stelle bei *Baeocentrum* vielleicht unrichtig eingeordnet. Der Sachverhalt müßte noch überprüft werden.



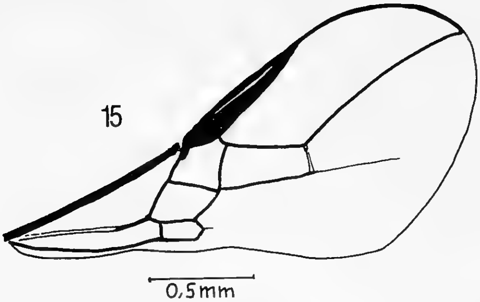


Abb. 14, 15. *Opius (Baeocentrum) salmossi*, spec. nov. 14. Kopf, Thorax, T1 und Hinterbein lateral. 15. Vorderflügel.

Namenserklärung. Der Name *salmossi* ist als Abkürzung für *Saltus mossmani* (saltus/lat. = Schlucht) zu verstehen und zeigt den Locus typicus an.

Beschreibung. ♂.

Körperlänge. 2.2 mm.

Kopf. 2 × so breit wie lang, 1.9 × so breit wie das Gesicht, 1.33 × so breit wie das Mesoscutum, 2 × so breit wie das T1 hinten; Augen vorstehend, 2 × so lang wie die Schläfen, Augen und Schläfen in gemeinsamer Flucht gerundet, Abstand der Toruli voneinander und von den Augen so groß wie ihr Durchmesser, Hinterhaupt nur schwach gebuchtet, Oberseite höchstens mit wenigen unscheinbaren Haaren; Ocellen vorstehend, der Abstand zwischen ihnen so groß wie ein Ocellendurchmesser, der Abstand eines seitlichen Ocellus vom Augenrand so groß wie das Ocellarfeld breit. Gesicht 1.1 × so breit wie hoch, Mittelkiel oben schärfer, unten wenig breiter und verflachend, unscheinbar behaart, keine Haarpunkte erkennbar, Augenränder parallel. Clypeus 3 × so breit wie hoch, quer gewölbt, unterer Rand gerade, einige unscheinbare Haare, Epistomalfurche ungleichmäßig gebogen und einfach. Tentorialgruben voneinander 3 × so weit entfernt wie von den Augen. Wange etwas kürzer als die Mandibel an der Basis breit, mit schwacher Subokularnaht. Mund offen, Labrum uneben, Mandibeln an ihren Basen nicht erweitert, Maxillartaster so lang wie die Kopfhöhe. Ein Auge in Seitenansicht 2 × so hoch wie lang, 1.5 × so lang wie die Schläfe breit, letztere parallelseitig. Fühler an dem vorliegenden Exemplar beschädigt, 29 Glieder sichtbar, es dürften wenigstens 5 Glieder fehlen, mindestens 1.5 × so lang wie der Körper; G1 4 ×, G2-G4 3.5 ×, G10 3 ×, G27 2.5 × so lang wie breit; G1-G4, G10, G27 = 16, 14, 14, 14, 12, 9; in Seitenansicht 3 Sensillen sichtbar, Haare so lang wie die Geißelglieder breit.

Thorax. 1.25 × so lang wie hoch, 1.5 × so hoch wie der Kopf, Oberseite stark gewölbt. Notauli nur als unscheinbare Eindrücke ausgebildet, im übrigen fehlend, vom Rand entfernt, Dorsalgrube fehlt, Seiten nur an den Tegulae gerandet, Randfurchen entfernen sich in der Mitte vom Rand und ziehen nur andeutungsweise zu den Notauli; feine Haare entlang der gedachten Notauli, am Absturz und an den Rändern. Praescutellarfurche kurz, gekerbt. Scutellum breiter als lang. Postaxillae hinten und innen gekerbt. Seitenfelder des Metanotums gekerbt. Propodeum fast zur Gänze unregelmäßig runzelig, eine gebogene quere Runzelreihe schwach abgehoben. Vordere Furche der Seite des Pronotums gekerbt, hintere nicht. Sternaulus schmal gekerbt, beiderseits verkürzt, vordere Randfurche des Metapleurums gekerbt, alle übrigen Furchen der Thoraxseite einfach. Metapleurum glänzend, Coxalrand mit einigen Querfalten, lang, hell behaart. Hinterschenkel 5 × so lang wie breit, Hintertarsus so lang wie die Hinterschiene.

Flügel. Stigma keilförmig, r entspringt aus dem basalen Viertel, r1 ein Drittel der Stigmabreite, geht im Bogen in r2 über, r2 1.5 × so lang wie cq1, r3 nach außen geschwungen, 2.8 × so lang wie r2, R reicht an die Flügelspitze, nr interstitial, Cu2 distad wenig verjüngt, cq1 2 × so lang wie cq2, d 1.1 × so lang wie nr, nv postfurkal, B 2.5 × so lang wie breit, np entspringt aus der Mitte von B; r′ und nr′ fehlen ganz, cu′ höchstens als Falte angedeutet.

Metasoma. T1 so lang wie hinten breit, vorn halb so breit wie hinten, nach vorn geradlinig verjüngt, Dorsalkiele stark, weit getrennt, reichen an den Hinterrand, das mediane Feld schwach runzelig, die lateralen Felder uneben. T2 äußerst schwach und dicht retikuliert, diese Skulptur verliert sich auf dem T3, T2 so lang wie T3.

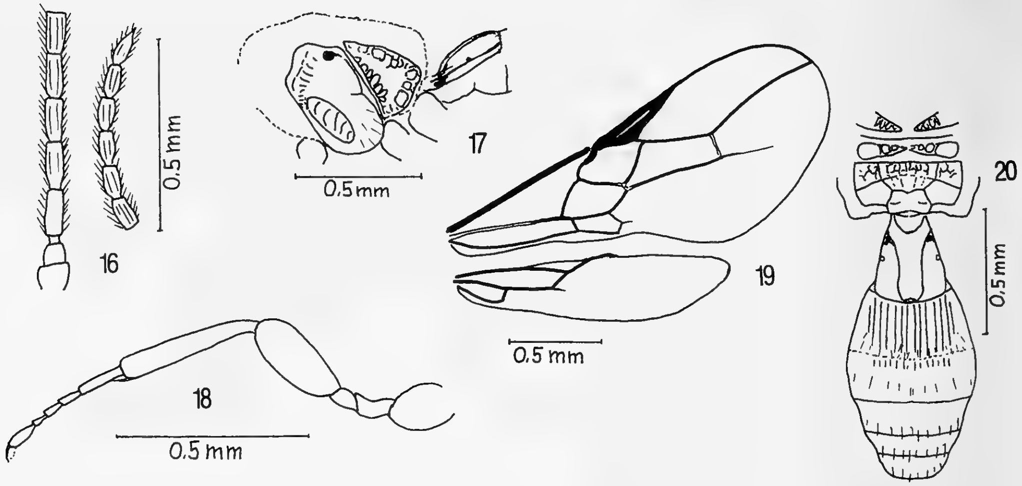


Abb. 16-20. *Opius (Aulonotus) bogianus*, spec. nov. 16. Basis und Spitze eines Fühlers. 17. Meso- und Metapleurum und T1 lateral. 18. Hinterbein. 19. Vorder- und Hinterflügel. 20. Metanotum, Propodeum und Metasoma dorsal.

Färbung. Kopf wenig heller rotbraun, Thorax und Metasoma wenig dunkler rotbraun. Dunkel: Fühlergeißeln, 3 verwaschene Flecke auf dem Mesoscutum, Hintertarsen und das Metasoma vom Endrand des T3 angefangen. Gelb: Scapus, Pedicuellus, Anellus, Mandibeln, alle Beine, Tegulae und die Flügelnervatur. Weiß: Taster, Hüften und die Trochanteren. Flügelmembran hyalin.

♀. Unbekannt.

Subgenus *Aulonotus* Ashmead

Opius (Aulonotus) bogianus, spec. nov.

Abb. 16-20

Typen. Holotypus: ♂, 50 km E. of Bogia, Om. New Guinea, II.18-22.1979, J. Sédlacek, Holotype (AEIG).

Taxonomische Stellung. Die Art ist in das Subgenus *Aulonotus* Ashmead zu stellen. Die Tabelle nach Fischer (1988) führt sie zu *Opius compremur* Fischer (Gabel 20), dem sie recht ähnlich ist und von dem sie sich wie folgt unterscheiden läßt:

bogianus, spec. nov. Oberfläche des T2+3, abgesehen von einer schütteren Querreihe von Haaren, kahl; auch die folgenden nur einreihig behaart. Propodeum zur Gänze stark, weitmaschig genetzt. Ferner T2 äußerst fein, kaum sichtbar längsstreifig und durch eine vollständige, teilweise feinst skulptierte Naht gegen das T2 abgegrenzt. 2,3 mm. Neu Guinea.

compremur Fischer. T2+3 mit zahlreichen, über die ganze Oberfläche verteilten Haaren; die folgenden mit mehrfachen Haarreihen vor ihren Endrändern. Propodeum in der Mitte grob runzelig, mit Basalkiel, angedeuteter Areola und Querkiel. 2.8 mm. Neu Guinea.

Namenserklärung. Der Name wurde nach dem Originalfundort gewählt.

Beschreibung. ♂.

Körperlänge. 2.1 × so breit wie lang, 2 × so breit wie das Gesicht, 1.3 × so breit wie das Mesoscutum, 2.1 × so breit wie das T1 hinten. Augen vorstehend, 2.5 × so lang wie die Schläfen, Augen und Schläfen in gemeinsamer Flucht gerundet. Toruli kaum vortretend, voneinander wenig weiter entfernt als von den Augen; Hinterhaupt schwach gebuchtet, Oberseite seitlich, das Hinterhaupt und besonders die Stirn feinst, zerstreut behaart, Haarpunkte kaum sichtbar. Ocellen vortretend, der Abstand zwischen ihnen so groß wie ein Ocellendurchmesser, der Abstand eines seitlichen Ocellus vom Augenrand so groß wie das Ocellarfeld breit, zwischen den Ocellen und am Scheitel ein Längseindruck. Gesicht 1.2 × so breit wie hoch, Mittelkiel sehr deutlich, dicht und deutlich haarpunktiert, Augenränder gebogen. Clypeus 4 × so breit wie hoch, quergewölbt, Epistomalnaht gleichmäßig gebogen und einfach, unterer Rand gerade, fein behaart und mit deutlichen Haarpunkten. Wangen so lang wie die basale Mandibelbreite, Subokularnaht vorhanden. Mund offen, Mandibeln an der Basis nicht breit und nicht erweitert, Maxillartaster so lang wie die Kopfhöhe. Ein Auge in Seitenansicht 1.9 × so hoch wie lang, 2 × so lang wie die Schläfe breit. Fühler 1.5 × so lang wie der Körper, 28gliedrig, Endglied in eine Spitze ausgezogen, alle Geißelglieder gleich breit; G1 3 ×, G2 2.5 ×, G12 2.5 ×, Gv 2 × so lang wie breit; G1-G3, G12, Gv = 12, 11, 11,10, 8; Glieder des apikalen Drittels deutlich voneinander getrennt, Haare kürzer als die Geißelglieder breit, in Seitenansicht 2 oder 3 Sensillen sichtbar.

Thorax. 1.3 × so lang wie hoch, 1.4 × so hoch wie der Kopf, Oberseite gewölbt. Mesoscutum 1.2 × so breit wie lang, vor den Tegulae trapezförmig, Mittellappen heraustretend, Notauli vollständig, reichen zur tiefen, bis zur Mitte reichenden Dorsalgrube, vorn gekerbt, auf der Scheibe einfach, Seiten überall gerandet und gekerbt, gehen in die Notauli über, fein behaart sind der Absturz, die Notauli, die Seitenränder und ein Streifen vorn in der Mitte des Mittellappens. Praescutellarfurche gekerbt. Postaxillae nur ganz innen mit Kerben. Seitenfelder des Metanotums nur mit 2 Längsfalten. Propodeum weitmaschig genetzt, ein gebogener Querkiel nur undeutlich, nur an den Ecken unebene, glänzende Stellen. Hintere Furche der Seite des Pronotums gekerbt, vordere nur oben. Sternaulus breit oval, unten von einer Kante begrenzt, mit unregelmäßigen queren Falten, reicht an den Vorderrand, nicht ganz jedoch an die Mittelhüfte, Epicnemialfurche der Länge nach gekerbt, hintere Randfurche einfach. Metapleurum in der Mitte glatt, vordere Furche gekerbt, am Coxalrand einige Zellen, Propodealrand hinten gekerbt, vorn mit einigen Zellen, mit längeren Haaren. Hinterschenkel 3 × so lang wie breit, Hinterschiene etwas unregelmäßig geformt, an der Basis schwach eingeschnürt, Hintertarsus kürzer als die Hinterschiene.

Flügel. Stigma mäßig breit, dreieckig, r entspringt aus dem basalen Drittel, r1 eindrittel so lang wie das Stigma breit, r2 1.5 × so lang wie cq1, r3 nach außen geschwungen, 1.66 × so lang wie r2, R reicht an die Flügelspitze, Cu2 distad nur schwach verjüngt, cq1 1.8 × so lang wie cq2, nr postfurkal, d 1.8 × so lang wie nr, nv um die eigene Breite postfurkal, B geschlossen, distad erweitert, 2 × so lang wie breit, np entspringt aus der Mitte von B; r′ und nr′ fehlen, cu′ über b′ hinaus wenig verlängert.

Metasoma. T1 1.25 × so lang wie hinten breit, hinten 1.8 × so breit wie vorn, nach vorn geradlinig verjüngt, quer gewölbt, uneben, glänzend, Dorsalkiele reichen an den Hinterrand. T2 fast bis ans Ende, T3 nur an der Basis längsgestreift, nur seitlich nahezu ohne Skulptur.

Färbung. Schwarz. Braun: Scapus, Pedicellus, Anellus, Clypeus, Mundwerkzeuge, alle Beine, Tegulae und die Flügelnervatur. Die beiden letzten Glieder der Maxillartaster weiß. Flügelmembran hyalin.

♀. Unbekannt.

Subgenus *Utetes* Foerster

Opius (Utetes) curtilosus, spec. nov.

Abb. 21, 22

Typen. Holotypus: ♀, Baiyer R(iver), N. Guinea, II.25-III.9.1979, Holotype (AEIG).

Taxonomische Stellung. Die Art ist in die *bianchii*-Gruppe des Subgenus *Utetes* Foerster einzuordnen und läuft im Schlüssel nach Fischer (1987) zur Gabel 5. Sie unterscheidet sich von *wauanicus*, spec. nov. und den beiden dort folgenden Arten wie folgt:

curtilosus, spec. nov. Propodeum ohne Querkiel und mit nur sehr undeutlichem Längskiel. T2+3 dicht, kurz, hell über die ganze Oberfläche behaart. Bohrerklappen nicht vorstehend. 3.8 mm. Neu Guinea.

wauanicus, spec. nov., *wamenaensis* Fischer und cf. *perkinsi* Fullaway. Propodeum entweder mit Querkiel oder Bohrerklappen so lang wie das Metasoma oder nur wenig kürzer. T2+3 ohne solche Behaarung.

Namenserklärung. Der Name *curtilosus* ist als Abkürzung für "curtipilosus" zu verstehen und bezieht sich auf die Behaarung des Mittellappens des Mesoscutums und des T2+3.

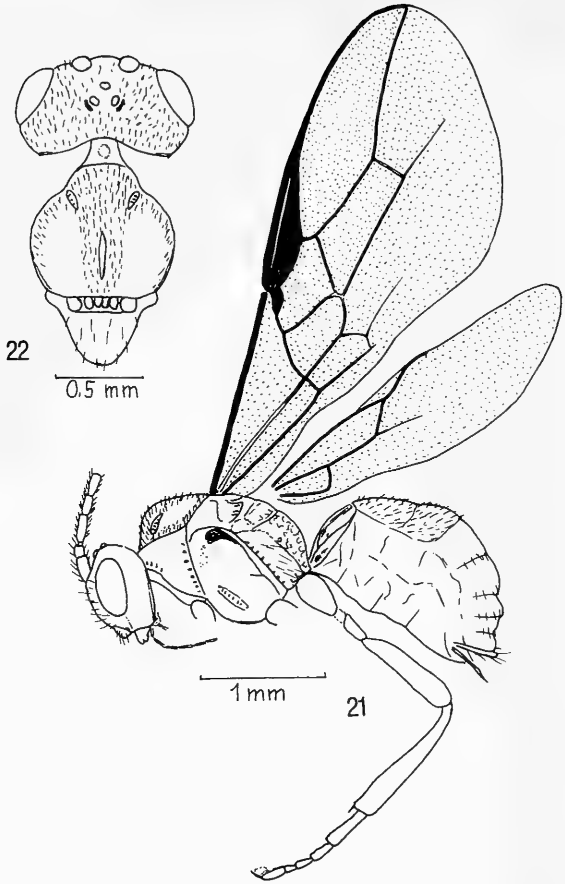


Abb. 21, 22. *Opius (Utetes) curtilosus*, spec. nov. 21. Körper lateral. 22. Kopf, Mesoscutum, Praescutellarfurche und Scutellum dorsal.

Beschreibung. ♀.

Körperlänge. 3.8 mm.

Kopf. 2.2 × so breit wie lang, 1.8 × so breit wie das Gesicht, 1.25 × so breit wie das Mesoscutum, 1.9 × so breit wie das T1 hinten; Augen vorstehend, 2 × so lang wie die Schläfen, an den Schläfen gerundet und deutlich schmäler als an den Augen, Abstand der Toruli voneinander und von den Augen so groß wie ihr Durchmesser, Hinterhaupt schwach gebuchtet, Oberseite mit unscheinbaren, ganz kurzen, unauffälligen Haaren und unauffälligen Haarpunkten; Ocellen vortretend, der Abstand zwischen ihnen fast kleiner als ein Ocellendurchmesser, der Abstand eines Ocellus vom Auge fast größer als das Ocellarfeld breit; je ein ovaler Eindruck neben den hinteren Ocellen. Gesicht so breit wie hoch, schwach gewölbt, Mittelkiel stark vortretend, unten breiter und parallel, schütter haarpunktiert, die Punkte fein, Augenränder parallel. Clypeus 2.5 × so breit wie hoch, schwach quergewölbt, Mittelkiel stark vortretend, unten breiter und parallel, schütter haarpunktiert, die Punkte fein. Augenränder parallel. Epistomalnaht einfach, unterer Rand in Frontalansicht gerade, wenige Borstenpunkte nahe dem unteren Rand. Tentorialgruben voneinander 1.8 × so weit entfernt wie von den Augen. Mund offen, Labrum mit einem queren Eindruck und wenigen deutlichen Haarpunkten, Mandibeln nicht erweitert, Maxillartaster so lang wie die Kopfhöhe. Wange so lang wie die Mandibel an der Basis breit. Subokularnaht vorhanden. Ein Auge in Seitenansicht 1.8 × so hoch wie lang, 1.33 × so lang wie die Schläfe unten breit. Fühler an dem Exemlar beschädigt, 17 Glieder sichtbar, dürfte vielgliedrig und länger als der Körper sein; G1 2.5 ×, G2 2 ×, G3 1.9 ×, G15 1.6 × so lang wie breit, G1-G5, G15 = 12, 10, 9, 9, 8, 7; Geißelglieder dicht behaart, Haare eher kürzer als die Geißelglieder breit, in Seitenansicht 4 Sensillen sichtbar.

Thorax. 1.3 × so lang wie hoch, 1.5 × so hoch wie der Kopf, Oberseite gewölbt, nur in der Mitte eher flach. Mesoscutum 1.2 × so breit wie lang, Mittellappen wenig heraustretend; dieser, der Absturz und die Ränder der Seitenlappen ziemlich dicht, gleichmäßig, kurz, wenig auffällig behaart; Notauli vorn tief und gekerbt, erlöschen auf der Scheibe, reichen nicht an den Rand, Seiten nur an den Tegulae gerandet, Dorsalgrube verlängert. Praescutellarfurche gekerbt. Scutellum so breit wie lang. Postaxillae hinten gekerbt. Seitenfelder des Metanotums innen mit wenigen Leisten. Propodeum schwach, eng genetzt, Vorderecken fast glatt, kein Mittelkiel, nur hinten zwei nach außen biegende Kiele, Spirakel klein. Hintere Furche der Seite des Pronotums ganz, vordere nur oben gekerbt. Sternaulus gekerbt, beiderseits etwas verkürzt, die anderen Furchen des Mesopleurums einfach. Metapleurum nur behaart, vordere Furche gekerbt, hinten mit einigen Querfalten. Hinterschenkel 4 × so lang wie breit.

Flügel. Stigma keilförmig, r entspringt vor der Mitte, r1 halb so lang wie die Stigmabreite, einen stumpfen Winkel mit r2 bildend, r2 1.5 × so lang wie cq1, r3 nach außen geschwungen, 1.66 × so lang wie r2, R reicht an die Flügelspitze, Cu2 distad nur schwach verjüngt, cq1 2 × so lang wie cq2, nr postfurkal, d 1.7 × so lang wie nr, nv fast interstitial, B geschlossen, 2.5 × so lang wie breit, np entspringt aus der Mitte von B; r′ und nr′ fehlen, cu′ über b′ hinaus weit verlängert.

Metasoma. T1 1.2 × so lang wie breit, hinten 2 × so breit wie vorn, basad geradlinig verjüngt, seitlich gerandet, Dorsalkiele deutlich, reichen an den Hinterrand, begrenzen ein erhabenes, gestreiftes Feld, Seitenfelder glatt, Spirakel unscheinbar, T2 länger als T3, T2+3 dicht, kurz, hell über die ganze Oberfläche behaart. Bohrerklappen nicht vorstehend.

Färbung. Körper rötlichgelb, nur Propodeum, Metanotum, Metapleurum, T1 und die Hüften mehr oder weniger weißlich. Fühlergeißeln braun. Flügelnervatur braun, Flügelmembran stark gebräunt.

♂. Unbekannt.

Opius (Utetes) traventatus, spec. nov.

Abb. 23-28

Typen. Holotypus: ♀, Baiyer R(iver), N. Guinea, II.6.-25.1979, 110 m. J. Sédlacek, Holotype (AEIG).

Taxonomische Stellung. Die Art ist in das Subgenus *Utetes* Foerster zu stellen. Im Schlüssel nach Fischer (1987) läuft sie zur Gabel 11 und ist von den dort folgenden Arten wie folgt zu unterscheiden:

bianchii Fullaway und *tephritivorus* Wharton (früher als *africanus* Szépligeti). Kopf höchstens 2.2 × so breit wie lang. Der mediane Raum des T1 längsgestreift oder runzelig. Entweder Bohrerklappen so lang wie das Metasoma, Propodeum mit Querkiel und T2+3 mit schwachen Längsstreifen (*bianchii*), oder Notauli nur ganz vorn als kleine, einfache Grübchen ausgebildet (*tephritivorus*).

traventatus, spec. nov. Kopf außergewöhnlich stark quer, 2.5 × so breit wie lang. Der mediane Raum des T1 mit einzelnem Längskiel. Notauli vorn tief eingedrückt und sogar spurenhaft gekerbt, Bohrerklappen kaum vorstehend, T2+3 glatt.

Namenserklärung. Der Name *traventatus* ist als Abkürzung von "transversicapitatus" zu verstehen und bezieht sich auf den stark quer geformten Kopf.

Beschreibung. ♀.

Körperlänge. 3.5 mm.

Kopf. 2.5 × so breit wie lang, 1.9 × so breit wie das Gesicht, 1.2 × so breit wie das Mesoscutum, 1.66 × so breit wie das T1 hinten; Augen stark vorstehend, 3 × so lang wie die Schläfen, Augen und Schläfen in gemeinsamer Flucht gerundet, Toruli kaum vortretend, ihr Abstand voneinander so groß wie ihr Durchmesser, der Abstand von den Augen deutlich geringer, Hinterhaupt nur schwach gebuchtet; Ocellen vortretend, ihr Abstand voneinander so groß wie ein Ocellendurchmesser, der Abstand eines seitlichen Ocellus vom Augenrand wenig größer als das Ocellarfeld breit, an den seitlichen Ocellen außen je ein kleiner Eindruck. Gesicht so breit wie hoch, Mittelkiel deutlich nach unten etwas verbreitert, mäßig dicht und deutlich haarpunktiert, Augenränder parallel. Clypeus 2.5 × so breit wie hoch, Epistomalnaht gleichmäßig gebogen und einfach, unterer Rand fast gerade, mit feinen, längeren Haaren und schwachen, schütteren Haarpunkten. Tentorialgruben mäßig groß, voneinander 2 × so

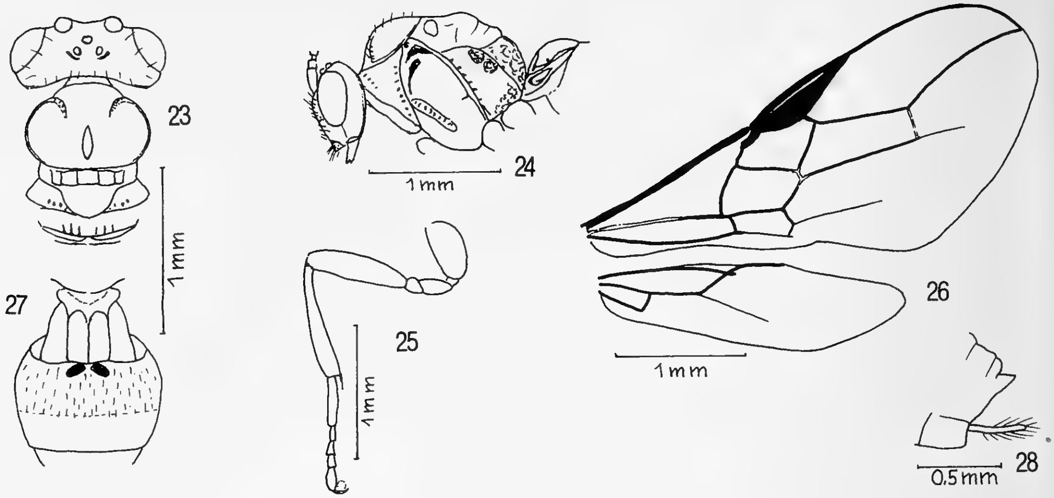


Abb. 23-28. *Opius (Utetes) traventatus*, spec. nov. 23. Kopf und vorderer Teil des Thorax dorsal. 24. Kopf, Thorax und T1 lateral. 25. Hinterbein. 26. Vorder- und Hinterflügel. 27. T1 bis T3 dorsal. 28. Metasomaspitze lateral.

weit entfernt wie von den Augen. Mund offen, Labrum glatt, Mandibeln an ihren Basen nicht erweitert, Maxillartaster so lang wie der Kopf hoch. Ein Auge in Seitenansicht 2 × so hoch wie lang, fast 2 × so lang wie die Schläfe breit, letztere parallelseitig. Fühler an dem Exemplar verkürzt, 18 Glieder sichtbar, wahrscheinlich ungefähr so lang wie der Körper; G1 2.4 ×, G2 2 ×, G3 1.75 ×, G14 1.25 × so lang wie breit; die sichtbaren Geißelglieder gleich breit und eng aneinander schließend, G1-G5, G16 = 19, 15, 14, 13, 13, 10; in Seitenansicht 5 Sensillen sichtbar, Haare kürzer als die Geißelglieder breit.

Thorax. 1.25 × so lang wie hoch, 1.5 × so hoch wie der Kopf, Oberseite gewölbt. Mesoscutum 1.3 × so breit wie lang, an den Seitenlappen gerundet, Mittellappen heraustretend, Notauli vorn tief, gekerbt, reichen auf die Scheibe, erlöschen hier, Dorsalgrube bis zur Mitte des Mittellappens reichend, Seiten überall gerandet, die Randfurchen stoßen vorn an die Notauli; Absturz, Notauli und Seitenränder kaum merklich behaart. Praescutellarfurche mit 5 Leisten. Scutellum breiter als lang. Postaxillae innen gekerbt. Seitenfelder des Metanotums median mit einigen Leisten. Propodeum genetzt, ein undeutlicher Mittelkiel schon an der Basis gegabelt. Hintere Randfurche der Seite des Pronotums gekerbt, vordere nur oben gekerbt. Sternaulus breit, scharf gerippt, reicht nahe an den Vorderrand, endet vor der Mittelhüfte, die anderen Furchen einfach. Metapleuren am Propodealrand mit zwei eingedrückten Feldern, in der Mitte glatt, vordere Furche gekerbt, nahe der Coxa runzelig, schwach behaart. Hinterschenkel 4 × so lang wie breit, Hintertarsus wenig kürzer als die Hinterschiene.

Flügel. Stigma mäßig breit, keilförmig, r entspringt wenig vor der Mitte, r1 halb so lang wie das Stigma breit, r2 1.75 × so lang wie cq1, r3 nach außen geschwungen, 1.5 × so lang wie r2, R reicht an die Flügelspitze, Cu2 distad verjüngt, cq1 1.8 × so lang wie cq2, nr postfurkal, B geschlossen, distad erweitert, 2 × so lang wie breit, np entspringt aus der Mitte von B; r′ und nr′ fehlen, cu′ über b′ hinaus stark verlängert.

Metasoma. T1 so lang wie hinten breit, hinten 1.75 × so breit wie vorn, nach vorn geradlinig verjüngt, Dorsalkiele geschwungen, reichen an den Hinterrand, das mediane Feld erhaben und mit Mittelkiel, glatt. T2 und T3 kaum voneinander abgegrenzt. Bohrer nicht vorstehend, Hypopygium endet bedeutend vor der Metasomaspitze.

Färbung. Rötlichgelb. Fühlergeißel schwarz. Taster und Beine eher gelb. Flügelgeäder braun. Flügelmembran hyalin.

♂. Unbekannt.

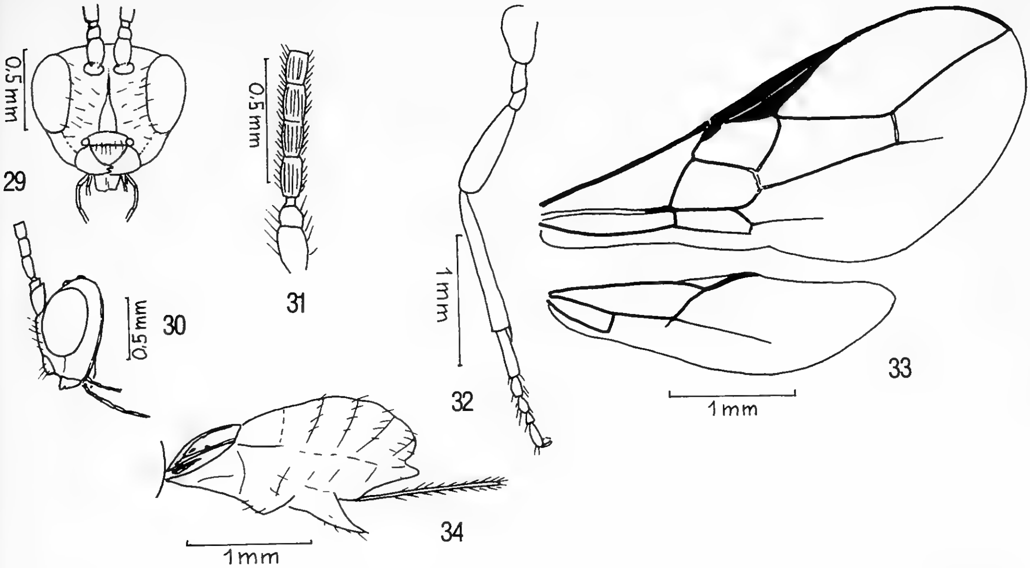


Abb. 29-34. *Opius (Utetes) wauanicus*, spec. nov. 29. Kopf frontal. 30. Kopf lateral. 31. Fühlerbasis. 32. Hinterbein. 33. Vorder- und Hinterflügel. 34. Metasoma lateral.

Opius (Utetes) wauanicus, spec. nov.
Abb. 29-34

Typen. Holotypus: ♀, Wau, N. Guinea, 1.250 m, II.13-III.13.1979, J. Sedlacek, Holotype (AEIG).

Taxonomische Stellung. Die Art ist dem Subgenus *Utetes* Foerster zuzuordnen. Der Schlüssel nach Fischer (1987) führt sie zur Gabel 5. Von *O. curtilosus*, spec. nov. unterscheidet die neue Art u.a. das Fehlen der Behaarung auf dem T2+3 und der vorstehende Bohrer. Die beiden nachgeordneten Arten *wamenaensis* und *perkinsi* lassen sich wie folgt unterscheiden:

wauanicus, spec. nov. Praescutellarfurche schmal, dicht gekerbt. Epicnemialfurche gekerbt. Gesicht so breit wie hoch, Augenränder gebogen, unten divergierend. 4.2 mm.

wamenaensis Fischer und cf. *perkinsi* Fullaway. Praescutellarfurche länger, nur mit 3 Längsleistchen. Epicnemialfurche einfach. Gesicht 1.25 × so breit wie hoch, Augenränder unten nicht divergierend.

Namenserklärung. Die Art wird nach dem Originalfundort benannt.

Beschreibung. ♀.

Körperlänge. 4.2 mm.

Kopf. 2.25 × so breit wie lang, 2.2 × so breit wie das Gesicht, 1.4 × so breit wie das Mesoscutum, 2.2 × so breit wie das T1 hinten; Augen vorstehend, nehmen den größten Teil der Kopfseite ein, 4 × so lang wie die Schläfen, an den Schläfen stark verengt, Abstand der Toruli voneinander und besonders von den Augen kleiner als ihr Durchmesser, Hinterhaupt fast gerade, Oberseite nur mit einzelnen feinsten, unscheinbaren Haaren; Ocellen vortretend, ihr Abstand voneinander kleiner als ein Ocellendurchmesser, Abstand eines äußeren Ocellus vom Augenrand so groß wie das Ocellarfeld breit. Gesicht so breit wie hoch, der nach unten verbreiterte Mittelkiel oben scharf, glänzend, schwach und schütter haarpunktiert, Augenränder gebogen, nach unten divergierend. Clypeus 2.5 × so breit wie hoch, schwach gewölbt, die ziemlich gleichmäßig gebogene Epistomalnaht einfach, unterer Rand gerade. Tentorialgruben groß, rund, voneinander 1.8 × so weit entfernt wie von den Augen. Wangen so lang wie die basale Mandibelbreite, Subokularnaht deutlich. Mund offen, Labrum gerandet und ohne deutliche Punkte, Mandibeln an ihren Basen nicht erweitert, Maxillartaster so lang wie die Kopfhöhe. Ein Auge in Seitenansicht 1,8 × so hoch wie lang, 1.25 × so lang wie die Schläfe unten breit, Schläfe oben merklich schmäler als unten. Fühler kaum länger als der Körper, 37gliedrig; G1 1.9 x. G2 1.7 ×, G3 1.6 ×, G20 1.2 ×, Gv 1.5 × so lang wie breit, nur die Glieder des Enddrittels etwas schmäler werdend; G1-G5, G20, Gv = 17, 15, 14, 13, 13, 13, 10; in Seitenansicht 5 Sensillen sichtbar, Geißelglieder eng aneinanderschließend, dicht behaart, die Haare kürzer als die Breite der Geißelglieder.

Thorax. 1.4 × so lang wie hoch, 1.4 × so hoch wie der Kopf, Oberseite schwach gewölbt. Mesoscutum 1.2 × so breit wie lang, Seitenlappen gerundet, Mittellappen wenig heraustretend, Notauli vorn tief, reichen auf die Scheibe, erlöschen hier, Dorsalgrube wenig verlängert, Seiten überall gerandet, einfach. Praescutellarfurche schmal, gekerbt. Scutellum breiter als lang. Postaxillae und Seitenfelder des Metanotums gekerbt. Propodeum glatt, mit starkem Mittelkiel, dieser mit einigen kurzen Querfalten, vor der Mitte ein unterbrochener Querkiel, Seiten deutlich gerandet. Hintere Furche der Seite des Pronotums schmal gekerbt, die vordere nur spurenhaft. Sternaulus schmal, gekerbt, beiderseits verkürzt, Epicnemialfurche gekerbt, hintere Randfurche einfach. Metapleurum mit längeren Haaren schütter bestanden, die vordere Furche gekerbt. Hinterschenkel 4 × so lang wie breit, Hintertarsus kürzer als die Hinterschiene.

Flügel. Stigma ziemlich breit, fast dreieckig, r entspringt nur wenig vor der Mitte, r1 ein Drittel so lang wie das Stigma breit, r2 1.7 × so lang wie cq1, r3 nach außen geschwungen, 1.3 × so lang wie r2, R reicht an die Flügelspitze, Cu2 groß, distad verjüngt, nr stark (um zwei Drittel der eigenen Länge) posfurkal, d 2.2 × so lang wie nr, nv um die eigene Breite postfurkal, B geschlossen, 3 × so lang wie breit, np entspringt aus der Mitte von B; r′ fehlt, nr′ nur kurz, cu′ weit über b′ hinaus als sklerotisierte Ader verlängert.

Metasoma. T1 1.1 × so lang wie hinten breit, nach vorn stark verjüngt, vorn kaum halb so breit wie vorn, seitlich gerandet, uneben glänzend, Dorsalkiele vorn stark, reichen weit nach hinten, auf der Scheibe parallel, das mediane Feld etwas erhaben, Stigmen klein. T2 länger als T3, glatt und kahl. Bohrerklappen zweidrittel so lang wie das Metasoma. Hypopygium endet vor der Metasomaspitze.

Färbung. Rötlichgelb. Fühlergeißeln, Hintertarsen und Bohrerklappen schwarz. Taster und Beine eher ganz gelb. Flügelnervatur und Flügelmembran braun.

♂. Unbekannt.

Subgenus *Rhogadopsis* Brèthes

Rhogadopsis Brèthes 1913: 44. - Species typica: *Rhogadopsis miniacea* Brèthes (Monotypie); de Santis 1967: 8, "(*Rhogadopsis* Brèthes, 1913) = *Opius* Wesmael, 1835."

Subgenus *Lissosema* Fischer, 1972: 32. - Species typica: *Opius parvungula* Thomson (Originalbezeichnung); Fischer 1972: 359 (Diagnose); Fischer 1987: 458.

Subgenus *Rhogadopsis*, Wharton 1987: 66, stat. nov.

Opius (Rhogadopsis) miniaceus (Brèthes)
Abb. 35-37

Rhogadopsis miniacea Brèthes, 1913: 45, ♀; Wharton 1987: 66.

Opius miniaceus, de Santis 1967: 9, 34, comb. nov.

Typen. Holotypus: ♀, Lectotype: *Rhogadopsis miniacea* Brèthes det. Wharton 1986 (MACN), ohne Fundortsetikett, mit einem mit Bleistift handgeschriebenen Etikett von Brèthes mit dem Namen, nach der Originalbeschreibung Buenos Aires (A. Zotta) (Col. Mus. Nac. Buenos Aires). - Terra typica: "Algunos ejemplares de Buenos Aires (A. Zotta).

Taxonomische Stellung. Die Art ist in das Subgenus *Rhogadopsis* Brèthes zu stellen. Im Bestimmungsschlüssel des Subgenus *Lissosema* Fischer für die amerikanischen Formen nach Fischer (1977) läuft die Art zur *tucumanus*-Gruppe und dort zu *Opius roveretoi* Fischer, von dem sie sich wie folgt unterscheiden läßt:

Opius miniaceus (Brèthes): Vordere Furche des Metapleurums gekerbt. Seiten des T1 nach vorn geradlinig konvergierend. Thorax 1.33 × so lang wie hoch, Propodeum gewölbt, im Bogen abfallend (in Seitenansicht zu sehen).

Opius roveretoi Fischer: Vordere Furche des Metapleurums einfach. Seiten des T1 hinten parallel, vorn konvergierend. Thorax 1.25 × so lang wie hoch. Propodeum hinten steil abfallend.

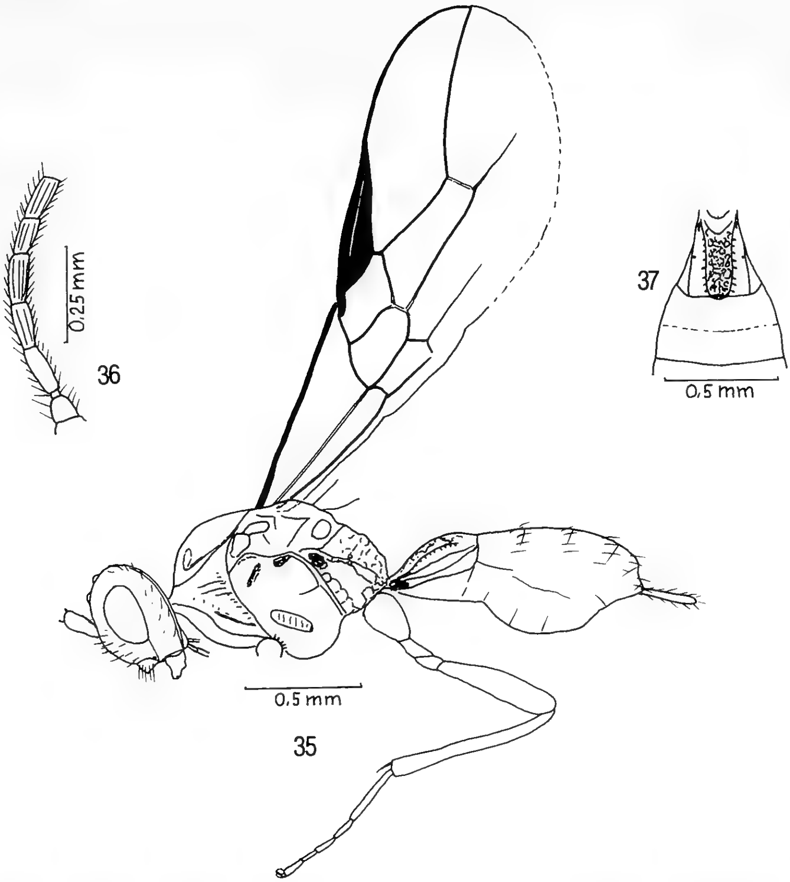


Abb. 35-37. *Opius (Rhogadopsis) miniaceus* (Brèthes). 35. Körper lateral. 36. Basis der Fühlergeißel. 37. Basis des Metasoma dorsal.

Beschreibung. ♀.

Körperlänge. 2.2 mm.

Kopf. 2 × so breit wie lang, 1.9 × so breit wie das Gesicht, 1.33 × so breit wie das Mesoscutum, 2.6 × so breit wie das T1 hinten; Augen wenig vortretend, 1.7 × so lang wie die Schläfen, Augen und Schläfen in gemeinsamer Flucht gerundet, Oberseite nur mit wenigen unscheinbaren Haaren, keine Haarpunkte erkennbar, Abstand der Toruli voneinander und von den Augen eher kleiner als ihr Durchmesser, Hinterhaupt wenig gebuchtet; Ocellen etwas vortretend, der Abstand zwischen ihnen so groß wie ein Ocellendurchmesser, Abstand eines äußeren Ocellus vom Augenrand so groß wie das Ocellarfeld breit. Gesicht 1.4 × so breit wie hoch, nur schwach gewölbt, spärlich behaart, Haarpunkte schwach erkennbar, Mittelkiel flach und nach unten ziemlich breit, Augenränder fast parallel. Clypeus 3 × so breit wie hoch, durch eine flach gebogene, einfache Furche gegen das Gesicht abgegrenzt, gewölbt, unterer Rand frontal gesehen gerade, in ventraler Ansicht gebogen, mit längeren Haaren, Haarpunkte kaum erkennbar. Tentorialgruben ziemlich groß, voneinander 2 × so weit entfernt wie von den Augen. Mund offen, Mandibeln an ihren Basen nicht erweitert, Maxillartaster wahrscheinlich so lang wie die Kopfhöhe. Wangen so lang wie die basale Mandibelbreite. Subokularnaht deutlich. Ein Auge in Seitenansicht 1.8 × so hoch wie lang, 1.25 × so lang wie die Schläfe breit, letztere parallelseitig. Fühler an dem Exemplar beschädigt, 21 Glieder vorhanden, mindestens so lang wie der Körper; G1 und G2 2.2 ×, G3, G4, G18 und G19 2 × so lang wie breit, G1 bis G7 ungefähr gleich lang, die folgenden nur sehr wenig kürzer werdend; die Haare kürzer als die Geißelglieder breit, in Seitenansicht 3 oder 4 Sensillen sichtbar.

Thorax. 1.33 × so lang wie hoch, 1.25 × so hoch wie der Kopf, Oberseite gewölbt. Mesoscutum 1.15 × so breit wie lang, kahl, vor den Tegulae fast gleichmäßig gerundet, Mittellappen kaum heraustretend, Notauli nur vorn eingedrückt, einfach, fehlen auf der Scheibe, Dorsalgrube fehlt, Seiten an den Tegulae gerandet, Randfurche entfernt sich vom Seitenrand und geht in den Notaulus über. Praescutellarfurche gekerbt. Postaxillae und Metanotum glatt. Propodeum mit zahlreichen, kleinen, unregelmäßigen Zellen, ein Mittelkiel und eine Areola schwach angedeutet, die posterolateralen Felder glatt, Spirakel klein. Vordere Furche der Seite des Pronotums undeutlich, hintere deutlich gekerbt, oben glatt, in der Mitte mit einigen schwachen Streifen. Sternaulus ziemlich breit, unregelmäßig gekerbt, reicht weder an den Vorderrand noch an die Mittelhüfte, vordere Mesosternalfurche gekerbt, die übrigen Furchen einfach, Coxalfeld fein behaart. Metapleurum auf der Scheibe glatt, mit feinen längeren Haaren, vordere Ecke niedergedrückt, vordere Furche breit und mit wenigen Querrippen, hinterer Rand aufgebogen und mit einigen Feldern, am Propodealrand eine breite, glatte Furche mit einigen Querrippen vorn. Hinterschenkel 5 × so lang wie breit.

Flügel. Stigma keilförmig, r entspringt aus dem basalen Drittel, r1 halb so lang wie das Stigma breit, r2 1.75 × so lang wie cq1, r3 nach außen geschwungen, 1.75 × so lang wie r2, R reicht an die Flügelspitze, nr postfurkal, Cu2 distad nur eine Spur verjüngt, cq1 2 × so lang wie cq2, d 1.8 × so lang wie nr, nv schwach postfurkal, B geschlossen, 2.5 × so lang wie breit, distad schwach erweitert, np entspringt aus der Mitte von B; nr′ nur als Falte angedeutet.

Metasoma. T1 1.25 × so lang wie hinten breit. Seiten nach vorn ziemlich geradlinig konvergierend, hinten 1.7 × so breit wie vorn, Dorsalkiele deutlich, parallel, reichen an den Hinterrand, das erhabene mediane Feld dicht runzelig, die lateralen Felder glatt, nur median gekerbt. Der Rest des Metasoma ohne Skulptur. Bohrerklappen so lang wie das T1, gerade.

Färbung. Gelb: Kopf, Scapus, Pedicellus, Mundwerkzeuge, Tegulae, Flügelnervatur und alle Beine. Thorax und Metasoma gelb mit rotbraunem Stich. Fühlergeißeln und Propodeum dunkel. Flügelmembran schwach gebräunt.

♂. Unbekannt.

Genus *Diachasma* Foerster

Diachasma tasmaniae, spec. nov.

Abb. 38-42

Typen. Holotypus: ♀, Australia: Tas(mania), Mt. Field N.P. 200 m Russell Falls Creek I.6.84 L. Masner (AEIG); - Paratypen: 1♀, mit den gleichen Angaben wie die Holotype; 2♂♂, wie Holotypus, Jan. 7, 1984 (AEIG); 1♂, Togari, Tasmania II.12-II.12; 1♂, Frenchmans Cap Tr. at Franklin River, Tasmania, Feb. 22 - March 26; 4♂♂, Australia: NSW, Monga State For. 1.000 m I.21.1984, Lubomir Masner.

Taxonomische Stellung. Der Schlüssel nach Fischer (1988) zur Beurteilung der indo-australischen Arten führt die Form bei Gabel 2 zu *kaltenbachi* Fischer. Dort sind neben *tasmaniae*, spec. nov. auch *extasis* Fischer, 1988 einzufügen, welch letztere Art infolge eines bedauerlichen Versehens ausgelassen wurde. Die Gabel 2 kann wie folgt ergänzt werden:

2. T1 3 × so lang wie breit. Notauli nur an den Vorderecken ausgebildet, hier mit je einer Kante, auf der Scheibe erloschen. (Gesicht so breit wie hoch, fein und schütter behaart, keine Haarpunkte.) 2.3 mm. Neu Guinea .... *extasis* Fischer, ♀

– T1 1.5-2 × so lang wie breit. Notauli vollständig, fein gekerbt .... 2a.

2a. Kopf 2 × so breit wie lang, Augen nehmen fast die ganzen Kopfseiten ein, in Seitenansicht 5 × so lang wie die Schläfe breit. T1 2 × so lang wie breit, schwach längsgestreift. Thorax ganz schwarz, Hinterhüften geschwärzt. (Gesicht 1.2 × so breit wie hoch, deutlich und ziemlich dicht haarpunktiert.) 2.7 mm. Neu Guinea .... *kaltenbachi* Fischer, ♀♂

– Kopf 1.8 × so breit wie lang, Augen groß, nehmen aber nicht die ganzen Kopfseiten ein, in Seitenansicht 2 × so lang wie die Schläfen breit. T1 1.5 × so lang wie breit, stark längsgestreift. Thorax mit reicher roter Zeichnung, Hinterhüften gelb. (Gesicht so breit wie hoch, feinst lederartig, ohne auffällige Haarpunkte.) 2.8 mm. Tasmanien, Queensland .... *tasmaniae*, spec. nov., ♀♂

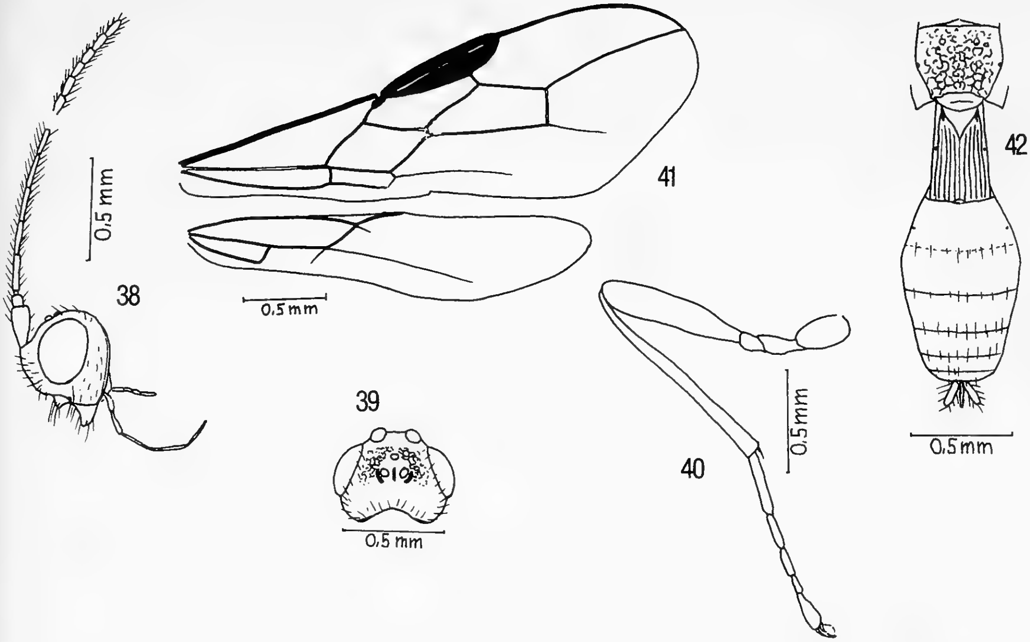


Abb. 38-42. *Diachasma tasmaniae*, spec. nov. 38. Kopf mit Basis und Spitze eines Fühlers lateral. 39. Kopf dorsal. 40. Hinterbein. 41. Vorder- und Hinterflügel. 42. Propodeum und Metasoma dorsal.

Namenserklärung. Die Art wird nach der Terra typica benannt.

Beschreibung. ♀.

Körperlänge. 2.8 mm.

Kopf. 1.8 × so breit wie lang 2 × so breit wie das Gesicht, 1.25 × so breit wie das Mesoscutum, 2 × so breit wie das T1 hinten; Augen vorstehend, 2 × so lang wie die Schläfen, diese gerundet und hier schmäler als an den Augen, Abstand der Toruli voneinander und von den Augen fast kleiner als ihr Durchmesser, Hinterhaupt schwach gebuchtet; Oberseite feinst lederig, glänzend, zahlreiche kurze Haare seitlich auf der Stirn, bedeutend längere Haare seitlich auf dem Scheitel und dem Hinterhaupt, Haarpunkte nicht erkennbar; Ocellen wenig vortretend, der Abstand zwischen ihnen so groß wie ein Ocellendurchmesser, der Abstand eines seitlichen Ocellus vom Auge so groß wie das Ocellarfeld breit. Gesicht so breit wie hoch, fein lederig und mit unscheinbaren Haaren ohne erkennbare Haarpunkte, nur der verschwommene, nach unten verbreiterte Mittelkiel glatt und kahl, Augenränder parallel. Clypeus 3 × so breit wie hoch, quer gewölbt, glatt, mit längeren Haaren, Epistomalnaht gleichmäßig gebogen und einfach. Tentorialgruben voneinander 3 × so weit entfernt wie von den Augen. Wangen so lang wie die basale Mandibelbreite. Subokularnaht vorhanden. Mund offen, Labrum uneben, Mandibeln an ihren Basen nicht erweitert, Maxillartaster länger als die Kopfhöhe. Ein Auge in Seitenansicht 1.5 × so hoch wie lang, 2 × so lang wie die Schläfe oben, letztere nach unten deutlich verbreitert. Fühler 1.4 × so lang wie der Körper, 30gliedrig; alle Geißelglieder langgestreckt, G1 4 ×, G2 4 ×, G3 3.8 ×, G4 3.8 ×, G15 3 ×, Gv 2.5 × so lang wie breit, G1-G4, G15, Gv = 16, 16, 14, 14, 12, 9; in Seitenansicht 2 oder höchstens 3 Sensillen sichtbar, Haare schütter über die Oberfläche verteilt, länger als die Geißelglieder breit.

Thorax. 1.7 × so lang wie hoch, 1.5 × so hoch wie der Kopf, Oberseite nur sehr schwach gewölbt. Mesoscutum 1.1 × so breit wie lang, Seitenlappen gerundet, Mittellappen heraustretend, Notauli tief, gerade, vollständig gekerbt, treffen einander in einem vertieften Feld nahe der Basis der gekerbten, fast an den Vorderrand reichenden Dorsalfurche, Seiten überall breit gerandet und stark gekerbt, gehen im Bogen in die Notauli über, Mittellappen, Absturz und Seitenränder mit zahlreichen langen Haaren. Praescutellarfurche mit 3 Längsfalten. Scutellum so breit wie lang. Postaxillae hinten und Seitenfelder des Metanotums schwach gekerbt. Propodeum vorn ziemlich flach, mit Mittelkiel, hinten und seitlich dicht genetzt, vordere Felder glatt, Seiten schwach gerandet, Spirakel klein und innerhalb der Seitenränder, mit einigen langen Haaren. Beide Furchen der Seite des Pronotums gekerbt. Sternaulus gekerbt, reicht an den Vorderrand, endet unterhalb der Hinterhüfte, vordere Mesosternalfurche und Epicnemialfurche unten gekerbt, hintere Randfurche einfach. Metapleurum vorn glänzend, hinten runzelig, mit langen hellen Haaren, ein tiefer Stigmaleindruck vor der Mitte und ein weiterer am oberen Propodealrand. Hinterschenkel 5 × so lang wie breit, Hintertarsus so lang wie die Hinterschiene.

Flügel. Stigma ziemlich breit, halbeiförmig, r entspringt hinter der Mitte, r1 halb so lang wie das Stigma breit, einen stumpfen Winkel mit r2 bildend, r2 eine Spur kürzer als cq1, r3 nach außen geschwungen, 2.2 × so lang wie r2, R reicht an die Flügelspitze, nr postfurkal, Cu2 distad deutlich verjüngt, cq1 2 × so lang wie cq2, d so lang wie nr, nv postfurkal, B geschlossen, 5 × so lang wie breit, np entspringt über der Mitte von B; r′ als Falte ausgebildet, cu′ reicht nahe an den Rand, nr′ kurz, aber deutlich ausgebildet.

Metasoma. T1 1.6 × so lang wie hinten breit, nach vorn geradlinig und schwach verjüngt, regelmäßig, dicht längsgestreift, Dorsalkiele konvergieren, erreichen einander, verschwinden in der Streifung, Stigmen auf schwachen Höckern in der Mitte. Bohrerklappen nur eine Spur vorstehend, in Seitenansicht so lang wie das T1.

Färbung. Rotgelb. Schwarz: Propodeum hinten, Seiten des Pronotums, Mesopleurum oben, Metapleurum, T1 und die Ränder der Tergite von T3 an. Geißelglieder an den Spitzen und apikale Hälfte der Fühler dunkel. Weiß: Schläfen unten, Wangen, Mundwerkzeuge, vordere Hüften und Trochanteren. Tegulae und Flügelnervatur gelb. Flügelmembran nahezu hyalin.

♂. Fühler etwa 37gliedrig. T1 wenig länger als beim ♀. Randfurchen des Mesoscutums mitunter schmäler und kaum gekerbt. Mittelfurche des Mesoscutums oft kürzer.

Literatur

Brèthes, J. 1913. Himenópteros de la America meridional. - An. Mus. nac. Hist. nat. Buenos Aires **24**: 35-160

Fischer, M. 1971. Die Opiinae der Noona Dan Expedition nach den Philippinen und den Bismarck-Inseln und Redeskription von *Opius dissitus* aus Hawai. - Steenstrupia **1**: 1-25

– – 1971. Opiinae aus Neu-Guinea und von den Bismarck-Inseln. - Pacific Insects **13**: 487-512

– – 1972. Über die äthiopischen Arten der Gattungen *Opius* Wesmael, *Biosteres* Foerster und *Gnaptodon* Haliday aus den Sammlungen Haeselbarth (München) und dem British Museum (London). - Boll. Lab. ent. agr. Portici **39** (pro 1971): 120-148

– – 1972. Hymenoptera. Braconidae, Opiinae. - Das Tierreich **91** (pro 1973), XII + 620 pp, Verlag W. de Gruyter (Teil I, paläarktische Region)

– – 1977. Hymenoptera, Braconidae (Opiinae II - Amerika). - Das Tierreich **96**, XXVII + 1001 pp, Verlag W. de Gruyter

– – 1978. Neue Opiinae (Hymenoptera, Braconidae) von der australischen Region, besonders aus Tasmanien. - Polskie Pismo ent. **48**: 371-412

– – 1982. Die paläarktischen Arten der Subgenera *Misophthora* Foerster und *Agnopius* n. des *Opius* Wesmael sowie über andere Opiinae. - Fol. ent. hung. 43: 21-37

– – 1984. Aufteilung des Formenkreises um das Subgenus *Cryptonastes* Foerster des Genus *Opius* Wesmael sowie Ergänzungen zum Subgenus *Tolbia* Cameron. - Z. Arbeitsgem. öst. Ent. **36**: 33-40

– – 1987. Hymenoptera, Opiinae III - äthiopische, orientalische, australische und ozeanische Region. - Das Tierreich **104**: XV + 734 pp, Verlag W. de Gruyter

– – 1987. Neue Bestimmungsschlüssel für paläarktische Opiinae, neue Subgenera, Redeskriptionen und eine neue Art. - Ann. Naturhist. Mus. Wien, **88/89B**: 607-662 (1986)

– – 1988. Beschreibungen von Opiinen-Wespen, besonders aus Neu Guinea. - Linzer biol. Beitr. **20**: 847-917

– – 1989. Neues von der australischen Opiinen-Fauna. - Stapfia, Linz **17**: 239-272

– – 1990. Opiinae aus Neu Guinea. - Linzer biol. Beitr. **22**: 29-58

– – 1990. Zwei neue südostasiatische Opiinae aus den Sammlungen in Honolulu beziehungsweise Budapest. - Z. Arbeitsgem. Öst. Ent. **42**: 105-109

– – 1991. Wiederbeschreibungen und Neubeschreibungen von Opiinae aus der Alten Welt. - Ann. Naturhist. Mus. Wien **92B**: 139-203

Papp, J. 1985. Taxonomical and faunistical novelties of the Opiinae from the Old World tropics. - Acta zool. hung. **31**: 185-216

Roman, A. 1910. Notizen zur Schlupfwespensammlung des schwedischen Reichsmuseums. - Ent. Tidskr. **31**: 109-196
Schulz, W. A. 1911. Zweihundert alte Hymenopteren. - Zool. Ann. **4**: 1-220
Santis, L. de 1967. Catalogo de los Himenópteros argentinos de la serie Parasitica, incluyendo Bethyloidea. - Com. Invest. Cient. Prov. Buenos Aires, La Plata: 33-34
Shenefelt, R. D. 1975. Hymenopterorum Catalogus (nova editio), 12 Braconidae 8 (Exothecinae, Rogadinae): 1115-1262
Wharton, R. A. 1987. Changes in nomenclature and classification of some Opiine Braconidae (Hymenoptera). - Proc. ent. Soc. Wash. **89**: 61-73
Szépligeti, G. V. 1907. Collections faites par M. le Baron Maurice de Rothschild dans l'Afrique Orientale. - Bull. Mus. Hist. Nat. Paris 1907: 34-36
– – 1908. in: Wissenschaftliche Ergebnisse der deutschen Zentral-Afrika-Expedition, **8**(3): 36.
– – 1911. Braconidae der I. Zentral-Afrika-Expedition. - Wiss. Ergebn. dtsch. Zentr. Afr. Exped. **3**: 393-418

14. Haller, H.: Zur Ökologie des Luchses *Lynx lynx* im Verlauf seiner Wiederansiedlung in den Walliser Alpen. - Verlag Paul Parey, Hamburg, Berlin (Mammalia depicta; 15), 1992. 62 S., 24 Abb., 11 Tab.

Die Wiederansiedlung des Luchses in der Schweiz, die seit ungefähr 20 Jahren betrieben wird, hat zu kontroversen Diskussionen zwischen Jägern, Viehhaltern und Natürschützern geführt. Ziel der vorliegenden Studie war es, Daten zur Bestandsdichte, zum Lebensraum und zur Ernährung des Luchses zu sammeln, um die Diskussion auf eine sachliche Grundlage zu stellen. Von der aus etwa 10 Tieren bestehenden Population des Wallis, die auf heimliche Aussetzungen in den 70er Jahren zurückgeht, wurden 6 Exemplare mit Halsbandsendern versehen und radiotelemetrisch überwacht. Außerdem wurden 114 Beutetiere bzw. deren Reste sichergestellt, die sich einzelnen Luchsindividuen zuordnen ließen. Hauptbeutetiere mit über 90 % der aufgenommenen Biomasse waren Rehe und Gemsen. Zu drastischen Rückgängen dieser beiden Arten durch den Luchs kam es nur dort, wo deren Bestände aufgrund von Hegemaßnahmen vor Auftreten des Luchses überhöht waren. Der Autor kommt zu dem Schluß, daß eine Koexistenz von Luchs und ökologisch vertretbaren Schalenwildbeständen durch wechselseitige Anpassungsmechanismen möglich ist. Die vorliegende Publikation ist eine der gründlichsten und umfasendsten Untersuchungen zur Populationsökologie des Luchses. R. Kraft

15. Redford, K. H. & J. F. Eisenberg: Mammals of the Neotropics. The Southern Cone. Vol. 2. - The University of Chicago Press, Chicago and London, 1992. 430 S., zahlreiche Abb. und Verbreitungskarten im Text, 18 Tafeln, davon 8 farbig.

Ein Handbuch oder Feldführer über die Säugetierfauna Südamerikas fehlte bisher, wenn man von einigen regional bzw. nationalstaatlich gegliederten Werken absieht. In den zurückliegenden Jahren haben jedoch verschiedene nordamerikanische "Schulen" durch intensive Forschungstätigkeit die Kenntnisse über die südamerikanische Säugetierfauna wesentlich erweitert, so daß die Zeit für ein zusammenfassendes Werk reif schien. Dieses bringt nun der bekannte Südamerikaforscher John F. Eisenberg mit einer dreibändigen Handbuchreihe auf den Markt, wovon dem Rezensenten der 2. Band vorliegt, der die Säugetiere der südlichen Staaten Paraguay, Uruguay, Chile und Argentinien behandelt. Die nördlichen Staaten der Neotropis wurden im ersten Band (Eisenberg 1989) behandelt, ein dritter Band mit den zentralen Staaten Südamerikas Brasilien, Bolivien, Peru und Ecuador soll folgen.

Text und Ausstattung sind so, wie man es sich bei einem Handbuch nur wünschen kann: konsequent gegliedert nach Ordnungen, Familien, Gattungen und Arten, enthält das Buch klare und ausführliche Merkmalsbeschreibungen, Tabellen mit Körpermaßen, detaillierte Punktverbreitungskarten, informative und gleichzeitig ansprechende Habituszeichnungen, für einige Arten auch Schädel- und Gebißzeichnungen. Auch allgemeine Zusammenhänge der Biogeographie, der Klimatologie, der Landschafts- und Vegetationskunde und des Naturschutzes werden angesprochen. Das Buch ist ein ausführliches Kompendium aller Säugetierarten des Geltungsbereiches. Die kenntnisreiche Darlegung phylogenetischer und ökologischer Zusammenhänge macht es darüberhinaus zu einer spannenden und anregenden Lektüre. R. Kraft

16. Szalay, F. S.; Novacek, M. J.; Mc Kenna M. C. (Hrsg.): Mammal Phylogeny. Band 1: Mesozoic Differentiation, Multituberculates, Monotremes, Early Therians, and Marsupials. 2. Band: Placentals. - Springer-Verlag, New York, Berlin u.a., 1993. 249 S., 115 Abbildungen mit 288 Einzeldarstellungen (Band 1) bzw. 321 S., 137 Abbildungen mit 284 Einzeldarstellungen (Band 2).

Die beiden Bände enthalten eine Reihe zusammenfassender Übersichtsartikel international bekannter Paläontologen und Anatomen, die die neuesten Erkenntnisse zur Großgruppensystematik fossiler und rezenter Säugetiere zusammenfassend darstellen. Im ersten Band wird den ausgestorbenen Säugetieren des Mesozoikums, ihren verwandtschaftlichen Beziehungen zu den Synapsiden einerseits sowie zu den Monotremen und Marsupialiern andererseits breiter Raum gewidmet. Besondere Aktualität gewinnt dieser Teil durch die Einbeziehung neuer, teilweise aufsehenerregender Fossilfunde aus jüngerer Zeit, z.B. neue Morganucodontidae aus dem Lias der Lufeng-Formation von Yunnan oder ein miozänes Schnabeltier aus Queensland, das als Ahnform des rezenten Schnabeltieres gilt. Doch nicht nur neuentdeckte Fossilformen, sondern auch verbesserte Analysenmethoden haben der phylogenetischen Forschung entscheidende Impulse gegeben. So arbeiten die meisten Autoren des ersten Bandes mit computergestützten Clusteranalysen zur Rekonstruktion von Dendrogrammen.

Der zweite Band beschäftigt sich mit der Großsystematik verschiedener plazentaler Säugetierordnungen. Themen, die von mehreren "Schulen" mit verschiedenen methodischen Ansätzen bearbeitet werden - wobei hier neben morphologischen auch molekularbiologische Merkmale herangezogen werden - sind unter anderem die in letzter Zeit häufig und kontrovers diskutierten Beziehungen zwischen Flughunden, Primaten und Pelzflatterern oder diejenigen zwischen Nebengelenktieren und Schuppentieren. Auch die neuesten Erkenntnisse über Systematik und Umfang der Paenungulata, Lipotyphla, Carnivora und Artiodactyla und anderer Gruppen werden dargestellt.

Die Beiträge überzeugen durch die präzise Darstellung morphologischer Merkmale und ihrer phylogenetischen Entwicklung. Darüberhinaus bietet der zweite Band einen grundlegenden Überblick über den Wert und die Anwendbarkeit verschiedener "moderner" Untersuchungsmethoden wie DNA-Hybridisierung, Sequenzanalysen der Augenlinsenproteine oder Vergleich der Immunreaktion der Serum-Albumine. Die beiden Bände belegen in eindrucksvoller Weise, daß gerade in jüngerer Zeit die Kenntnisse über Abstammung und Radiation der Säugetiere wesentlich zugenommen haben. R. Kraft

SPIXIANA – Zeitschrift für Zoologie	SPIXIANA – Journal of Zoology
herausgegeben von der	published by
Zoologischen Staatssammlung München	The Zoological State Collection Munich

SPIXIANA bringt Originalarbeiten aus dem Gesamtgebiet der Zoologischen Systematik mit Schwerpunkten in Morphologie, Phylogenie, Tiergeographie und Ökologie. Manuskripte werden in Deutsch, Englisch oder Französisch angenommen. Pro Jahr erscheint ein Band zu drei Heften. Umfangreiche Beiträge können in Supplementbänden herausgegeben werden.

Ein Jahresabonnement kostet 120,- DM oder 60 US-$. Supplementbände werden gesondert nach Umfang berechnet. Mitglieder der "Freunde der Zoologischen Staatssammlung München" können die Zeitschrift zum ermäßigten Preis von 50,- DM beziehen.

SPIXIANA publishes original papers on Zoological Systematics, with emphasis on Morphology, Phylogeny, Zoogeography and Ecology. Manuscripts will be accepted in German, English or French. A volume of three issues will be published annually. Extensive contributions may be edited in supplement volumes.

Annual subscription rate is 60 US-$ or any internationally convertible currency in the value of 120,- DM. Supplements are charged at special rates depending on the number of printed pages. Members of the "Freunde der Zoologischen Staatssammlung München" may order the journal at the reduced rate of 50,- DM.

Bestellungen sind zu richten an die / Orders should be addressed to the library of the

Zoologische Staatssammlung München
Münchhausenstraße 21
D-81247 München

Hinweise für Autoren

Die Manuskripte sollen in zweifacher Ausfertigung eingereicht werden. Sie sollen einseitig und weitzeilig mit mindestens vier cm breitem Rand geschrieben sein. Sie müssen den allgemeinen Bedingungen für die Abfassung wissenschaftlicher Manuskripte entsprechen. Für die Form der Manuskripte ist die jeweils letzte Ausgabe der SPIXIANA maßgebend und genau zu beachten. Eine englische Zusammenfassung ist der Arbeit voranzustellen. Tabellen und Abbildungsvorlagen sind gesondert beizufügen. Der Gesamtumfang eines Beitrages sollte nicht mehr als 2 Druckbogen (32 Druckseiten) umfassen.

Manuskripte auf Computerdisketten werden bevorzugt. In diesem Falle müssen die Diskette und zwei gedruckte Exemplare eingereicht werden. Der Text sollte keine Absatzformatierungen enthalten, die Tabellen sollten aber mit Tabulatoren formatiert sein. Gattungs- und Artnamen können kursiv gesetzt werden. Von der Verwendung anderer Zeichenformatierungen ist abzusehen. Anstelle von ♀ und ♂ sollte eine Zeichenkombination, welche im Text sonst nicht vorkommt, z. B. '#w' und '#m', verwendet werden. Es sollten 3,5" und 5,25" Disketten, lesbar auf IBM-kompatiblem Computern mit MS-DOS, eingereicht werden.

Die Herausgabe dieser Zeitschrift erfolgt ohne gewerblichen Gewinn. Mitarbeiter und Herausgeber erhalten kein Honorar. Die Autoren erhalten 1 Heft mit ihrer Arbeit. Sonderdrucke werden nach Wunsch gegen Rechnung angefertigt. Die Bestellung sollte bei Rückgabe der Fahnenkorrektur erfolgen.

Notice to Contributors:

The manuscript should be presented in two complete copies. It must be typed on one side of the paper only and double spaced with a margin of at least four centimetres. It should correspond to the universal composition of scientific manuscripts. The form should observe the SPIXIANA standard outlay set up in the previous issue. An English abstract should precede the paper. Tables, graphs and illustrations must be enclosed separately. The total text of a contribution should not exceed two galley proofs (32 printed pages).

Manuscripts on word processor discs are preferred. The floppy disc with text (and graphic-files, if present) and two hard copies shoud be send to the Editor. Do not format the text, except for italics (for names of genera and species) and tabs (only for tables !). Instead of ♀ and ♂ use '#f' and '#m' or any other combinations of signs which do not occur elsewhere in the text. The text should be on 3.5" or 5.25" discs, readable on IBM-compatibles with MS-DOS.

The publication of this journal ensues without material profit. Co-workers and publishers receive no payment. The authors will receive 1 copy of the part of the volume in which their paper appears. Reprints can be ordered when the proofs are returned.

1. DM 178.-; **2.** DM 42.-; **3.** DM 48.-; **4.** DM 48.-; **5.** DM 48.-; **6.** USD 63.35; **7.** ?; **8.** ?; **9.** USD 85.-; **10.** DFL 150.-; **11.** GBP 47.50; **12.** USD 16.95; **13.** GBP 60.-; **14.** DM 58.-; **15.** USD 39,50; **16.** DM 290.-.

SPIXIANA	**18**	1	1–104	München, 01. März 1995	ISSN 0341–8391

INHALT - CONTENTS

zoologische staatssammlung
münchen

SPIXIANA

Zeitschrift für Zoologie

SPIXIANA • Band 18 • Heft 2 • 105-200 • München, 01. Juli 1995 • ISSN 0341-8391

SPIXIANA

ZEITSCHRIFT FÜR ZOOLOGIE

herausgegeben von der

ZOOLOGISCHEN STAATSSAMMLUNG MÜNCHEN

SPIXIANA bringt Originalarbeiten aus dem Gesamtgebiet der Zoologischen Systematik mit Schwerpunkten in Morphologie, Phylogenie, Tiergeographie und Ökologie. Manuskripte werden in Deutsch, Englisch oder Französisch angenommen. Pro Jahr erscheint ein Band zu drei Heften.
Umfangreiche Beiträge können in Supplementbänden herausgegeben werden.

SPIXIANA publishes original papers on Zoological Systematics, with emphasis on Morphology, Phylogeny, Zoogeography and Ecology. Manuscripts will be accepted in German, English or French. A volume of three issues will be published annually. Extensive contributions may be edited in supplement volumes.

Manuskripte, Korrekturen und Besprechungsexemplare sind zu senden an die

Manuscripts, galley proofs, commentaries and review copies of books should be addressed to

Redaktion SPIXIANA
ZOOLOGISCHE STAATSSAMMLUNG MÜNCHEN
Münchhausenstraße 21, D-81247 München
Tel. (089) 8107-0 – Fax (089) 8107-300

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Spixiana : Zeitschrift für Zoologie / hrsg. von der Zoologischen Staatssammlung München. – München : Pfeil.
Erscheint jährlich dreimal. - Früher verl. von der Zoologischen Staatssammlung, München. - Aufnahme nach Bd. 16, H. 1 (1993)
ISSN 0341-8391
Bd. 16, H. 1 (1993) -
Verl.-Wechsel-Anzeige

Satz: Desktop Publishing mit PageMaker®
Druck: Druckerei Braunstein, München

ISSN 0341-8391

Printed in Germany

– Gedruckt auf chlorfrei gebleichtem Papier –

Verlag Dr. Friedrich Pfeil, P.O. Box 65 00 86, D-81214 München, FRG
Tel. (089) 74 28 27-0 – Fax (089) 72 42 772

SPIXIANA	18	2	105–109	München, 01. Juli 1995	ISSN 0341–8391

Ein neuer *Graecophalangium* Roewer aus Mazedonien

(Arachnida, Opiliones, Phalangiidae)

von **Plamen Mitov**

Mitov, P. (1995): A new *Graecophalangium* Roewer from Macedonia (Arachnida, Opiliones, Phalangiidae). – Spixiana **18/2**: 105-109

Graecophalangium drenskii, spec. nov. from Macedonia is described.

Plamen Mitov, Department of Zoology, Biological Faculty, University of Sofia, 8 Dragan Zankov Boul., 1421 Sofia, Bulgaria.

Einleitung

Von dem Genus *Graecophalangium* Roewer sind bisher 4 Arten (Roewer 1923, Martens 1966, Starega 1973) beschrieben worden, wovon aus Mazedonien (Martens 1966) nur eine Art, nämlich *Graecophalangium atticum* Roewer, bekannt ist.

Bei der Bearbeitung des Opiliones-Materiales aus der Sammlung des Zoologischen Instituts, Sofia wurde ein Exemplar eines neuen *Graecophalangium* aus Mazedonien festgestellt.

Graecophalangium drenskii, spec. nov.

Typen. Holotypus: ♂, Mazedonien, Bitolia, 1248 m ü. NN, V-VIII. 1918, Leg. P. Drenski (Zool. Inst. Sofia).

Derivatio nominis. Trägt den Namen des berühmten bulgarischen Zoologen Dr. Pentscho Drenski, der das vorliegende Material gesammelt hat.

Diagnose. 2. Chelicerenglied frontal mit einer keilförmigen Apophyse und auf der Basis des Fingers mit einer hornartig nach innen gekrümmten Apophyse. 3. Chelicerenglied mit einer hornartig gekrümmten Apophyse. Femur, Patella und Tibia des 1. Beines stark keulig verdickt. Tuber oculorum relativ flach, jederseits mit 6-8 kräftigen kegelförmigen Höckern. Abdominale Tergite mit querreihigen Dörnchen.

Beschreibung

Maße: Länge: 6.7 mm; Breite des Prosoma: 3.8 mm; Breite des Opisthosoma: 4.4 mm.

Färbung und Zeichnung (nach 75-jähriger Lagerung in Alkohol). Dorsalseite (Abb. 1) gelb-grün mit Reihen von dunkleren gelb-grünen Fleckchen. Der Sattel hat eine dunkel gelb-grüne Färbung und die Sattelzeichnung ist schwarz umrissen. Bauchfläche gelb, grau-gelb mit braunen Fleckchen an den Vorderkanten der Sternite.

Supracheliceral-Lamellen. Nur eine mit 1 Dörnchen versehen.

Tuber oculorum (Abb. 5) relativ flach, beiderseits mit 6-8 kräftigen kegelförmigen Höckern besetzt; gelb gefärbt. Höhe (einschl. Höcker): 0.42 mm, Breite: 0.68 mm, Länge: 0.63 mm.

Cheliceren (Abb. 2). 1. Glied (2.25 mm) dorsal und ventral mit Dornen mit Börstchen. Färbung hellbraun, dorsal gelb. 2. Glied (3.30 mm) apo-artig mit Börstchen, frontal mit einer keilförmiger Apophyse (in Profil etwa rechteckig oder beilblattähnlich) deren Ventralspitze mit schwarzen Körnchen versehen ist. Basal auf dem Fixfinger eine hornartige Apophyse mit einer abgestumpften nach

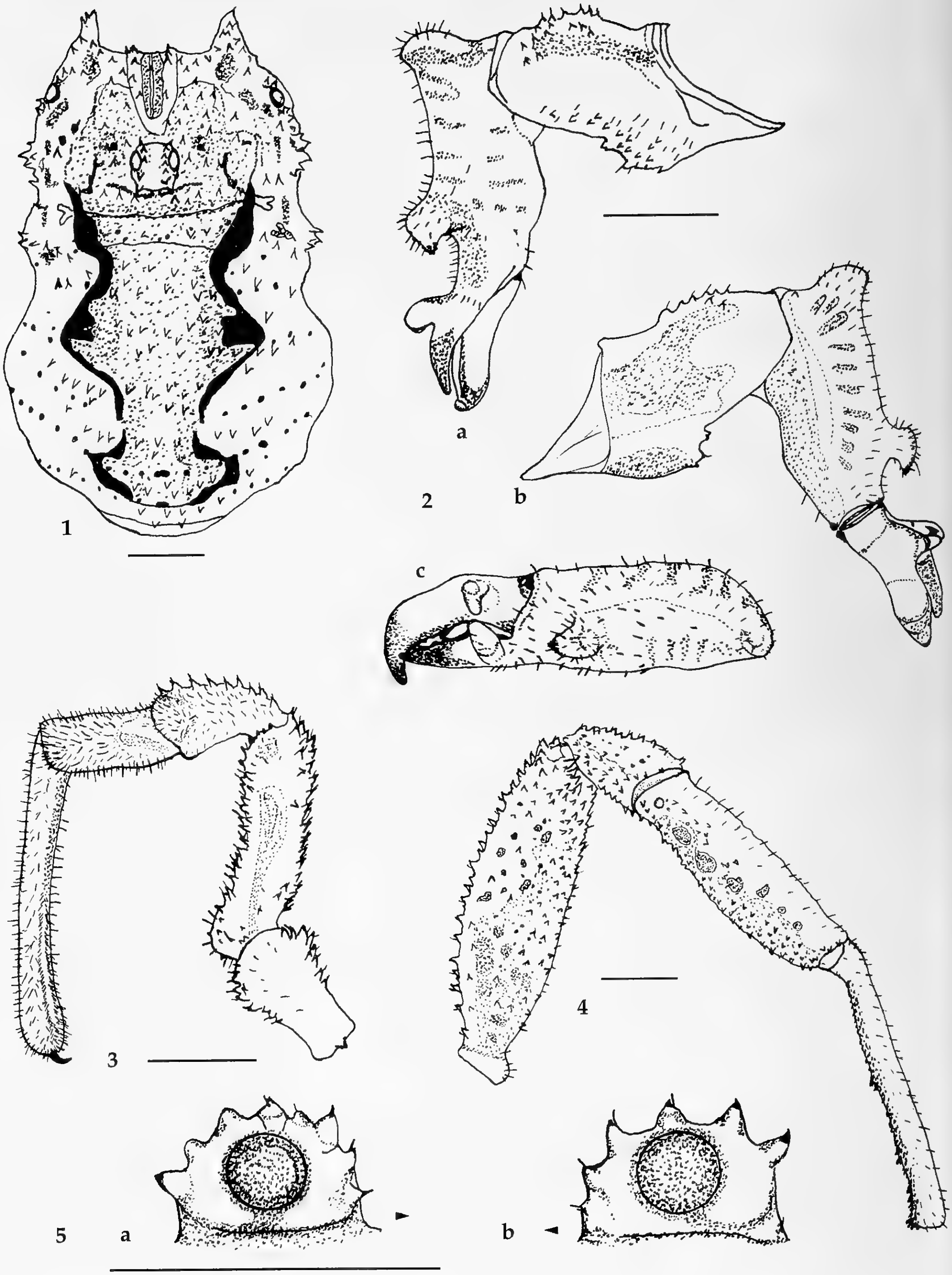
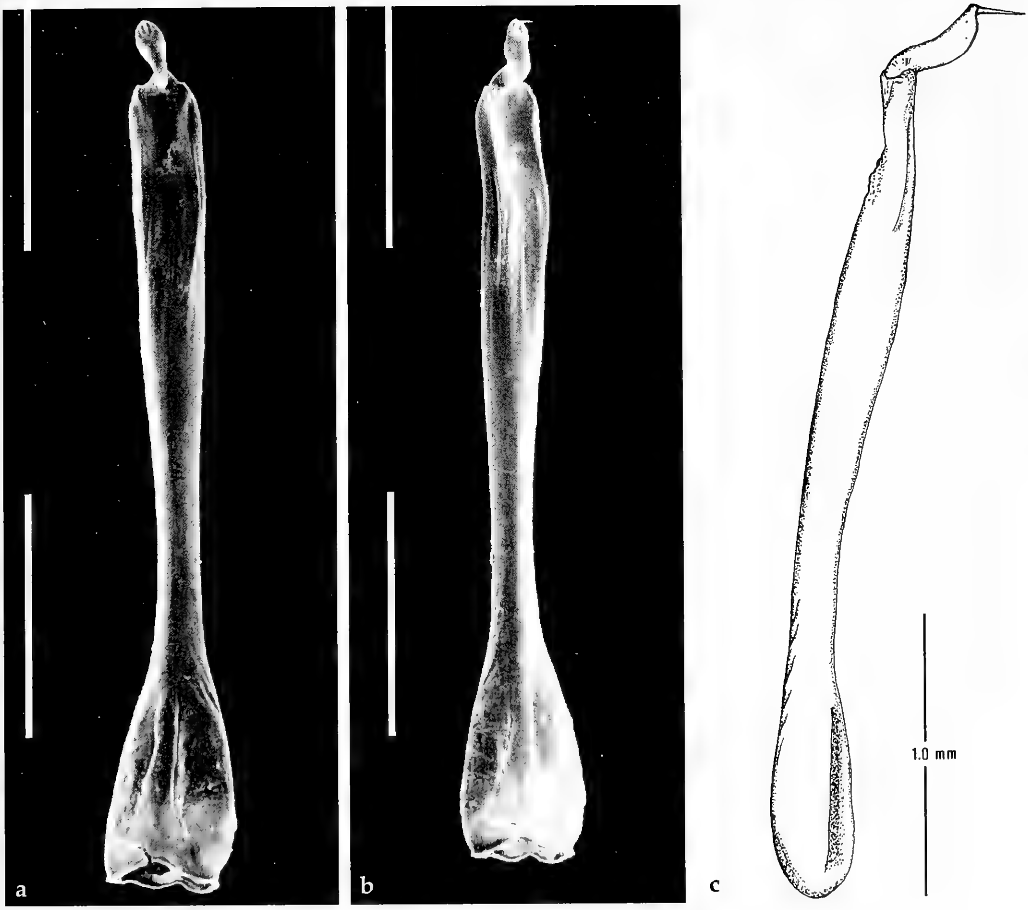


Abb. 1.-5. *Graecophalangium drenskii*, spec. nov., Holotypus ♂. 1. Habitus von dorsal. Skala: 1 mm. 2. Rechte Chelicere: a. medial, b. lateral, c. frontal (punktierte Felder des 1. und 2. Glieds, ausschließlich der Finger braun). 3. Rechter Pedipalpus von medial (punktierte Felder an Femur, Patella und Tibia hellbraun). 4. Rechtes Laufbein I von lateral (punktierte Felder an Femur und Tibia braun). 5. Tuber oculorum. a. von rechts, b. von links (Pfeil weist nach frontal). Skalen: 1 mm.



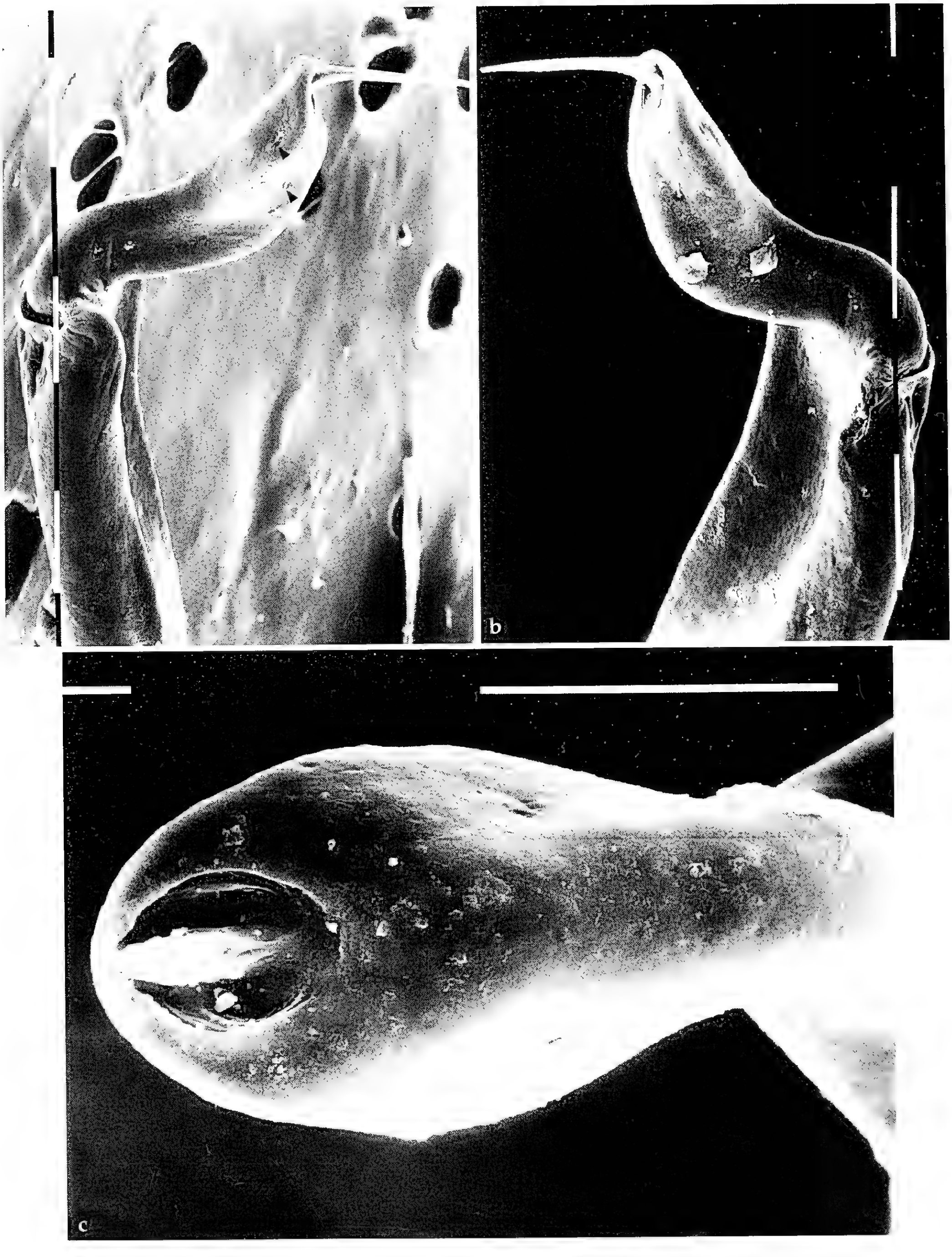
6. *Graecophalangium drenskii*, spec. nov., Holotypus ♂. Penis: a. dorsal, × 30, REM-Aufnahme; b. dorso-lateral, × 30, REM-Aufnahme; c. lateral, (nach REM-Aufnahme). Skalen: 1 mm.

innen orientierten konischen Spitze. Mit einer nach innen (gegen die Mediane) gekrümmten Apophyse. Über dieser Apophyse eine Reihe Börstchen. Grundfärbung hellbraun mit braunen Flecken. 2. Glied frontal gelb gefärbt. Scherenspitze und Zähne schwarz. 3. Glied (1.25 mm) mit hornartiger Apophyse mit einer auf die Apophyse des Fixfingers orientierten konischen Spitze. Apophyse frontal mit kleinem Höcker in der Basis. Färbung hellbraun, Scherenspitze und Zähne schwarz.

Pedipalpen (Abb. 3). Trochanter (1.0 mm) dorsal und ventral kräftig bedornt, lateral mit Einzelborsten. Färbung gelb-braun. Femur (2.2 mm) dorsal und ventral kräftig bedornt (dorsale Dörnchen in zwei Reihen), lateral und medial mit Borsten; mit kaum angedeuteter Apophyse. Färbung medial gelbbraun, lateral gelb. Patella (1.1 mm) behaart, dorsal mit Dörnchen in zwei Reihen; mit deutlicher distaler Apophyse. Färbung: medial gelb-braun, lateral gelb. Tibia (1.25 mm) behaart, ventral mit Einzelkörnchen; mit angedeuteter Apophyse. Färbung gelb. Tarsus (2.9 mm) behaart, ventral mit einem Körnchenfeld, es folgt ein von Härchen umgebenes, kahles Band. Färbung gelb.

Beinmaße (in mm):

	Fe	Pt	Ti	Mt	Ta	Gesamt
I	4.60	1.90	3.30	3.85	5.65	19.30
II	5.00	1.50	3.75	4.50	10.65	25.40
III	2.75	1.30	2.25	3.95	5.60	15.85
IV	4.50	1.50	3.25	5.55	7.85	22.65



7. *Graecophalangium drenskii*, spec. nov., Holotypus ♂. Glans penis, REM-Aufnahmen: a. lateral, × 203 (Pfeile: Börstchen); b. lateral, × 252; c. dorsal, × 500. Skalen: 100 µm

Beine. Alle Coxen behaart, gelb gefärbt und braun gefleckt. Coxa I und II dorsal und hinten mit je einem spitzigen Dorn. Coxa III dorsal mit einem Dorn und Coxa IV vorn mit einigen Dornen. Alle Trochanter bedornt, gelb gefärbt und braun gefleckt.

Bein I (Abb. 4). Femur, Patella und Tibia keulig verdickt. Femur medial, lateral und ventral gezähnelt, dorsal mit 2 Reihen Dornen. Patella ventral und lateral gezähnelt, dorsal mit 2 Reihen Dornen; gelb, medial mit hellbraunen Flecken. Tibia medio-lateral platt, lateral und ventral gezähnelt; gelb mit hellbraunen Flecken. Metatarsus und Tarsus gelb gefärbt und behaart, Metatarsus ventral mit schwarzen Tuberkeln.

Bein II. Femur etwa zylindrisch, schlank mit 5 Reihen Dornchen. Patella etwa 5-kantig, mit 5 Reihen Zähnchen. Tibia 5-kantig, ventral an den Kanten mit 3 Längsbändern aus Börstchen und kleinen Zähnchen, dorsal mit 2 Bändern nur aus Börstchen. Femur, Patella und Tibia gelb, braun gefleckt. Metatarsus und Tarsus gelb, nur behaart.

Bein III. Femur kegelförmig, mit etwa 5 Reihen Dornen. Patella zylindrisch, leicht behaart, mit 3 Reihen Dornen. Tibia 5-kantig, mit 5 Bändern aus Börstchen und Zähnchen an den Kanten. Femur, Patella und Tibia gelb mit braunen Flecken. Metatarsus und Tarsus gelb, behaart.

Bein IV. Stärker bedornt als Bein III. Femur kegelförmig mit 5 Reihen Dornen. Patella 5-kantig mit 5 Reihen Dornen, die 3 Dorsalreihen mit stärker entwickelten Dornen. Tibia 5-kantig, mit 5 Bändern aus Borsten und Zähnen an den Kanten. Metatarsus behaart und gezähnelt. Tarsus nur behaart. Färbung von Bein IV wie die von Bein III.

Penis (Abb. 6-7). Corpuslänge: 3.3 mm; Eichel 0.3 mm lang, mit 4 Börstchen (Abb. 7); Stylus 0.15 mm lang. Grundfarbe des Penis braun. Das mittlere Drittel des Corpus penis verdunkelt. Stylus dunkelbraun bis schwarz.

Weibchen unbekannt.

Verwandtschaft

Graecophalangium drenskii, spec. nov. kann auf Grund der starken Chelicerenbewehrung in dieselbe Gruppe wie *Graecophalangium atticum* Roewer und *Graecophalangium militare* (C. L. Koch) aufgenommen werden. Die Penisstruktur hat gemeinsame Merkmale mit der von *Graecophalangium cretaeum* Martens.

Es verdient Erwähnung, daß bei *Graecophalangium drenskii,* spec. nov. und *Rilaena pusilla* (Roewer) (s. Redikorzev 1936: ff. 18-19) sub "*Zacheus hyrcanus* Red."eine gewisse Ähnlichkeit in der Chelicerenbewehrung besteht.

Danksagung

Ich danke herzlich Dr. Deltschev vom Zoologischen Institut in Sofia für die freundliche Überlassug des Opilionenmateriales.

Literatur

Martens, J. 1966. Zoologische Aufsammlungen auf Kreta. III. Opiliones. - Ann. Naturhist. Mus. Wien **69**: 347-362

Redikorzev, V. 1936. Materialy k faune Opiliones SSSR. - Trudy zool. Inst. Akad. Nauk SSSR, Moskva-Leningrad **3**: 33-57

Roewer, C.-F. 1923. Die Weberknechte der Erde. Systematische Bearbeitung der bisher bekannten Opiliones. - Jena: 1116 pp.

Starega, W. 1973. Beitrag zur Kenntnis der Weberknechte (Opiliones) des Nahen Ostens. - Ann. zool. Warszawa **30** (6): 129-153

17. Stubbe, M.; Krapp, F. (Hrsg.): Handbuch der Säugetiere Europas. Band 5: Raubsäuger - Carnivora (Fissipedia), Teil II: Mustelidae 2, Viverridae, Herpestidae, Felidae. - Aula-Verlag, Wiesbaden, 1993. 681 Seiten, 171 Abbildungen.

Der 5. Band der renommierten Handbuchreihe mit den Landraubtieren mußte wegen des Umfangs der Ordnung zweigeteilt werden. Dem bereits erschienenen ersten Teil (mit den Hunden, Bären, Kleinbären sowie einem Teil der Marderartigen) ist nun in relativ kurzem Abstand der zweite Halbband gefolgt, der die Marderartigen abschließt und außerdem die in Europa heimischen oder eingeführten Schleichkatzen, Mongos und Katzenartigen behandelt.

Der besondere Wert der gesamten Handbuchreihe liegt auf der gründlichen und sorgfältigen Bearbeitung diagnostischer Merkmale. So werden auch im vorliegenden Band äußere Kennzeichen und ihre geographischen und jahreszeitlichen Variationen sowie Schädel- und Gebißmerkmale ausführlich dargestellt. Ebenso werden artspezifische Merkmale im postkranialen Skelett beschrieben. Daneben werden aber auch biologische Aspekte wie Lebens- und Aktionsraum, Nahrungsspektrum und Verhalten behandelt.

Die Verbreitungsareale fast aller behandelten Arten haben sich in jüngerer Zeit durch menschliche Einflüsse verändert. Zu diesem Thema wurde sehr viel aktuelles Datenmaterial zusammengetragen, bei Problemarten wie Fischotter und Europäischer Nerz werden aktuelle Bestandsänderungen und ihre Ursachen detailliert für die einzelnen europäischen Staaten bzw. die deutschen Bundesländer dargestellt. Das Buch bietet eine Fülle aktueller Informationen auf hohem wissenschaftlichen Niveau. Die Handbuchreihe wird dadurch weiter an Ansehen und positiver Beurteilung gewinnen. R. Kraft

18. Carroll, R. L.: Paläontologie und Evolution der Wirbeltiere. - Stuttgart, New York: Thieme, 1993. Übersetzt und bearbeitet von W. Maier und D. Thies. 684 Seiten, 710 Abbildungen in 1762 Einzeldarstellungen.

Durch Entdeckung neuer Fossilformen, darunter vollkommen neuer Taxa, aber auch durch die Neubewertung lang bekannter Fossilien, ist das Wissen über Abstammung und Evolution der Wirbeltiere in den letzten 25 Jahren enorm angewachsen. Trotz des Aufschwungs, den die Wirbeltierpaläontologie dadurch genommen hat, fehlte ein zusammenfassendes Werk, das unter Einbeziehung neuester Fossilfunde Baupläne, Abstammung und Entwicklungslinien aller fossilen und rezenten Wirbeltierklassen zusammenfassend darstellt. Das vorliegende Buch schließt diese Lücke in hervorragender Weise. Im Vordergrund steht die Beschreibung und stammesgeschichtliche Bewertung von Skelett- und Gebißmerkmalen, wobei vor allem den Übergängen zwischen den verschiedenen Stammeslinien und dem Entstehen neuer Strukturen breiter Raum gewidmet wird. Daneben werden aber auch die geologischen und klimatischen Voraussetzungen, die zum Auftreten (oder Aussterben) und zur Ausbreitung der Hauptgruppen geführt haben, ausführlich dargestellt. Hervorzuheben ist der Anhang mit einer Klassifikation aller bekannten Gattungen, von denen Fossilfunde vorliegen.

Der Autor empfiehlt sein Buch zu Recht als Textgrundlage und Nachschlagewerk für Lehrveranstaltungen auf dem Gebiet der Wirbeltieranatomie und -evolution. Seit Romers Standardwerk "Vertebrate Paleontology" aus dem Jahr 1966 ist wohl kein Buch erschienen, das dieses Thema in vergleichbarer Ausführlichkeit und mit derselben wissenschaftlichen Zuverlässigkeit behandelt. R. Kraft

19. Benecke, N.: Der Mensch und seine Haustiere. Die Geschichte einer jahrtausendealten Beziehung. - Theiss Verlag, Stuttgart, 1994. 470 S., 263 Abbildungen.

Das Buch beschreibt Entstehung, Bedeutung und Nutzung der Haustiere. Nach einer Einführung über das Wesen der Domestikation und das Phänomen domestikationsbedingter Formänderungen beschäftigt sich der erste Teil mit den kulturgeschichtlichen und ökonomischen Aspekten der Haustierhaltung. Unter Bezugnahme auf Knochenfunde aus archäologischen Grabungsstätten sowie auf prähistorische Tierdarstellungen beschreibt der Autor die Entstehung der Haustiere im Zug der neolithischen Revolution im vorderen Orient und die Ausbreitung der agrarischen Wirtschaftsform mit Pflanzenanbau und Tierzucht über den europäischen Kontinent. Einen Schwerpunkt bildet die Geschichte der Haustiere und die historische Entwicklung von Haltungs- und Nutzungsformen in Europa vom Neolithikum bis zum ausgehenden Mittelalter.

Der zweite Teil beschäftigt sich in Einzeldarstellungen mit Abstammung, Merkmalen, Biologie und Nutzungsweise aller Haus-, Farm- und Labortierarten.

Entgegen der Verlagsankündigung ist das Buch zwar nicht die erste zusammenfassende Darstellung der Domestikation, aber dennoch eine lesens- und empfehlenswerte Neuerscheinung. Da es die Geschichte der Haustiere vor allem aus der Sicht des Historikers und Archäologen schildert, wird dem Leser nachdrücklich bewußt, daß die Entstehung der Haustiere in Zusammenhang mit dem Anbau von Kulturpflanzen einen der bedeutendsten Vorgänge in der Menschheitsgeschichte darstellt. R. Kraft

SPIXIANA	18	2	111–121	München, 01. Juli 1995	ISSN 0341–8391

New taxa and new records of the genus *Scopodes* Erichson from New Guinea. Supplement to the "Revision of the genus *Scopodes* Erichson from New Guinea"

(Insecta, Coleoptera, Carabidae, Pentagonicinae)

By **Martin Baehr**

Baehr, M. (1995): New taxa and new records of the genus *Scopodes* Erichson from New Guinea. Supplement to the "Revision of the genus *Scopodes* Erichson from New Guinea" (Insecta, Coleoptera, Carabidae, Pentagonicinae). – Spixiana **18/2:** 111-121

Four new species and one new subspecies of *Scopodes* from New Guinea are described: *S. muliae*, spec. nov., *S. amplipennis*, spec. nov., both from central Irian Jaya, *S. perfoveatus*, spec. nov. from the Western Highlands in Papua New Guinea, *S. chimbu viridans*, subspec. nov. from the Eastern Highlands in Papua New Guinea, and *S. balkei* from central Irian Jaya. The first three species and the new subspecies belong to the *chimbu*-group of the New Guinean *Scopodes*, the last species is closely related to *S. violaceus* and *S. riedeli* which are both characterized by their minute elytral foveae. *S. amplipennis* and *S. perfoveatus* differ from all known species by the wide, posteriorly markedly widened elytra, the conspicuously sinuate apex of elytra, and the deeply impressed inner striae and basally markedly convex intervals. *S. perfoveatus* differs also by the presence of an additional setiferous puncture at the 4th interval close to the base of the elytra. The new subspecies of *S. chimbu* Darlington from central Papua New Guinea differs from the nominate form by its plain green colour.

New records of *S. altus* Darlington, *S. darlingtoni* Baehr, *S. atricornis* Baehr and *S. minor* Baehr are dealt with. *S. cheesmanni* Darlington is emendated to *S. cheesmannae*.

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

Introduction

Soon after having finished my "Revision of the genus *Scopodes* Erichson from New Guinea" I received a small sample of *Scopodes* from New Guinea from the Australian National Insect Collection, Canberra by courtesy of Mr. Tom Weir. Apart from some additional material of species mentioned in the revision, the sample contained a single female specimen of a conspicuous new species that could be included no more in the revision. Mr. A. Riedel who collected the bulk of the new species described in the revision, recently captured additional few *Scopodes* in Irian Jaya, two of them proved to represent a new species each. I received also another few *Scopodes* from the Naturhistorisches Museum, Wien, for determination that were recently collected by Mr. M. Balke in Irian Jaya, and from the Muséum d'Histoire naturelle, Genève that were collected in 1979 by Dr. W. G. Ullrich in Papua New Guinea. These samples include another new species and a new subspecies. The new taxa are now described separately in a supplement to my revision.

In the revision I had already expressed my opinion that the present knowledge of the New Guinean *Scopodes* is certainly very preliminary and that new species would be likely discovered in the near future. Hence these new taxa are perhaps only the beginning of a supplementary series of new species that will be discovered in future.

Abbreviations of Collections mentioned in the text

ANIC	Australian National Insect Collection, Canberra
CBM	Collection M. Baehr, München
NHMW	Naturhistorisches Museum, Wien
MHNG	Muséum d'Histoire naturelle, Genève
ZSM-CBM	Collection M. Baehr, München (permanent loan from Zoologische Staatssammlung, München)

The species

Scopodes altus Darlington

Darlington, 1968, p. 198; Baehr 1994, p. 104.

New records: 3♂♂, 2♀♀, Irian Jaya, Trikora-Gebiet, 19.-20.10.1993 Habbema-Kali Oue Tal, ca. 138°43'E, 04°13'S, 3450 m, leg. M. Balke (39)(NHMW); 2♂♂, Irian Jaya, Habbema-Gebiet, Paß zum Iebele-Tal, ca. 138°45'E, 04°07'S, 3300 m, leg. M. Balke (40)(NHMW).

Note. This high altitude inhabiting species is so far known only from a limited area around Lake Habbema in the Snow Mountains of central Irian Jaya.

Scopodes darlingtoni Baehr

Baehr, 1994, p. 122

New records: 2♂♂, 2♀♀, PNG/EHProv. Umg. Kainantu Onerunka, Papua Nlle Guinée W. G. Ullrich, 22.IV., 18.VIII., 24.IX., 23.X.79 (CBM, MHNG); 1♂, PAPUA N GUINEA Onerunka II 80 nr Kainantu W. G. Ullrich (MHNG).

Note. This species is rather widely distributed in the central eastern part of Papua New Guinea.

Scopodes cf. *atricornis* Baehr

Baehr, 1994, p. 121

New record: 1♀, Irian Jaya, Jayawijaya-Pr. Holuwen, 1500 m, 30.VI.1994, leg. A. Riedel (CBM).

Note. The single specimen differs from a large series of *S. atricornis* by the generally green colour, the regular pronotal sulci, the regular frontal sulci, and the smooth frons and almost smooth clypeus. The specimen may thus likely represent a separate species or subspecies. Without knowledge of the male genitalia, however, I do not want to describe it formally as a separate taxon.

Scopodes minor Baehr

Baehr, 1994, p. 131

New record: 1♀, Irian Jaya, Jayawijaya-Pr. Holuwen, 1000 m, 30.VI.1994, leg. A. Riedel (CBM); 2♀♀, 9 II 80, XI 79, PNG/EHProv. Umg. Kainantu Onerunka, Papua Nlle Guinée W. G. Ullrich (MHNG).

Note. This species was so far known from 4 specimens only and it is recorded as well from central Papua New Guinea as from central Irian Jaya.

Scopodes chimbu viridans, subspec. nov.
Fig. 9

Types. Holotype: ♂, 11 VI 79 PNG/EHProv. Umg. Kainantu Onerunka, Papua Nlle Guinée W. G. Ullrich (MHNG). – Paratypes: 5♀♀, same locality and collector, 8 X 79, 17 XI 79, XI 79, XII 79 (CBM, MHNG).

Diagnosis. Similar to nominate subspecies of *S. chimbu*, but elytra plain green, pronotum narrower with more acutely projecting lateral triangular process, and with denser, more regular transverse sulci.

Description

Measurements. Length: 3.5-3.7 mm; width: 1.50-1.60 mm. Ratios. Width head/pronotum: 1.17-1.20; width/length of pronotum: 1.24-1.26; width elytra/pronotum: 1.80-1.83; length/width of elytra: 1.32-1.33.

Colour. Elytra plain green, head and pronotum green with more or less extensive purplish areas. Otherwise colour similar to nominate subspecies.

Head. Similar to nominate subspecies.

Pronotum. Narrower than in nominate subspecies, lateral triangular process conspicuous, distinctly more projecting, transverse sulci in posterior part denser and more regular.

Elytra. Similar to nominate subspecies.

Lower surface. Similar to nominate subspecies.

♂ genitalia. Similar to nominate subspecies.

♀ genitalia. Similar to nominate subspecies.

Variation. Some variation noted in intensity of purplish colour on head and pronotum, and in relative width of pronotum.

Distribution (Fig. 9). Central eastern Papua New Guinea. Known only from type locality.

Habits. Largely unknown. Perhaps collected in median altitude.

Etymology. The name refers to the plain green colour of the elytra.

Relationships. This subspecies is in several respects similar to *S. chimbu* s. str., especially in the male genitalia. It is probably a local form, that is nevertheless easily recognized.

Scopodes muliae, spec. nov.
Figs 1, 5, 9

Types. Holotype: ♂, Irian Jaya, Mulia (n) to Dowone, 2200-2250 m, 8.VII.1994, leg. A. Riedel (ZSM-CBM).

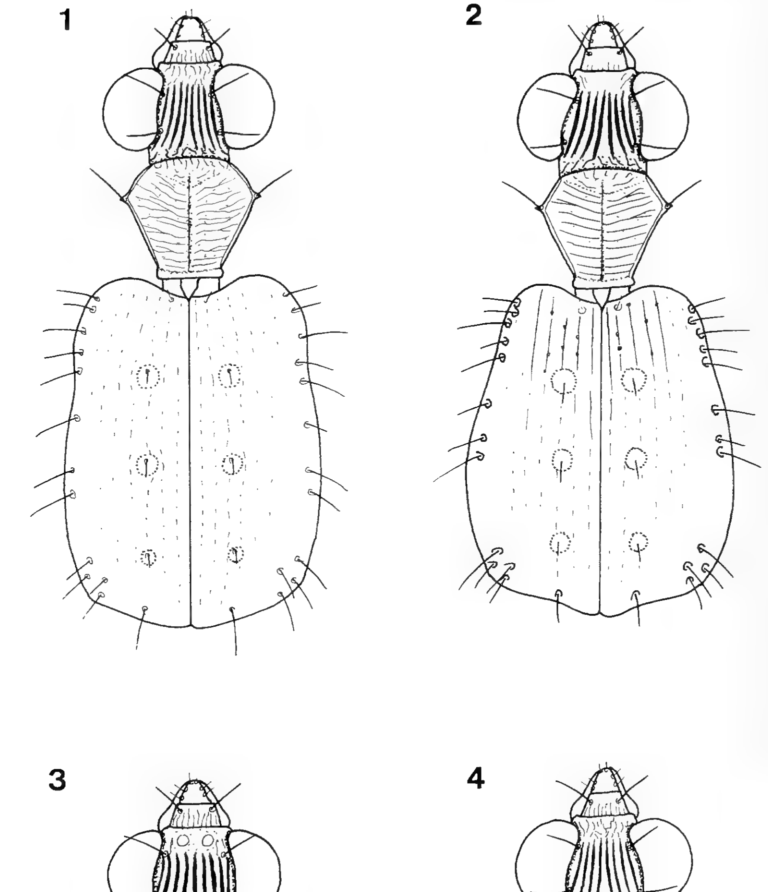
Diagnosis. Rather small and fairly narrow, greenish species with large, though not contrasting elytral foveae, rather superficial striation, and transverse, sericeous microreticulation of elytra. Further distinguished from related species by completely yellowish legs, short antenna, and rather regular transverse strioles on pronotum.

Description

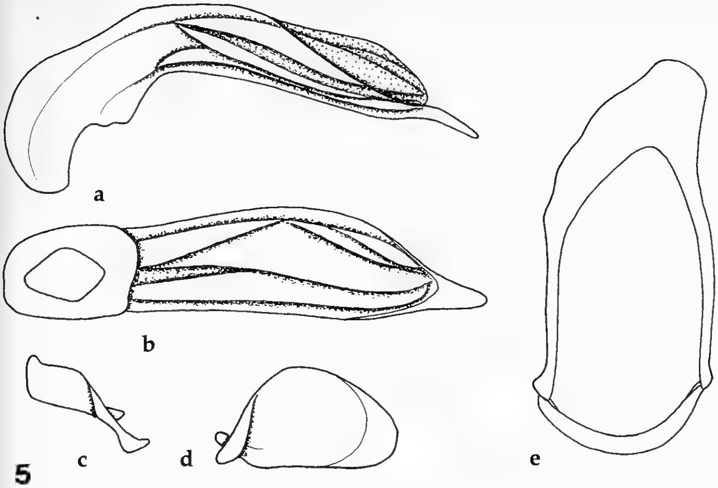
Measurements. Length: 3.6 mm; width: 1.45 mm. Ratios. Width head/pronotum: 1.21; width/length of pronotum: 1.24; width elytra/pronotum: 1.69; length/width of elytra: 1.38.

Colour. Greenish, head, pronotum, and elytra with faint golden and purplish lustre. Labrum and clypeus greenish. Antenna dark piceous, 1st-4th segments dirty yellow with piceous apices. Femora dirty yellow, metafemur and tibiae slightly darker, tarsi piceous.

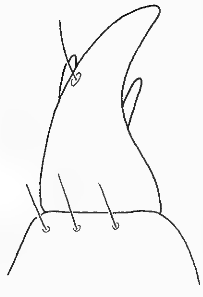
Head. Eyes very large, space between inner border of eyes about as wide as diameter of eye. Labrum rather short and wide, gently triangular, anterior border fairly convex, 6-setose, in basal part medially impressed. Clypeus with shallow, transverse sulcus, basal part coarsely striate, rugose, rather glossy. Labrum, clypeus, and anterior part of frons with some very inconspicuous additional hairs. Anterior triangular field of frons heavily, irregularly wrinkled, moderately glossy. Frons between eyes with c. 8 deep, rather straight, fairly regular sulci that reach far posteriorly. Summit and neck coarsely wrinkled, impunctate. Whole upper surface of head moderately rugose, rather glossy. Antenna short, median segments c. 1.1-1.2 × as long as wide.



Figs 1-4. Habitus. 1. *Scopodes muliae*, spec. nov. 2. *S. amplipennis*, spec. nov. 3. *S. perfoveatus*, spec. nov. 4. *S. balkei*, spec. nov. Holotypes. Lengths: 3.6 mm; 3.5 mm; 3.45 mm; 3.85 mm.



5



6

Fig. 5. *Scopodes muliae,* spec. nov. ♂ genitalia. a. Lateral view of aedeagus. b. Lower surface of aedeagus. c. Right paramere. d. Left paramere. e. Genital ring.
Fig. 6. *Scopodes amplipennis,* spec. nov. ♀ stylomere 2.

Pronotum. Convex, wide, rather trapezoidal, widest at lateral triangular process in anterior third. Lateral border line distinct. Margin anteriorly convex, posterior of triangular process very faintly convex, in front of posterior angles not concave. Lateral triangular process distinct, though small, triangular, laterally not much projecting. Posterior marginal seta absent. Anterior margin slightly convex, posterior margin straight. Median line distinct, fairly deep, not reaching apex nor base. In apical third with extremely shallow, wide, barely visible transverse sulcus. Whole upper surface with dense, coarse, in posterior part rather regular transverse sulci. Surface with sparse puncturation, without microreticulation, moderately rugose, rather glossy.

Elytra. Moderately elongate, fairly convex. Base comparatively wide, therefore elytra rather rectangular. Sides gently rounded, in anterior third rather deeply excised. Apex wide, apical border oblique, barely sinuate. Whole surface with fairly irregular, superficial striation. Foveae in third interval wide, though shallow, not contrasting. Surface fairly uneven. Microrecticulation conspicuous, though rather superficial, consisting of very dense, transverse meshes that are remarkably irregular around the discal foveae. Surface with conspicuous, sericeous lustre. Pilosity very sparse and extremely short. Marginal pores comparatively small, rather inconspicuous. Wings elongate.

Lower surface. Metepisternum c. 1.8 × as long as wide. Sternites with sparse, short pilosity, with distinct microreticulation.

♂ genitalia. Genital ring somewhat deformed, asymmetric, large, fairly narrow. Apex fairly wide, rectangular, arms moderately wide. Aedeagus large, fairly curved, slightly asymmetric, lower surface gently convex, near apex sinuate, apex elongate, somewhat spoon-shaped. Orificium fairly elongate. Parameres large, as in fig. 5.

♀ genitalia. Unknown.

Variation. Unknown.

Distribution (Fig. 9). Central Irian Jaya. Known only from type locality.

Habits. Largely unknown. Collected in median altitude.

Etymology. The name refers to the type locality.

Relationships. With regard to the rather similar male genitalia this species is certainly closely related to *S. chimbu* Darlington. It differs, however, by the narrower elytra with less distinct striation, the plain green colour, and the yellowish colour of the legs.

Scopodes amplipennis, spec. nov.
Figs 2, 6, 9

Types. Holotype: ♀, Irian Jaya, s. Mulia, 1900-2200 m, 6.-7.VII.1994, leg. A. Riedel (ZSM-CBM).

Diagnosis. Rather small, short and wide, bronzed-black species with greenish lustre, yellow legs, wide, posteriorly even markedly widened elytra, large, rather contrasting, blue elytral foveae, and irregularly structured surface of the elytra with the striae very deeply impressed near base. Further distinguished from related species by absence of an additional elytral pore at the basis of 5th stria, and rather regular transverse strioles on pronotum.

Description

Measurements. Length: 3.5 mm; width: 1.5 mm. Ratios. Width head/pronotum: 1.25; width/length of pronotum: 1.23; width elytra/pronotum: 1.86; length/width of elytra: 1.19.

Colour. Bronzed-black, head with very faint, pronotum with rather distinct greenish and purplish lustre, elytra with distinct golden lustre. Labrum and clypeus black. Antenna yellow, becoming gradually darker towards apex. Legs yellow, tarsi piceous.

Head. Eyes very large, space between inner border of eyes slightly wider than diameter of eye. Labrum rather short and wide, gently triangular, anterior border fairly convex, 6-setose, in basal part medially impressed. Clypeus with shallow, transverse sulcus, basal part barely striate, smooth, glossy. Labrum, clypeus, and anterior part of frons with some very inconspicuous additional hairs. Anterior triangular field of frons not wrinkled, glossy. Frons between eyes with c. 6 deep, rather straight, regular sulci that reach far posteriorly. Summit and neck coarsely wrinkled, impunctate. Whole upper surface of head rather smooth, glossy. Antenna short, median segments c. 1.1 × as long as wide.

Pronotum. Convex, wide, rather trapezoidal, widest at lateral triangular process in anterior third. Lateral border line distinct. Margin anteriorly convex, posterior of triangular process almost straight, in front of posterior angles not concave. Lateral triangular process distinct, though small, triangular, laterally mderately projecting. Posterior marginal seta absent. Anterior margin slightly convex, posterior margin straight. Median line distinct, fairly deep, not reaching apex nor base. In apical third with extremely shallow, wide, barely visible transverse sulcus. Whole upper surface with dense, rather coarse, in posterior part regular transverse sulci. Surface almost without puncturation, without microreticulation, fairly smooth, rather glossy.

Elytra. Very short and wide, moderately convex. Base comparatively narrow, elytra markedly widened towards apex, widest in apical third. Sides strongly rounded, in anterior third somewhat excised. Apex rather wide, apical border oblique, slightly sinuate. Surface in basal fourth deeply striate, in posterior part striation superficial. Foveae in third interval wide, moderately deep, rather contrasting. Surface markedly uneven. Microrecticulation conspicuous, though rather superficial, consisting of very dense, transverse meshes that are remarkably irregular around the discal foveae. Surface with conspicuous, sericeous lustre. Pilosity very sparse and short. Marginal pores comparatively large, contrasting. Wings short.

Lower surface. Metepisternum c. 1.3 × as long as wide. Sternites with extremely sparse and short pilosity, without distinct microreticulation.

♂ genitalia. Unknown.

♀ genitalia. Stylomere 2 medium-sized, rather curved, with dorsal ensiform and nematiform seta and with a single medium-sized ventral ensiform seta. Apex of stylomere 1 with 3-4 elongate hairs. Lateral plate densely setose.

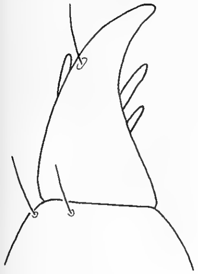
Variation. Unknown.

Distribution (Fig. 9). Central Irian Jaya. Known only from type locality.

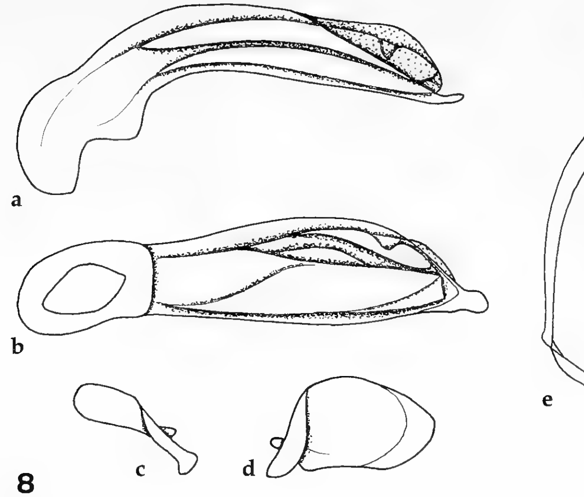
Habits. Largely unknown. Collected in median altitude.

Etymology. The name refers to the wide and short elytra.

Relationships. This species is perhaps rather closely related to the following *S. perfoveatus*, spec. nov. with which it shares the shape of the elytra, the deeply impressed striae in basal third, and the large, blue elytral foveae. A final decision, however, must await the discovery of the male genitalia in both species.



7



8

Fig. 7. *Scopodes perfoveatus*, spec. nov. ♀ stylomere 2.
Fig. 8. *Scopodes balkei*, spec. nov. ♂ genitalia. For legends see fig. 5.

Scopodes perfoveatus, spec. nov.

Figs 3, 7, 9

Types. Holotype: ♀, NEW GUINEA, Western Highlands, Kandep, 8000-8500 ft. 23.12.1961-14.2.1962, W. W. Brandt (ANIC).

Diagnosis. Rather small, very short and wide, cupreous species with yellow legs, wide, posteriorly markedly widened elytra, large, extremely contrasting, blue elytral foveae, presence of an additional fovea at the base of the 5th stria, and irregularly structured surface of the elytra with the striae very deeply impressed near base. Further distinguished from related species by the very irregular transverse strioles on pronotum and the markedly coarse microreticulation of elytra.

Description

Measurements. Length: 3.45 mm; width: 1.55 mm. Ratios. Width head/pronotum: 1.15; width/length of pronotum: 1.31; width elytra/pronotum: 1.81; length/width of elytra: 1.17.

Colour. Vividly cupreous. Labrum and clypeus blackish, clypeus with faint cupreous lustre. Antenna black, 1st-4th segments dirty yellow. Legs yellow, tarsi piceous.

Head. Eyes large, though space between inner border of eyes distinctly wider than diameter of eye. Labrum rather short and wide, gently triangular, anterior border fairly convex, 6-setose, in basal part medially impressed. Clypeus with shallow, transverse sulcus, basal part rather densely striate, smooth, rather glossy. Labrum, clypeus, and anterior part of frons with some very inconspicuous additional hairs. Anterior triangular field of frons barely wrinkled, though with two deep, circular foveae, rather glossy. Frons between eyes with c. 7-8 deep, rather straight, though somewhat irregular sulci that reach far posteriorly. Summit and neck very coarsely wrinkled, somewhat punctate. Whole upper surface of head rather rugose, fairly glossy. Antenna short, median segments c. 1.1 × as long as wide.

Pronotum. Convex, very wide, rather trapezoidal, widest at lateral triangular process in anterior third. Lateral border line distinct. Margin anteriorly convex, posterior of triangular process very faintly convex, in front of posterior angles not concave. Lateral triangular process distinct, though small, triangular, laterally not much projecting. Posterior marginal seta absent. Anterior margin slightly convex, posterior margin straight. Median line distinct, fairly deep, not reaching apex nor base. In apical third with extremely shallow, wide, barely visible transverse sulcus. Whole upper surface with dense, coarse, markedly irregular transverse sulci. Surface with sparse puncturation, without microreticulation, highly rugose, moderately glossy.

Elytra. Very short and wide, moderately convex. Base comparatively narrow, elytra markedly widened towards apex, widest in apical third. Sides strongly rounded, in anterior third faintly excised. Apex rather wide, apical border oblique, deeply sinuate. Surface in basal forth very deeply striate, striae with irregular, deep punctures, in posterior part striation more superficial and very irregular. Foveae in third interval very wide, deep, very contrasting. An additional fovea present on both elytra near base of 5th stria, und unilaterally (left) an additional median fovea inside of 3rd stria present. Surface markedly uneven. Microrecticulation very conspicuous, coarse, consisting of dense, transverse meshes that are remarkably irregular around the discal foveae. Surface with conspicuous, sericeous lustre. Pilosity very sparse and short. Marginal pores large, contrasting. Wings short.

Lower surface. Metepisternum c. 1.2-1.3 × as long as wide. Sternites with comparatively dense and short pilosity, with distinct microreticulation.

♂ genitalia. Unknown.

♀ genitalia. Stylomere 2 medium-sized, rather curved, with dorsal ensiform and nematiform seta, and with two rather elongate ventral ensiform setae. Apex of stylomere 1 with 2-3 elongate hairs. Lateral plate densely setose.

Variation. Unknown.

Distribution (Fig. 9). Western Highlands, central Papua New Guinea. Known only from type locality.

Habits. Unknown. Collected in fairly high altitude.

Etymology. The name refers to the very deep elytral foveae and to the additional fovea near base.

Relationships. This species is perhaps rather closely related to the foregoing *S. amplipennis*, spec. nov. with which it shares the shape of the elytra, the deeply impressed striae in basal third, and the large, blue elytral foveae. A final decision, however, must await the discovery of the male genitalia in both species. Certainly *S. perfoveatus*, spec. nov. is unique within all New Guinean *Scopodes* in the presence of the additional elytral fovea and this makes the relationships rather incertain.

Recognition of the new taxa of the *chimbu*-group

For recognition of the new species and subspecies of the *chimbu*-group the key in my revision (Baehr 1994) should be altered as following (Figs of the revision marked as **Ba94** fig.):

4. Foveae in 3rd interval more or less conspicuously blue; legs always uniformly yellow or light reddish .... 5.
– Foveae in 3rd interval not or but faintly blue; legs dark, or, more rarely, yellowish .... 8.

5. Elytra very short and wide, ratio length/width <1.20, posteriorly remarkably widened (Figs 2, 3); elytral striae in basal third coarse and deep, posteriorly shallow and inconspicuous .... 5a.
– Elytra longer and less wide, ratio length/width >1.30, posteriorly barely widened, elytral striae in basal third fine and rather shallow as in posterior part .... 5b.

5a. Colour cupreous; transverse strioles of pronotum very coarse and irregular; apex of elytra deeply excised; besides the foveae at 3rd stria a setiferous fovea present in basal fourth of 5th stria (Fig. 3); microreticulation of elytra very distinct. Central Papua New Guinea .... *perfoveatus*, spec. nov.
– Colour blackish-bronzed with greenish and purplish tinge; transverse strioles of pronotum less coarse, rather regular; apex of elytra moderately excised; no additional setiferous fovea present in basal fourth of 5th stria (Fig. 2); microreticulation of elytra superficial. Central Irian Jaya .... *amplipennis*, spec. nov.

5b. Smaller species (c. 3.5 mm); colour bronzed or somewhat greenish; antenna almost completely reddish, short, median segments c. as wide as long; frontal sulci fewer, c. 6; aedeagus with simple apex (**Ba94** fig. 9). Eastern central Papua New Guinea .... *tafa* Darlington
– Larger species (>4 mm); colour either bright green, or bronzed without any green reflections, or cupreous, or pronotum and head green, elytra cupreous; antenna with 4 basal segments yellow, rest more or less contrastingly dark, longer, median segments distinctly longer than wide; frontal sulci more numerous, 8-9; aedeagus either with knob-like apex or simple, in latter case either colour bright green or microreticulation of elytra almost isodiametric. .... 6.

Fig. 9. Distribution. *Scopodes chimbu viridans*, subspec. nov.: ■; *S. muliae*, spec. nov.: ●; *S. amplipennis*, spec. nov.: ▼; *S. perfoveatus*, spec. nov.: ◆; *S. balkei*, spec. nov.: ▲.

and

8. Femora yellow or light reddish .... 8a.
– Femora dark .... 9.

8a. Large, wide species with cupreous elytral suture; aedeagus with wide, spatulate, laterally hooked apex (**Ba94** fig. 8). Central eastern Papua New Guinea .... *wei* Bell & Bell
– Smaller, narrower, uniformly greenish species without cupreous elytral suture; aedeagus with narrow, elongate, tapering apex (Fig. 5). Central Irian Jaya .... *muliae*, spec. nov.

9. Smaller species, length <3.7 mm; antenna short, median antennomeres almost as wide as long; aedeagus (when known) without knob-like apex and without sharp lateral edge (**BA94** fig. 3)10.
– Larger species, length >4.0 mm; antenna longer, median antennomeres >1.3 × as long as wide; aedeagus with knob-like apex and/or with sharp lateral edge (**BA94** figs 4, 6, 7) .... 11.

10. Colour green .... 10a.
– Colour blackish-bronzed, forebody with some greenish tinge; ♂ genitalia see **Ba94** fig. 3. Central Papua New Guinea .... *chimbu chimbu* Darlington

10a. Clypeus and labrum contrastingly blackish-aeneous; frontal sulci parallel, markedly regular; antenna reddish throughout, only terminal segments slightly darkened; striation of elytra almost absent except near base; ♂ genitalia unknown. Eastern central Papua New Guinea .... *regularis* Baehr
– Clypeus and labrum greenish, not contrasting; frontal sulci less parallel, slightly irregular; antenna from 5th antennomere contrastingly black; striation of elytra distinct throughout; ♂ genitalia as in *c. chimbu* Darlington (**Ba94** fig. 3). Eastern central Papua New Guinea .... *chimbu viridans*, subspec. nov.

11. Colour plain green, only labrum blackish-green; elytra slightly shorter, ratio l/w 1.36; apex of aedeagus slightly knob-like, but without sharp lateral edge (**BA94** fig. 4). Northeastern Papua New Guinea .... *virescens* Baehr
– Colour cupreous, or blackish with dark greenish, bluish, or cupreous tinge; elytra more elongate, ratio l/w >1.4; lower surface of aedeagus laterally with sharp edge, apex more or less widened (**BA94** figs 6, 7) .... 12.

Scopodes cheesmannae Darlington

Scopodes cheesmanni Darlington, 1968, p. 201; Baehr 1994, p. 129.

Note. Emendation of gender, because the species was named after Miss L. Evelyn Cheesman.

Scopodes balkei, spec. nov.

Figs 4, 8, 9

Types. Holotype: ♂, Irian Jaya, 23.9.1993 Tanime Gebiet, Tanime, 1500 m, ca. 140°06'E 04°27'S, leg. M. Balke (18)(NHMW).

Diagnosis. Small species with greenish forebody and black elytra, dark legs, very small, not contrasting elytral foveae, superficial elytral striation, and superficial microreticulation. Further distinguished from related species by contrasting colour of fore body and elytra, little deformed male genital ring with square apex, and aedeagus with slightly knob-shaped apex and markedly striolate lower surface.

Description

Measurements. Length: 3.85 mm; width: 1.5 mm. Ratios. Width head/pronotum: 1.25; width/length of pronotum: 1.14; width elytra/pronotum: 1.82; length/width of elytra: 1.39.

Colour. Head and prothorax dark green with some cupreous lustre median of eyes; elytra black with faint golden hue. Labrum black, clypeus and anterior part of frons black with some cupreous tinge. Antenna reddish throughout. Legs black, tibiae slightly lighter.

Head. Eyes very large, space between inner border of eyes about as wide as diameter of eye. Labrum elongate, triangular, anterior border very convex, 6-setose, in basal part medially impressed. Clypeus with shallow, transverse sulcus, basal part slightly striate, glossy. Labrum, clypeus, and anterior part of frons with some very inconspicuous additional hairs. Anterior triangular field of frons slightly wrinkled and punctate, rather glossy. Frons between eyes with c. 8 deep, rather regular sulci that reach far posteriorly. Summit and neck slightly wrinkled, apparently impunctate. Whole upper surface of head glossy. Antenna moderately elongate, median segments c. 1.3 × as long as wide.

Pronotum. Convex, rather wide, cordiform, widest at lateral triangular process in anterior third. Lateral border line distinct. Margin rather evenly rounded throughout, in front of posterior angles barely concave, hence, whole pronotum has a rather rounded appearance. Lateral triangular process distinct, though very small, obtusely triangular. Posterior marginal seta absent. Anterior margin slightly convex, posterior margin straight. Median line distinct, fairly deep, not reaching apex nor base. In apical third with distinct, though rather shallow, moderately wide, transverse sulcus. Upper surface posteriorly of sulcus with rather few, superficial, transverse sulci, apparently without puncturation, without microreticulation. Surface highly glossy.

Elytra. Moderately elongate, highly convex. Base comparatively wide, therefore elytra rather rectangular. Sides gently rounded, in anterior third slightly sinuate. Apex wide, apical border oblique and faintly sinuate. Striation barely indicated by very superficial rows of fine punctures. Foveae in third interval small, very inconspicuous, not contrasting. Surface with faint traces of microreticulation, glossy. Pilosity very sparse and extremely short, barely visible. Marginal pores rather large and conspicuous. Wings moderately elongate.

Lower surface. Metepisternum c. 1.5 × as long as wide. Sternites with extremely sparse and short pilosity, with dense and dictinct microreticulation.

♂ genitalia. Genital ring fairly deformed, moderately asymmetric, moderately wide. Apex rather wide, apically rounded, arms fairly slender. Aedeagus large, moderately curved, slightly asymmetric, lower surface straight, distinctly striolate, apex slightly knob-shaped, moderately wide. Orificium rather short. Parameres medium-sized, as in fig. 8.

♀ genitalia. Unknown.

Variation. Unknown.

Distribution (Fig. 9). Central eastern Irian Jaya. Known only from type locality.

Habits. Unknown. Collected in median altitude.

Etymology. The name is a patronym in honour of the collector.

Relationships. This species is certainly closely related to *S. violaceus* Baehr and *S. riedeli* Baehr, though differs from both by colour and by shape of the apex of the aedeagus. By virtue of similar structure of pronotum and rather similar aedeagus it is perhaps more closely related to the eastern *S. violaceus*.

Recognition

For recognition of *S. balkei*, spec nov. the key in my revision (Baehr 1994) should be altered as following:

14. Foveae in 3rd interval small, barely visible; ♂ genitalia see **BA94** figs. 26, 27; fig. 8. .... 15.
– Foveae in 3rd interval always large and conspicuous; ♂ genitalia, when known, see **BA94** figs 13-15, 17-23, 25 .... 16.

15. Colour violaceous; apex of aedeagus not knob-like (**Ba94** figs 26, 27) .... 15a.
– Colour not violaceous, forebody greenish, elytra black with golden tinge; aedeagus ventrally striolate, apex slightly knob-like (Fig. 8). Central eastern Irian Jaya .... *balkei*, spec. nov.

15a. Foveae in 3rd interval usually smaller, barely visible; elytra almost non-striate; apex of aedeagus not lancet-shaped (Fig. 26); ♀ sternum VII without distinct notch in middle of apical margin. Central Irian Jaya .... *violaceus*, spec. nov.
– Foveae in 3rd interval usually larger, well visible; elytra usually feebly striate; apex of aedeagus lancet-shaped (Fig. 27); ♀ sternum VII with distinct notch in middle of apical margin. Vogelkop, western Irian Jaya .... *riedeli*, spec. nov.

Acknowledgements

My best thanks are due to Dr. I. Löbl, Genève, Mr. A. Riedel, München, Dr. H. Schönmann, Wien, and Mr. T. Weir, Canberra, for kindly submitting the specimens for examination.

Literature

Baehr, M. 1994. Revision of the genus *Scopodes* Erichson from New Guinea (Insecta, Coleoptera, Carabidae, Pentagonicinae). – Spixiana **17**: 97-155

Darlington, P. J. Jr. 1968. The Carabid Beetles of New Guinea. Part III. Harpalinae (Continued): Perigonini to Pseudomorphini. – Bull. Mus. comp. Zool. **137**: 1-253

20. Houston, W. W. K. (ed.): Zoological Catalogue of Australia, Vol. 6: Ephemeroptera, Megaloptera, Odonata, Plecoptera, Trichoptera. - Australian Covernment Publishing Service, Canberra, 1988. 315 S.

Dieser Katalog, herausgegeben vom Bureau of Flora and Fauna, Canberra unter der Federführung des Executive Editors D.W. Walton, setzt diese inzwischen sehr bekannte Reihe als 6. Band fort. Kompetente Spezialisten dokumentieren hier den Artenbestand der merolimnischen Insektengruppen auf dem australischen Kontinent. Die beschriebenen Gattungen und Arten werden mit detaillierten Literaturzitaten belegt, angefügt sind großräumige Verbreitungsangaben und Habitatzuordnungen. Die vorangestellte Einführung in die jeweiligen Familien geht auf den äußeren Bau der Imagines wie der Larven sowie auf systematische wie zoogeographische Aspekte ein. Jede der hier behandelten Ordnungen wird abrißhaft vorgestellt, wobei der Hauptaugenmerk auf der Bearbeitung der australischen Arten und deren chronologische Entwicklung verständlicherweise liegt. Die diesem einführenden Kapitel angehängte Literaturliste zeigt den herausragenden Bearbeitungsstand dieser Insektengruppen. Die Suche nach taxonomischen Einheiten wird durch den Index deutlich erleichtert. Für jeden Bearbeiter, auch den, der sich nicht nur auf australische Arten der 5 hier behandelten Tiergruppen beschränkt, stellt dieser Katalog eine unentbehrliche Hilfe dar.

E.-G. Burmeister

21. Humberg, B.: Unterwasserführer Europäischer Binnengewässer. - Verlag S. Nagelschmid, Stuttgart, 1994. 198 S.

In die inzwischen stark angewachsene Zahl von Führern zur Fauna und Flora der Binnengewässer reiht sich dieses neu konzipierte Büchlein ein, das jedoch auf Grund des Umschlagbildes einen falschen Eindruck erweckt. Ein Gerätetaucher über einem Algenrasen in einer Seenflachwasserzone ist kaum geeignet, die Lebensgemeinschaft zu analysieren und auch das Accessoir der Unterwasserkamera ist nicht geeignet, eine Analyse mit Determination der Organismen in den möglichen Bereich zu rücken. Vielmehr wirkt dies wie ein Hobbytaucher, der sich aus dem marinen Bereich in das Süßwasser verirrt hat. Davon unbeeinflußt sind die guten makroskopischen Fotos der Mitglieder der Lebensgemeinschaft. Diese jedoch sind leider in Unkenntnis der zur Bestimmung wesentlichen Differentialdiagnose in untypischer 'Pose' oder nur als Detailbild wiedergegeben. Determinationen sind an Hand der guten Abbildungen nicht möglich, auch fehlen Hinweise zur Artenfülle der durch Einzeltiere vorgestellten Tier- und Pflanzengruppen und deren Verwechslungsmöglichkeiten. Auch hier wird die Sucht nach Wissenschaftlichkeit befriedigt durch die den Bildern beigefügten Artnamen, die jedoch besonders bei den Wirbellosen nicht zuzuordnen und damit überflüssig sind. Unkritisch werden bei Insekten auch Larven abgebildet (S. 141) ohne entsprechenden Kommentar. Offensichtlich sind dem Autor die taxonomischen Kriterien der abgebildeten Individuen einer Art nicht bekannt (s. Gastropoda). Den Fotos sind kurze Begleittexte zugeordnet, die Abbildungen für die Habitatangabe, ein Schema der Vegetationsgürtel von stehenden Gewässern, ist vollkommen unbrauchbar und zeugt vom Mangel an ökologischer Kenntnis, da auch Fließwasserarten hier mit Pfeilen eingegliedert werden. Hier bei den Tiefenangaben zeigt sich die Priorität des Tauchers, biologische Fakten wurden hintangestellt. Die Einführung mit den Kriterien der Gewässergüte sind erfreulich kurz gehalten ebenso wie die Beschreibungen der einzelnen Tier- und Pflanzengruppen. Das Buch lebt durch die Abbildungen, deren Auswahl nicht immer verständlich ist, mehr Sorgfalt bei der Textgestaltung hätten ihm gut getan. Ein Bestimmungsbuch, wie textlich herausgestellt, ist es sicher nicht.

E.-G. Burmeister

22. Wolff, W. J., van der Land, J., Nienhuis, P. H. & P. A. W. J. de Wilde (ed.): Ecological Studies in the Coastal Waters of Mauretania. - Kluwer Academic Publishers, Dordrecht/Boston/London, 1993. 222 S.

Dieser Symposiumsband, der vom 25.-27.März 1991 in Leiden abgehaltenen Tagung gleichen Titels, enthält neben der Einführung in das Thema durch die Herausgeber 18 Fachbeiträge zur Ökologie der Küstenbereiche Mauretaniens vor allem der Bucht zwischen Cap Blanc bei Nouadhibou und dem Cap Timiris. In dieser Bucht liegt auch die besonders interessante Flachwasserzone der Banc d'Arguin mit ihren besonderen marinbiologischen Bedingungen. So werden in den Beiträgen, die die Zusammenarbeit der Behörden Mauretaniens und den wissenschaftlichen Instituten in den Niederlanden dokumentieren, die abiotischen Faktoren , die Wachstumsbedingungen von Pflanzen und besiedelnden Krabben in der Gezeitenzone, die Verteilung der Schwammarten, die Verbreitungsbilder pelagischer und benthischer Flagellaten und anderer Zooplankter behandelt. Hinzu kommen ökologische Darstellungen zur Biomasse des Makrobenthos in der Niedrigwasserzone, Fangauswertungen der Schleppnetzfischerei, Nahrungspräferenzen eines dominanten Fisches (Mugil cephalus), Verbreitung von Jungfischen im küstennahen Bereich besonders der vorgelagerten Bank, die Seevogelfauna des Gebietes und abschließend eine zusammenfassende Ökosystemstudie des gesamten Bucht. Eine umfangreiche Studie befaßt sich mit der Analyse von Schwermetallkonzentrationen im Sediment, Zooplankton und Makrozoobenthos, vor allem Krebse und eine Muschelart in diesem wenig anthropogen beeinflußten Areal. Für jeden Fachbiologen und Ökologen enthält diese Zusammenfassung wertvolle Daten. Der überzogene Preis grenzt jedoch den Leserkreis entscheidend ein.

E.-G. Burmeister

SPIXIANA	18	2	123–144	München, 01. Juli 1995	ISSN 0341-8391

The Coccinellidae (excluding Epilachninae) collected by J. Klapperich in 1977 on Taiwan

(Insecta, Coleoptera)

By **Yu Guoyue**

Yu, G. (1995): The Coccinellidae (excluding Epilachninae) collected by J. Klapperich in 1977 on Taiwan (Insecta, Coleoptera). – Spixiana **18/2**: 123-144

82 species of Coccinellidae (excluding Epilachninae) are enumerated from Taiwan. Among them 9 species are new records for Taiwan and the following 10 species are described as new: *Sticholotis linguiformis, Stethorus klapperichi, S. muriculatus, Scymnus grammicus, S. bifurcatus, S. phylloides, S. novenus, S. petalinus, S. bistortus, Cryptogonus robustus.*

Yu Guoyue, Laboratory of Insect Ecology, South China Agricultural University, Guangzhou, P. R. China

Present address: Institute of Plant & Environmental Protection, Beijing Academy of Agricultural & Forestry Science, Beijing 100081, P. R. China

Introduction

156 species of Coccinellidae have been recorded from Taiwan (Sasaji 1988, 1991), and recently Yu & Pang (1992a,b) described additional three new species from Taiwan, but there are still many more species undescribed or unrecorded. The present paper is a list of the specimens of the family Coccinellidae (excluding subfamily Epilachninae) collected in Taiwan by J. Klapperich during 1977. This collection is fairly rich and contains more than 1.500 individuals. 82 species have been identified, of which 10 are new to science (another 5 have or will be published elsewhere) and 9 (labelled with *) are new records for Taiwan. The specimens (including types) will be preserved in Zoologische Staatssammlung München, Germany (ZSM) and South China Agricultural University, Guangzhou, China (SCAU).

Before going further, I wish to acknowledge my gratitude to Prof. H. Fürsch of Passau University, cooperator of ZSM, who kindly gave me the opportunity to examine the valuable material, and I also wish to express my cordial thanks to Prof. Pang Xiongfei for his constant guidance and encouragement to my study.

Subfamily Sticholotidinae

1. *Microserangium okinawense* Miyatake, 1961

Specimens examined: 1♂, 1♀, 2-V-1977, Shanmei (600 m).
Distribution: Taiwan; Ryukyus.

2. *Serangium japonicum* Chapin, 1940

Specimen examined: 1♀, 3-IV-1977, Taipei (30 m).
Distribution: Taiwan, Shaanxi, Zhejiang, Fujian, Guangdong, Guangxi, Yunnan; Japan, Korea.

3. *Shirozuella mirabilis* Sasaji, 1967

Specimens examined: 2♂♂, 10-VI-1977, Alishan (2.400 m).
Distribution: Taiwan.

4. *Shirozuella appendiculata* Yu & Pang, 1992

Specimens examined: 1♂, 28-IV-1977; 1♂, 7-VI-1977, both from Alishan (2.400 m).
Distribution: Taiwan.

5. *Shirozuella alishanensis* Yu & Pang, 1992

Specimen examined: 1♂, 10-VI-1977, Alishan (2.400 m).
Distribution: Taiwan.

6. *Nesolotis shirozui* Sasaji, 1967

Specimen examined: 1♀, 14-V-1977, Fenchihu (1.400 m).
Distribution: Taiwan.

7. *Sticholotis morimotoi* Kamiya, 1965

Specimens examined: 1♂, 2♀♀, 15-IV-1977; 3♀♀, 30-IV-1977; 4 exs., 13-VI-1977; 2 exs., 8-V-1977; 1♀, 14-V-1977; 2 exs., 23-IV-1977, all from Fenchihu (1.400 m).
Distribution: Taiwan; Ryukyus.

8. *Sticholotis linguiformis*, spec. nov.

Fig. 1

Types. Holotype: ♂, No. 920402-1, 2-V-1977, Shanmei (600 m), Taiwan, J. Klapperich leg. (ZSM). - Allotype: ♀, 23-III-1989, Chebaling (Shixing County), Guangdong, Yu Guoyue leg. (SCAU).

Description

Body length: 2.0-2.26 mm, width: 1.76-1.82.

Body short, oval, strongly convex with whitish pubescence. Head brown with black eyes; pronotum yellowish-brown; elytra brown with four pairs of brown spots: one pair at base, situated on calli, connected with elytral base; one pair at disc, situated at ⅖ elytral length, the diameter of the spot about as wide as its distance to suture; one pair near middle of elytral length; one pair at suture, confluent, situated at ¾ of elytral length. Underside including legs yellowish-brown. Colouration slightly darker in female.

Interocular distance of frons about ⅗ width of head; interocular margins posteriorly distinctly divergent. Dorsal surface with relatively fine punctures, separated by about their diameter. Prosternal carinae distinct, anteriorly divergent, anterior margin distinctly carinate. Postcoxal line incomplete, nearly extending to hind margin of 1st abdominal segment, with a few coarse punctures at inner corner. Hind margin of segments V and VI in male distinctly emarginate, in female rounded.

Male genitalia. Sipho without inner process of siphonal capsule. Tegmen stout. Basal piece of tegmen dorsally produced in a long process, but distinctly shorter than median strut. Median piece widest at base, narrowing gently to apex in lateral aspect, distinctly longer than lateral lobes. Median piece in basal half nearly parallel, then divergent apically with a widely rounded tip in ventral aspect.

Hemisternite as figured.

Remarks. The new species is similar to *S. vietnamicus* Hoang, 1982 in colouration, but the latter has the discal spots connected with each other, its siphonal capsule is developed, and the median piece narrows gently to a pointed tip.

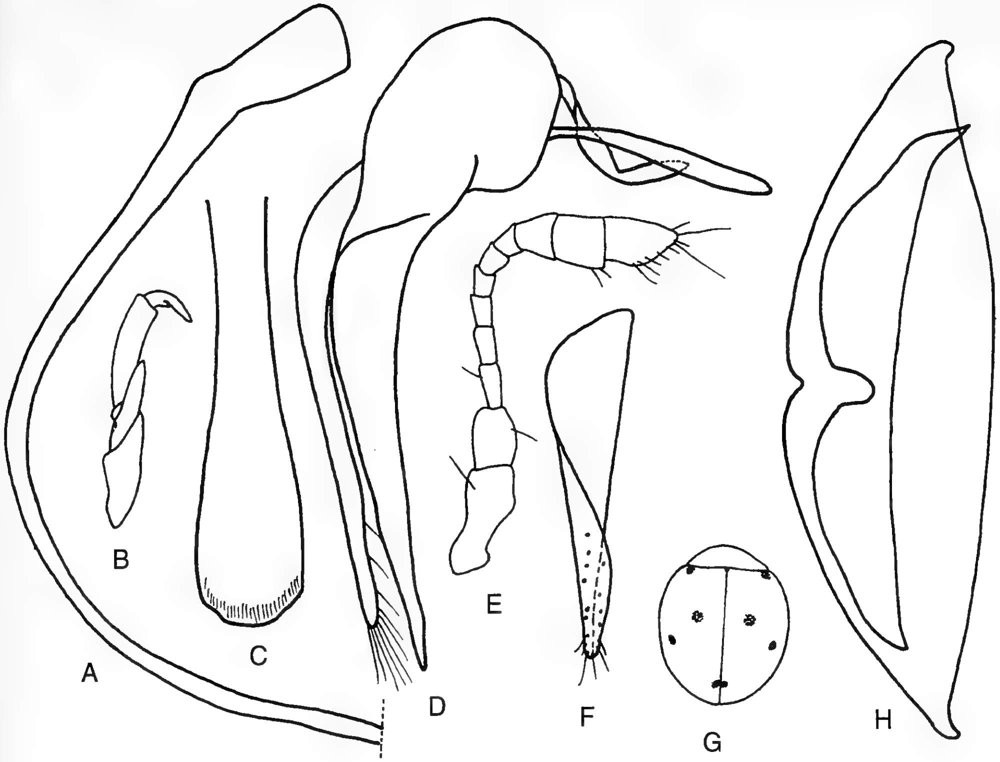


Fig. 1. *Sticholotis linguiformis*, spec. nov. A. Sipho (without apex); B. Tarsus; C. Median piece, ventral aspect; D. Tegmen, lateral aspect; E. Antenna; F. Hemisternite; G. Outline of the body; H. Fifth and sixth abdominal segment of ♂.

9. *Jauravia limbata* Motschulsky, 1858

Specimens examined: 2♀♀, 3-IV-1977; 1♂, 2♀♀, 23-IV-1977; 1♀, 30-IV-1977; 1♀, 19-V-1977; 1♂, 25-V-1977; 1 ex., 14-V-1977; all from Fenchihu (1.400 m).

Distribution: Taiwan, Yunnan; India, Sri Lanka, Nepal, Thailand.

Subfamily Scymninae

* 10. *Stethorus aptus* Kapur, 1948

Specimens examined: 1♂, 2-V-1977, Shanmei (600 m); 1♀, 23-V-1977, Shanmei (600 m); 1♀, 10-IV-1977, Fenchihu (1.400 m); 2♀♀, 15-IV-1977, Fenchihu (1.400 m); 1♀, 3-IV-1977, Taipei (30 m); 1♀, 5-IV-1977, Wulai (Tapei, 200 m).

Distribution: Zhejiang, Fujian, Guangdong, Guangxi, Taiwan; Japan, Malaysia.

11. *Stethorus klapperichi*, spec. nov.
Fig. 2

Types. Holotype: ♂, No. 920421 (10-VI-1977, Fenchihu (1.400 m), Taiwan). - Allotype: ♀ (same data as holotype). - Paratypes: 2♂♂, 10-VI-1977; 2♂♂, 28-IV-1977, all from Fenchihu (1.400 m). All types are deposited in ZSM except one paratype in SCAU.

Description

Body length: 1.35-1.47, width: 1.0-1.12 mm, L/W: 1.30-1.35.

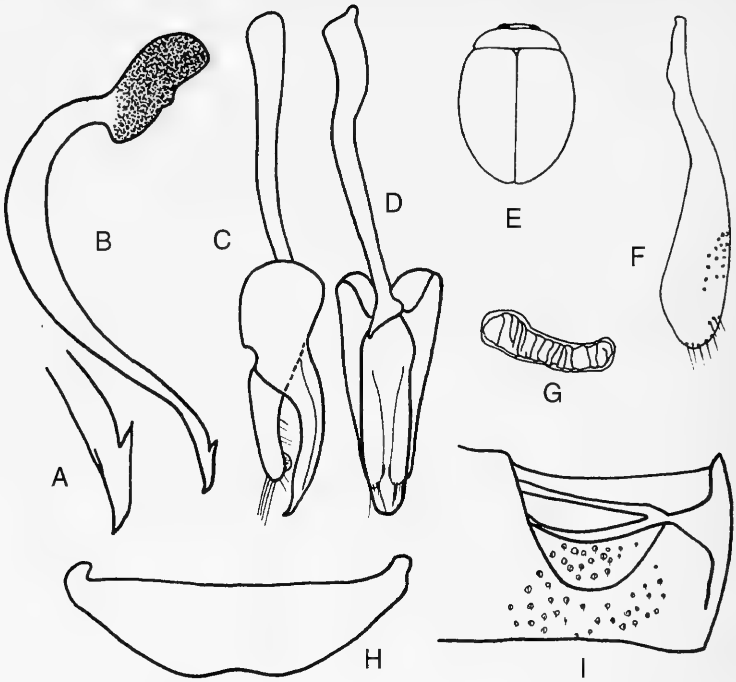


Fig. 2. *Stethorus klapperichi*, spec. nov. A. Apex of sipho; B. Sipho; C. Tegmen, lateral aspect; D. ditto, ventral aspect; E. Outline of the body; F. Hemisternite; G. Receptaculum semnis; H. Fifth abdominal segment of ♂; I. First abdominal segment.

Body oval, with sides moderately arcuate in dorsal aspect. Dorsum moderately convex with dense yellowish-white pubescence. Body black, but eyes, antennae, mouthparts and legs brown. Interocular distance about $^{3}/_{7}$ width of head; interocular margins nearly parallel in front view, slightly divergent posteriorly. Elytral punctures similar to those of pronotum, separated by about their diameter. Postcoxal line complete, extending to a little more than half of length of 1st abdomional segment; area surrounded by the line with more than 10 coarse puntures. Hind margin of segment VI distinctly emarginate in male.

Male genitalia. Sipho short and stout, siphonal capsule distinct and developed, black in colouration, consisting of a strongly flattened outer process and a very short, indistinct inner process. Apical part of sipho hook-shaped. Tegmen also stout, median piece nearly parallel at basal $^{4}/_{5}$ in ventral aspect; apical part of the median piece curved tergally in lateral aspect. Lateral lobes distinctly shorter than median piece with very fine setae at inner surface; preapex of lateral lobes with a distinct expansion at inner surface; basal piece of tegmen longer than the main part.

Female genitalia as figured.

Remarks. The new species resembles *S. yezoensis* Miyatake, 1966 and *S. binchuanensis* Pang & Mao, 1975 in the structure of the sipho and the postcoxal line, but is easily separated from them by abdominal segment VI of male with distinctly emarginate hind margin and lateral lobes of the tegmen expanded preapically at their inner surface.

12. *Stethorus muriculatus*, spec. nov.

Fig. 3

Types. Holotype: ♂, No. 920423, (13-VI-1977, Fenchihu (1.400 m), Taiwan). - Allotype: ♀ (same data as holotype). - Paratypes: 1♂, 4♀♀, 13-VI-1977; 1♂, 1♀, 9-IV-1977; 1♀, 10-IV-1977; 1♀, 15-IV-1977; 1♂, 23-IV-1977; 1♂, 30-IV-1977; 1♀, 10-V-1977; 1♂, 3♀♀, 14-V-1977; 1♀, 19-V-1977; 1♂, 3♀♀, 30-V-1977; 1♀, 7-VI-1977, all from Fenchihu (1.400 m); 1♂, 1♀, 28-IV-1977, 3♂♂, 3♀♀, 10-VI-1977, both from Alishan (2.400 m), 2♀♀, 5-IV-1977, Wulai (Taipei, 200 m). All types are deposited in ZSM, but 8 paratypes in SCAU.

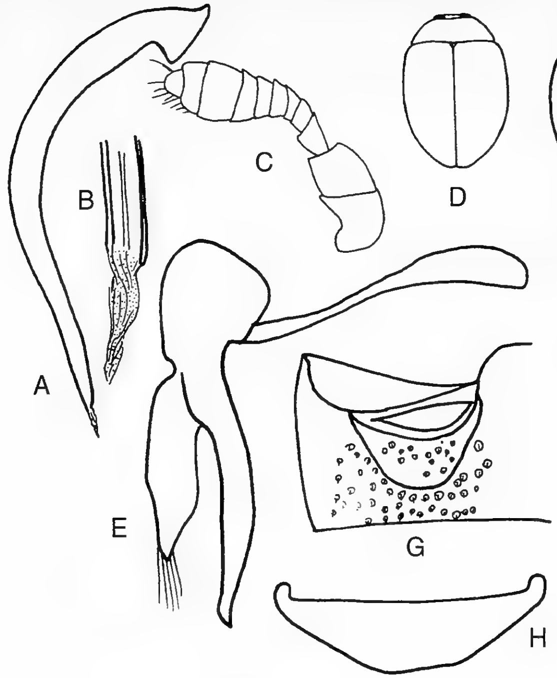


Fig. 3. *Stethorus muriculatus*, spec. nov. A. Sipho; B. Apex of sipho; C. Antenna; D. Outline of the body; E. Tegmen, lateral aspect; F. ditto, ventral aspect; G. First abdominal segment; H. Sixth abdominal segment of ♂; I. Hemisternite.

Description

Body length: 1.32-1.52 mm, width: 0.85-1.0 mm, L/W: 1.52-1.55.

Body small, elongately oval with relatively weakly arcuate sides, about 1.5 times as long as wide, dorsum moderately convex. Body overall black, but eyes, mouthparts, antennae, tibiae and tarsi dark brown.

Interocular distance about ½ width of head; interocular margins of head divergent posteriorly; punctures on frons sparse, finer than facets. Pronotal punctures fine on disc, coarser on lateral part; elytral punctures coarser and sparser than pronotal ones. Postcoxal line complete, rather widely rounded, extending to 3/5 of length of 1st abdominal segment; area surrounded by the line with more than 10 strong punctures, narrowly smooth along the line. Apical margin of segment VI substruncate or very slightly emarginate in male.

Male genitalia. Sipho relatively short, very stout, nearly as long as tegmen including the median strut, very weakly curved through entire length; siphonal capsule undeveloped, without distinct inner and outer process. Siphonal apex with a small nodle-like projection. Tegmen fairly stout, median piece of tegmen moderately broad, widest at base, about 3 × as long as wide in middle, gently narrowing apically with a pointed tip in ventral aspect. Lateral lobes distinctly shorter than median piece, nearly parallel at basal 2/3, then distinctly narrowing.

Hemisternite of female genitalia as figured.

Remarks. The new species resembles *S. yezoensis* Miyatake, 1966, but differs from the latter by apex of sipho without a hook-like projection and lateral lobes with sides parallel at basal half and narrowing distinctly at apical half. It also resembles *S. chengi* Sasaji, 1968, but the latter has a siphonal capsule with a semicircular flattened outer process and extremely slender and linear hemisternites.

13. *Stethorus* sp.

Specimen examined: 1♀, 3-IV-1977, Taipei (30 m).

Remarks. The species is very small (length: 0.94 mm, width: 0.79 mm), and lateral sides of body narrow distinctly to apex of elytra.

* 14. *Diomus brunsuturalis* Pang & Gordon, 1986

Diomus brachsiphonus Pang & Huang, 1986 **(syn. nov.)**

Specimens examined: 1♂, 2♀♀, 3-IV-1977, Taipei (30 m); 1♀, 5-IV-1977, Wulai (Taipei, 200 m).
Distribution: Hainan, Fujian, Guangdong, Taiwan, Sichuan; Vietnam.

Remarks. The four examined specimens are variable in colouration, from entirely brown to a black triangular marking at base of elytra, to black elytra with brown apex. I examined the holotype of *brachsiphonus* and found that the punctures in the median part are coarse and distinct.

15. *Keiscymnus securiformis* Yu & Pang, 1992

Specimen examined: 1♂, 10-VI-1977, Fenchihu (1.400 m).
Distribution: Taiwan.

* 16. *Nephus (Nephus) dilepismoides* Pang & Pu, 1988

Specimens examined: 2♂♂, 3♀♀, 4-III-1977, Taipei (30 m).
Distribution: Guangxi, Taiwan.

Remarks. The examined specimens have relatively wide apex of sipho, as compared with the types.

* 17. *Nephus (Nephus) quadrimaculatus* (Herbst, 1783)

Specimen examined: 1♂, 10-VI-1977, Alishan (2.400 m).
Distribution: Taiwan, Palaearctic Region.

18. *Nephus (Sidis) tagiapatus* (Kamiya, 1965)

Specimen examined: 1♀, 3-IV-1977, Taipei (30 m).
Distribution: Taiwan, Guangdong; Ryukyus, Thailand, Malaysia, India.

19. *Nephus* sp.

Specimen examined: 1♀, 30-IV-1977, Fenchihu (1.400 m).

20. *Axinoscymnus beneficus* Kamiya, 1963

Specimen examined: 1♂, 15-IV-1977, Fenchihu (1.400 m).
Distribution: Hainan, Guangdong, Taiwan; Japan

21. *Axinoscymnus* sp.

Specimen examined: 1♀, 5-IV-1977, Wulai (Taipei, 200 m).

Remarks. The specimen is small in size and brown in colouration.

* 22. *Pseudoscymnus sylvaticus* (Lewis, 1896)

Specimens examined: 3♂♂, 4♀♀, 15-IV-1977; 3♂♂, 2♀♀, 23-IV-1977; 1♀, 30-IV-1977; 2♂♂, 1♀, 8-V-1977; 1♀, 14-V-1977; 2♀♀, 25-V-1977; 1♂, 7-VI-1977; 1♂, 1♀, 13-VI-1977, all from Fenchihu (1.400 m).
Distribution: Taiwan; Japan, Korea.

23. *Pseudoscymnus nagasakiensis* (Kamiya, 1961)

Specimens examined: 1♂, 3-IV-1977, Taipei (30 m); 3♀♀, 2-V-1977; 2♀♀, 23-V-1977, both from Shanmei (600 m).
Distribution: Taiwan; Japan.

24. *Pseudoscymnus fulvihumerus* Yang & Wu, 1972

Specimens examined: 1♂, 1♀, 2-V-1977, Shanmei (600 m).
Distribution: Taiwan.

25. *Pseudoscymnus fuscus* Yang, 1971

Specimens examined: 3♂♂, 1♀, 10-VI-1977, Alishan (2.400 m).
Distribution: Taiwan.

26. *Pseudoscymnus changi* Yang, 1971

Specimen examined: 1♂, 19-V-1977, Fenchihu (1.400 m).
Distribution: Taiwan.

27. *Pseudoscymnus orbiculatus* Yang, 1971

Specimens examined: 1♂, 28-IV-1977; 1♂, 1♀, 10-VI-1977, all from Alishan (2.400 m).
Distribution: Taiwan.

28. *Pseudoscymnus anmashanus* Yang, 1971

Specimens examined: 2♂♂, 1♀, 10-VI-1977, Alishan (2.400 m).
Distribution: Taiwan.

29. *Pseudoscymnus quinquepunctatus* (Weise, 1923)

Specimens examined: 1♀, 30-IV-1977; 1♂, 19-V-1977, 1♀, 3-VI-1977, all from Fenchihu (1.400 m); 1♂, 6-V-1977, Yangmingshan-Gebirge (Taipei); 1♀, 5-IV-1977, Wulai (Taipei, 200 m).
Distribution: Taiwan; Ryukyus.

30. *Pseudoscymnus kurohime* (Miyatake, 1959)

Specimens examined: 1♂, 30-IV-1977, Wulai (Taipei, 200 m); 1♂, 6-V-1977, Yangmingshan-Gebirge (Taipei).
Distribution: Taiwan, Fujian, Guangdong, Guangxi, Guizhou, Yunnan; Japan, Vietnam.

31. *Pseudoscymnus hareja* (Weise, 1879)

Specimen examined: 1♀, 23-IV-1977, Fenchihu (1.400 m).
Distribution: Taiwan; Japan.

32. *Scymnus (Scymnus) grammicus*, spec. nov.

Fig. 4

Types. Holotype: ♂, No. 910515-1, Taiwan (Fenchihu), 14-V-1977, J. Klapperich (deposited in ZSM).

Description

Length: 2.47 mm, width: 1.53 mm.

Body elongate, oval, moderately convex with yellowish-white pubescence. Head brown with grey eyes; pronotum brown; scutellum black; elytra black with apical ⅕ brown; venter brown with black pterothorax.

Interocular margins arcuate, anteriorly convergent, separated by less than ½ width of head; head large, about ¾ width of pronotum, with large mandible; puncturation on head irregular, coarser than facets, denser along the eyes, on median part of frons punctures separated by their diameter. Anterior margin of pronotum slightly concave, anterior corners nearly rectangular, posterior ones relatively round; punctures similar to those on head in size, separated by half their diameter. Scutellum wider than long. Elytra with distinct calli, punctures coarser and sparser than those on pronotum, separated by about their diameter. Prosternum with broad intercoxal carinae, extending to anterior margin, slightly convergent anteriorly, length about 2 × width at base. Postcoxal line incomplete, extending to ¾ length of 1st abdominal segment; area surrounded by the line finely punctured, smooth along the line; punctures on the middle of segment I-III coarser than on lateral parts. Hind margins of segments V-VI slightly and widely emarginate in male.

Male genitalia. Sipho moderately stout and long, with short outer process and long inner one of siphonal capsule; basal half of sipho strongly curved, semicircular; apex of sipho long thread-like, without any appendix. Tegmen stout; lateral lobes distinctly longer than median piece, broad in lateral aspect; median piece boat-shaped, with a pointed tip, in ventral aspect widest at middle.

Remarks. There are several species of *Scymnus* with long sipho occurring in the Oriental region, e.g. *Scymnus (Scymnus) longmenicus* Pang, 1986, *S. (Pullus) tenuis* Yang, 1978, and *S. (P.) longisiphonatus* Hoang, 1982. However, this new species can be easily separated from the latter two by the boat-like median piece, incomplete postcoxal line and broad separated prosternal carinae.

33. *Scymnus (Scymnus) bifurcatus*, spec. nov.

Fig. 5

Types. Holotype: ♂, No. 910515-2, Taiwan (Fenchihu), 7-VI-1977 (ZSM). - Allotype: ♀, same data as holotype (ZSM.). - Paratypes: 1♂, same data as holotype (ZSM); 3♀♀, 9-IV-1977 (ZSM); 1♂, 1♀, 10-IV-1977 (ZSM); 1♂, 3♀♀, 23-IV-1977 (ZSM); 1♀, 30-IV-1977 (ZSM); 3♂♂, 5♀♀, 10-V-1977 (SCAU); 5♂♂, 6♀♀, 25-V-1977 (ZSM); 1♂, 30-V-1977 (SCAU); 1♀, 3-VI-1977 (SCAU); 8♀♀, 13-VI-1977 (ZSM), all from Fenchihu (1.400 m); 1♀, 2-V-1977, Shanmei (600 m) (SCAU).

Description

Length: 2.0-2.65 mm, width: 1.35-1.94 mm.

Body oval, moderately convex with yellowish-white pubescence, weakly S-shaped arranged on elytra. Head brown in male, black in female, both with black eyes; pronotum brown with a large black mark at base; scutellum dark brown, elytra black with posterior ⅐ brown; prosternum brown; meso- and metasternum black; abdomen brown with central part of base brown; legs brown.

Interocular margins slightly incurvate, separated by half of width of head; puncturation on head coarse, larger than facets, punctures separated by half their diameter. Pronotum with anterior and posterior corners round, but the latter more widely round; pronotal punctures similar to those on head in size, separated by about their diameter. Scutellum triangular, wider than long. Elytra distinctly wider than pronotum, with indistinct calli; elytral punctures coarser than those on pronotum, separated by 0.5-1.0 of their diameter. Prosternal carinae narrow, distinctly constricted in basal half, almost parallel in anterior half, length about 3.5 × width at base. Postcoxal line complete, extending to ⅚ of length of 1st abdominal segment; area surrounded by the line irregularly punctured in anterior half, smooth along the line; punctures on median part of this segment smaller than on lateral parts. Hind margin of segments V-VI straight in male, round in female.

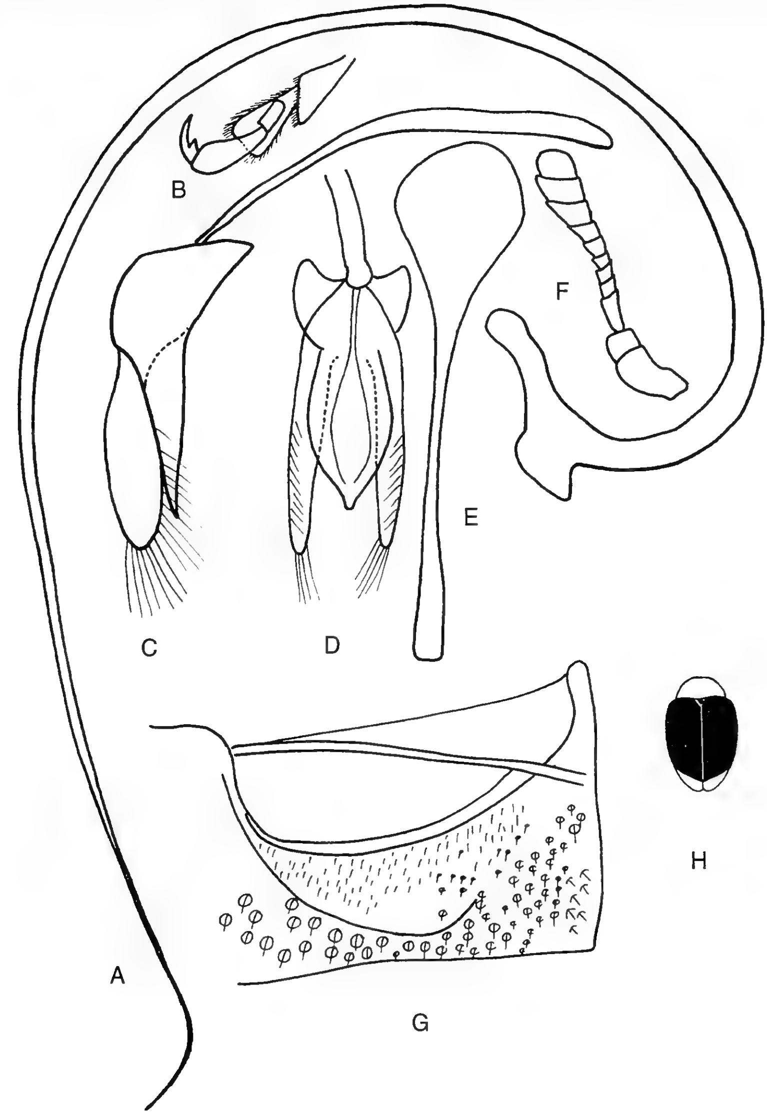


Fig. 4. *Scymnus (Scymnus) grammicus*, spec. nov. A. Sipho; B. Tarsus; C. Tegmen, lateral aspect; D. ditto, ventral aspect; E. Ninth sternite of ♂; F. Antenna; G. First abdominal segment; H. Outline of the body.

Male genitalia. Sipho stout with indistinct outer process and long inner one of siphonal capsule; apical 1/3 of sipho slightly swollen; apex of sipho scleroidly bifid, surrounded by a membrane. Tegmen stout with distinctly longer lateral lobes; lateral lobes broad in lateral aspect; median piece tapering to tip in lateral view with widest part near base in ventral aspect.

Remarks. This new species resembles *Scymnus (Scymnus) tsushimaensis* Sasaji, 1970, but the latter differs in: 1. apex of sipho with short membranous hook, without sclerotized part; 2). hind margin of V in male relatively distinctly emarginate; 3. pronotum black with narrow anterior margin and lateral portions reddish-brown; 4. median piece relatively narrow in ventral aspect.

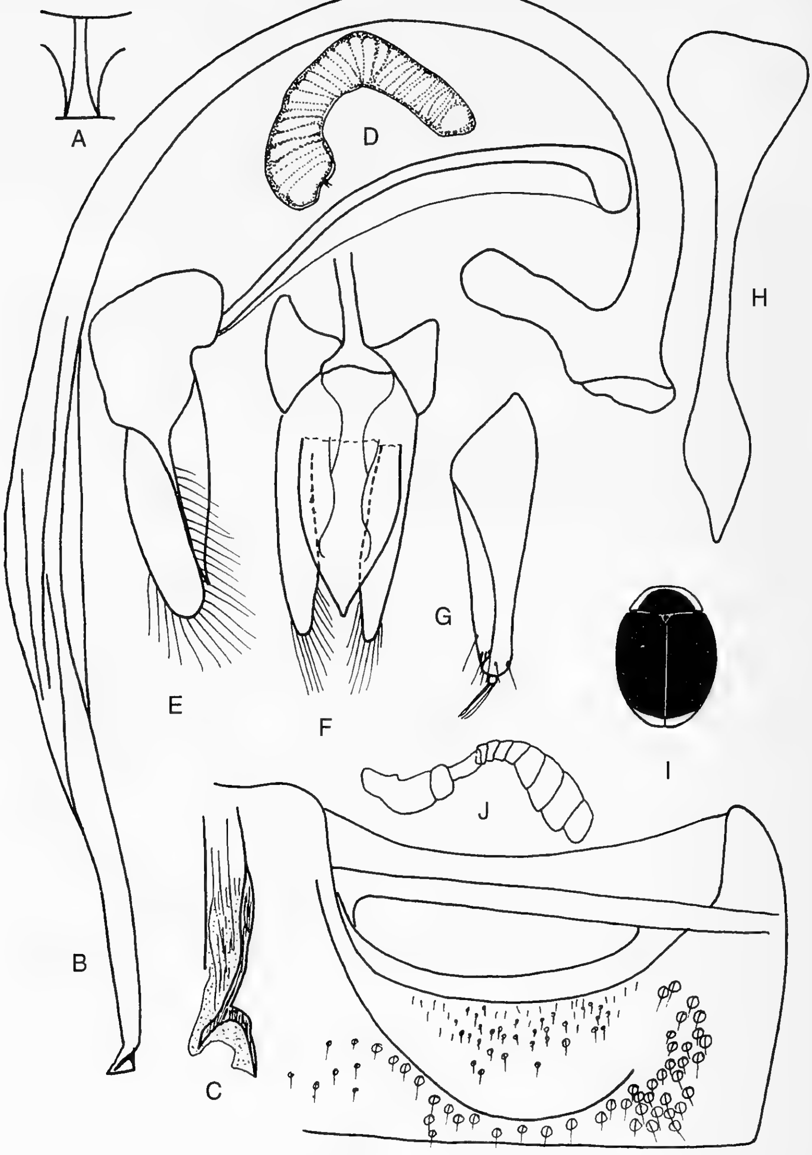


Fig. 5. *Scymnus (Scymnus) bifurcatus*, spec. nov. A. Median part of prosternum; B. Sipho; C. Apex of sipho; D. Receptaculum seminis; E. Tegmen, lateral aspect; F. ditto, ventral aspect; G. Hemisternite; H. 9th sternite of ♂; I. Outline of body; J. Antenna; K. First abdominal segment.

34. *Scymnus (Pullus) perdere* Yang, 1978

Scymnus (Pullus) nepenthus Pang & Huang, 1985: 32.

Specimens examined: 154 exs., 9-IV/13-VI-1977, all from Fenchilu (1.400 m).
Distribution: Taiwan, Fujian, Guangdong, Zhejiang.

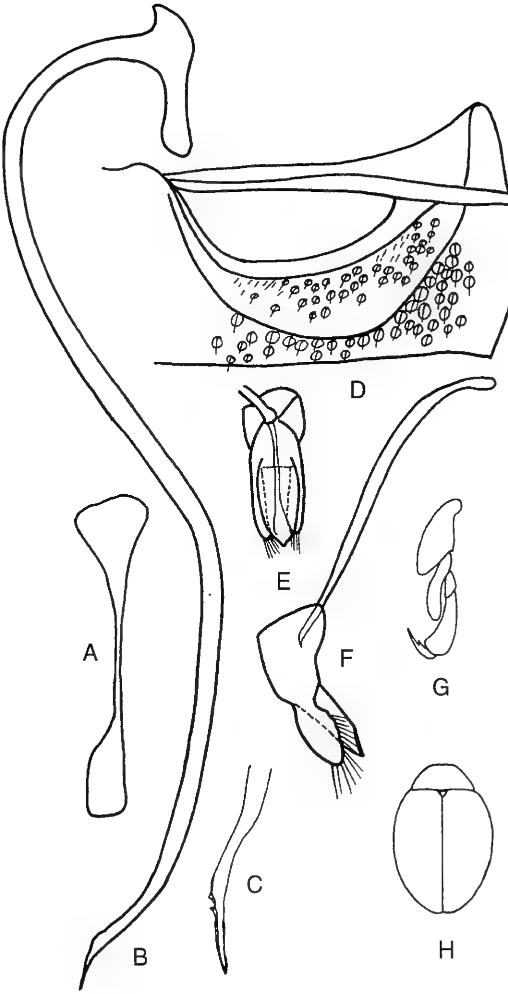


Fig. 6. *Scymnus (Pullus) phylloides*, spec. nov. A. Ninth sternite of ♂; B. Sipho; C. Apex of sipho; D. First abdominal segment; E. Tegmen, ventral aspect; F. ditto, lateral aspect; G. Tarsus; H. Outline of the body.

35. *Scymnus (Pullus) phylloides*, spec. nov.

Fig. 6

Types. Holotype; ♂, No. 910523-2, Taiwan (Fenchihu), 3-VI-1977, J. Klapperich (ZSM).

Description

Length: 1.53 mm, width: 1.06 mm.

Body small, oval, moderately convex with yellowish-white pubescence, arranged S-shaped on elytra. Body overall reddish-brown.

Puncturation on head fine, punctures smaller than facets; pronotal punctures similar to those on head, separated by 1-2 × of their diameter; elytral punctures coarse, separated by half of their diameter; elytron with distinct callus, without rows of coarse punctures. Prosternum with carinae, extending to anterior margin, parallel, length about 2 × width at base. Postcoxal line complete, weakly arched, extending to ¾ length of 1st abdominal segment; area surrounded by the line slightly less coarsely punctured, smooth along the line. Hind margin of segment V round, of segment VI straight, slightly emarginate in male.

Male genitalia. Sipho relatively long with short outer process and long inner process of siphonal capsule; apex of sipho simple. Tegmen slender with long trabe; median piece widest at base, tapering gradually in basal ⅔ and then distinctly to tip in lateral aspect, distinctly longer than lateral lobes; lateral lobes widest at middle, narrow at base in lateral aspect.

Remarks. In China several small brown species occur, but the new species can be distinguished from others by its male genitalia, postcoxal line, and coarse facets of eyes.

36. *Scymnus (Pullus) takasago* Kamiya, 1965

Specimens examined: 359 exs., Fenchihu, from IV-VI, 1977.
Distribution: Taiwan.

37. *Scymnus (Pullus)* sp.

Specimens examined: 53 exs., from Fenchihu (1.400 m) during 9-VI/13-VI-1977.

Remarks. This is an undescribed species that will be described elsewhere.

38. *Scymnus (Pullus) pangi* Fürsch, 1989

Scymnus (Nipponopullus) hoocalis Pang & Gordon, 1986: 182.
Scymnus (Pullus) notus Pang & Pu, 1990: 337.

Specimens examined: 5♂♂, 8♀♀, 23-V-1977, Shanmei (600 m).
Distribution: Taiwan, Guangdong, Hainan, Guangxi.

39. *Scymnus (Pullus) centralis* Kamiya, 1965.

Scymnus (Scymnus) prosericatus Pang, 1988: 385.

Specimens examined: 94 exs., Fenchihu, J. Klapperich from 9-IV/13-VI-1977.
Distribution: Taiwan, Guangdong, Hainan. Vietnam.

Remarks. Sasaji (1965) described this species as a member of *Scymnus (Pullus)*, and I examined many examples, of which a few have complete postcoxal line. Moreover, I also examined additional 30 examples from Fenchihu (Taiwan, J. Klapperich, 9-IV/13-VI-1977), which are identical with *S. centralis*, except for colouration (overall brown) and fine punctures on lateral part of 1st abdominal segment. These specimens are tentatively included in this species.

40. *Scymnus (Pullus) novenus*, spec. nov.
Fig. 7

Types. Holotype: ♀, No. 920402-2, 10-VI-1977, Alishan (2.400 m), J. Klapperich leg.

Description

Body length: 2.59 mm, width: 1.65.

Body elongate, oval, moderately convex with yellowish-white pubescence. Body overall brown, but median part of pterothorax dark brown and elytra with 9 black spots: one pair at calli, nearly heart-shaped, connected with basal margin; one discal spot, situated in anterior ⅓ of elytral length, round; one pair near centre of elytra, elongately oval; one pair at lateral margin, situated at about half of length of elytra, not connected with lateral sides of elytra, rhombic; one pair situated near apex of elytra, round.

Dorsal punctures nearly uniform, about the size of facets, separated by about their diameter. Prosternal carinae straight, extending to anterior margin, anteriorly moderately convergent, length

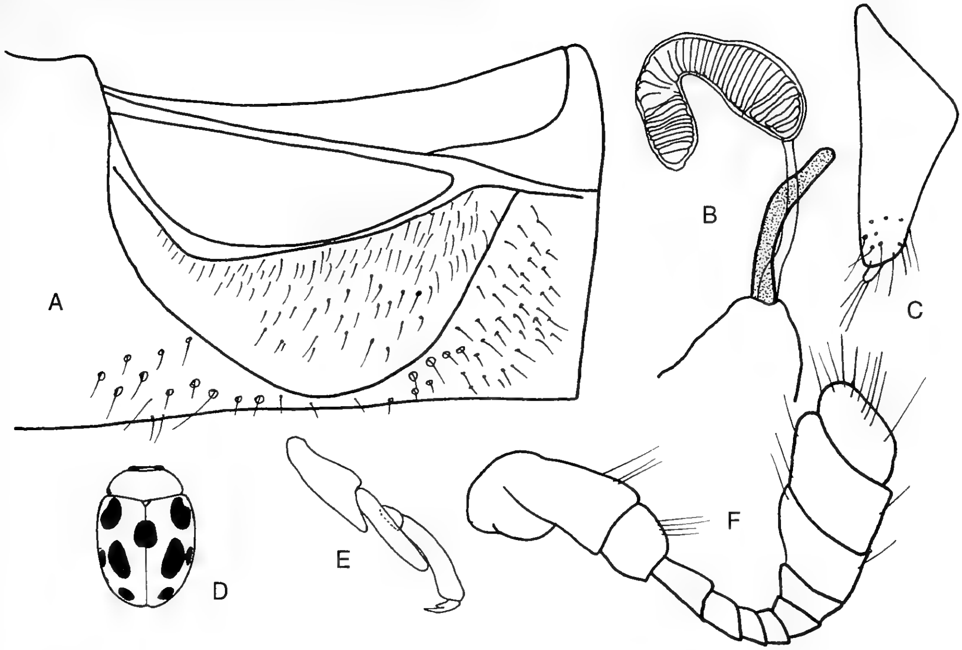


Fig. 7. *Scymnus (Pullus) novenus,* spec. nov. A. First abdominal segment; B. Receptaculum semnis, spermduct and infundibulum; C. Hemisternite; D. Outline of the body; E. Tarsus; F. Antenna.

about 2.5 times of width at base. Postcoxal line complete, extending to hind margin of 1st abdominal segment; area surrounded by the line finely punctured with long setae, narrowly smooth along the line. Apical margins of segments V, VI rounded.

Female genitalia as figured.

Remarks. The colouration of this new species is very peculiar in the genus *Scymnus,* it is therefore easily separable from other species.

41. *Scymnus (Pullus) posticalis* Sicard, 1912

Specimens examined: 2♂♂, 1♀, Taipei, 3-IV-1977; 1♀, Fenchihu, 23-IV-1977; 1♂, 25-V-1977, Fenchihu; 2♂♂, 1♀, Wulai, 5-IV-1977; 3♂♂, 2♀♀, 6-V-1977, Yangmingshan-Gebirge.

Distribution: Shaanxi, Taiwan, Yunnan, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Sichuan; Myanmar (formerly Burma), Japan, Vietnam.

42. *Scymnus (Pullus) sodalis* Weise, 1923

Specimens examined: 75 exs, from Fenchihu (1400 m), Taipei (30 m), Wulai (200 m), Shanmei (600 m) during 3-VI/ 13-VI-1977.

Distribution: Taiwan, Guandong, Fujian, Zhejiang, Jiangsu; Japan, India, Nepal, Vietnam.

43. *Scymnus (Pullus) petalinus,* spec. nov.

Fig. 8

Types. Holotype: ♂, No. 910515-4, Fenchihu (1.400 m), 13-IV-1977, J. Klapperich leg. (ZSM). - Paratypes: 2♀♀, same data as holotype (SCAU, ZSM).

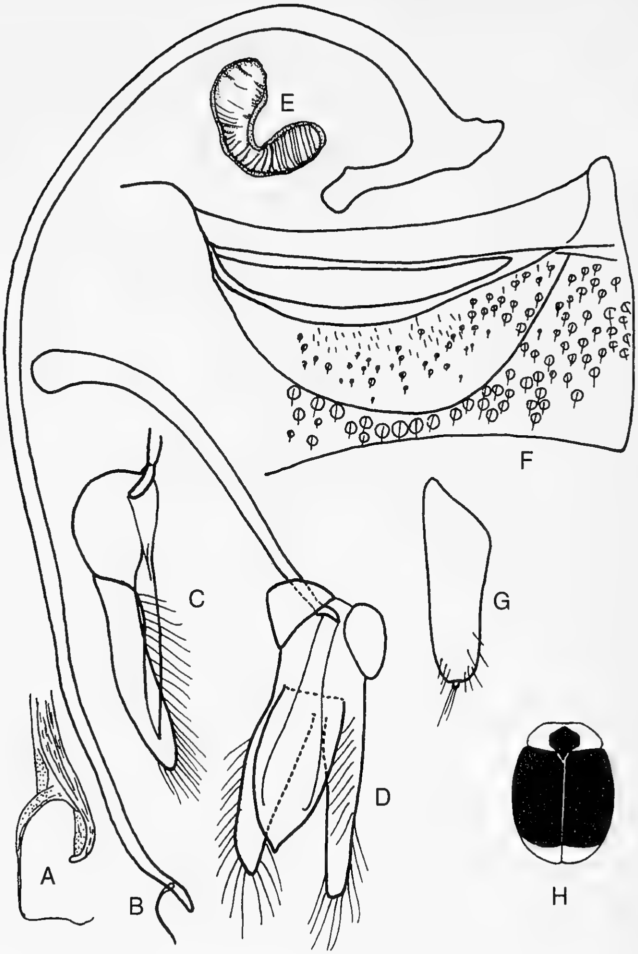


Fig. 8. *Scymnus (Pullus) petalinus*, spec. nov. A. Apex of sipho; B. Sipho; C. Tegmen, lateral aspect; D. ditto, ventral aspect; E. Receptaculum semnis; F. First abdominal segment; G. Hemisternite; H. Outline of the body.

Description

Length: 2.06-2.35 mm, width: 1.47-1.65 mm.

Body oval, moderately convex with yellowish-white pubescence. Head yellowish-brown with grey eyes; pronotum yellowish-brown with a black basal mark; scutellum black; elytra black with posterior $1/4$ yellowish-brown; underside including legs brown except pterothorax black.

Interocular margins slightly arcuate, separated by about $3/5$ of width of head; puncturation on head and pronotum fine and dense, punctures separated by 0.5-1.0 × of their diameter; elytral puctures coarser than those on pronotum, separated by their diameter; elytron with indistinct rows of coarse punctures near suture. Prosternal carinae extending to anterior margin, anteriorly distinctly convergent, length about 2 × width at base. Postcoxal line complete, extending to $4/5$ of length of 1st abdominal segment; area surrounded by the line irrgularly punctured, coarser posteriorly, narrowly smooth along the line; punctures on median part of segments I-II finer than those on lateral parts. Hind margin of segment V nearly straight, slightly rounded in male, rounded in female.

Male genitalia. Sipho moderately slender with indistinct outer process and long inner process of siphonal capsule; apex of sipho slightly curved with a thread-like appendix at outer surface. Tegmen relatively stout; lateral lobes broad, median piece flatted in lateral aspect; median piece shorter than lateral lobes, boat-shaped with a pointed tip in ventral view.

Remarks. There are many species of *Scymnus* that have the apex of sipho with thread-like appendix. The new species resembles *S. (Pullus) sodalis* (Weise, 1923), but can be easily separated from the other species by the flatted median piece of tegmen which is distinctly shorter than the lateral lobes.

44. *Scymnus (Pullus) leo* Yang, 1978

Specimens examined: 1♂, 15-IV-1977; 1♀, 13-VI-1977, both from Fenchihu.
Distribution: Taiwan.

45. *Scymnus (Pullus) bistortus*, spec. nov.
Fig. 9

Types. Holotype: ♂, No. 910522-1, Taiwan (Alishan, 2.400 m), 10-VI-1977, J. Klapperich leg. (ZSM). - Allotype: ♀, same data as holotype (ZSM). - Paratypes: 1♂, 7♀♀, same data as holotype (ZSM); 1♂, 2♀♀, Taiwan (Alishan, 2.400 m), 28-IV-1977 (SCAU).

Description

Length: 1.71-2.29 mm, width: 1.18-1.41 mm.

Body elongately oval, relatively weakly convex with yellowish-white pubescence. Head brown, dark towards vertex with grey eyes; or head black with brown clypeus; pronotum black with antero-lateral corners more or less widely brown, or entirely black; scutellum black; elytra black with less than posterior ¼ brown; venter black or dark-brown.

Interocular margins arcuate, separated by 1.5 × width of eye; puncturation on head slightly coarser than facets, denser along eyes, punctures separated by their diameter at centre of frons. Pronotal punctures similar to those on frons in size, separated by their diameter; elytral punctures much coarser than those on pronotum, separated by half of their diameter, elytron without rows of coarse punctures. Prosternum with intercoxal carinae extending to anterior margin, distinctly convergent anteriorly, length about 2.5 × width at base. Postcoxal line complete, extending to ⅔ of length of 1st abdominal segment; area surrounded by the line irregularly punctured, coarser posteriorly, widely smooth along the line; punctures on median part of segments I-II much smaller than lateral parts. Hind margin of segments V-VI both widely emarginate in male, rounded in female.

Male genitalia. Sipho moderately stout with short outer process and long inner process of siphonal capsule; sipho strongly curved at base; apex of sipho very characteristic, first hooked and then swirled. Tegmen stout with median piece longer than lateral lobes; median piece divergent at base, then convergent and gradually tapering to tip in ventral aspect.

Remarks. This species is easily distinguished from the known species occurring in China by almost entirely black body, almost parallel sides of body, and characteristic male genitalia.

* 46. *Scymnus (Pullus) oestocraerus* Pang & Huang, 1985

Specimens examined: 4♂♂, 5♀♀, 15-IV-1977; 1♂, 1♀, 30-IV-1977; 4♂♂, 5♀♀, 14-V-1977; 1♂, 1♀, 3-VI-1977; 4♂♂, 23-IV-1977; 1♂, 1♀, 8-V-1977; 3♂♂, 4♀♀, 19-V-1977; 1♂, 1♀, 25-V-1977; 1♂, 5♀♀, 13-VI-1977, all from Fenchihu.
Distribution: Fujian, Taiwan; Vietnam.

47. *Scymnus (Pullus) yangi* Yu & Pang, 1993

Scymnus (Pullus) bicolor Yang, 1978: 114 (preoccupied by Philippi, 1854).
Scymnus (Pullus) endocorycus Pang & Huang, 1986: 62.
Scymnus (Pullus) vinhphuensis Hoang, 1982: 152.

Specimens examined: 1♂, 2♀♀, Yangmingshan-Gebirge, 6-V-1977; 1♀, Fenchihu, 13-IV-1977; 1♀, 15-IV-1977; 1♂, Fenchihu, 23-IV-1977; 3♀♀, Fenchihu, 30-IV-1977; 1♀, Fenchihu, 14-V-1977; 4♀♀, Fenchihu, 19-V-1977; 1♀, Fenchihu, 25-V-1977; 1♂, 1♀, Fenchihu, 7-VI-1977.
Distribution: Taiwan, Zhejinag, Fujian, Guangdong, Hainan; Vietnam.

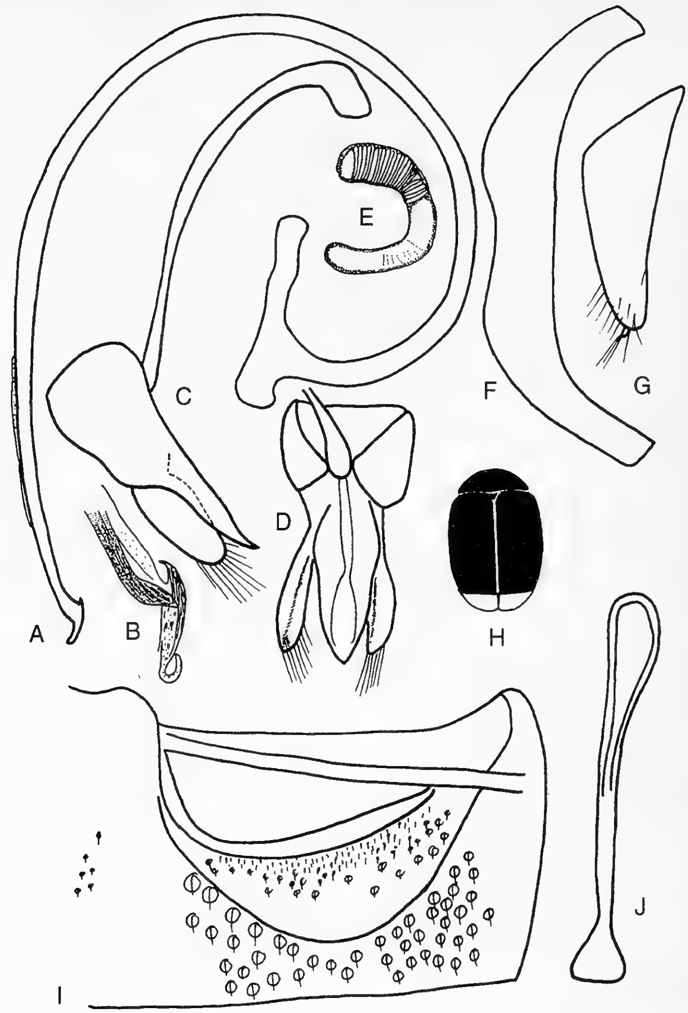


Fig. 9. *Scymnus (Pullus) bistortus*, spec. nov. A. Sipho; B. Apex of sipho; C. Tegmen, lateral aspect; D. ditto, ventral aspect; E. Receptaculum semnis; F. Sixth abdominal segment of ♂; G. Hemisternite; H. Outline of the body; I. First abdominal segment; J. Ninth sternite of ♂.

48. *Scymnus (Pullus) dorcatomoides* Weise, 1879

Specimens examined: 16♂♂, 11♀♀, Alishan, 10-VI-1977, J. Klapperich.
Distribution: Taiwan, Fujian; Japan, Vietnam.

Remarks. The examined specimens are variable in colouration (dark parts of the body might become light) and the length of median piece (from 2/3 to 4/5 of length of lateral lobes).

* 49. *Scymnus (Pullus) klapperichi* Pang & Gordon, 1986

Specimen examined: 1♂, 10-V-1977, Fenchihu (1.400 m).
Distribution: Taiwan, Fujian, Guangxi.

50. *Scymnus (Parapullus) secula* Yang, 1978

Specimens examined: 5♂♂, 9♀♀, Taiwan (Alishan), 10-VI-1977.
Distribution: Taiwan.

51. *Scymnus (Parapullus) alishanensis* Pang & Yu, 1993

Specimens examined: 5♂♂, 1♀, 10-VI-1977, Alishan (2.400 m), J. Klapperich.

Distribution. Taiwan.

52. *Scymnus (Neopullus) brunnescens* Motschulsky, 1866

Specimens examined: 1♀, Taipei, 10-IV-1977; 3♂♂, 2♀♀, 8-V-1977; 2♂♂, 3♀♀, 10-V-1977; 8 exs., 25-V-1977; 2♀♀, 3-VI-1977; 1♂, 1♀, 13-VI-1977, all from Fenchihu.
Distribution: Guangdong, Fujian, Taiwan; Ceylon, India.

Remarks. *Scymnus brunnescens* has been synonymized with *fuscatus* by Sasaji (1971: 172), but actually it is a valid species (Iablokoff-Khnzorian, 1972: 172). It is separable from *fuscatus* by its somewhat triangular median piece in ventral aspect, which is equal in length to the lateral lobes, and by the apex of sipho with a thread-like appendix.

53. *Aspidimerus esakii* Sasaji, 1968

Specimens examined: 1♂, 19-V-1977; 2♂♂, 2♀♀, 25-V-1977; 1♀, 3-VI-1977; 1♂, 7-VI-1977; 1♂, 1♀, 13-VI-1977 from Fenchihu (1.400 m).
Distribution: Taiwan, Guangxi.

54. *Cryptogonus orbiculus* (Gyllenhal, 1801)

Specimens examined: 1♂, 2-V-1977; 3♂♂, 23-V-1977, both from Shanmei (600 m); 1♂, 6-V-1977, Yangmingshan-Gebirge (Taipei); 1♂, 4♀♀, 3-IV-1977, Taipei (30 m); 2♀♀, 5-IV-1977, Wulai (Taipei, 200 m).
Distribution: Widely distributed in China; Japan, India, Indonesia, Malaysia, Myanmar, Sri Lanka, Micronesia.

55. *Cryptogonus postmedialis* Kapur, 1948

Specimens examined: 1♂, 11-IV-1977; 1♂, 15-IV-1977, both from Fenchihu (1.400 m).
Distribution: Sichuan, Taiwan, Fujian, Guangdong; Myanmar, India.

56. *Cryptogonus angusticarinatus* Sasaji, 1968

Specimens examined: 1♂, 5-IV-1977, Fenchihu (1.400 m); 2♀♀, 2-V-1977, Shanmei (600 m); 2♂♂, 2♀♀, 5-IV-1977, Taipei (30 m).
Distribution: Taiwan, Guangdong.

57. *Cryptogonus ohtai* Sasaji, 1968

Specimens examined: 4♂♂, 6♀♀, 3-IV-1977, Taipei (30 m); 1♂, 23-V-1977, Shanmei (600 m).
Distribution: Taiwan.

58. *Cryptogonus horishanus* (Ohta, 1929)

Specimens examined: 3♂♂, 3-IV-1977, Taipei (30 m).
Distribution: Gansu, Zhejiang, Sichuan, Taiwan, Fujian, Guangdong; Japan.

59. *Cryptogonus kurosawai* Sasaji, 1968

Specimens examined: 1♀, 9-IV-1977; 1♀, 13-VI-1977, both from Fenchihu (1.400 m).
Distribution: Taiwan.

60. *Cryptogonus robustus*, spec. nov.

Fig. 10

Types. Holotype: ♂ (3-IV-1977, Taipei (30 m)). - Paratypes: 4♂♂, (same data as holotype); 1♂, 23-V-1977, Shanmei (600 m), J. Klapperich leg. (ZSM, one in SCAU).

Description

Body length: 2.29-2.53 mm, width: 1.79-1.88 mm.

Body oval, dorsal surface strongly convex with whitish pubescence. Head yellowish-brown, but clypeus black and frons usually with black area, or even the black marking enlarged leaving only vertex brown; pronotum black with very narrow anterior margin reddish-brown, sometimes anterio-lateral corners yellowish-brown; elytra black with a pair of yellowish-brown discal spots, rounded, situated nearer to apex than to base of elytron; their distance to suture about ½ to that of lateral margin. Underside black; legs black with dark-brown tip of femora and brown tarsi.

Interocular margins of frons weakly arcuate and anteriorly slightly convergent in anterior part. Prosternum with distinct carinae which are slightly convergent in middle. Elytral punctures fine, separated by 1.5 × their diameter. Hind margin of segment VI of male rounded, but straight or very slightly emarginate in middle.

Male genitalia. Sipho short, strongly curved in basal half. Siphonal capsule short and stout, nearly rectangular, outer process distinctly longer than the indistinct inner process. Apex of sipho distinctly narrowing, hook-like. Tegmen relatively stout, median piece widest at base, gently narrowed to a rounded tip in ventral aspect.

Remarks. The new species resembles *C. orbiculus*, but is easily separable from the latter by the short sipho with nearly rectangular siphonal capsule. It also resembles *C. quadrigulatus* (Weise, 1895) in the structure of the male genitalia, but differs from the latter by the position of the discal spots on elytra and by the hook-like apex of sipho that narrows distinctly.

Subfamily Chilocorinae

61. *Platynaspidius maculosus* (Weise, 1910)

Specimens examined: 1♂, 1♀, 3-VI-1977, Taipei (30 m); 1♂, Yangmingshan-Gebirge (Taipei).
Distribution: Widely distributed in China.

62. *Platynaspidius babai* Sasaji, 1988

Specimen examined: 1♀, 5-IV-1977, Wulai (Taipei, 200 m).
Distribution: Taiwan.

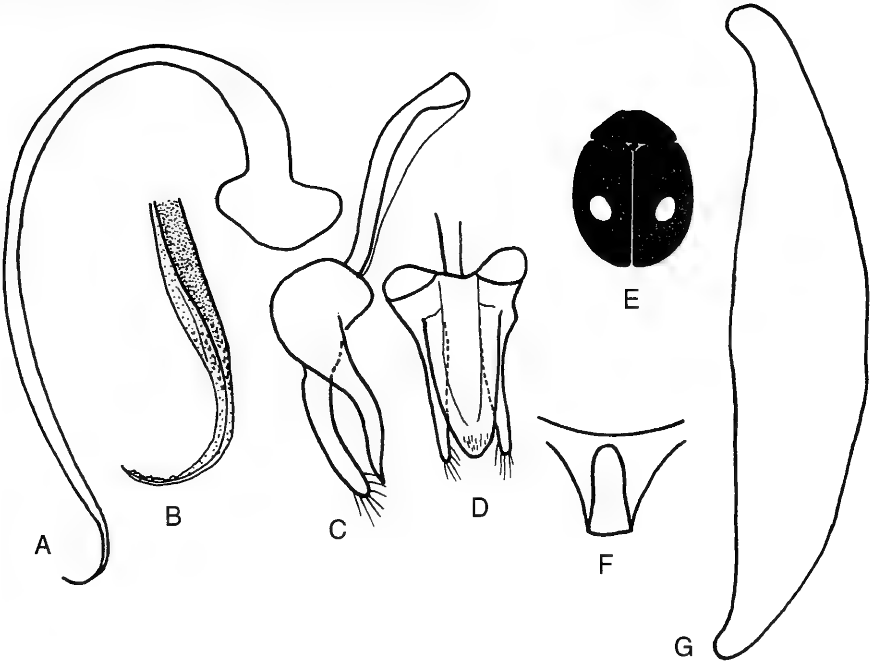


Fig. 10. *Cryptogonus robustus*, spec. nov. A. Sipho; B. Apex of sipho; C. Tegmen, lateral aspect; D. ditto, ventral aspect; E. Outline of the body; F. Median part of prosternum. G. Sixth abdominal segment of ♂.

63. *Chilocorus shirozui* Sasaji, 1968

Specimen examined: 1♀, 10-VI-1977, Alishan (2.400 m).
Distribution: Taiwan.

64. *Chilocorus alishanus* Sasaji, 1968

Specimens examined: 1♂, 23-IV-1977; 1♂, 1♀, 28-IV-1977; 1♀, 30-IV-1977; 1♀, 8-V-1977, all from Fenchihu (1.400 m); 4♀♀, 10-VI-1977, Alishan (2.400 m).
Distribution: Taiwan, Yunnan.

65. *Telsimia nigra* (Weise, 1879)

Specimens examined: 1♂, 9-IV-1977; 1♂, 10-IV-1977; 1♂, 1♀, 11-IV-1977; 1♂, 15-IV-1977; 2♂♂, 23-IV-1977; 1♂, 2♀♀, 30-IV-1977; 1♂, 19-V-1977; 2♀♀, 13-VI-1977, all from Fechihu (1.400 m).
Distribution: Taiwan, Fujian; Japan.

* 66. *Telsimia nagasakiensis* Miyatake, 1978

Specimens examined: 1♂, 3-IV-1977, Taipei (30 m); 1♀, 2-V-1977, Shanmei (600 m).
Distribution: Taiwan; Japan.

67. *Telsimia scymnoides* Miyatake, 1978

Specimens examined: 1♂, 9-IV-1977; 1♂, 2♀♀, 10-IV-1977; 2♂♂, 25-V-1977, all from Fenchihu (1.400 m).
Distribution: Taiwan.

Subfamily Coccinellinae

68. *Coccinella septempunctata* Linnaeus, 1758

Specimens examined: 3 exs. 11-IV-1977; 5 exs., 15-IV-1977; 7 exs., 23-IV-1977; 2 exs., 30-IV-1977; 2 exs., 8-V-1977; 1 ex., 14-V-1977; 1 ex., 23-V-1977; 1 ex., 3-VI-1977; 10 exs., 13-VI-1977, Fenchihu (1.400 m).
Distribution: Widely distributed in China; Palaearctic Region, America.

69. *Illeis koebelei* Timberlake, 1943

Specimens examined: 4 exs., 2-V-1977; 4 exs., 23-V-1977, both from Shanmei (600 m); 6 exs., 3-IV-1977, Taipei (30 m); 1 ex., 30-IV-1977; 3 exs., 10-V-1977; 5 exs., 14-V-1977; 2 exs., 8-V-1977; 2 exs., 19-V-1977; 1 ex., 25-V-1977, 1 ex., 13-VI-1977, all from Fenchihu (1.400 m).
Distribution: Fujian, Guandgdong, Guangxi, Yunnan, Taiwan; Japan.

* 70. *Illeis shensiensis* Timberlake, 1943

Specimens examined: 2 exs., Alishan; 35 exs., from Fenchihu during 10-IV/7-VI-1977.
Distribution: Shaanxi, Yunnan, Taiwan.

Remarks. The above two species are co-existent at the altitude of 1.400 m (Fenchihu), but those specimens occurring in Taipei (30 m) and Shanmei (600 m) belong to the former and those from Alishan (2.400 m) to the latter.

71. *Halyzia sanscrita* Mulsant, 1853

Specimens examined: 2♂♂, 28-IV-1977; 2♂♂, 10-VI-1977, all from Alishan (2.400 m).
Distribution: Kansu, Sichuan, Hebei, Shaanxi, Zhejiang, Taiwan, Fujian, Guizhou, Yunnan, Tibet; India, Yemen.

72. *Macroilleis hauseri* (Mader, 1930)

Specimens examined: 10 exs., 10-V-1977; 4 exs., 14-V-1977; 2 exs., 25-V-1977, all from Fenchihu (1.400 m).
Distribution: Widely distributed in China.

73. *Lemnia biplagiata* (Swartz, 1808)

Specimens examined: 2♂♂, 1♀, 2-V-1977; 16♂♂, 21♀♀, 23-V-1977, all from Shanmei (600 m).
Distribution: Zhejiang, Jiangxi, Sichuan, Taiwan, Fujian, Guangdong, Guangxi, Yunnan, Tibet; Japan, Korea, India, Myanmar, Thailand, Nepal, Vietnam, Malaysia, Philippines, Indonesia.

74. *Lemnia (Synia) melanaria* (Mulsant, 1850)

Specimen examined: 1♀, 23-V-1977, Shanmei (600 m).
Distribution: Gansu, Shaanxi, Hubei, Sichuan, Taiwan, Fujian, Guangxi, Guangdong, Guizhou, Yunnan, Tibet; India, Sri Lanka, Vietnam, Philippines.

75. *Lemnia (Artemis) circumusta* (Mulsant, 1850)

Specimens examined: 1♀, 5-IV-1977, Wulai (Taipei, 200 m); 1♀, 2-V-1977, Shanmei (600 m).
Distribution: Taiwan, Guangxi, Hainan, Yunnan; Thailand, Philippines, India.

76. *Harmonia dimidiata* (Fabricius, 1781)

Specimen examined: 1♀, 6-V-1977, Yangmingshan-Gebirge (Taipei).
Distribution: Sichuan, Hunan, Taiwan, Fujian, Guangdong, Guangxi, Yunnan, Tibet; Japan, Nepal, India, Indonesia.

77. *Harmonia sedecimnotata* (Fabricius, 1801)

Specimens examined: 3♀♀, 11-IV-1977; 2 exs., 10-IV-1977; 7 exs., 28-IV-1977; 1♂, 10-V-1977, all from Fenchihu (1.400 m); 1♀, 10-VI-1977, Alishan (2.400 m).
Distribution: Sichuan, Taiwan, Guangdong, Guangxi, Hainan, Guizhou, Yunnan, Tibet; Philippines, Indonesia.

78. *Harmonia octomaculata* (Fabricius, 1781)

Specimens examined: 1♂, 7-VI-1977; 2♀♀, 13-VI-1977, both from Fenchihu (1.400 m).
Distribution: Widely distributed in China; Japan, India, SE Asia to Australia.

79. *Propylea japonica* (Thunberg, 1781)

Specimens examined: 1♀, 3-IV-1977, Taipei (30 m); 1♀, 15-IV-1977; 1♀, 19-IV-1977; 4♀♀, 23-IV-1977; 2♂♂, 30-IV-1977; 1♂, 5-VI-1977, Fenchihu (1.400 m).
Distribution: Widely distributed in China; India, Palaearctic region.

80. *Propylea luteopustulata* (Mulsant, 1850)

Specimens examined: 4 exs., 11-IV-1977; 1 ex., 23-IV-1977; 1 ex., 30-IV-1977; 2 exs., 10-V-1977; 1♀, 14-V-1977; 1♂, 25-V-1977; 1 ex., 3-VI-1977; 1 ex., 7-VI-1977, all from Fenchihu (1.400 m).
Distribution: Shaanxi, Sichuan, Taiwan, Fujian, Guangxi, Guangdong, Yunnan, Tibet; India, Nepal, Myanmar, Thailand.

81. *Calvia muiri* (Timberlake, 1943)

Specimens examined: 3 exs., 23-IV-1977; 1 ex., 14-V-1977; 1 ex., 7-VI-1977; 1♀, 13-VI-1977, Fenchihu (1.400 m).
Distribution: Shaanxi, Guangxi, Yunnan, Taiwan; Japan.

82. *Oenopia takasago* (Sasaji, 1982)

Specimen examined: 1♀, 28-IV-1977, Alishan (2.400 m).
Distribution: Taiwan.

References

Bielawski, R. 1961. Bemerkungen über die männlichen Genitalien von Arten der Gattung *Illeis* Muls. nebst Beschreibungen einer neuen Art und einer Unterart (Coleoptera: Coccinellidae). - Ann. Zool. Warsz. **19**: 353-368

Hoang, D. N. 1982. Bo Rua - Coccinellidae of Viet Nam (I). - Hanoi, 211 pp.

Iablokoff-Khnzorian, S. M. 1982. Les Coccinelles. - Soc. Nouv. Edit. Boubée, Paris, 568 pp.

Kamiya, H. 1965. Tribe Scymnini (Coleoptera: Coccinellidae) from Formosa collected by Prof. T. Shirozu. - Spec. Bull. Lepidopt. Soc. Japan. **1**: 75-82

Kapur, A. P. 1948. A revision of the tribe Aspidimerini Weise (Col. Cocc.). - Trans. R. ent. Soc. Lond. **99** (2): 77-128

Miyatake, M. 1961. The East-Asian coccinellid-beetles preserved in the California Academy of Science, tribe Platynaspini. - Mem. Ehime Univ. **6** (6): 67-86

– – 1966. Description of two new species of the genus *Stethorus* Weise from Japan (Coleoptera: Coccinellidae). - Trans. Shikoku ent. Soc. **9**: 51-54

– – 1978. The genus *Telsimia* Casey of Japan and Taiwan (Coleoptera: Coccinellidae). - Trans. Shikoku ent. Soc. **14** (1-2): 13-19

Pang, X. & B. Huang 1985. Descriptions of twelve new species of ladybeetles from Fujian Province (Col. Cocc. Scymnini). - Wuyi Sci. J. **5**: 29-46 (in Chinese with English summary)

– – & – – 1986. Six new species of *Scymnus* and four new species of *Pseudoscymnus* from Fujian (Col. Cocc. Scymnini). - Wuyi Sci. J. **6**: 61-73 (in Chinese with English summary).

Pang, X. & J. Mao 1979. Fauna of Economic Insects of China, Coleoptera: Coccinellidae. II. - Beijing, 170 pp. (in Chinese)

Pang, X. & T. Pu 1988. Descriptions of two new species of *Nephus* (Scymnini) from Guangxi (Coleoptera: Coccinellidae). - Entomotaxonomia **10** (3-4): 239-242

Pang, X. & G. Yu 1993. Validity od *Scymnus (Parapullus)* Yang with description of a new species (Col. Cocc.) from Taiwan. - Coleopt. Bull. **47** (3): 228-231

Sasaji, H. 1967. A revision of the Formosan Coccinellidae (I), the subfamily Sticholotinae, with an establishment of a new tribe (Coleoptera). - Etizenia, Fukui **25**: 1-28

– – 1968. A revision of the Formosan Coccinellidae (II) tribes Stethorini, Aspidimerini and Chilocorini (Col.). - Etizenia, Fukui **32**: 1-24

– – 1971. Fauna Japonica: Coccinellidae (Ins. Col.). - Tokyo, 340 pp.

– – 1982. A revision of the Formosan Coccinellidae (III), subfamily Coccinellinae (Coleoptera). - Mem. Fac. Educ., Fukui Univ., Ser. II, **31**: 1-49

– – 1986. Cucujoidea (Insecta: Coleoptera) collected by the Nagoya University Scientific Expedition to Formosa in 1984. - Mem. Fac. Educ., Fukui Univ., Ser. II, **36**: 1-14

– – 1988. The Formosan Coccinellidae collected by Dr. K. Baba in 1986. - Trans. Essa. ent. Soc. Niigata **65**: 37-52

– – 1991. The Coccinellidae (Coleoptera) collected from the Island of Lan Yu, Formosa, by Dr. K. Baba in 1987, with description of a new species. - Trans. Essa. ent. Niigata **71**: 48-52

Yang, C. T. 1978a. A new subgenus and specis of Coccinellidae. - Bull. Soc. ent. Taichung **13** (1): 27-28

– – 1978b. *Scymnus* (Subgenus *Pullus*) (Col. Cocc.) from Taiwan. - Plant Prot. Bull. Taiwan **20** (2): 106-116

– – & R. H. Wu 1972. Notes on some Coccinellidae of Taiwan. - J. Agric. Forest, Taichung **21**: 115-128

Yu, G. & X. Pang 1992a. Description of one new species of *Keiscymnus* (Coleoptera: Coccinellidae) from Taiwan. - Coccinella **4** (1/2): 10-11

– – & – – 1992b. Description of male genitalia of *Shirozuella mirabilis* Sasaji with two additional new species from Taiwan (Coleoptera: Coccinellidae). - J. South China Agric. Univ. **13** (3): 37-41

– – , Pang, H. & X. Pang 1993. Coccinellidae collected from Chebaling Nature Reserve. In: Xu, Y. (ed.): Collected Papers on the Investigation of National Chebaling Nature Reserve, Guangzhou, 467-511 (in Chinese with English summary)

SPIXIANA	18	2	145–150	München, 01. Juli 1995	ISSN 0341–8391

Coccinellid beetles from Fujian, China, preserved in the Zoologische Staatssammlung München, Germany

(Insecta, Coleoptera, Coccinellidae)

By **Yu Guoyue**

Yu, G. (1995): Coccinellid beetles from Fujian, China, preserved in the Zoologische Staatssammlung München, Germany (Insecta, Coleoptera, Coccinellidae). – Spixiana **18/2**: 145-150

21 species of Coccinellidae from Fujian, China, are enumerated, of which one, *Scymnus (Pullus) tschungi*, is new to science, and five are new records for Fujian.

Yu Guoyue, Laboratory of Insect Ecology, South China Agricultural University, Guangzhou, P. R. China
Present address: Institute of Plant & Environmental Protection, Beijing Academy of Agricultural & Forestry Science, Beijing 100081, P. R. China

Introduction

Fujian (formerly Fukien) in southeastern China is a mountanous province with abundant biological resources. Recently Huang & Pang (1991) gave a check-list that contains 145 species of ladybeetles occurring in Fujian. There is no doubt that there still exists a considerable number of undescribed or unrecorded species in this province.

Through the kindness of Prof. Helmut Fürsch of Passau University, cooperator of Zoologische Staatssammlung München, Germany (ZSM), I was recently given the opportunity to examine the coccinellid beetles from Fujian which are preserved in that museum, and 219 specimens (among them 7 are not coccinellids) were referred to my study, which were collected in Kautun, Fujian by Tschung Sen.

The present collection contains 21 species and among them one species is described as new to science here, and 5 species (labelled with *) are new records for Fujian. The types of the new taxon described in this paper are deposited in ZSM and South China Agricultural University (SCAU).

Before going further, I wish to express my cordial thanks to Prof. Pang Xiongfei for his constant guidance and encouragement to my study, and to Prof. Helmut Fürsch for the privilege of examining the material of ZSM.

Subfamily Scymninae

* 1. *Pseudoscymnus dapae* Hoang, 1978

Specimens examined: 1♂, 2♀♀, 12-IV-1946, Tschung Sen leg.
Distribution: China (Guangdong, Fujian), Vietnam.

2. *Pseudoscymnus disselasmatus* Pang & Huang, 1986

Specimens examined: 1♂, 5♀♀, 12-IV-1946, Tschung Sen leg.
Distribution: China (Fujian, Guangdong).

3. *Pseudoscymnus*, sp. 1

Specimen examined: 1♀, 12-IV-1946, Tschung Sen leg.

Remarks. This species is closely related to *P. nagasakiensis* (Kamiya, 1961), but differs in the punctuation on the 1st abdominal segment and hemisternite (the examined specimen with much finer and sparser punctures and elongately oval hemisternite).

4. *Pseudoscymnus*, sp. 2

Specimen examined: 1♀, 12-IV-1946, Tschung Sen leg.

Remarks. This species resembles *P. sylvaticus* (Lewis, 1896), but the punctures on the lateral section of the 1st abdominal segment are sparser, and the hemisternite is triangular, but much shorter than that of the latter.

* 5. *Scymnus (Scymnus) tegminalis* Hoang, 1985

Specimens examined: 1♀, 12-IV-1946; 1♂, 12-V-1946; Tschung Sen leg.
Distribution: China (Guangdong, Fujian), Vietnam.

Remarks. Hoang (1985) described it as a member of *Scymnus* s. str. However, the specimens from China have a complete postcoxal line, although it is laterally very weak, or sometimes the postcoxal line disappears before the basal margin of the 1st abdominal segment.

6. *Scymnus (Pullus) rhamphiatus* Pang & Huang, 1985

Specimens examined: 1♂, 21-III-1946; 8 exs., 12-IV-1946; 1♀, 12-V-1946; 1♂, 12-VII-1946; 1♀, 1-VIII-1946; 1♀, 15-IX-1946; Tschung Sen leg.
Distribution: China (Fujian, Zhejiang, Guizhou, Hubei).

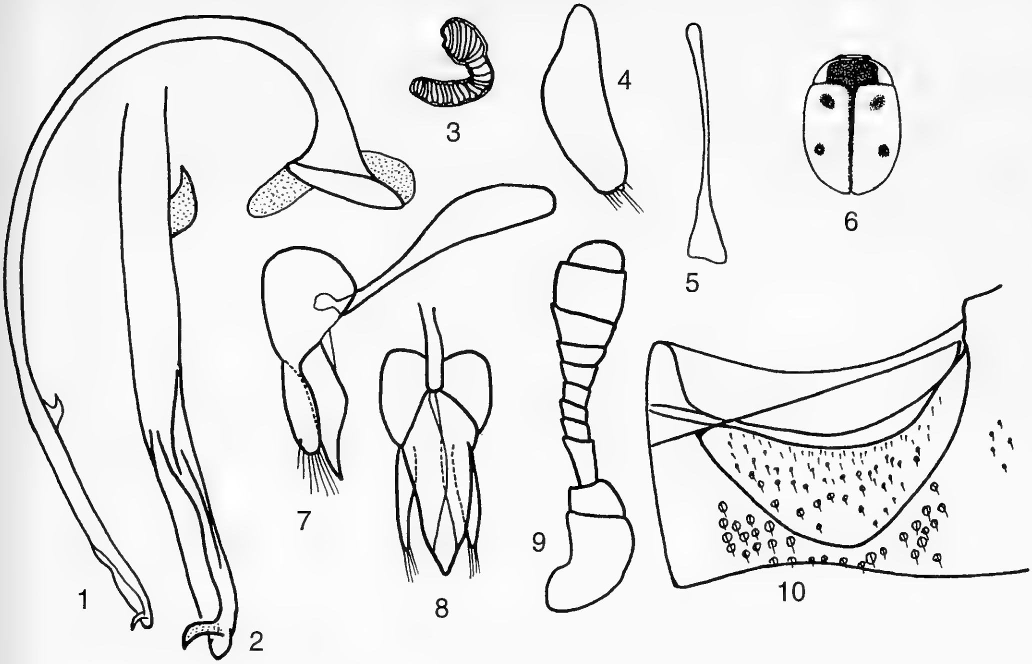
7. *Scymnus (Pullus) perdere* Yang, 1978

Scymnus (Pullus) nepenthus Pang & Huang, 1985

Specimen examined: 1♀, 12-IV-1946, Tschung Sen leg.
Distribution: China (Taiwan, Fujian, Guangdong, Zhejiang).

8. *Scymnus (Pullus) tschungi*, spec. nov.
Figs 1-10

Types. Holotype: ♂, No. 920331, 13-IV-1952, Tschung Sen leg. (ZSM). - Allotype: ♀, same data (ZSM). - Paratypes: 5♂♂, 6♀♀, same data as holotype (3♂♂, 5♀♀ paratypes deposited in ZSM, 2♂♂, 1♀ in SCAU).



Figs 1-10. *Scymnus (Pullus) tschungi*, spec. nov. 1. Sipho. 2. Apex of sipho. 3. Receptaculum seminis. 4. Hemisternite. 5. 9th sternite of ♂. 6. Outline of body. 7. Tegmen, lateral aspect. 8. Tegmen, ventral aspect. 9. Antenna. 10. 1st abdominal segment.

Description

Body length: 1.85-2.24 mm; width: 1.35-1.64 mm.

Body oval, dorsal surface moderately convex with whitish pubescence, arranged in very weakly S-form; head brown with grey eyes; pronotum reddish-brown with large, square, dark reddish-brown marking that nearly extends to anterior margin, but lateral parts widely reddish-brown; scutellum dark brown; elytra reddish-brown with anterior margin and suture dark brown; and with two pairs of obscure, dark reddish-brown spots. Sometimes the anterior spot enlarged, or the posterior one becoming indistinct, or even without any distinct spots. Underside including legs brown except for dark brown meso- and metasternum. Sometimes the large basal part of abdomen is dark brown.

Interocular distance about 1.5 × width of eyes; maxillary palpi distinctly securiform; structure of antenna as figured; punctures on head fine and dense, separated by half of their diameter; pronotal punctures slightly finer, separated by about their diameter; elytral punctures coarser, separated by their diameter. Prosternal carinae extending to anterior margin, anteriorly moderately convergent, length about 2.2 × width at base. Postcoxal line complete, extending to about $\frac{4}{5}$ of length of 1st abdominal segment; area surrounded by the line irregularly punctured, narrowly smooth along the line. Hind margin of segment V very slightly emarginate, nearly straight in male, slightly rounded in female.

Male genitalia. Sipho moderately stout, strongly curved in basal half, with well developed, large siphonal capsule; apical $\frac{1}{4}$ of sipho with a hook, apex of sipho with a small appendix at outer surface. Tegmen relatively stout, lateral lobes shorter, about $\frac{3}{4}$ to $\frac{4}{5}$ of length of median piece. In ventral aspect, median piece widest at base, tapering gently to the pointed tip; in lateral view, median piece nearly parallel in basal half, distinctly narrowing in apical half.

Hemisternite and receptaculum seminis as figured.

Remarks. The new species is closely related to *S. (P.) taiwanus* (Ohta, 1929) in body form and male genitalia, but it can be separated from the latter by colouration, and by the median piece of the tegmen which is not anchor-like in ventral aspect.

9. *Scymnus (pullus) sodalis* (Weise, 1923)

Specimens examined: 1♂, 1♀, 12-IV-1946, Tschung Sen leg.
Distribution: China (widely distributed in China), Japan, India, Nepal, Vietnam.

Remarks. The examined specimens are slightly different from other specimens in their postcoxal line (relatively less arched in the above two specimens). We have large series of *S. sodalis* which are variable in punctures on the area surrounded by the postcoxal line (widely or narrowly smooth along the line) and in length of median piece (shorter to slightly longer than the lateral lobes).

10. *Scymnus (Pullus)*, sp. 1

Specimens examined: 3♀♀, 12-V-1946, Tschung sen leg.

Remarks. This species is similar to *S. (S.) tegminalis* Hoang, 1985, but the pronotum is almost entirely black with very narrow anterior margin reddish-brown and the area surrounded by the postcoxal line is finely punctured.

11. *Scymnus (Pullus)*, sp. 2

Specimens examined: 1♀, 20-VI-1946; 1♀, 12-VII-1946, Tschung Sen. leg.

Remarks. This species is peculiar with respect to the long receptaculum seminis with a dark ringed spermduct and nearly rectangular hemisternite.

12. *Scymnus (Pullus) oestocraerus* Pang & Huang, 1985

Specimens examined: 2♀♀, 12-IV-1946; 1♂, 5-V-1946; 2♀♀, 12-VI-1946, Tschung Sen leg.
Distribution: China (Fujian, Taiwan).

* 13. *Scymnus (Pullius) dorcatomoides* Weise, 1879

Specimens examined: 2♂♂, 2♀♀, 12-IV-1946, Tschung Sen leg.
Distribution: China (Taiwan, Fujian), Japan, Vietnam.

Remarks. We have examined many specimens from Taiwan, and found that the length of the median piece of the tegmen is variable from ⅔ to ⅘ of length of the lateral lobes.

* 14. *Scymnus (Neopullus) brunnescens* Motsch., 1866

Specimens examined: 9 exs., 12-V-1946; 6♂♂, 11♀♀, 12-V-1946; 1♂, 1♀, 12-VI-1946, Tschung Sen leg.
Distribution: China (Taiwan, Fujian, Guangdong), Sri Lanka, India.

Remarks: *Scymnus brunnescens* was synonymized with *S. fuscatus* by Sasaji (1971: 180), but actually it is a valid species (Iablokoff-Khnzorian, 1972: 172). It is separable from *S. fuscatus* by its somewhat triangular median piece in ventral aspect which is equal in length to the lateral lobes.

Subfamily Chilocorinae

15. *Cryptogonus orbiculus* (Gyllenhal, 1801)

Specimens examined: 56 exs., 12-IV-1946; 18 exs., 20-IV-1946; 28 exs., 12-V-1946; 1♂, 18-VI-1946; 10 exs., 12-VII-1946; 1♂, 15-IX-1946, Tschung Sen leg.

Distribution: China (widely distributed in China), Japan, Korea, Micronesia, Southeast Asia, India, Sri Lanka.

16. *Cryptogonus postmedialis* Kapur, 1948

Specimens examined: 1♂, 4♀♀, 12-IV-1946; 1♂, 20-VI-1946; 1♂, 1♀, 12-VII-1946; 1♀, 15-IX-1946, Tschung Sen leg.

Distribution: China (Taiwan, Fujian, Guangdong), Myanmar (formerly Burma).

17. *Telsimia nigra* (Weise, 1879)

Specimens examined: 1♀, 12-IV-1846, Tschung Sen leg.

Distribution: China (Taiwan, Fujian), Japan.

Subfamily Coccinellinae

18. *Propylea japonica* (Thunberg, 1781)

Specimen examined: 1♂, 12-V-1946, Tschung Sen leg.

Distribution: China (widely occurred in China), Japan, Korea, Siberia, Sakhalin, Vietnam, Thailand, India.

* 19. *Micraspis allardi* (Mulsant, 1850)

Specimen examined: 1♀, 2-V-46, Tschung Sen leg.

Distribution: China (Fujian, etc.), Afghanistan, India, Sumatra, Indonesia, Borneo, Philippines.

20. *Oenopia chinensis* (Weise, 1912)

Specimen examined: 1♀, 12-V-1946, Tschung Sen leg.

Distribution: China (widely distributed in China).

Remarks: Mader (1955) described *Coelophora fallaciosa* from Fujian, which is now a synonyme of *O. chinensis.* The examined specimen has much smaller spots on elytra, compared with the typical colouration of *O. chinensis.*

21. *Harmonia aryxidis* (Pallas, 1773)

Specimens examined: 1 ex., 12-VII-1946, Tschung Sen leg.

Distribution: China (widely occurred in China), Siberia, Mongolia, Korea, Sakhalin, Japan, Vietnam.

References

Bielawski, R. 1973. Rhyzobiini, Stethorini, Scymnini et Pharini (Col. Cocc.) de Nouvelle Calédonie. - Ann. Zool. Warsz. **30** (4): 387-409

– – 1984. Coccinellidae (Col.) of Mongolia. - Ann. Zool. Warsz. **38** (14): 281-460

Hoang, D. N. 1978. Genre *Pseudodscymnus* Chapin au Vietnam. - Tap San Sinh Vat Dia Hoc **16** (4): 111-115

– – 1982. Bo Rua - Coccinellidae of Viet Nam (I). - Hanoi, 211 pp.

– – 1985. On the study of Coccinellidae of Teinguen Plateau from South Vietnam, p. 30-49. In: Medvedev (ed.): Insects of Vietnam, Moscow, 182 pp. (In Russian)

Huang, B. & X. Pang 1991. A check-list of ladybeetles from Fujian province (Col. Cocc.), p 218-231. In: Huang, B. (ed.): Proceedings of the Symposium on Coccinellids in China, Shanghai, 247 pp.

Iablokoff-Khnzorian, S. M. 1972. Les types de Coccinellidae de la collection Motschulsky (Col. Cocc.). - Nouv. Rev. Ent. **II** (2): 163-184.

– – 1982. Les Coccinelles. - Soc. Nouv. Edit. Boubee, Paris, 568 pp.

Kapur, A. P. 1948. A revision of the tribe Aspidimerini Weise (Col. Cocc.). - Trans. R. ent. Soc. London **99** (2): 77-128

Mader, L. 1955. Neue Coleopteren aus Fukien (China). - Koleopt. Rdsch. **33**: 62-78

Miyatake, M. 1959. A contribution to the coccinellid-fauna of the Ryukyu Island (Col.). - Mem. Ehime Univ. **6** (4): 121-161

Pang, X. & B. Huang 1985. Descriptions of twelve new species of ladybeetles from Fujian Province (Col. Cocc. Scymnini). - Wuyi Sci. J. **5**: 29-46 (in Chinese with English summary)

– – & – – 1986. Six new species of *Scymnus* and four new species of *Pseudoscymnus* from Fujian (Col. Cocc. Scymnini). - Wuyi Sci. J. **6**: 61-73 (in Chinese with English summary)

– – & J. Mao 1979. Coleoptera: Coccinellidae. II. - Beijing, 170 pp. (in Chinese)

Sasaji, H. 1968. A revision of the Formosan Coccinellidae (II) tribes Stethorini, Aspidimerini and Chilocorini (Col.). - Occas. Pub. Bio. Lab., Fukui Univ. **32**: 1-24

– – 1971. Fauna Japonica: Coccinellidae (Ins. Col). - Tokyo, 340 pp.

Yang, C. T. 1978. *Scymnus* (Subgenus *Pullus*) (Col. Cocc.) from Taiwan. - Plant Prot. Bull. Taiwan **20** (2): 106-116

SPIXIANA	18	2	151–155	München, 01. Juli 1995	ISSN 0341–8391

Four new species of *Scymnus* Kugelann from China

(Insecta, Coleoptera, Coccinellidae)

By **Ren Shunxiang & Pang Xiongfei**

Ren, S. & X. Pang (1995): Four new species of *Scymnus* Kugelann from China (Insecta, Coleoptera, Coccinellidae). – Spixiana **18/2**: 151-155

Four new species of *Scymnus* Kugelann from China are described: *Scymnus (Pullus) fanjingicus, S. (P.) heptaspilicus, S. (P.) klinosiphonicus, S. (P.) spirosiphonicus.*

Ren Shunxiang, Pang Xiongfei, Laboratory of Insect Ecology, South China Agricultural University, Guangzhou, 510642, P. R. China

The present paper gives descriptions of four new species of *Scymnus* Kugelann, collected at Mt. Fangjing, Guizhou Province, China, by Ren Shunxiang and Tian Mingyi (July 1990) and at Mt. Fenchihu, Taiwan, China, by Klapperich (April to June 1977). Type specimens are deposited in the South China Agricultural University, Guangzhou, China (SCAU) and in the Zoologische Staatssammlung München, Germany (ZSM).

Scymnus (Pullus) fanjingicus, spec. nov.
Figs 1-7

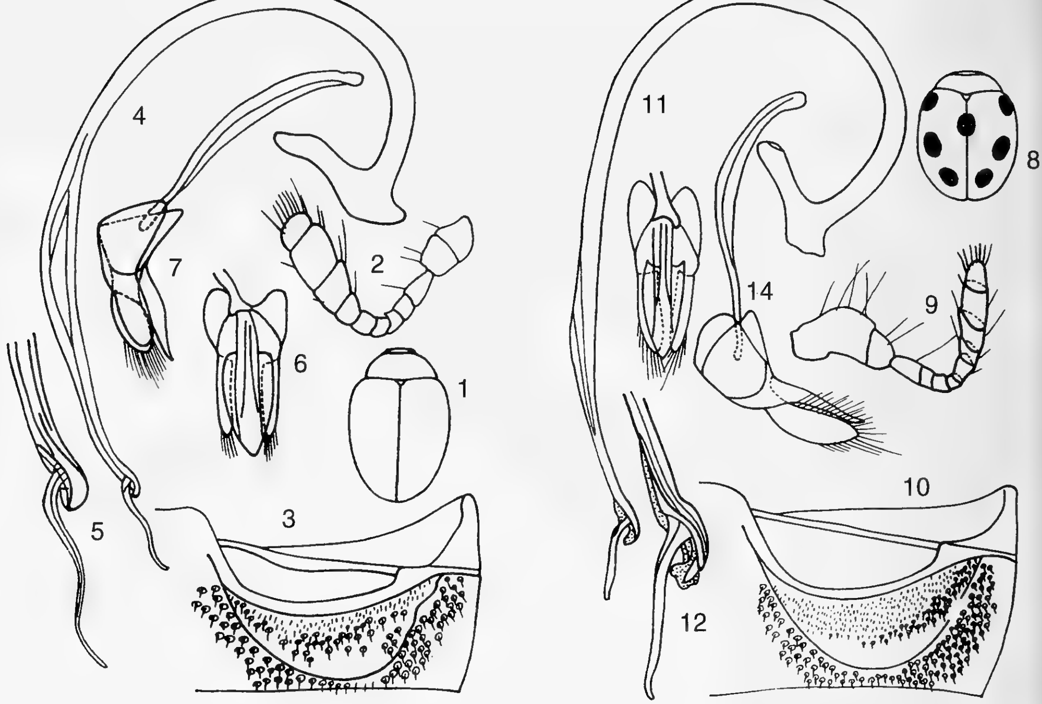
Types. Holotype: ♂, No. 900261-1, Mt. Fanjing, Guizhou Province, China, 21-VII-1990, Ren Shunxiang leg. (SCAU). - Allotype: ♀, No. 900266-8, same data as holotype (SCAU). - Paratypes: 4♂♂, 2♀♀, same data as holotype; 1♂, same locality as holotype, Tian Mingyi leg. (SCAU); Mt. Fenchihu, Taiwan, China, 3♂♂, 7♀♀, 9-IV-1977, 1♂, 2♀♀, 11-IV-1977, J. Klapperich leg. (SCAU); Mt. Fenchihu, Taiwan, China, 3♀♀, 10-IV-1977, 3♂♂, 15-IV-1977, 1♂, 3♀♀, 23-IV-1977, 1♂, 2♀♀, 30-IV-1977, 1♂, 8-V-1977, 4♀♀, 10-V-1977, 1♀, 14-V-1977, 1♀, 19-V-1977, 2♂♂, 3♀♀, 25-V-1977, 1♂, 1♀, 30-V-1977, 3♂♂, 5♀♀, 3-VI-1977, 1♂, 1♀, 7-VI-1977, 3♀♀, 13-VI-1977, J. Klapperich leg. (ZSM).

Description

Length: 2.29-2.55 mm; width: 1.66-1.77 mm.

Form elongately oval in outline, moderately convex with dorsal pubescence yellowish-white. Head yellow with eyes greyish-brown. Mouthparts brown with tip of mandible dark brown. Pronotum, scutellum, and elytra brown (Fig. 1). Prosternum and hypomeron yellowish-brown; meso- and metasternum dark brown. Abdomen yellowish-brown with the anterior process of 1st abdominal sternum dark brown. Legs yellowish-brown.

Punctures on head fine and spare, separated by 1.5-2 × their diameter; pronotal punctures coarser than those on head, separated by 1-1.5 × their diameter; elytral punctures coarser than those on pronotum, separated by about their diameter; each elytron with two rows of coarse punctures on disc. Prosternum with intercoxal carinae extending to anterior margin, slightly convergent anteriorly, length about 3 × width at base. Postcoxal line complete, almost extending to hind margin of 1st abdominal sternum, the middle of external side very week; area surrounded by postcoxal line irregularly punctate, smooth along postcoxal line (Fig. 3).



Figs 1-7. *Scymnus (Pullus) fanjingicus*, spec. nov. 1. Outline of body. 2. Antenna. 3. 1st abdominal sternum. 4. Sipho. 5. Apex of sipho. 6. Tegmen, ventral aspect. 7. Tegmen, lateral aspect.
Figs 8-14. *Scymnus (Pullus) heptaspilicus*, spec. nov. 8. Outline of body. 9. Antenna. 10. 1st abdominal sternum. 11. Sipho. 12. Apex of sipho. 13. Tegmen, ventral aspect. 14. Tegmen, lateral aspect.

Male genitalia. Sipho very stout, with long inner process and indistinct outer process of siphonal capsule, about 1/3 of siphonal apex slightly expanded, siphonal apex curved with a thread-like appendix (Figs 4-5). Tegmen moderately stout with lateral lobes distinct shorter than median piece (Figs 6-7).

Remarks: This new species is similar to *S. (P.) prostylotus* Pang & Huang 1985 and *S. (P.) ursulus* Fürsch 1975 in body colouration and sipho of male genitalia, but *S. (P.) prostylotus* has postcoxal line extending to about 3/4 length of 1st abdominal sternum; sipho with very stout outer process and relatively slender inner process of siphonal capsule, and siphonal apex with a prostyle poiting straight to outside; median piece of tegmen oval in ventral aspect, and nearly equal to lateral lobes in length. *S. (P.) ursulus* has tegmen of male genitalia with narrowly and strongly tapered apically lateral lobes and slightly broadened median piece in lateral aspect.

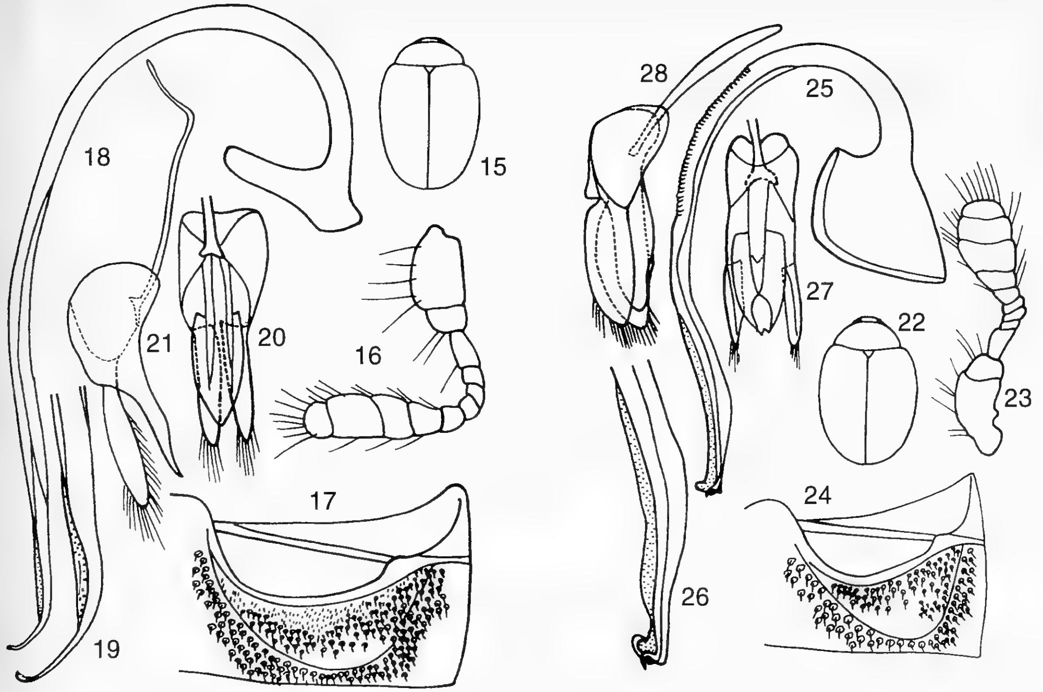
Scymnus (Pullus) heptaspilicus, spec. nov.
Figs 8-14

Types. Holotype: ♂, No. 900264-1, Mt. Fanjing, Guizhou Province, China, 21-VII-1990, Ren Shunxiang leg. (ZSM). - Allotype: ♀, No. 900264-6, same data as holotype, Tian Mingyi leg. (ZSM). - Paratypes: 5♂♂, same data as holotype; 1♂, 2♀♀, same data as allotype (SCAU).

Description

Length: 2.29-3.14 mm; width: 1.71-2.34 mm.

Form shortly oval in outline, moderately convex with dorsal pubescence yellowish-white. Head yellowish-brown except for black eyes and black tip of mandible. Pronotum reddish-yellow. Elytra



Figs 15-21. *Scymnus (Pullus) klinosiphonicus*, spec. nov. 15. Outline of body. 16. Antenna. 17. 1st abdominal sternum. 18. Sipho. 19. Apex of sipho. 20. Tegmen, ventral aspect. 21. Tegmen, lateral aspect.
Figs 22-28. *Scymnus (Pullus) spirosiphonicus*, spec. nov. 22. Outline of body. 23. Antenna. 24. 1st abdominal sternum. 25. Sipho. 26. Apex of sipho. 27. Tegmen, ventral aspect. 28. Tegmen, lateral aspect.

reddish-brown with 7 nearly round dark brown spots, of which a pair of anterior spots is situated at humera and hardly reaches the lateral margin; a pair of central spots situated at middle of elytron; a pair of posterior spots situated at $^{5}/_{6}$ of elytron; a sutural spot situated at anterior $^{1}/_{3}$ of suture (Fig. 8). Venter dark brown except for prosternum yellow. Legs yellow.

Punctures on head fine, separated by about their diameter; pronotal punctures coarser than those on head, separated by 1-1.5 × their diameter; elytral puncture coarser than those on pronotum, separated by 0.5-1 × their diameter; each elytron with two rows of coarse punctures on disc. Prosternum with intercoxal carinae extending to anterior margin, slightly convergent anteriorly, length about 3 × width at base. Postcoxal line complete, almost extending to $^{5}/_{6}$ length of 1st abdominal sternum, the middle of external surface very week; area surrounded by postcoxal line irregularly punctate, very broadly smooth along postcoxal line (Fig. 10).

Male genitalia. Sipho long and very stout, with long inner process and indistinct outer process of siphonal capsule, and apex of sipho distinctly curved with a sword-like appendix (Figs 11-12). Tegmen very stout with lateral lobes slightly shorter than median piece (Figs 13-14).

Remarks. This new species is similar to *S. (P.) mongolicus* Weise 1890, but the latter has characteristic lateral lobes of tegmen which are breached at base in lateral aspect, and it is very narrowly smooth along postcoxal line.

Scymnus (Pullus) klinosiphonicus, spec. nov.

Figs 15-21

Types. Holotype: ♂, No. 900265-1, Mt. Fanjing, Guizhou Province, China, 21-VII-1990, Ren Shunxiang leg. (ZSM). - Allotype: ♀, No. 900265-2, same data as holotype (ZSM).

Description

Length: 2.46-2.63 mm; width: 1.66-1.89 mm.

Form elongately oval in outline, moderately convex with dorsal pubescence yellowish-white. Head yellow with eyes greyish-brown. Mouthparts brown with tip of mandible dark brown. Pronotum, scutellum and elytra brown (Fig. 15). Prosternum and hypomeron yellowish-brown; meso- and metasternum dark brown. Abdomen yellowish-brown with the anterior process of 1st abdominal sternum dark brown. Legs yellowish-brown.

Punctures on head fine, separated by 1-1.5 × their diameter; pronotal punctures coarser than those on head, separated by about their diameter; elytral punctures coarser than those on pronotum, separated by 1-1.5 × their diameter; each elytron with two rows of coarse punctures on disc. Prosternum with intercoxal carinae extending to anterior margin, slightly convergent anteriorly, length about 2.5 × width at base. Postcoxal line complete, extending to about $^6/_7$ of length of 1st abdominal sternum, the middle of external surface very week; area surrounded by the postcoxal line irregularly punctated, smooth along postcoxal line (Fig. 17).

Male genitalia. Sipho long and stout, with long inner process and indistinct outer process of siphonal capsule, siphonal apex distinctly bent outside (Figs 18-19). Tegmen moderately stout with lateral lobes slightly shorter than median piece (Figs 20-21).

Remarks. This new species is similar to *S. (P.) impexus* Mulsant, 1850 and *S. (P.) bengalicus* Canepari, 1986, but it can easily be distinguished from *S. (P.) impexus* by siphonal apex distinctly bent outside, and by length of median piece as compared with lateral lobes relatively shorter. *S. (P.) bengalicus* is more oval-shaped, the siphonal capsule is nearly shuttle-shape, and it is smaller (1.65-1.95 mm).

Scymnus (Pullus) spirosiphonicus, spec. nov.

Figs 22-28

Types. Holotype: ♂, No. 900267-1, Mt. Fanjing, Guizhou Province, China, 21-VII-1990, Ren Shunxiang leg. (SCAU). - Allotype: ♀, No. 900267-2, same data as holotype (SCAU).- Paratype: 1♂, same data as holotype (SCAU).

Description

Length: 1.66-1.94 mm; width: 1.20-1.31 mm.

Form elongately oval in outline, moderately convex with dorsal pubescence yellowish-white. Head yellow with eyes greyish-brown. Mouthparts brown with tip of mandible yellowish-brown; meso- and metasternum dark brown. Abdomen yellowish-brown with the anterior process of 1st abdominal sternum dark brown. Legs yellowish-brown.

Punctures on head fine, separated by 1-1.5 × their diameter; pronotal punctures coarser than those on head, separated by about their diameter; elytral puncture coarser than those on pronotum, separated by about 0.5-1 × their diameter. Prosternum with intercoxal carinae extending to anterior margin, slightly convergent anteriorly, length about 3 × width at base. Postcoxal line complete, extending to $^6/_7$ of length of 1st abdominal sternum, very curved; area surrounded by postcoxal line irregularly and sparsely punctate, broadly smooth on inner part of postcoxal line (Fig. 24).

Male genitalia. Sipho very stout, with extremely expanded siphonal capsule, and with many whorls in middle of sipho (Figs 25-26). Tegmen very stout with asymmetrical median piece, lateral lobes slightly shorter than median piece (Figs 27-28).

Remarks. This new species is similar to *S. (P.) syoitii* Sasaji, 1971, but it can be easily distinguished from the latter by the extremely expanded siphonal capsule and the asymmetrical median piece of tegmen.

Acknowledgement

The authors wish to express their deepest thanks to Prof. Dr. H. Fürsch of Passau University, Germany for the privilege to examine the material of the Zoologische Staatssammlung München, Germany.

References

Bielawsiki, R. 1984. Coccinellidae (Col.) of Mongolia. - Ann. Zool. Warsz. **38** (14): 281-460

Canepari, C. 1986. Su alcuni Coccinellidi dell'India e Nepal Settentrionale del Museo di storia Naturale di Gineva (Col. Cocc.). - Rev. suisse Zool. **93** (1): 21-36

Fürsch H. 1975. Beschreibung einiger neuer Coccinelliden aus dem Museum Tevuren. - Rev. Zool. Afr. **83** (3): 645-650

Gourreau, J. 1974. Systématique de la tribu des Scymnini (Cocc.). - Ann. Zool. anim. (Hors. ser), 221 pp.

Pang, X. & B. Huang 1985. Descriptions of twelve new species of ladybeetles from Fujian Province (Col. Cocc. Scymnini). - Wuyi Sci. J. **5**: 29-46 (in Chinese with English summary)

Sasaji, H. 1971. Fauna Japonica: Coccinellidae (Ins. Col). - Tokyo, 345 pp.

23. Fott, J. (ed.): Limnology of Mountain Lakes. Developments in Hydrobiology 93. - Kluwer Academic Publishers, Dordrecht/Boston/London, 1994. 182 S.

Dieser Band der bekannten Reihe zur Limnologie enthält 21 Beiträge des vom 1.-7.Juli 1991 in Stara Lesna (Slovakei) abgehaltenen Symposium mit gleichem Titel. 53 Teilnehmer aus 13 Ländern haben im Verlauf dieser Tagung 28 Einzelvorträge und 18 Poster präsentiert. Dabei ruht der Hauptaugenmerk auf den physikochemischen Bedingungen des Zooplankton, Phytoplankton, Phytobenthos und den Bakterien der Seen der Hohen Tatra, Böhmens, der Sierra Nevada, der Südalpen und nordischen Bergseen British Columbiens und Schwedisch Lapplands. Die limnologischen und palaeolimnologischen Darstellungen sind geprägt vom Phänomen der Gewässerversauerung, das zum Hauptproblem ungepufferter Gewässer geworden ist. Für jeden angewandten Ökologen und besonders Limnologen bietet diese aktuelle Zusammenfassung wesentliche Aspekte dieses Forschungsgebietes, das weltweit mit ähnlichen Problemen die Bearbeiter konfrontiert. Für vergleichbare Symposiumsbände so auch hier wäre ein Sachwörterverzeichnis im Anhang wünschenswert. E.-G. Burmeister

24. Ouboter, P.E. (Ed.): The Freshwater Ecosystems of Suriname. - Kluwer Academic Publishers, Dordrecht/Boston/London, 1993. 313 S.

Dieser 70. Band der bekannten Reihe 'Monographiae Biologicae' enthält 16 besonders detailliert dargestellte Artikel zur Ökologie und Biologie der limnischen Lebensräume dieses tropischen Landes. Neben der Einführung des Herausgebers sind diese in drei Gruppen aufgeteilt, wobei die erste als Grundlagenvermittlung die geographischen, klimatischen, physikochemischen Bedingungen des Phytoplankton, die Vegetation und Sukzession der Feuchtwiesenbereiche, die aquatischen Makrophyten, die Makroinvertebraten der in die nördliche Küstenzone einmündenden Fließgewässer und die Fischfauna behandelt. die zweite Sektion umfaßt die speziellen Fallstudien der Libellenfauna der Schwarzwassersysteme, die Biologie nestbauender Panzerwelse, die Herpetofauna der schwimmenden Wiesen und die Jahresrhythmik des Brillenkaiman. Dem dritten Abschnitt, dem wie den übrigen eine kurze aber besonders informative Zusammenfassung vorangestellt ist, ist der Einfluß des Menschen in diesem tropischen Areal gewidmed. Dabei wird auf die Problematik des Baues eines Staudammes, dem inzwischen ein riesiger See vorgelagert ist (Brokopondo Lake), auf den Wandel in Sumpfgebieten mit Verschmutzung, auf den Zusammenhang von Wasser und Gesundheit sowie auf den dringenden Schutz des Ökosystems 'Süßwasser' eingegangen. Der Herausgeber erwähnt ausdrücklich, daß hier die gesamte Problematik nur an Einzelbeispielen aufgezeigt werden kann und sich weitere Bearbeiter limnischer Zusammenhänge angesprochen fühlen sollten, einen oder mehrere potentielle Supplementbände mit entsprechenden neuen Studienergebnissen zu füllen. Die umfangreichen Indices erleichtern erheblich die Suche nach Stichworten, wissenschaftlichen Namen und damit die Beatwortung von Einzelfragen. Dieses Buch setzt die Tradition der Behandlung bedeutender Ökosysteme in herausragender Weise, wenn auch nur abrißhaft, fort.

E.-G. Burmeister

25. Commission of the European Communities (ed.): Multilingual Illustrated Dictionary of Aquatic Animals and Plants. - Publishes by Fishing News Books, Office for Official Publications of the European Communities, ECSC-EEC-EAEC, Brussels, Luxembourg, 1993. 518 S.

Das vorliewgende illustrierte Glossar "Wassertiere und -pflanzen" ist Teil eiiner Reihe terminologischer Werke zum Thema Fischerei. Hier sind über 1 500 Arten oder Artengruppen zusammengestellt, die weltweit gehandelt werden oder deren Schutz Ziel entsprechender Rechtsvorschriften ist. Generell angegeben werden der wissenschaftliche Name und die geläufigen Namen in den 10 Hauptsprachen der Europäischen Gemeinschaft. Diesen beigefügt ist eine zeichnerische Darstellung, die jedoch nicht den Anspruch einer vergleichenden Bestimmungstafel erheben kann. Primär ist dieses Buch für die Kommunikation unter Fachverbänden und politisch agierenden Gremien zu verstehen. der Index in den verschiedenen Sprachen erleichtert die Findung der taxonomischen Einheit. Vorangestellt ist eine Liste der aufgeführten Organismen neben einer Einführung in den verschiedenen Sprachen. Vorwiegend werden Fische vorgestellt, daneben jedoch auch wirtschaftlich bedeutende marine Tiere wie Krebse, Weichtiere, Manteltiere, Schwämme, Korallen, Stachelhäuter und Algen. Hinzu kommen die mehr schützenswerten Meeressäuger, Reptilien, Amphibien, deren Auswahl nicht immer verständlich ist. Ein nüchternes Nachschlagewerk, dessen Zitierung Schwierigkeiten bereiten dürfte. E.-G. Burmeister

26. Menken, S. B. J., J. H. Visser & P. Harrewijn (Hrsg.) Proceedings of the 8th International Symposium on Insect-Plant Relationships. - Kluwer Academic Publishers, Dordrecht, 1994. 424 S. ISBN0-7923-2099-9.

In diesem Kongreßbericht sind die Kurzfassungen der Beiträge des Kongresses vom März 1992 allgemein zugänglich gemacht. Die einzelnen Beiträge umfassen in der Regel etwa zwei bis vier Druckseiten. Das Werk ist in folgende Kapitel gegliedert: Insekten-Pflanzen Gesellschaften, Wirtspflanzen Wahl, Genetik und Evolution, Resistenz der Wirtspflanzen, Multitrophische Interaktionen. K. Schönitzer

SPIXIANA	18	2	157–164	München, 01. Juli 1995	ISSN 0341–8391

Beschreibung und systematische Stellung von *Temnorhynchus zairensis*, spec. nov. aus Zaïre

(Insecta, Coleoptera, Scarabaeoidea, Melolonthidae, Dynastinae, Pentodontini)

Von **Frank-Thorsten Krell**

Krell, F.-T. (1995): Description and systematic position of *Temnorhynchus zairensis*, spec. nov. from Zaïre (Insecta, Coleoptera, Scarabaeoidea, Melolonthidae, Dynastinae, Pentodontini). – Spixiana **18/2**: 157-164

Temnorhynchus zairensis, spec. nov. from Zaïre is described. It is distiguished from other species by the combination of the following characters: broad egg-shaped epicranial plate with completely wrinkled puncture; lateral parts of the parameres convex, hence visible from dorsal; ocular canthus bristled; pronotum without hypertrophies, without median tubercle; apex of hind tibiae frequently with one or two bristles. The systematic position of the new species is discussed. Its sister group is not diagnosable.

Dipl.-Biol. Frank-Thorsten Krell, Bayerische Julius-Maximilians-Universität, Theodor-Boveri-Institut, Lehrstuhl Zoologie III, Biozentrum, Am Hubland, D-97074, Germany.

Einführung

Während der abschließenden Arbeiten an der phylogenetischen Revision des ostmediterran-afrotropischen Genus *Temnorhynchus* Hope, 1837 (Krell 1993, 1994) fanden sich neun Individuen, deren Merkmalsausprägungen außerhalb der Variationsspektren der bisher beschriebenen Arten liegen und die daher als Individuen einer neuen Art, *Temnorhynchus zairensis*, spec. nov., diagnostiziert und benannt werden können. Da es aus technischen Gründen nicht mehr möglich war, die neue Art in der phylogenetischen Analyse (Krell 1993) zu behandeln, wird deren systematische Stellung im Anschluß an die Beschreibung diskutiert.

Verleihende Institutionen

MGFT Museum G. Frey, z. Zt. München
MRAC Musée Royal de l'Afrique centrale, Tervuren

Temnorhynchus zairensis, spec. nov.

Typen. Holotypus: ♂, COLL. MUS. CONGO, Kwango: Mekwo, 3-X-1939, Vleeschonwers, R. DET. F. 5069 (MRAC). - Paratypen: 3♂♂, MUSÉE DU CONGO, Sankuru: Kondue, Coll. Ed. Luja, R. DET. F. 5069 (MRAC); 1♂, 1♀, Musée du Congo, Région de Sassa, 1895-96, Colmant, R. DET. F. 5069 (MRAC); 1♂, mit gleichen Daten, zusätzlich: *Temnorhynchus rugatus* (MGFT); 1♂, MUSÉE DU CONGO, de Kwamouth à Port Franqui-V-1930, R. P. Vanderyst, R. DET. F. 5069 (MRAC); 1♂, COLL. MUS. CONGO, Kwango: Popokabaka, III-1952, L. Pierquin (MRAC).

Das Etikett "R. DET. F. 5069" bezieht sich auf die Determination von Paulian als *T. rugatus* (Kolbe) (cfr. die Etikettierung eines *T. rugatus*, wiedergegeben in Krell 1994: 139). Die Exemplare wurden bereits von Paulian (1946: 32) und Burgeon (1947: 300) unter diesem Namen aufgeführt.

Locus typicus: Mekwo (Mekono, Mekno) (Zaïre): 3°45'S, 17°17'E [Q1]*; Ort links des Kwango (Kouango) zwischen den Mündungen des Leguane und des Moboué, ca. 54 km südlich von Bandundu (Banningville). Vegetationszone nach White (1983): Guineo-Congolian rain forest: drier types.

Weitere Lokalitäten (s. Abb. 16): Ilebo (Zaïre): 4°19'S, 20°35'E [Q2], Guineo-Congolian rain forest: drier types; Kondue (Zaïre): 4°57'S, 23°21'E [Q3]; 4°58'S, 23°16'E [Q4], Guineo-Congolian rain forest: drier types; Kwamouth (Zaïre): 3°10'S, 16°12'E [Q2], Guineo-Congolian rain forest: drier types/mosaic of Guineo-Congolian rainforest and secondary grassland; Popokabaka (Zaïre): 5°42'S, 16°35'E [Q2], Guineo-Congolian rain forest: drier types; Port Francqui = Ilebo; Sassa (Zaïre): 5°05'N, 25°30'E [Q5]**, Mosaic of Guineo-Congolian rainforest and secondary grassland.

Diagnosis. 14.8-19.8 mm long; dark red brown/very dark brown. Lamina epicranialis wrinkledly punctate, broadly egg-shaped, in the male deeply emarginated, lateral margins strongly convergent, dorsolateral tips acute- to obtuse-angled. Ocular canthus bristled. Outer side of mandibles three-dentate. Antennae 10-jointed without symphysocery. Pronotum strongly, confluently punctate. Puncture of small pronotal depression or cavity of male finer. Male cavity neither carinate nor tuberculate. Female without cavity. Elytra stongly punctate. Metacalcaria parallel-sided, spatula-shaped, sides at the tip more or less convergent. Metatibial apex frequently with one or two bristles. Sides of parameres convex, visible from dorsal; apex of parameres slightly broadened.

Beschreibung

♂. Habitus. Abb. 1-2 (als Holotypus wurde ein vollständiges und wenig abgenütztes Individuum ausgewählt).

Dimensionen. Körperlänge: 14.8-19.8 mm (arithmetisches Mittel $x_{n=8}$=17.3 mm, Variationsbreite w=5.0 mm=29 %), Holotypus: 18.5 mm; größte Breite im Bereich des Pronotum: 6.7-8.4 mm ($x_{n=8}$=7.7 mm, w=1.7 mm=22 %), Holotypus: 8.4 mm; größte Breite im Bereich der Elytren: 8.3-10.0 mm ($x_{n=6}$=9.1 mm, w=1.7 mm=19 %), Holotypus: 9.7 mm; Relation Elytrenbreite/Pronotumbreite: 1.15-1.21 ($x_{n=6}$=1.18, w=0.06=5 %), Holotypus: 1.15; Relation Körperlänge/Elytrenbreite: 1.81-1.99 ($x_{n=6}$=1.93 (w=0.18=9 %), Holotypus: 1.91.

Färbung. Kopf und Pronotum dunkel rotbraun bis schwarzbraun, Pronotum seitlich heller. Elytren dunkel orangebraun bis rotbraun, so hell wie die Lateralbereiche des Pronotum. Ventralseite und Beine orangebraun, Tibiae und Tarsi dunkler. Fühler orangebraun, Scapus, Pedicellus und Funiculus oft dunkler.

Mikroskulptur. Pronotum zwischen den Punkten, Elytren, Scutellum, Teile des Caput, Femora und Tibiae durch feine Risse variabler Ausrichtung gestrichelt (ähnlich wie auf Abb. 78 in Krell (1992: 346), zumeist jedoch schwächer). In glatten Bereichen der Dorsalseite, insbesondere im caudalen Bereich des Scutellum, auf den Elytren sowie auf der Ventralseite, hier besonders auf den Sterniten ist die polygonale, retikuläre Mikroskulptur zu erkennen, die wir bei den meisten chitinigen Cuticulae finden.

Behaarung. Pronotum, interelytraler Bereich des Scutellum und Elytren dorsal kahl. Caput und Thorax ventral lang orangebraun behaart. Epimeren des Pronotum lang und dorsad gebogen beborstet. Basis des Pronotum unterhalb der Randung dicht gelbbraun behaart. Elytren am Basalrand sowie an der Unterseite des Außenrandes kurz und relativ gleichmäßig hell behaart. Diese Behaarung läuft um den Apex der Elytren herum bis auf den Apikalbereich der Interelytralsutur. Epipleuren der Elytren kahl, jedoch mit weitläufiger, mikroskopischer Punktreihe. Metasternalplatte diskal median kahl. Abdominalsternite mit je einer transversalen Borstenpunktreihe, die median kaum reduziert ist. Lateralbereiche der Sternite feiner, flächig behaart. Borstenpunktreihe des Abdominalsternits VIII rückt median bogenförmig vom Caudalrand ab. Holotypus: Lateralbereiche der cranialen Randung

---

* Quellen der geographischen Koordinaten: Q1: Sérvice Géographique de l'Armée, Paris 1935. Croquis de l'Afrique française au 1.000.000ᵉ. **S.A_33** Franceville. – Q2: Kümmerly + Frey & Rand McNally & Westermann (Hrsg.) 1986. Internationaler Atlas. – Q3: Lekkerkerk, R. W. & Krikken, J. 1986. Taxonomic review of the afrotropical genus Dicronorhina Hope, with notes on its relatives (Coleoptera: Cetoniidae). - Zool. Verh. Leiden **233**: 46 pp. – Q4: Bamps, P. 1968. Flore du Congo du Rwanda et du Burundi. Index des lieux de récolte (cités dans les volumes I à X). - Bruxelles: Jardin botanique national de Belgique. 191 pp., 1 Karte. – Q5: Chapin, J. P. 1954. The birds of the Belgian Congo. Part 4. - Bull. Am. Mus. nat. Hist. **75B**: Xi + 846 pp., 27 pls.

** Es existiert noch ein Fluß gleichen Namens sowie mindestens zwei Orte namens Sasa in Zaïre. Basilewski (in litt. 1993) teilte mit, welcher Ort hier besammelt wurde.

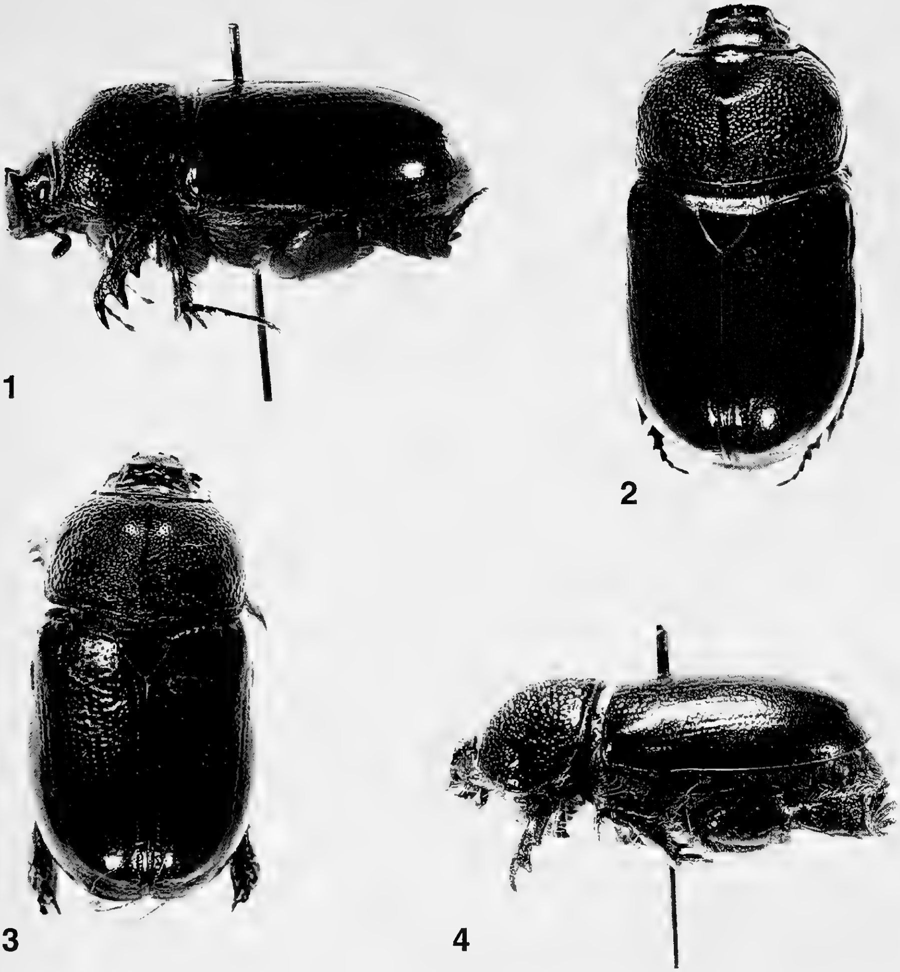


Abb. 1-4: *Temnorhynchus zairensis*, spec. nov., Habitus. 1-2. Holotypus, ♂. 1. Lateralansicht, 2. Dorsalansicht. 3-4. Paratypus, ♀, Sassa. 3. Dorsalansicht, 4. Lateralansicht.

des Pronotum dorsal fein beborstet. Die Punkte im Basal- und Lateralbereich des Epicranium tragen feine Borsten. Beide Beborstungen sind bei allen anderen Individuen nicht (mehr) vorhanden.

Lamina epicranialis (Abb. 5, 11-13). Breit eiförmig bis breit oval mit bogen- bis halbkreisförmiger dorsomedianer Ausrandung, die beiden Seitenstücke spitz zulaufend (Abb. 5, 11) bis stumpfwinklig (Abb. 12-13) abgerundet. Fläche der Lamina konvex gewölbt. Lateralrand bis oberhalb der breitesten Stelle der Lamina kielförmig (bei Abnutzung fein wulstförmig). 1.14-1.37× so breit wie hoch ($x_{n=8}$ = 1.26×, w = 0.23 = 18 %), Holotypus: 1.18×. Der Abstand der Spitzen der Clypealzähnchen entspricht 24 %-31 % der Maximalbreite der Lamina ($x_{n=7}$ = 26 %, w = 7 Prozentpunkte = 27 %), Holotypus: 31 %. Beim größten Individuum von 19.8 mm Körperlänge beträgt die Höhe der Lamina 2.3 mm und deren Breite 2.7 mm, beim kleinsten Individuum von 14.8 mm Körperlänge 1.6 mm bzw. 2.1 mm. Arithmetische Mittel (n = 8): Höhe: 1.9 mm (w = 0.7 mm = 37 %), Breite: 2.4 mm (w = 0.6 mm = 25 %), Holotypus: Höhe: 2.3 mm, Breite: 2.7 mm. Skulptur kräftig querverrunzelt, bei nicht abgenutzten Individuen sind die Runzeln kielartig erhaben und netzartig verbunden, die Querrunzeln herrschen vor. Die Runzelung zieht sich bis in die Spitzen der lateralen Hörnchen und wird hier nur wenig schwächer. Die Clypealzähnchen sind flach und von eigentümlicher Ausprägung, die an *T. overlaeti* erinnert: Die Lateralrandung der Lamina zieht kielförmig bis in den Cranialbereich, ist hier aufgebogen und fällt senkrecht zur

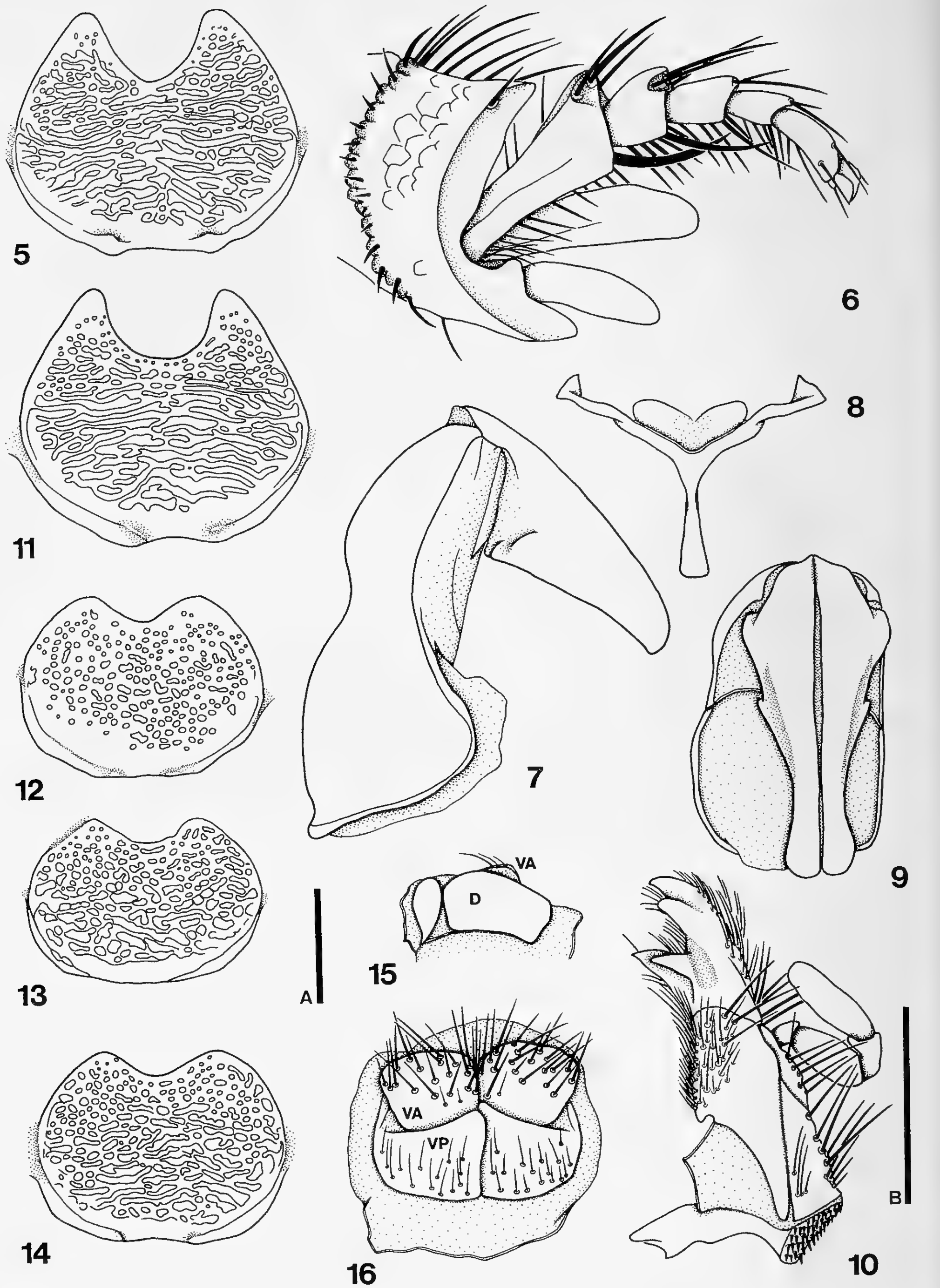


Abb. 5-16: *Temnorhynchus zairensis*, spec. nov. 5-10. Holotypus, ♂. 5. Lamina epicranialis. 6. Apex des linken Hinterbeins. 7. Aedoeagus von lateral. 8. Spiculum gastrale von ventral. 9. Aedoeagus von dorsal. 10. Linke Maxille von ventral. 11. Paratypus, ♂, Kwamouth-Ilebo (MRAC), Lamina epicranialis. 12. Paratypus, ♂, Sassa (MRAC), Lamina epicranialis. 13. Paratypus, ♂, Sassa (MGFT), Lamina epicranialis. 14-16. Paratypus, ♀, Sassa (MRAC). 14. Lamina epicranialis. 15. rechte dorsale Vaginalpalpen. 16. weibliche äußere Genitalien von ventral. Maßstäbe: 1 mm (A für 5-9, 11-16; B für 10).

Fläche der Lamina ab (Abb. 5, 14), so daß Clypealzähnchen entstehen. Bei den übrigen *Temnorhynchus*-Arten bildet die kielförmige Randung nicht die Dorsalkante der Clypealzähnchen, sondern geht breit wulstförmig in die Dentikel über oder ist lateral der Dentikel reduziert.

Ocularcanthus. Ventromedian gekielt, dorsal konkav, apikal nicht verflacht, rechtwinklig bis stumpfwinklig. Am Apex mit mehreren Borsten.

Maxillae (Abb. 10). Mit zwei basalen und zwei apikalen Zähnchen.

Mandibulae. Apiculus außen dreilappig. Der basale Lappen ist flach und breit, der mittlere Lappen ist dem apikalen genähert.

Labium. Diskal aufgewölbt, basal und breit lateral weitläufig, sehr lang beborstet. Die Borsten sind teilweise länger als die Breite des Labium. Zwischen den anterioren Lateralprocessi ein Büschel kurzer, feinerer Borsten; die Processi selbst stumpfwinklig, dazwischen flach dreieckig ausgeschnitten, median zusätzlich schmal, spitzwinklig eingeschnitten.

Antennae. 10-gliedrig, alle Antennomere regulär ausgeprägt.

Pronotum. Punktur kräftig, zusammenfließend, verrunzelt. Lateralcallus größtenteils unpunktiert. Punktierung der Lateralränder schwächer. Craniale Absturzfläche schwächer, zur Mitte hin immer feiner werdend punktiert. Caudal der Impression zeichnet sich eine schmale, in ihrer cranialen Hälfte unpunktierte, caudad undeutlicher werdende, glatte Mittellinie ab. Die craniale Absturzfläche ist bei den kleinsten Individuen nur als schmale und kurze, noch konvexe Verflachung der Halsschild-Wölbung mit schwächerer Punktur ausgebildet. Mit stärkerer Ausprägung bildet sich die breite Medianfurche aus, bis schließlich eine konkave, dreieckige Impression von maximal 40 % der Länge des Pronotum vorliegt, die ein wenig breiter als die Lamina ist. Bei stärkster Ausprägung ist der Medianbereich der Impression völlig unpunktiert; deren Rand immer ohne Wulst oder Zähnchen. Beim größten Individuum erscheint der craniale Rand der glatten Medianlinie am Caudalrand der Impression als angedeutete, kleine Beule.

Tibiae. Protibiae mit drei kräftigen Zähnen am Außenrand. Apikalsporne (Calcaria) der Protibiae regelmäßig zugespitzt, auf der Höhe zwischen dem mittleren und basalen Außenzahn eingelenkt, reicht bis zum Ende des ersten Protarsomers. Anteapikale Querleiste der Mesotibiae erreicht nicht den Apex der Tibia. Anteapikale Querleiste der Metatibiae regelmäßig gezähnelt und beborstet, in für *Temnorhynchus* üblicher Entfernung vom Apex (Abb. 6). Apex der Metatibiae: Holotypus (Abb. 6) und 1♂ aus Kwamouth: beide Tibiae mit einer kräftigen Borste ventral am distalen Ende des Apex; der ventroapikale Rand der Tibiae ist im Bereich der Borste gekerbt. 1♂ aus Kondue: linke Tibia mit zwei kräftigen, aber am Ende gespaltenen Borsten am distalen Ende des Apex, davon eine ventral und eine dorsal; rechte Tibia ohne Borste oder Borstenpunkt-Rudiment. 1♂ aus Kondue: beide Tibiae mit einer kräftigen Borste ventral am distalen Ende des Apex; der ventroapikale Rand der Tibiae ist im Bereich der Borste gekerbt; die Borsten selbst sind am Ende regelmäßig aufgefächert bzw. unregelmäßig mehrfach gespalten. 1♂ aus Kondue: rechte Tibia mit Borstenpunkt ventral am distalen Ende des Apex; der ventroapikale Rand der Tibiae ist im Bereich der wohl abgebrochenen Borste gekerbt; linke Tibia fehlt. 2♂♂ aus Sassa, 1♂ aus Popokabaka: ohne Borste oder Borstenpunkt-Rudiment. Calcaria der Metatibiae: flach spatelförmig, zum Ende jedoch mehr (Abb. 6) oder weniger verschmälert.

Interelytraler Bereich des Scutellum. Glatt, unpunktiert, 1.19×-1.35× so breit wie lang ($x_{n=7}$=1.26×, w=0.16=13 %), Holotypus: 1.27×.

Elytren. Relativ kräftig, ocelliert punktiert, dazwischen mit unregelmäßiger, mikroskopischer Punktur; kräftige Punkte teilweise in Reihen, dazwischen unregelmäßig angeordnet; Punktur caudad schwächer werdend; Humeralcallus, Anteapicalcallus und Lateralbereiche der Elytren nur mikroskopisch punktiert; lateral und caudal des Anteapicalcallus kräftig, unregelmäßig auf unebenem, teilweise verrunzeltem Grund punktiert.

Prosternalprocessus. Ventralfläche konvex, marginal kräftig und lang beborstet, auch in der cranialen Hälfte, selten auch weiter hinten mit einigen langen Borsten, die aus körnchenartigen Borstenpunkten entspringen; beim wohl frisch geschlüpften Holotypus ist die gesamte Ventralfläche von mikroskopisch feinen, hellen Härchen weitläufig bedeckt, die bei den anderen Individuen nur noch selten vorhanden sind.

Pygidium. In einem schmalen basalen Streifen glatt, in der cranialen Hälfte raspelig punktiert und behaart, in den Basalecken gedrängt runzelig; apikale Hälfte weitläufiger bis spärlich punktiert und behaart.

Genitalapparat (Abb. 7-9). Parameren apikad schwach erweitert, konvexe Seitenflächen der Parameren bis zu den Lateralzähnchen von dorsal sichtbar.

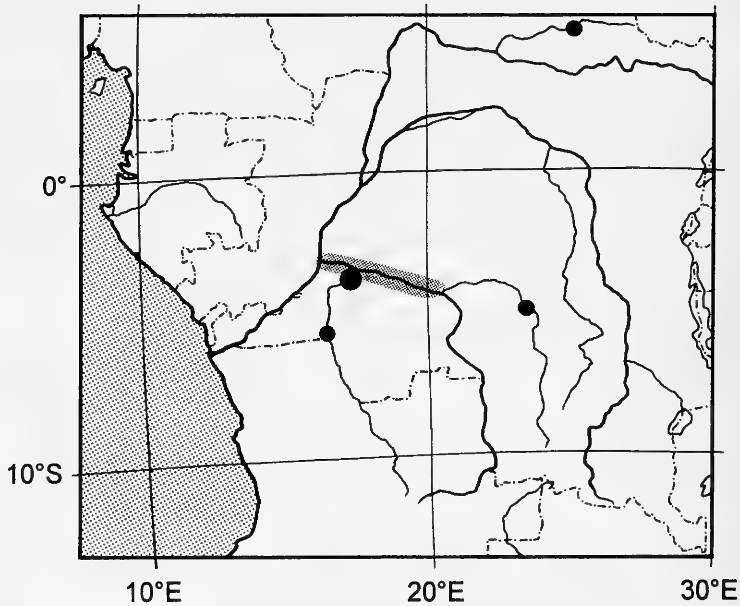


Abb. 17. Karte der Fundorte von *Temnorhynchus zairensis*, spec. nov. Der Locus typicus ist durch einen größeren Kreis dargestellt.

♀. Habitus. Abb. 3-4.

Dimensionen. Körperlänge: 17.5 mm; größte Breite im Bereich des Pronotum: 7.8 mm; größte Breite im Bereich der Elytren: 9.0 mm; Relation Elytrenbreite/Pronotumbreite: 1.15; Relation Körperlänge/Elytrenbreite: 1.94.

Merkmale. Wie beim ♂, mit folgenden Ausnahmen:

Lamina epicranialis. Ähnlich wie bei kleinen ♂♂; 1.33 × so breit wie hoch (2.4 mm breit, 1.8 mm hoch) (Abb. 14). Der Abstand der Spitzen der Clypealzähnchen entspricht 29 % der Maximalbreite der Lamina.

Pronotum. Punktur wie beim ♂, aber im medianen Cranialbereich ein wenig schwächer werdend. Pronotum auch hier gleichmäßig konvex, ohne Impression oder Depression. Die glatte Mittellinie zieht sich über die ganze Länge des Pronotum.

Anteapikale Querleiste der Mesotibiae. Endet relativ weit vor dem Apex der Tibia.

Apex der Metatibiae. Ohne Borsten, ohne Borstenpunkt-Rudiment.

Interelytraler Bereich des Scutellum. Glatt, unpunktiert, 1.27 × so breit wie lang (1.9 mm breit, 1.5 mm lang).

Genitalapparat (Abb. 15-16). Ventrale proximale Vaginalpalpen fein behaart, ventrale apikale Vaginalpalpen kräftig beborstet. Dorsalseite teilweise beschädigt.

Phänologie. Nur drei Funddaten sind bekannt. Der Holotypus aus Mekwo wurde am 3.X., das ♂ aus Popokabaka im März und das ♂ aus der Gegend zwischen Kwamouth und Ilebo im Mai aufgefunden, d.h. in den ersten und letzten Monaten der Regenzeit.

Autökologie und Biogeographie. Die Art wurde in den trockeneren Randgebieten des Guinea-Congo-Regenwaldes sowie im angrenzenden Mosaik aus Regenwald und sekundärem Grasland aufgefunden. Möglicherweise wird der feuchtere Typ des Guinea-Congo-Regenwaldes gemieden. Das Vorkommen nördlich und südlich dieses feuchteren Bereiches des Congo-Beckens weist auf Reliktpopulationen hin, deren Arealsystem mit der Ausbreitung des Regenwaldes nach dem letzten glazialen Maximum an die Randbereiche des Congo-Beckens gedrängt wurde.

Differentialdiagnose. *T. zairensis* unterscheidet sich von *T. coronatus* durch die durchschnittlich geringere Größe, die Umrißform der Lamina epicranialis, insbesondere deren apikalwärts deutlich konvergierende Seiten, durch die von dorsal sichtbaren Seitenteile der Parameren, den fehlenden

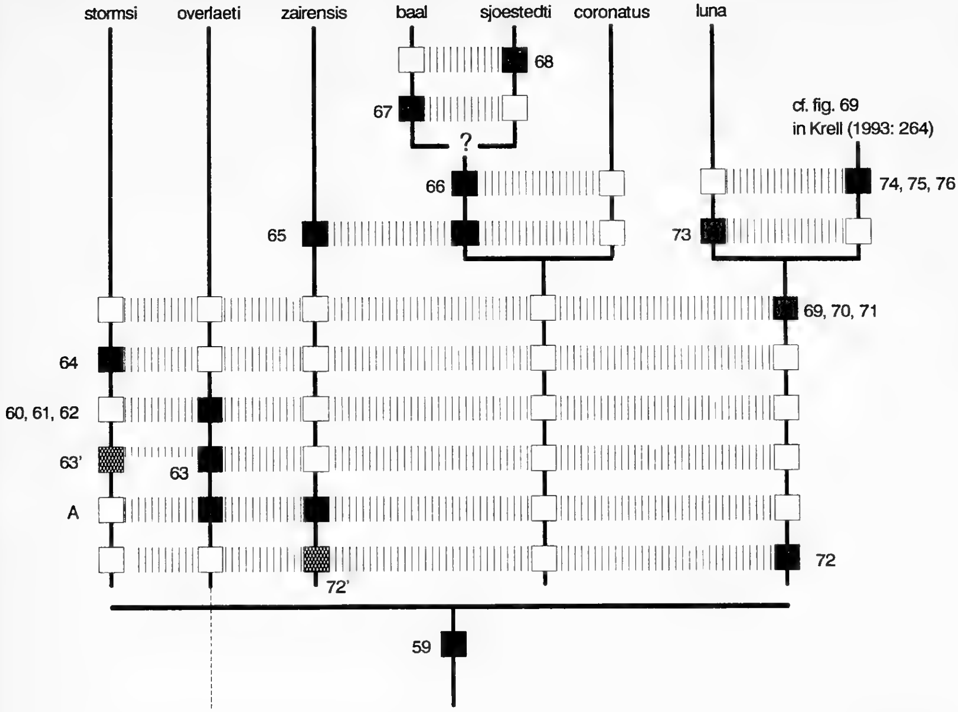


Abb. 18. Phylogenetisches Argumentationsschema der Sammelgruppe 4.3. (Krell 1993: 277). Nach Krell (1993: 263: Fig. 89) verändert und aktualisiert; die Zahlen beziehen sich auf die Apomorphien, die dort diskutiert werden.

Mediandentikel des männlichen Pronotum sowie durch die oft vorhandene Borste distal am Apex der Metatibiae; von *T. baal*, *T. sjoestedti*, *T. burgeoni*, *T. raffrayi* und *T. zambezianus* s. str. durch die Beborstung des Ocularcanthus; von *T. rugatus* durch die durchschnittlich geringere Größe, die ganzrandige Lamina und deren Umrißform (cfr. Diagnose von *T. rugatus* in Krell 1992: 327ff); von *T. luna* und *T. tridentatus* durch die vollständig verrunzelte Lamina epicranialis und deren Umrißform; von *T. overlaeti* die nur wenig eingedrückte Pronotum-Impression und die nicht hypertrophierte Skulptur des Pronotum beim ♂. Verwechslungen mit anderen Arten sind unwahrscheinlich. *T. zairensis* ist in der Bestimmungstabelle in Krell (1994) enthalten.

Die systematische Stellung von *T. zairensis*, spec. nov.

Das phylogenetische System der Gattung *Temnorhynchus* wurde in einer vorangehenden Arbeit diskutiert (Krell 1993). *T. zairensis* weist die dort aufgeführte Autapomorphie 55 sowie die Apomorphien 56 und 57 (p. 275) auf, nicht jedoch die Autapomorphien der vorläufig gleichrangigen Schwestertaxa. Somit befindet sich *T. zairensis* im Subgenus *Temnorhynchus* s.str.

Als Autapomorphie für die Gattung *Temnorhynchus* wurde die Reduktion des Borstenkranzes am Apex der Metatibien postuliert (Krell 1993: 247). Diese ist zumeist als vollständige Reduktion ausgeprägt, bei *T. (Temnorrhynchodes) descarpentriesi* jedoch sind noch mehrere Borsten im Distalbereich vorhanden. Einzelne Borsten finden wir manchmal noch bei *T.* (sed. inc.) *grandicornis*, *T.* (sed. inc.) *cribratus* und *T.* (s. str.) *overlaeti* (l.c.). Auch bei der neuen Art *T.* (s. str.) *zairensis* konnten derartige Borsten festgestellt werden. Es bleibt offen, ob es sich bei diesen einzelnen Borsten um häufig auftretende Atavismen (d.h. artspezifische Autapomorphien) oder um Plesiomorphien handelt. Im letzteren Falle, für den auch die bisherige Stellung der entsprechenden Arten im System spricht, sollten wir eine frühe Abzweigung von *T. zairensis* von der Masse der *Temnorhynchus*-Arten annehmen, die keine metatibiale Apikalborste mehr aufweisen. Diese Hypothese wird unterstützt durch die Beborstung des

Ocularcanthus, die nach Außengruppenvergleich als Plesiomorphie für *Temnorhynchus* anzusehen ist und bei verwandten Arten reduziert ist.

Bei Abnutzung erinnert der Vorderrand der Lamina epicranialis an *T. overlaeti*, von dem nur abgenutzte Laminae bekannt sind. Sollten Lateralrandung und Dentikel der Lamina bei frischen Individuen von *T. overlaeti* ebenso eigentümlich ausgeprägt sein wie bei *T. zairensis* (s.o.), handelt es sich um eine Synapomorphie (A in Abb. 18).

Da *T. zairensis* eine ganzrandige Lamina epicranialis besitzt (Synapomorphie 59), kann er der Sammelgruppe 4.3. zugerechnet werden, die aus den Taxa *T. overlaeti*, *T. stormsi*, {*T. coronatus* + *T. baal* + *T. sjostedti*} und {*T. luna* + *T. tridentatus* + *T. burgeoni* + *T. raffrayi*-Gruppe + *T. zambezianus* + *T. kasanganus* + *T. clypeatus* + *T. elongatus* + *T. retusus*} besteht. Im vorgeschlagenen System stehen diese Taxa gleichrangig in der Sammelgruppe 4.3., da die Schwestergruppenverhältnisse nicht bestimmbar sind (Abb. 18).

Die Lateralflächen der Parameren sind bei *T. zairensis* von dorsal sichtbar, weil sie nach außen gewölbt sind. Bei den größeren Species der Sammelgruppe 4.3.4. (*T. luna* + *T. tridentatus* + *T. clypeatus* + *T. elongatus*) kommt diese Sichtbarkeit durch die Verschmälerung der Dorsalflächen der Parameren zustande (Synapomorphie 72, Krell 1993: 285, 318: Abb. 101). Es kann jedoch nicht ausgeschlossen werden, daß beide Ausprägungsformen auf eine gemeinsame Ausgangsform zurückgehen. Wenn die Verschmälerung der Dorsalflächen gegenüber der bloßen Aufwölbung der Lateralflächen der Parameren apomorph wäre, könnte ein Schwestergruppenverhältnis zwischen *T. zairensis* und der Sammelgruppe 4.3.4. bestehen.

Durch die fehlende Pronotum-Impression beim ♀ und den reduzierten Mediandentikel des Pronotum beim ♂ könnte *T. zairensis* als Adelphotaxon von {*T. baal* + *T. sjoestedti*} betrachtet werden, was jedoch der biogeographischen Hypothese widerspricht, die eine geographische Speciation zwischen *T. baal* und *T. coronatus* postuliert (Krell, in Vorb.). Die Nähe zum Taxon {*T. coronatus* + *T. baal* + *T. sjoestedti*} ist aufgrund der morphologischen Merkmalsausstattung wahrscheinlich. Da kein begründetes Schwestergruppenverhältnis festgestellt werden kann, bleibt *T. zairensis* vorerst gleichrangig mit den übrigen oben aufgeführten Taxa in der Sammelgruppe 4.3. (Abb. 18).

Danksagung

Dank gebührt Herrn Dr. G. Scherer, Zoologische Staatssammlung, München, sowie Herrn Dr. M. André, Musée Royal de l'Afrique Centrale, Tervuren, für die geduldige Ausleihe des hier beschriebenen Materials. Dr. P. Basilewsky, Tervuren, half bei der Lokalisierung des Fundorts Sassa. Frau M. Hohloch, Zoologisches Institut der Universität Tübingen, fertigte die Photographien an.

Literatur

Burgeon, L. 1947. Catalogues raisonnés de la faune entomologique du Congo Belge. Coléoptères Dynastinae, Valginae, Melolonthinae p. p. - Annls Mus. Congo Belge C, Zoologie, Série III (II), Tome **5**: 277-340

Krell, F.-T. 1992. Verschmelzung von Antennomeren (Symphysocerie) als Regelfall bei *Temnorhynchus repandus* Burmeister, 1847, sowie phylogenetische, taxonomische, faunistische und nomenklaturische Anmerkungen zu diversen Taxa dieser Gattung (Coleoptera. Scarabaeoidea, Melolonthidae, Dynastinae, Pentodontini). - Dt. ent. Z., N. F. **39**: 295-367

-- 1993. Phylogenetisch-systematische Revision des Genus *Temnorhynchus* Hope, 1837 (Coleoptera: Scarabaeoidea: Melolonthidae: Dynastinae: Pentodontini). 1. Teil: Phylogenetische Analyse, mit Anmerkungen zur phylogenetisch-systematischen Methodologie. - Beitr. Ent. **43**: 237-318

-- 1994. Phylogenetisch-systematische Revision des Genus *Temnorhynchus* Hope, 1837 (Coleoptera: Scarabaeoidea: Melolonthidae: Dynastinae: Pentodontini). 2. Teil: Bestimmungstabelle, Katalog, Bibliographie, Gazetteer und Material-Listen. - Beitr. Ent. **44**: 83-155

Paulian, R. 1946. Le genre *Temnorrhynchus* Hope (Col. Scarabaeidae). - Bull. Mus. r. Hist. nat. Belg. **22**, 7: 36 pp.

White, F. 1983. UNESCO/AETFAT/UNSO vegetation map of Africa. Scale 1:5000000. 3 Karten, 1 Legende. The vegetation of Africa. A descriptive memoir to accompany the Unesco/AETFAT/UNSO vegetation map of Africa. - Paris: Unesco: 356 pp.

SPIXIANA	18	2	165–176	München, 01. Juli 1995	ISSN 0341–8391

Notes on some leaf beetles from the Passam area, East Sepik Province, and Port Moresby area, Central Province, Papua New Guinea

(Insecta, Coleoptera, Chrysomelidae)

By **T. J. Hawkeswood** and **G. A. Samuelson**

Hawkeswood, T. J. & G. A. Samuelson (1995): Notes on some leaf beetles from the Passam area, East Sepik Province, and Port Moresby area, Central Province, Papua New Guinea (Insecta, Coleoptera, Chrysomelidae). – Spixiana **18/2:** 165-176

A list and notes are provided on 27 species of Chrysomelidae (Coleoptera) from primarily the Wewak-Passam area, East Sepik Province and secondarily from the Port Moresby area, Central Province, Papua New Guinea. Field observations were made from March to December 1989 by TJH. Host plants are recorded for 20 species or 74 % of all chrysomelids treated. Data on plant hosts are also reported.

Trevor J. Hawkeswood, c/- North Star Caravan Resort, Hastings Point, New South Wales 2489, Australia.

G. A. Samuelson, J. Linsley Gressitt Center for Research in Entomology, Bishop Museum, P. O. Box 19000-A, Honolulu, Hawaii 96817, U.S.A.

Introduction

Plant host associations and the biology of New Guinean Chrysomelidae remain incompletely known. This is especially so for members of the Eumolpinae, Chrysomelinae, Galerucinae, and Alticinae. However, the late J. L. Gressitt provided much impetus in gaining biological information on many of these beetles, particularly Hispinae. Since Gressitt's death in 1982, further knowledge has also been forthcoming, and continued in part by one of us, GAS. Currently, rainforest canopy studies in Papua New Guinea (PNG) have produced a wealth of chrysomelids (Allison, Miller, & Samuelson, unpublished), and associated studies on feeding habits have been ongoing (Basset & Samuelson, unpublished). In 1989, opportunity arose for one of us, TJH, to spend nine months in PNG, and the results of that visit are reported here. Most of the survey was undertaken in village gardens and bordering rainforests in the Wewak-Passam area. In addition, part of March 1989 was spent in the woodlands and gardens in the Port Moresby area, where some collections and observations were undertaken. A part of the information gained from these field studies was published elsewhere (Hawkeswood 1991).

Material and Methods

A. Study area, climate and vegetation.

Observations and collections of chrysomelids were undertaken mostly in and around the village of Passam (3°45'S, 143°35'E) and around Wewak (3°33'S, 143°38'E) in East Sepik Province, PNG. The area receives an average monthly rainfall ranging from 128 mm to 225 mm and maximum daily temperatures range from 29 °C to 35.5 °C, while minimum daily temperatures range from 18 °C to 22 °C throughout the year. The first half of 1989 was abnormally wetter than usual, and temperatures were cooler than average. The humidity of this area remains high, commonly between 70 % and 90 % throughout the year. The highest humidity readings, December to May, correspond to larger amounts of cloud cover, which varies from 65 % to 92 % daily. The average altitude of the Passam area is 960 m.

According to Robbins (1968) the vegetation of the Passam-Wewak area is composed of lowland hill (rain) forest with three main tree layers. The rainforest is of a very mixed composition with more than 60 tree species having been recorded from the canopy layer alone (Robbins 1968). Some of the common and dominant tree and shrub species of the area include: *Canarium indicum* L. (Burseraceae), *Alstonia scholaris* R. Br. (Apocynaceae), *Intsia bijuga* (Colebr.) Kuntze (Caesalpiniaceae), *Artocarpus altilis* (Park) Fosberg and *Ficus* spp. (Moraceae), *Spathodea campanulata* Beauv. (Bignoniaceae), *Pometia pinnata* Forst. f. (Sapindaceae), *Albizia falcataria* L. Back. (Mimosaceae), *Schizomeria serrata* (Hochr.) Hochr. (Cunoniaceae), *Flindersia amboinensis* Poir. (Flindersiaceae), *Euodia* spp. (Rutaceae), *Celtis* sp. (Ulmaceae), *Vitex cofasus* Reinw. (Verbenaceae), *Terminalia kaernbachii* Warb. (Combretaceae), and *Macaranga quadriglandulosa* Warb. (Euphorbiaceae). A large number of shrubs and herbs are to be found as the ground zone stratum and include *Selaginella* sp. (Selaginellaceae), *Pilea* spp. (Pileaceae), *Pteris* spp. (Pteridaceae), *Pipturus argenteus* (Forst.) Wedd. (Urticaceae), *Piper adunca* L. (Piperaceae), and *Spathoglottis rivularis* Schlecht. (Orchidaceae).

B. Observations and collections of beetles.

Field studies and collections of beetles took place from March to December 1989 by TJH during sunny periods on relatively fine days for up to 2-3 hours at a time when wide transects of the native vegetation and gardens around the villages were walked. Beetles were collected by hand, net, or by beating onto a sheet. Once captured, they were placed in bottles before being taken to the laboratory where they were curated. Later, representatives of all the species were examined by one of us, GAS. Data on beetle behaviour and host plants were also recorded during the 9-month period.

In the treatment below, the subfamily arrangement follows Seeno & Wilcox (1982); arrangement of genera and species appears alphabetically. Most of the specimens were collected by the senior author, abbreviated TJH, in East Sepik Province, ESP but a few records are from Central Province, CP. Specimens are deposited in the TJH collection and in Bishop Museum.

Annotated list of species

Subfamily Criocerinae

Lema sp. near *connectens* Baly

Fig. 1

Lema connectens Baly, 1865: 13 (Aru Islands). - Kimoto et al. 1984: 49 (Kuk, Western Highlands Prov. on cardamom; elsewhere on wild gingers from sea level to 2.000 m altitude).

Lema (Petauristes) connectens: Gressitt, 1965a: 156 (Maffin Bay). Material. PNG: ESP: Passam, 25.III., 22.VIII., 17.IX.1989, on leaves of *Alpinia*, TJH (6).

Plant hosts. Zingiberaceae: cardamom, *Elettaria cardamomum* (L.) Maton; various wild gingers. Jolivet (1977: 327) discussed host affinities for *Lema*.

Observations. This species was common on the foliage of *Alpinia* sp. growing at edges of rainforest around the village. Adults produced distinctive feeding marks between the parallel leaf veins of the plant hosts. The beetles were very wary, difficult to catch, and jumped rapidly away from the host plant when disturbed or closely approached. In life, the beetle was bright orange, and black but the orange colour fades to dull yellow testaceous upon death. Larvae were not found but may feed during the night on the leaf laminae and retreat into the leaf bases during the day. The material from Passam may represent an undescribed species.

Figs 1-3. 1. *Lema* sp. near *L. connectens* Baly, Passam, 25.III.1989, TJH, on *Alpinia* sp. (Zingiberaceae) (Scale: 6 mm). 2. *Cadmus* sp. near *C. latus* Gressitt, Passam, 7.VI.1989, TJH, on *Macaranga quadrglandulosa* Warb. (Euphorbiaceae) (Scale: 4 mm). 3. *Phyllocharis apicalis* Baly, Passam, 10.III.1989, TJH, on *Clerodendrum* sp. (Verbenaceae) (Scale: 3.5 mm). (Photos: T. J. Hawkeswood).

Lilioceris doryca (Boisduval)

Lema dorcya Boisduval, 1835: 533 (Dorei).
Crioceris doryca: Weise 1912: 424 (Lorentz-Fluß, Bivak I).
Lilioceris doryca: Gressitt 1965a: 141 (various localities throughout New Guinea).
Material. PNG: ESP: Passam, 22.VIII.1989, on foliage of unidentified vine, possibly *Smilax* amongst other vegetation, TJH (1).
Plant hosts. Smilacaceae. Possibly *Smilax*. Jolivet (1977: 327) discussed host affinities for *Lilioceris*.

Stethopachys papuana Gressitt

Stethopachys papuana Gressitt, 1965a: 186 (Papua). - Hawkeswood 1991: 283-291 (biology, life-stages, host plants).
Material. PNG: ESP: Passam, 22.VIII.1989, from flowers of *Spathoglottis rivularis*, TJH (3).
Plant hosts. Orchidaceae. *Spathoglottis rivularis* Schlecter. Jolivet (1977: 328) discussed host affinities for *Stethopachys*.

Subfamily Cryptocephalinae

Cadmus sp. near *latus* Gressitt
Fig. 2

Cadmus latus Gressitt, 1965b: 439 (NE New Guinea: Wau, Karimui; SE New Guinea: Daradae).
Cadmus: Gressitt 1965b: 419-445 (key, New Guinea species). - Jolivet 1978: 177 (plant hosts listed as hosts for Australo-Papuan species).
Material. PNG: ESP: Passam, 7.VI., 5.VII.1989, on leaves of *Macaranga quadriglandulosa*, TJH (2).
Plant hosts. Euphorbiaceae: *Acalypha*, *Glochidion*, *Homalanthus*, and *Macaranga*. Myrtaceae: *Eucalyptus*. (Jolivet 1978).
Observations. This beetle was not very common and was encountered only in cleared areas at the edges of rainforest. It was found only on *Macaranga quadriglandulosa* Warb. but no feeding was observed.

Subfamily Eumolpinae

Rhyparida sp. near *angulata* Gressitt

Rhyparida angulata Gressitt, 1967a: 310 (NE New Guinea: E Highlands).

Material. PNG: ESP: Passam, 22.VIII.1989, on leaves of *Phaseolus vulgaris,* TJH (1).

Plant hosts. Fabaceae: *Phaseolus vulgaris* L.

Observations. This was an uncommon species at Passam; feeding was not observed.

Rhyparida coriacea Jacoby

Rhyparida coriacea Jacoby, 1895: 57 (New Guinea). - Szent-Ivany & Stevens 1966: 117 (Wau, Morobe Prov.; severe defoliation of *Eucalyptus deglupta*). - Gressitt 1967a: 330 (many localities, mostly NE New Guinea). - Gray 1968: 304 (Goroka, E Highlands Prov.; *E. deglupta* listed as a host). - Gray & Wylie 1974: 72-73 (many hosts listed).

Material. PNG:ESP: Passam, 5.VIII., 11.IX.1989, on leaves of *Phaseolus vulgaris*, on leaves of young plants of *Tectona grandis,* TJH (2).

Plant hosts. Araucariaceae: *Araucaria.* Combretaceae: *Terminalia.* Fabaceae: *Phaseolus vulgaris* L. Myrtaceae: *Eucalyptus deglupta* Blume. Verbenaceae: *Tectona grandis* L.f.

Observations. This was a moderately common species in disturbed sites and at the margins of rainforest adjoining the village.

Rhyparida fasciata Baly

Rhyparida fasciata Baly, 1864: 10 (Dorey, NE New Guinea); 1867: 168 (S New Guinea). - Weise 1912: 426 (Etna-Bai). - Gressitt 1967a: 332 (many localities from NW and NE New Guinea).

Material. PNG: ESP: Passam, 6.III.1989, on foliage of *Solanum torvum*, TJH (3).

Plant hosts. Solanaceae: *Solanum torvum* Sw.

Observations. This species was noted only on *Solanum torvum,* a prickly weed species growing commonly on the sides of roads in the study area. The pale yellow eggs measure 1.6-1.8 mm long and were laid in clusters of up to 8 eggs on the abaxial leaf surface towards the margins. Hatching occurred within 5-6 days after eggs were laid. Some young larvae, which were yellow-green with various black spines, grew to the second instar but then died of a probable bacterial attack. Adults were observed from March to September either on the adaxial leaf surfaces or more commonly on the abaxial surfaces where they were better protected by the host's long spines and better hidden by the foliage. Adults fed on the palisade and spongy mesophyll leaf tissues between the sharp spines. Mating occurred on the main stems, petioles, or the adaxial leaf surfaces towards the margins. Feeding damage to leaves resulted in irregular-shaped holes. Younger leaves at the tops of plants were preferred by larvae and adults but older leaves were also eaten by adults. The beetles were very wary and dropped to the ground at the slightest disturbance, where they were well-camouflaged against old leaves or debris.

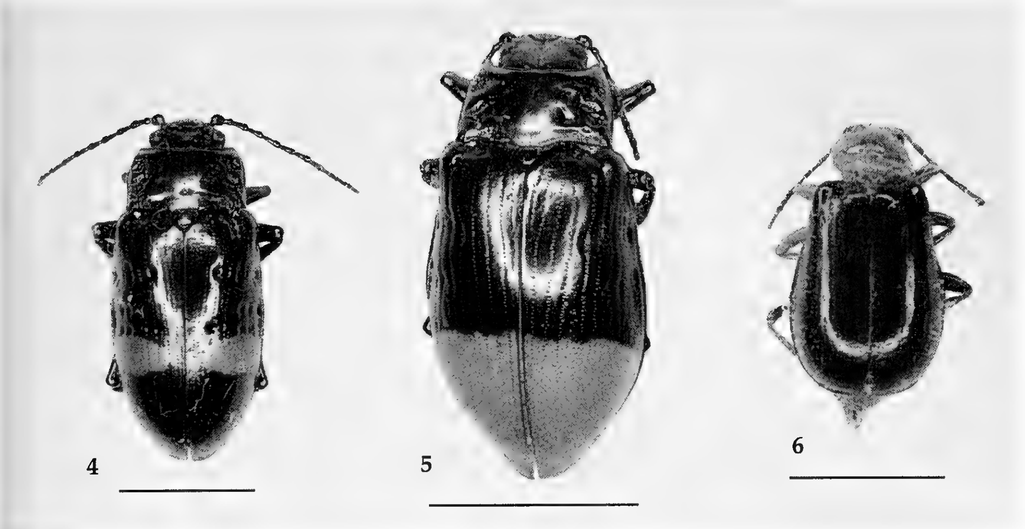
Rhyparida huona Gressitt?

Rhyparida huona Gressitt, 1967b: 552 (NE New Guinea).

Material. PNG:ESP: Passam, 12. and 15.V.1989, on foliage of *Phaseolus vulgaris* L., TJH (2).

Plant hosts. Fabaceae: *Phaseolus vulgaris* L.

Observations. This species was uncommon on *Phaseolus,* which grew as garden escapes at the edges of rainforest around the village houses. The Passam material varies slightly from typical *R. huona.*



Figs 4-6. 4. *Promechus bimaculatus* (Weise), Passam, 10.VIII. 1989, TJH, from *Boerlagiodendron* sp. (Araliaceae) (Scale: 5 mm). 5. *Promechus* sp. near *P. moskowskii* (Kuntzen), Passam, 17.XI.1989, TJH & J. Manuai, amongst grass (Scale: 10 mm). 6. *Aulacophora papuana* Jacoby, Passam, 15.V.1989, TJH & J. Kuwimb, on pumpkin vines, *Cucurbita pepo* L. (Cucurbitaceae) (Scale: 3 mm). (Photos: T. J. Hawkeswood).

Subfamily Chrysomelinae

Phyllocharis apicalis Baly
Fig. 3

Phyllocharis apicalis Baly, 1864: 617 (Dorey, New Guinea); 1867: 284 (further description).

Material. PNG: ESP: Passam, 10.III.1989, on *Clerodendrum* at edge of rainforest, TJH (5); same loc., 15.III.1989, on *Clerodendrum* sapling growing in an old rubber (*Hevea brasiliensis)* plantation, TJH and A. Lakamanga (1).

Plant hosts. Verbenaceae: *Clerodendrum.* This is also the host genus for *Phyllocharis* species in Australia, Vietnam, and Thailand (Hawkeswood 1988, Jolivet 1983, Jolivet et al. 1986).

Observations. Adults were common during March and April on *Clerodendrum* which grew as undergrowth saplings in an old rubber plantation and at the edges of rainforest. The beetle was not observed in the rainforest. The brilliant red colouration of parts of this species dulls after death.

Promechus bimaculatus (Weise)
Fig. 4

Aesernia bimaculata Weise, 1917: 197 (Hollandia, other locals., W New Guinea).

Promechus bimaculatus: Gressitt & Hart 1974: 280 (many localities throughout New Guinea cited).

Material. PNG: ESP: Passam, 7.VI., 2. and 10.VIII., 12.IX.1989, on leaves of *Boerlagiodendron*, TJH (6).

Plant hosts. Araliaceae: *Boerlagiodendron.* Jolivet (1971: 69, 1974: 120) recorded this genus as a host to *Promechus* (cited as *Aesernia*) in Papua New Guinea. Gressitt & Hart (1974: 282) recorded the species on *Boerlagiodendron* from the Kuper Range, PNG.

Observations. Adults were found only on the broad-leaved species of *Boerlagiodendron* growing in TJH's garden at Passam. They were present from June to early October when they fed extensively on the young foliage at the top of the plant. Feeding resulted in deep incisions to the leaf margins.

Promechus sp. near *moszkowskii* (Kuntzen)
Fig. 5

Aesernia moszkowskii Kuntzen, 1913: 94 (Taua, W New Guinea).

Promechus moszkowskii: Gressitt & Hart 1974: 277 (various localities cited for PNG; no biology).

Material. PNG: ESP: Passam, 17.XI.1989, amongst grass, TJH and J. Manaui (1).

Plant hosts. None apparently reported.

Observations. This was the largest chrysomelid collected from the study area, measuring 24 mm. It is a beautiful species, with dark bluish-green head and antennae, golden-green pronotum which is heavily pitted and foveolate at the lateral margins, and basal half of the elytra dark metallic blue with apical half orange-red. The orange-red colour fades after death. The Passam specimen differs somewhat from the typical coloration of *P. moszkowskii.*

Subfamily Galerucinae

Aulacophora indica (Gmelin)

Crioceris indica Gmelin, 1790, Linné, Syst. Nat. ed. 13, 1(4): 1720 (India).

Aulacophora indica: Kimoto 1989: 56.

Material. PNG:ESP: Passam, 5.IX.1989, on flowers of pumpkin vines (*Cucurbita pepo* L.) in a vegetable garden, TJH (2).

Plant hosts. Cucurbitaceae: *Cucurbita pepo* L.

Observations. This widespread species was not very common in the study area; it was restricted to pumpkin vines. The natural colouration of the adult is dark orange, excepting the middle and hind legs, but fades to a duller yellow testaceous upon death.

Aulacophora papuana Jacoby
Fig. 6

Aulacophora papuana Jacoby, 1894: 304 (Andai, New Guinea). - Weise 1908: 318 (Manokwari, Wa Udu).

Material. PNG: ESP: Passam, 15.V., 5., 10. and 17.IX.1989, on flowers of pumpkin growing in village gardens, TJH and J. Kuwimb (6).

Plant hosts. Cucurbitaceae: *Cucurbita pepo* L.

Observations. This was one of the most common *Aulacophora* species noted in the study area and like *A. indica*, it was restricted to pumpkin, where adults fed extensively on the large orange petals and abundant pollen.

Aulacophora pallidofasciata Jacoby?

Aulacophora pallidofasciata Jacoby, 1904: 495 (New Guinea: Haveri, Ighibirei). - Szent-Ivany & Stevens 1966: 117 (host: pumpkin, *Cucurbita pepo*). - Gressitt & Hornabrook 1977: 62 (figure).

Material. PNG: ESP: Passam, 11.V.1989, on leaves of pumpkin growing in village gardens, TJH (1).

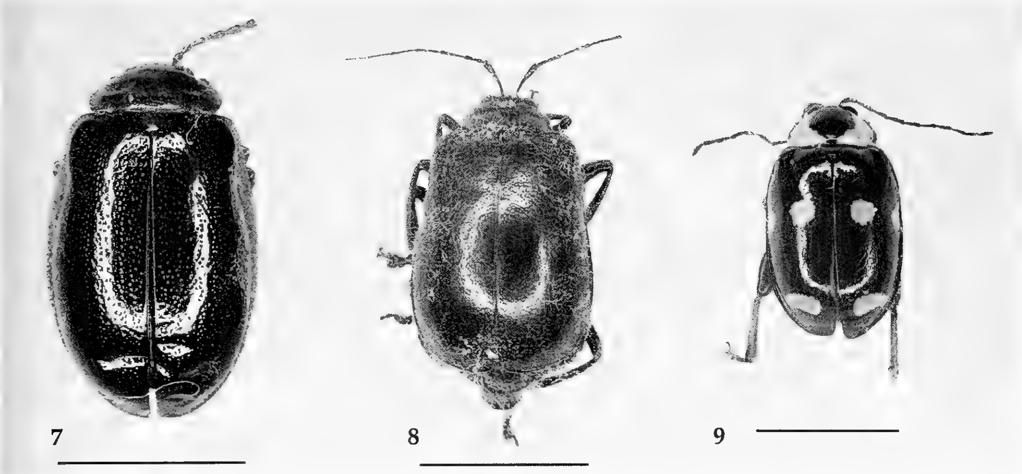
Plant hosts. Cucurbitaceae: *Cucurbita pepo* L.

Observations. This attractive species, with pale yellow head, pronotum and underside of body, and black elytra with a broad, median pale yellow transverse band was not very common in the study area.

Aulacophora sp.

Material. PNG: ESP: Passam, 3.IX.1989, on leaves of pumpkin vines, TJH (1).

Plant hosts. Cucurbitaceae: *Cucurbita pepo* L.



Figs 7-9. 7. *Oides subaenea* Jacoby (?), Passam, 15.V.1989, TJH, on leaves of a sapling of *Hevea brasiliensis* (Willd. ex A. Juss. Muell. Arg. (Euphorbiaceae) (Scale: 5 mm). 8. *Prasyptera* sp., Passam, 23.X.1989, TJH, on bark of unidentified rainforest tree (Scale: 5 mm). 9. *Sutrea sexnotata* Bryant (?), Passam, 17.IX.1989, TJH, flying over shrubs in rainforest (Scale: 3 mm). (Photos: T. J. Hawkeswood).

Observations. This species was the largest of the four *Aulacophora* species noted in the study area but was not common. The adult has a dark reddish head and pronotum, and black elytra with a broad yellowish median fascia.

Oides subaenea Jacoby?
Fig. 7

Oides subaenea Jacoby, 1886: 44.
Material. PNG: ESP: Passam, 15.V.1989, on leaves of a sapling of *Hevea brasiliensis*, TJH (1).
Plant hosts. Euphorbiaceae: *Hevea brasiliensis* (Willd. ex A. Juss.) Muell. Arg. Jolivet (1987: 287) reported that the main hosts for *Oides* are Vitaceae: *Cissus, Cayratia, Vitis*, and *Tetrastigma* but that other families such as Rubiaceae, Malvaceae, Sterculiaceae, and Euphorbiaceae may also be used by *Oides*.

Polysastra sp. *metallica* group

Polysastra Shute, 1983: 220 (*metallica* group Shute, 1983: 227).
Material. PNG: ESP: Passam, 1.VI. 1989, flying, TJH (1).
Plant hosts. Jolivet (1987: 289) reported that *Polysastra* species feed on Sterculiaceae: *Theobroma*, Rubiaceae: *Coffea*, and Zingiberaceae: *Curcuma* and *Elettaria*.
Observations. This species has a dull brownish orange head and pronotum and metallic olive-green elytra. Only one specimen was collected without any hint to its food preferences.

Sastra sp.

Material. PNG: ESP: Passam, 12.XI.1989, flying, TJH (1).
Plant hosts. Jolivet (1971: 63, 1987: 288) reported a member of this genus feeding on *Trema orientalis* L. at Goroka, E Highlands Prov.
Observations. This species has a dull yellow testaceous head and pronotum and brownish elytra.

Prasyptera sp.
Fig. 8

Material. PNG: ESP: Passam, 15. and 23.X.1989, on leaves of *Piper* and on bark of unidentified rainforest tree, TJH (2).

Plant hosts. Piperaceae: *Piper*?

Observations. Only two specimens of this uncommon and apparently undescribed beetle, which apparently mimics a hemipteran, were collected. One was taken from *Piper* leaves in heavily shaded rainforest. Numerous other *Piper* plants in the area failed to produce additional specimens. The head and pronotum of this beetle are bright reddish brown when alive but fades to dull brown after death and the elytra are large, broad and deep metallic green. The sides of the abdomen are broadly flanged.

Subfamily Alticinae

Sutrea sexnotata Bryant?
Fig. 9

Sutrea sexnotata Bryant, 1951: 794 (E Dutch New Guinea).

Material. PNG: ESP: Passam, 17.IX.1989, flying over shrubs in rainforest, TJH (1).

Plant hosts. Samuelson (1967: 157) recorded Zingiberaceae: *Alpinia* as a host for *S. apicalis* Samuelson from Guadalcanal, Solomon Islands; Jolivet (1991: 61) recorded Sterculiaceae: *Theobroma* as a host in PNG for an unidentified species.

Observations. A distinctive black species with yellow pronotum with a black central portion and black elytra with two yellow median spots on each elytron and one sublunate preapical yellow spot on each elytron. M. L. Cox (1991, pers. comm) compared the photo of the Passam specimen with the type in the BMNH and noted pattern differences in the pronotum (black discal mark reaches base) and the elytra (yellow maculae differ in shape and size).

Xenidea sp. near *purpureipennis* Baly

Xenidea purpureipennis Baly, 1877: 318 (New Guinea: Dorey).

Material. PNG: ESP: Passam, 22.VIII.1989, on leaves of *Piper*, TJH (1).

Plant hosts. Piperaceae: *Piper*. Jolivet (1991: 58) recorded Solanaceae: *Solanum* has a host for *Xenidea*.

Observations. This species was only observed in the shaded parts of the rainforest where it was often common on *Piper*. Feeding caused numerous small holes in the host's leaves. One of us, GAS, made similar observations in forests above Wau. Beetles were found on non-flowering plants. Plants in more light-exposed situations tended not to have these beetles.

Subfamily Hispinae

Ceratispa biroi Gestro

Ceratispa biroi Gestro, 1897: 232 (Tamara, Berlinhafen). - Gressitt 1957: 232 (NW and NE New Guinea); 1960: 32 (W New Guinea: Vogelkop, Cyclops; NE New Guinea: Maprik; larva; hosts): 1963: 627 (various locals. NW and NE New Guinea; larva, hosts).

Material. PNG: ESP: Passam, 5.XII.1989, on leaf of *Freycinetia*? or *Calamus*?, TJH (1).

Plant hosts. Arecaceae: *Areca catechu, Calamus*?, small palms, rattans. Questionable host is Pandanaceae: *Freycinetia*? Gressitt (1959: 72) noted that the genus occurs on palms: *Metroxylon, Areca*, and rattans in the lowland areas of New Guinea below 400 m elevation. Gressitt (1963: 627) further noted *Areca catechu* and other small palms, more rarely rattans as hosts for this species.

Figs 10-12. 10. *Aspidomorpha adhaerens* (Weber), Passam, 10.III.1989, TJH, on leaves of *Ipomoea indica* (Burm.) Merrill (Convolvulaceae) (Scale: 5 mm). 11. *Aspidomorpha novaguineensis* (Boisduval), Passam, 12.IV.1989, TJH, from leaves of *Ipomoea batatas* (L.) Lamk. (Convolvulaceae) (Scale: 5 mm). 12. *Aspidomorpha socia* (Boheman), Passam, 10.X.1989, TJH, on *Ipomoea indica* (Burm.) Merrill (Convolvulaceae) (Scale: 5 mm). (Photos: T. J. Hawkeswood).

Hispellinus sp.

Hispellinus: Gressitt, 1957: 312-314; 1960: 89-90; 1963: 705-707 (mainly treating the New Guinea members).

Material. PNG: ESP: Passam, 2.V., 2.-3.VI. 1989, on grass leaves, probably of *Panicum*, TJH (5).

Plant hosts. Poaceae: *Panicum?*

Observations. This species was restricted to grasses, though no larvae were observed on the hosts. *H. multispinosus* (Germar) is known to inhabit grasses in Australia (Gressitt 1960: 90, Hawkeswood 1988: 107) and *H. albertisi* (Gestro) has been recorded on sugarcane (*Saccharum* spp.) in PNG (Gressitt 1960: 90).

Subfamily Cassidinae

Aspidomorpha adhaerens (Weber)
Fig. 10

Cassida adhaerens Weber, 1801, Obs. Ent., 51.

Aspidomorpha adhaerens: Spaeth 1914: 70 (Neu-Guinea, Aru, Key-Insel). - Simon-Thomas 1964: 167-264 (Sulawesi, New Guinea, Solomon Islands; noted distribution on northern coast of New Guinea up to 1,000 m; biology: genetics).

Material. PNG: ESP: Passam, 10.III., 5.IV., 2. and 10.VI., 2.VII., 9.VIII.1989, on leaves of *Ipomoea indica*, TJH (12).

Plant hosts. Convolvulaceae: *Ipomoea indica* (Burm.) Merrill. Simon-Thomas (1964: 250) noted that *I. congesta* R. Br. is the main host for this species; *I. tuba* (Schldl.) G. Don. also serves as a host but *I. batatas* (L.) Lamk. is rarely so. Kimoto et al. (1984: 55) noted that it was only observed on wild *Ipomoea* at altitudes of up to 1,200 m.

Observations. This was one of the most common cassidines in the study area where it was apparently restricted to the large vine, *I. indica*; it did not appear to attack sweet potato, *I. batatas*, which was a more common plant in the Passam area, corroborating Simon-Thomas' findings (1964: 250).

Aspidomorpha australasiae (Boisduval)

Cassida australasiae Boisduval, 1835: 537 (Nouvelle-Hollande).

Aspidomorpha australasiae: Spaeth 1913: 447 (Alkmaar); 1914: 70 (Neu-Guinea).

Material. PNG: CP: Port Moresby, 2.III.1989, on foliage of *Ipomoea*, TJH (1). PNG: ESP: Passam, 22.IV., 2.VI:, 22.VIII.1989, on leaves of *Ipomoea indica* (6); Angoram, 12.IX.1989, on leaves of *Ipomoea batatas*, TJH (1); Wewak, 23.IX.1989, same host as preceding, TJH (1); 10 km W of Wewak, 5.XI.1989, same host as preceding, TJH (2).

Plant hosts. Convolvulaceae: *Ipomoea batatas* (L.) Lamk. and *I. indica* (Burm.) Merrill. Euphorbiaceae: *Aleurites fordii* Hemsl. In the Passam area, this beetle was found on both *Ipomoea* but was more common on *I. batatas*. Szent-Ivany (1956: 82) listed *I. batatas* as the host in the Port Moresby area. Lever (1948: 50) and Dumbleton (1954: 15) recorded leaves of *Ipomoea batatas* and *Aleurites fordii* (tung oil) as host for this beetle in the Solomon Islands.

Aspidomorpha novaguineensis (Boisduval)

Fig. 11

Cassida novaguineensis Boisduval, 1835: 537 (Nouvelle-Guinee).

Aspidomorpha novaguineensis: Spaeth 1909: 28 (Etna-Bai); 1913: 447 (Alkmaar); 1914: 71 (Neuguinea).

Material. PNG: ESP: Passam, 12.IV.1989, from leaves of *Ipomoea batatas*, TJH (1).

Plant hosts. Convolvulaceae: *Ipomoea batatas* (L.) Lamk. Kimoto et al. (1984: 56) included this species in a key of species potentially infesting sweet potato crops in PNG.

Observations. Less common than other cassidines in study area.

Aspidomorpha punctum (Fabricius)

Cassida punctum Fabricius, 1801, Syst. Eleuth. 1: 404 (Oceani pacifici Insulis).

Aspidomorpha punctum: Spaeth 1909: 28 (Merauke, Etna-Bai); 1914: 72 (Neu-Guinea, Papua).

Material. PNG: ESP: Passam, 22.IV.1989, on leaves of *Ipomoea indica*, TJH (1); Passam, 2.V.1989, on leaves of *Ipomoea batatas*, TJH (2); Angoram, 12.IX.1989, on *Ipomoea* sp., TJH (5); Wewak, 18.IX.1989, on *I. batatas*, TJH (1).

Plant hosts. Convolvulaceae: *Ipomoea indica* (Burm.) Merrill. and *I. batatas* (L.) Lamk. Kimoto et al. (1984: 55) recorded this species from *I. batatas* as well as from native *Ipomoea* in PNG.

Observations. This species was widely distributed and common on *Ipomoea batatas* around settlements in association with *A. australasiae* (Boisd.) and *Cassida astrolabiana* (Spaeth).

Aspidomorpha socia (Boheman)

Fig. 12

Cassida socia Boheman, 1856: 114.

Aspidomorpha socia: Spaeth 1913: 448 (Bivak-I); 1914: 72 (Neu-Guinea, Papua).

Material. PNG: ESP: Passam, 10.X.1989, on *Ipomoea indica*, TJH (1); near Passam, 11.III. and 22.IV.1989, on *I. indica*, TJH (3).

Plant hosts. Convolvulaceae: *Ipomoea indica* (Burm.) Merrill, *Ipomoea batatas* (L.) Lamk., and wild *Ipomoea*. Szent-Ivany (1956: 82) recorded *I. batatas* from Kerevat, New Britain. Kimoto et al. (1984: 55) recorded the wild *Ipomoea* and included this beetle in a key to cassidine species potentially infesting sweet potato crops in PNG.

Observations. Found only on *I. indica* in the study area.

Cassida astrolabiana (Spaeth)

Metriona astrolabiana Spaeth, 1903: 131 (Nova Guinea: Astrolabe Bai, Huon Gulf, Berlinhafen, Tamara); 1909: 28 (Merauke).

Cassida astrolabiana: Borowiec 1990: 17-18 (widely distributed in northern PNG, including New Britain).

Material. PNG: ESP: Passam, 8.III.1989, from leaves of *Ipomoea batatas,* TJH (2).

Plant hosts. Convolvulaceae: *Ipomoea batatas* (L.) Lamk.

Observations. This was one of the commonest chrysomelids in the Passam-Wewak area and seemed to be restricted to *I. batatas* growing in village gardens and cleared, exposed areas adjacent to rainforest where it flew rapidly in sunlight when disturbed. Adults were present on this host for most of the year.

Acknowledgements

Our thanks are expressed to Pierre Jolivet of France for reviewing the manuscript and for sending pertainent references, to Lech Borowiec of Poland, Terry N. Seeno of the United States, and F. R. Wylie of Australia for sending pertainent references, and to Peter Bostock of the Queensland Herbarium, Australia, who assisted with the nomenclature of several plant species. Not least is our gratitude to M. L. Cox, International Institute of Entomology, The Natural History Museum, London, for identifying some of the beetles from photographs sent to him via Jolivet.

References

Baly, J. S. 1864. Descriptions of new Phytophaga. - Trans. Entomol. Soc. London ser. 3, **1:** 611-624

-- 1867 (1865-1867). Phytophaga Malayana. - Trans. Entomol. Soc. Lond. ser. 3, **4:** 1-300, 6 pls.

-- 1877. Descriptions of new genera and of uncharacterized species of Halticinae. - Trans. Entomol. Soc. London 1877: 283-323.

Boheman, C. H. 1856. Catalogue of coleopterous insects in the collection of the British Museum, part **9**: 1-225

Boisduval, J. B. A. D. de 1835. Voyage de l'Astrolabe. Entomologie, part **2**: 1-716

Borowiec, L. 1990. A review of the genus *Cassida* of the Australian region and Papuan subregion (Coleoptera: Chrysomelidae: Cassidinae). Genus **1:** 1-51

Bryant, G. E. 1951. New species of Chrysomelidae (Halticinae, Coleoptera) from New Guinea, collected by Miss L. E. Cheesman. - Ann. Mag. Nat. Hist. ser. 12, **4:** 794-801

Dumbleton, L. J. 1954. A list of insect pests recorded in South Pacific territories. - South Pacific Comm. Tech. Paper **79**: 1-196

Fabricius, J. C. 1801. System. Eleuth. **1**: 1-506

Gestro, R. 1897. Hispidae raccolte nella Nuova Guinea dal sig. L. Biro e conservate nel Museo Nazionale di Budapest. - Termesz. Füz. **20**: 449-454

Gmelin, J. F. 1790. Linné, Syst. Nat. ed. 13, **1**(4): 1517-2224

Gray, B. 1968. Forest tree and insect pests in the Territory of Papua New Guinea. - Pacific Insects **10**: 301-323

-- & F. R. Wylie 1974. Forest tree and timber insect pests in Papua New Guinea. II. - Pacific Insects **16**: 67-115

Gressitt, J. L. 1957. Hispine beetles from the South Pacific (Coleoptera: Chrysomelidae). - Nova Guinea, n. ser. **8**(2): 205-324, 1 pl.

-- 1959. Host relations and distribution of New Guinea hispine beetles. - Proc. Hawaii. Entomol. Soc. **17**: 70-75

-- 1960. Papuan-West Polynesian hispine beetles (Chrysomelidae). - Pacific Insects **2**(1): 1-90

-- 1963. Hispine beetles (Chrysomelidae) from New Guinea. - Pacific Insects **5**(3): 591-714

-- 1965a. Chrysomelid beetles from the Papuan Subregion, 1. (Sagrinae, Zeugophorinae, Criocerinae). - Pacific Insects **7**(1): 131-189

-- 1965b. Chrysomelid beetles from the Papuan Subregion, 2. (Clytrinae, Cryptocephalinae, Chlamisinae). - Pacific Insects **7**(3): 387-449

-- 1967a. Chrysomelid beetles from the Papuan Subregion, 4 (Eumolpinae, 2). - Pacific Insects **9**(2): 295-340

-- 1967b. Chrysomelid beetles from the Papuan Subregion, 5 (Eumolpinae, 3). - Pacific Insects **9**(3): 551-562

-- & A. D. Hart 1974. Chrysomelid beetles from the Papuan Subregion, 8 (Chrysomelinae, 1). - Pacific Insects **16**(2-3): 261-306

-- & R. W. Hornabrook 1977. Handbook of Common New Guinea Beetles. - Wau Ecology Inst. Handbook **2**: 1-87

Hawkeswood, T. J. 1988. A survey of the leaf beetles (Coleoptera: Chrysomelidae) from the Townsville district, northern Queensland, Australia. - Giorn. Ital. Entomol. **4**: 93-112

-- 1991. Observations on the biology of *Stethopachys papuana* Gressitt associated with the orchid *Spathoglottis rivularis* Schlect. (Orchidaceae) in Papua New Guinea. - Spixiana **14**: 283-291

Jacoby, M. 1886. Descriptions of new genera and species of phytophagous Coleoptera from the Indo-Malayan and Austro-Malayan subregions, contained in the Genoa Civic Museum. - Ann. Mus. Civ. Genova 24: 41-128
-- 1894. Descriptions of new genera and species of phytophagous Coleoptera obtained by W. Doherty in the Malayan Archipelago. - Novitates Zool. **1**: 267-330
-- 1895. Descriptions of new species of phytophagous Coleoptera from the Indo- and Austro-Malayan regions. - Stettiner Entomol. Ztg. **56**: 52-80
-- 1904. Descriptions of new genera and species of phytophagous Coleoptera obtained by Dr. Loria in New Guinea. - Ann. Mus. Civ. Storia Nat. Genova **41**: 469-514
Jolivet, P. 1971. La Nouvelle-Guinée Australienne introduction Ecologique et Entomologique. - Cah. Pacif. **15**: 41-70, pls. 1-7
-- 1974. Les Chrysomeles des Araliacees (Coleoptera). - Bull. Mens. Soc. Linn. Lyon **43**: 113-120
-- 1977. Sélection trophique chez les Eupoda (Coleoptera Chrysomelidae). - Bull. Mens. Soc. Linn. Lyon **46**(9): 321-336
-- 1978. Sélection trophique chez les Clytrinae, Cryptocephalinae et Chlamisinae (*Camptosoma*) et les Lamprosomatinae (*Cyclica*) (Coleoptera Chrysomelidae). - Acta Zool. Path. Antverp. **70**: 167-200
-- 1983. Un hemimyrmecophyte a chrysomelides (Coleoptera) du sud-est Asiatique, *Clerodendrum fragrans* (Vent.) Willd. (Verbenaceae). - Bull. Mens. Soc. Linn. Lyon **52**: 242-261
-- 1987. Aperçu de la sélection trophique chez les Galerucinae (Coleoptera, Chrysomelidae). - Bull. Ann. soc. Belg. Entomol. **123**: 283-307
-- 1991. Sélection trophique chez les Alticinae (Coleoptera Chrysomelidae). - Bull. Mens. Soc. Linn. Lyon 60(1): 26-40, 60(2): 53-72
-- , Petitpierre E. & M. Daccordi 1986. Les plantes-hôtes des Chrysomelinae (Coleoptera). Quelques nouvelles précisions et additions. - Nouv. Rev. Entomol. **3**: 341-357
Kimoto, S. 1989. Chrysomelidae (Coleoptera) of Thailand, Cambodia, Laos and Vietnam. IV. Galerucinae. - Esakia **27**: 1-241
-- , Ismay, J. W. & G. A. Samuelson 1984. Distribution of chrysomelid pests associated with certain agricultural plants in Papua New Guinea (Coleoptera). - Esakia **21**: 49-57
Kuntzen, H. 1913. Eine neue *Aesernia*. - Arch. Naturgesch. **78A**(11): 94-95
Lever, R. J. A. W. 1948. New insect pest records in the British Solomon Islands. - Agric. J. Fiji **19**: 50-52
Robbins, R. G. 1968. Vegetation of the Wewak-Lower Sepik Area, Papua New Guinea, Part VI. - CSIRO, Melbourne. Land Research Series no. **22**: 109-124
Samuelson, G. A. 1967. Alticinae of the Solomon Islands (Coleoptera: Chrysomelidae). - Pacific Insects **9**(1): 139-174
Seeno, T. N. & J. A. Wilcox 1982. Leaf beetle genera (Coleoptera: Chrysomelidae). - Entomography 1: 1-221
Shute, S. L. 1983. Key to the genera of galerucine beetles of New Guinea, with a review of *Sastra* and related new taxa (Chrysomelidae). - Bull. Brit. Mus. (Nat. Hist.) **46**(3): 205-266
Simon-Thomas, R. T. 1964. Some aspects of the life history, genetics, distribution, and taxonomy of *Aspidomorpha adhaerens* (Weber, 1801) (Cassidinae, Coleoptera). - Tijds. Entomol. **107**: 167-264
Spaeth, F. 1903. Zusammenstellung der bisher von New-Guinea bekannt gewordenen Cassiden. - Ann. Mus. Nat. Hung. **1**: 109-160
-- 1909. Cassididae. - Nova Guinea **9**(1): 27-29
-- 1913. Cassididae. - Nova Guinea **9**(3): 447-452
-- 1914. Chrysomelidae: 16. Cassidinae. - Coleopt. Cat. **25**(62): 1-182
Szent-Ivany, J. J. H. 1956. New insect pest and host plant records in the Territory of Papua and New Guinea. - Papua and New Guinea Agric. J. **11**: 82-87
-- & R. M. Stevens 1966. Insects associated with *Coffea arabica* and some other crops in the Wau-Bulolo area of New Guinea. - Papua and New Guinea Agric. J. **18**: 101-119
Weber, F. 1801. Observationes entomolgicae.... Kiliae. 116 p
Weise, J. 1908. Coleoptera 2, Chrysomelidae. - Nova Guinea **5**: 311-349. (Includes a checklist of New Guinea Chrysomelidae known at the time.)
-- 1912. Chrysomeliden und Coccinelliden. - Nova Guinea **9**: 423-446
-- 1917. Chrysomeliden und Coccinelliden aus Nord-Neu-Guinea gesammelt von Dr. P. N. van Kampen und K. Gjellerup, in den Jahren 1910 und 1911. - Tijds. Entomol. **60**: 192-224

SPIXIANA	18	2	177–186	München, 01. Juli 1995	ISSN 0341–8391

The distribution of Palaearctic Diamesinae

(Insecta, Diptera, Chironomidae)

By **Bruno Rossaro**

Rossaro, B. (1985): The distribution of Palaearctic Diamesinae (Insecta, Diptera, Chironomidae). – Spixiana **18/2**: 177-186

The distribution of Palaearctic Diamesinae is analysed and discussed in relation to the phylogenetic tree of the subfamily. The presence of many widespread taxa and the uncertainty about the phylogenetic relationships is an hindrance to formulate zoogeographic hypotheses. The different distribution of tribes Protanypini and Boreoheptagyini is attributed to a vicariance phenomenon. Southern territories of Palaearctic are considered better candidates than the northern ones as centres of origin of some species group.

Prof. B. Rossaro, Department of Biology, Section Ecology, University of Milano, via Celoria 26, I-20133 Milano, Italy.

Introduction

The aim of this study is to analyse the geographic factors responsible of the actual distribution of Palaearctic Diamesinae. Chironomidae are considered a good material for zoogeographic studies (Brundin 1966), but this is true with some reservation. The reasons are listed below.

1. Many species are widespread, because of their very effective dispersion means and their wide ecological niche. Only species that are restricted by their limited dispersion means (e.g. reduced wings) and their narrow ecological niche (e.g. cold-stenothermal species) are good zoogeographic material; this requirement is fulfilled by the subfamily Diamesinae, whose members are all more or less cold-stenothermal (only *Potthastia* and *Sympotthastia* are eurythermal within the subfamily).

2. Vicariance between tribes or genera of Chironomidae is a well known phenomenon when large geographical regions (south America, south Africa, Australia etc.) are considered. Examples of vicariance of species belonging to the same species-group within the subfamily of Diamesinae are known within a single zoogeographical region: a boreo-alpine disjunction is observed within the Palaearctic region (Thienemann 1950), but new evidence had often falsified previous knowledge. It is the case of *Diamesa lindrothi* and *D. latitarsis* (Serra-Tosio 1973): the former is not restricted to the Arctic region, but it is also present in a few stations in the Alps, the latter is not confined in the Alps as previously stated, but it is also present in the Arctic region.

3. Palaearctic genera of Chironomidae are widespread in the region and many genera are also Holarctic. Widespread condition is still observed at the species level, even if endemic species do exist. Progress in knowledge has emphasised in the past that a restricted species distribution is often a mismatch due to the lack of knowledge: *D. veletensis* for example was known to occur only in the Sierra Nevada (Spain), but was later captured in Morocco and in Mongolia (Serra-Tosio 1983).

The aim of the present paper is to try to answer to the following questions:

1. Is the present information available about the distribution of Diamesinae enough to make hypotheses about the historical factors responsible of their distribution, to build area cladograms and to suggest vicariance phenomena within the Palaearctic region?

2. Can the ordination with multivariate methods made on the basis of the species distribution in provinces be useful to suggest hypotheses about point 1.?

Material and methods

Data were filed using the information present in the Catalogue of Palaearctic Diptera (Ashe & Cranston 1991). The Palaearctic region is divided into areas that are called provinces in the present study, they correspond more or less to the political states. The ex-Soviet Union is divided into provinces as described by Soós & Papp (1991). Holarctic species are included in the present data base and their presence in the Nearctic region is given. Presence in provinces that occur near the boundaries of the Palaearctic region is also given. The abbreviations used in data analysis are in Tab. 1.

The distribution of species was analysed by visual inspection, to suggest preliminary hypotheses.

The COMPONENT program was used (Page 1993) to analyse species groups, for which a cladogram of phylogenetic relationships is available (Serra-Tosio 1973). COMPONENT attempts to construct area cladograms using the information given by the known phylogenetic relationships between species and species distribution in provinces. The interpretation of the results outcoming from this program was hindered by the presence of many widespread taxa, that determined duplications of area cladograms when one attempts to reconcile taxon trees with area cladograms.

With the aim to suggest hypotheses about the history of distribution of widespread taxa, data were processed using the CANOCO program (Ter Braak 1988, Ter Braak & Prentice 1988). Different methods were considered because previous knowledge was not available with these data and no “a priori” model could be suggested. Indirect gradient analysis was carried out to discover the most relevant provinces and species gradients, principal component (=PCA) and correspondence analysis (=CA) were considered to analyse both a linear and a gaussian response model. A detrended correspondence analysis (=DCA, detrending by segments) was also carried out.

Direct gradient analysis (constrained ordination) was run using latitude and longitude of the investigated provinces as constraining variables. Constrained ordination also considered both a linear (redundancy analysis = RDA) and a gaussian (canonical correspondence analysis = CCA) response model.

Results

According to Hennig (1966) the primitive (plesiomorph) species of a monophyletic group lives in an area that is expected to be the centre of origin of the group: the progression rule states that a transformation series of characters would run parallel with progression in space (Humphries & Parenti 1986), so the most derived (apomorph) species live in the geographical periphery of the group. The analysis of the distribution must take into account the phylogenetic tree of the Diamesinae (Serra-Tosio 1973). The tree of the tribes and genera within the subfamily is in Fig. 1, the tree of the genus *Diamesa* is in Fig. 2. It must be emphasised that phylogenetic relationships are only tentative, so the analysis of taxa distribution cannot unequivocally bring to the discovery of the centre of origin.

Tab. 1. List of provinces in which the Palaearctic region is divided, and abbreviations (after Soós & Papp 1991).

A	Austria	AL	Albania	B	Belgium	BG	Bulgaria
CH	Switzerland	CS	Czechoslovakia	CY	Cyprus	D	west Germany
DDR	east Germany	DK	Denmark	E	Spain	F	France
FL	Liechtenstein	GB	Great Britain	GR	Greece	H	Hungary
I	Italy	IRE	Ireland	IS	Iceland	L	Luxembourg
M	Malta	N	Norway	NL	The Netherlands	P	Portugal
PL	Poland	R	Roumania	S	Sweden	SF	Finland
TR	Turkey	YU	Yugoslavia				
NET	north Russia	CET	Central Russia	SET	south Russia	TC	Transcaucasus
SMA	Middle Asia	KZ	Kazakh	WS	west Siberia	ES	east Siberia
FE	Far east Siberia	Jap	Japan	Can	Canada	Gree	Greenland
USA	United States						

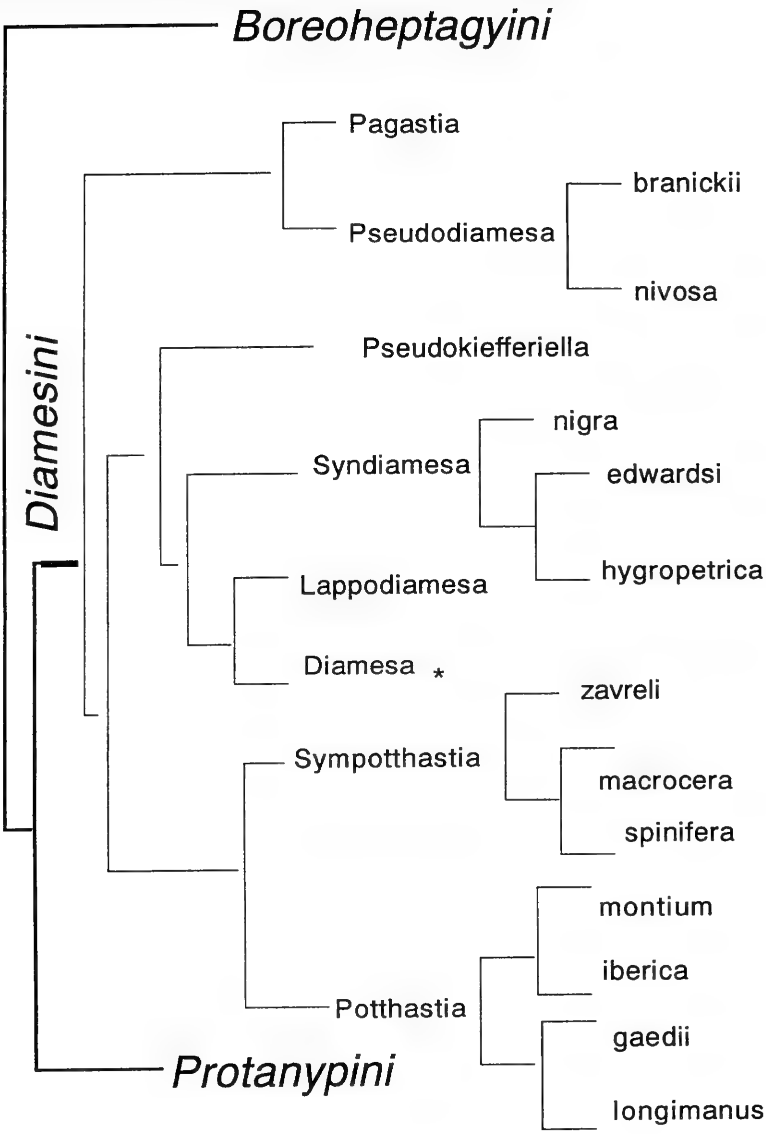


Fig. 1. Phylogenetic tree of the tribes and genera within the subfamily Diamesinae.

Palaearctic Diamesinae are divided into 3 tribes: Boreoheptagyini, Diamesini, and Protanypini. Boreoheptagyini belong to the Heptagyiae, that with the austral tribes Heptagyini and Lobodiamesini are considered the plesiomorph sister group of Diamesae, that include Harrisonini, Diamesini, and Protanypini (Serra-Tosio 1973, Brundin 1966). It's a snap, that Boreoheptagyini and Protanypini are not widespread on all the territory of the Palaearctic region: the former are absent in the British Isles and in Scandinavia (Serra-Tosio 1989), the latter are absent in the Mediterranean region. The observed distribution cannot be accounted for ecological factors.

When the distribution of genera and species is analysed within the tribe Diamesini, it appears that *Pagastia* is restricted to Siberia and Canada (Beringia), *Pseudodiamesa* is Holarctic, *Pseudokiefferiella* is absent from the south of Europe (in Italy it is restricted to the Alps), but it is present in Nearctic. *Syndiamesa* has endemic species with a very restricted distribution in Europe or in far east of Siberia

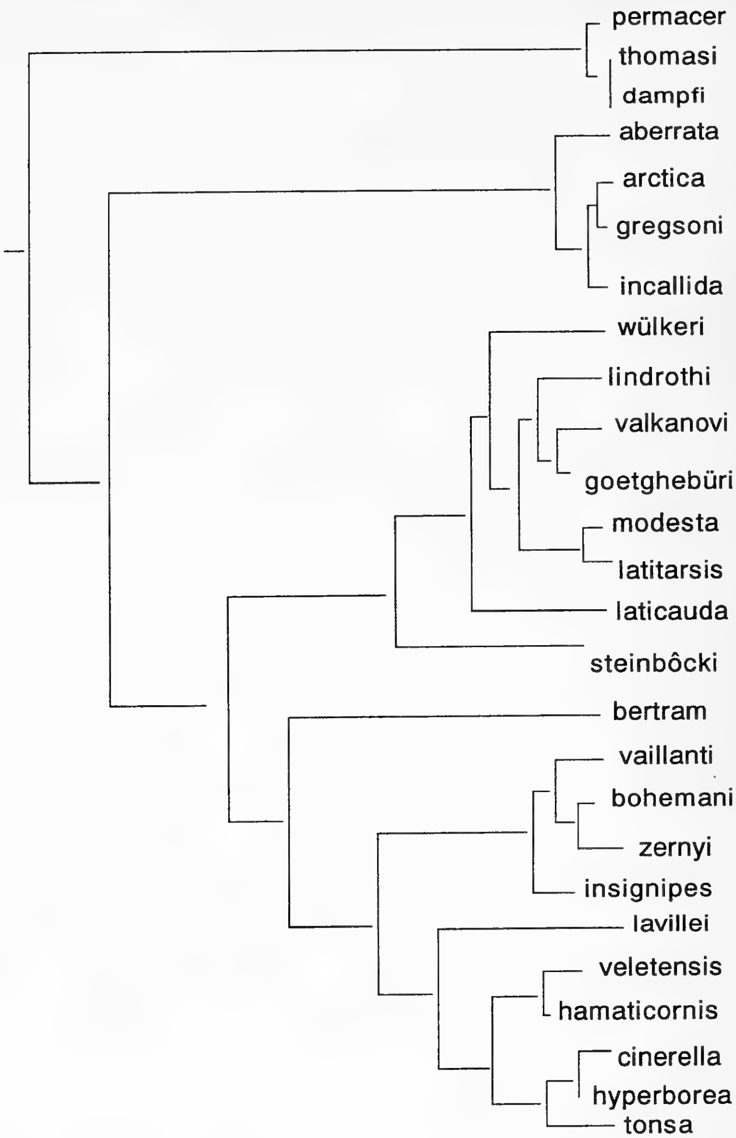


Fig. 2. Phylogenetic tree of the genus *Diamesa*.

(FE); it is also present in Nearctic, but no *Syndiamesa* species is at present known from Scandinavia. *Lappodiamesa* is considered by Serra-Tosio (1973) the plesiomorph sister group of *Diamesa*, it has a restricted northern distribution (eastern Nearctic, Lapland, Novaya Zemblya, FE). *Diamesa* is widespread in the Holarctic. If the distribution of Palaearctic species is examined, within the *dampfi*-group the plesiomorph species *D. permacra* is present both in the Alps and in Scandinavia, whereas the apomorph species *D. thomasi* and *D. dampfi* are absent from Scandinavia. In the *aberrata*-group both the plesiomorph *aberrata* and the apomorph *incallida* are widespread, whereas *arctica* and *gregsoni* are restricted to the northern provinces. Within the *latitarsis*-group the plesiomorph *D. wülkeri* is restricted to the Alps, *D. lindrothi* is common in north Europe and in Greenland, *D. latitarsis* is common in the Alps, present in Scandinavia and Balkan. Within the *zernyi*-group *D. vaillanti* and *D. zernyi* are present in the Pyrenean and in the Alps, *D. bohemani* lives in Scandinavia and in the British Isles. Serra-Tosio (1973) analysing the *cinerella*-group concluded that the plesiomorph species live in south-west Europe, the apomorph ones in the north-east (*D. hyperborea*, = *D. ursus* lives in Norway). Spain, France and SET are candidates as centres of origin of the group, because they are inhabited by *D. lavillei*, the most plesiomorph species of the group. *D. veletensis* and *D. hamaticornis* are also present in Spain. The capture of *D. veletensis* in Mongolia suggests that many species can have a distribution area that is much more extended than suspected.

Tab. 2. Geographic regions scores in detrended correspondence analysis.

N	NAME	AX1	AX2	AX3	AX4
	EIG	0,436	0,2512	0,1964	0,1454
1	AL	2,1075	0,8686	1,3286	0,6801
2	Afghan	2,5435	0	2,0237	0
3	Alger,	2,0061	0,4437	0,5115	1,4287
4	A	0	1,3968	0,9836	0,7694
5	Azores	2,5854	0,4365	0,1265	1,3268
6	BG	1,442	0,5173	0,5614	1,5539
7	B	2,1635	1,0246	1,3293	0,8885
8	CET	1,9268	0,9933	1,5356	0,4442
9	CH	0,7613	0,9285	0,5464	0,7247
10	CS	1,5985	0,8764	1,506	0,8736
12	DDR	2,0051	0,7818	1,4357	0,5919
13	DK	2,2814	0,7511	1,33	0,6969
14	D	0,4859	1,0934	1,6646	0,9175
15	ES	2,8696	1,6267	1,5029	1,5288
16	E	0,8106	0,2693	1,6258	1,7326
18	F	0,0609	0,6545	1,6606	0,979
19	GB	1,0957	1,0559	1,8032	0,418
20	GR	0,9417	0,9753	1,0442	1,1169
21	Green,	1,5892	1,8184	0,4059	1,0207
22	H	1,7138	0,8601	1,5247	0,6735
23	IRE	1,3611	1,2988	1,6451	0,3516
24	IS	1,0912	1,5205	1,003	0,8054
25	Indiax	1,9634	1,0226	0,656	1,2843
26	I	0,3849	1,2356	1,3884	0,6298
27	J-Kash	1,976	0,9268	0,8115	1,3772
30	Madei,	2,2784	0,1875	0	1,5399
31	Mongol	2,4967	1,3823	2,1745	1,9408
32	Moroc,	1,3868	0,398	1,4215	1,6046
33	NET	2,0619	1,4441	1,3341	0,9346
34	NL	2,1899	0,6836	1,5012	0,7245
35	Nepalx	2,7584	0,4237	1,6079	0,3674
36	N	1,0606	2,451	1,1923	0,3827
37	PL	0,3886	0,7894	1,1201	1,2049
38	Pakist	2,1048	0,9385	1,0027	0,9226
39	R	1,3108	1,1442	0,73	0,9515
40	SET	0,9956	0,0271	1,1806	1,9852
41	SF	1,495	1,899	1,3266	0,6756
42	SMA	3,1307	0,4337	1,0063	0,5979
43	S	1,12	2,3823	1,446	1,2337
45	TR	1,5087	0,6619	0,4722	1,5397
47	WS	2,7408	1,4885	1,2038	1,32
48	YU	1,3939	0,2371	1,6524	0,4043

To sum up many groups have the plesiomorph species with a prevalent Alpine distribution, but there are also situations in which the plesiomorph species live in Scandinavia or in the British Isles. The most frequent condition seems to be the plesiomorph taxon in the Alps, the apomorph one in north Europe. There are also cases in which the taxon has an east Asian-west N. America (=Beringian) distribution *(Pagastia)* and cases where the plesiomorph species within a genus are distributed in west Europe *(Sympotthastia zavreli, Potthastia montium, P. iberica)* whereas the apomorph species extend eastwards *(S. spinifera, P. longimanus)*.

The scores of provinces and species were calculated using PCA, CA, DCA, RDA, and CCA. Scores calculated using DCA are reported in Tab. 2.

Constrained ordination (RDA and CCA) will not be discussed further in this paper because constrained axes have a rather low eigenvalue and the first unconstrained axis (the 3rd in this case) has about the same eigenvalue of the first axis in the unconstrained ordination (Tab. 3). DCA gave better results than CA in the sense that sites ordination given by DCA can be better interpreted.

The first axis calculated with all methods is only roughly related to an west-east gradient, but this is bound to the large difference in species composition between Japan, Siberia, and Europe. PCA emphasises a north-east south-west gradient plotted in the plain of the first two axes, provided that only main trends be considered. All multivariate methods separate Japan from all the other provinces: its dissimilarity from all the other countries is probably exaggerated from the fact that different names had been given to the same species, but this requisites documentation. For this reason Japan was disregarded from data analysis. FE (far east Siberia), Transcaucasia (TC), and Lebanon (Leb) were also excluded because of the high scores in the first (FE) and in the second axis (TC and Leb) in CA analysis. USA and Canada were excluded because they are not Palaearctic. A DCA with the reduced set of data was carried out (DCAR) and results are given in Tab. 2 and in Fig. 3.

The longitudinal gradient cannot be evidenced within the European provinces: for example in DCAR the European provinces are ordered along the first axis in the following sequence: France, Poland, Germany, Spain, and Great Britain (Fig. 3 and Tab. 2). A north-south latitude gradient is outlined in the second axis of DCAR. Scandinavian countries have positive scores and are well separated from the Alpine and Mediterranean countries that have low scores, but ordination again is not strictly following the geographic gradient: Spain has a lower loading than Morocco for example.

DCAR gives high scores in the first axis to the east provinces. It also emphasises the difference between the Arctic and the Alpine fauna: *Boreoheptagyia rugosa, B. cinctipes, Diamesa vaillanti* have very low scores on the first DCAR axis and are endemic in the Alps or in Corsica. Species with high scores in the second axis are Arctic species *(Protanypus caudatus, P. morio, Lappodiamesa brundini)*, whereas species with a low score in the second axis are characteristic of the Mediterranean area *(D. thomasi, Syndiamesa vaillanti)* or of the Oriental region (Afganistan, Nepal) *(D. filicauda, D. löffleri)*. East provinces has high score in the first axis (Figs 3-4).

Discussion

Both ecological and geographical factors must be considered in analysing species distribution. Water temperature and oxygen content are the ecological factors that control Diamesinae species distribution above all. Diamesinae are cold-stenothermal and are restricted to mountain streams, springs, lakes. Species belonging to the *Diamesa latitarsis*-group live only in very cold waters. Species belonging to the

Tab. 3. Eigenvalues using different multivariate methods.

Eigenvalues	axis I	axis 2	axis 3	axis 4
PCA	0,22	0,11	0,08	0,07
CA	0,62	0,44	0,39	0,37
DCA	0,63	0,36	0,24	0,21
RDA	0,05	0,03	0,20	0,09
CCA	0,29	0,22	0,52	0,41

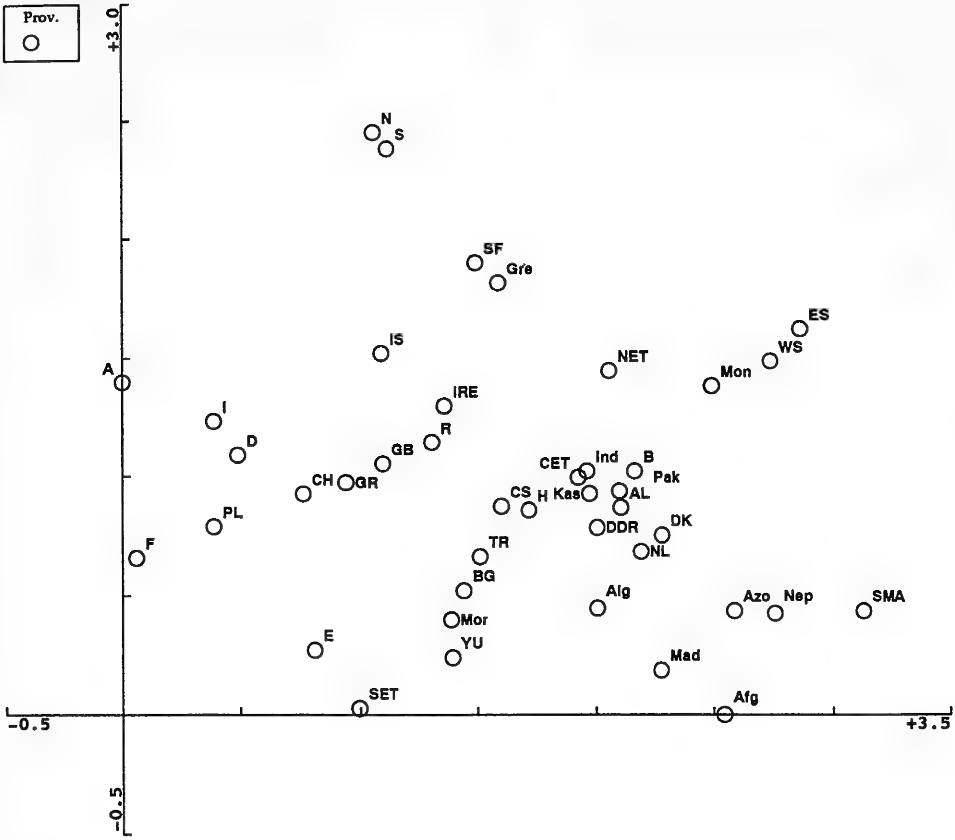


Fig. 3. Detrended correspondence analysis results, provinces scores; abscissa 1st axis, ordinate 2nd axis; abbreviations see Tab. 1.

genus *Potthastia* live in lower stretches of rivers because they tolerate warmer water temperature. Historical that is zoogeographical factors must be considered, when different species occupy a similar niche in different geographic regions. Each geographic district considered in the present study includes different habitats, so ecological factors should not influence so much the observed distribution. Notable exceptions could be Belgium, Netherlands, Denmark that are poor in mountains against Austria and Switzerland that are rich. These provinces are not widely separated in the ordination diagram, emphasising that ecological factors are not relevant in the present study (Fig. 3).

The development of knowledge about species distribution is quite different in different provinces: the Alps are very well studied, whereas Siberia is very poorly known. The uncertainty about phylogenetic relationships between taxa is still strong: the relations between genera within the tribe Diamesini are not well established. The positions of *Pagastia*, *Pseudodiamesa*, *Lappodiamesa*, *Sympotthastia*, and *Potthastia* is particularly uncertain and are probably different from the one proposed by Serra-Tosio (1968, 1973) and reported in Fig. 1. Sæther & Willassen (1988) suggest that the 5 genera are more related to each other than to *Diamesa*. *Lappodiamesa* should be placed differently in the phylogenetic tree: its relation with *Pseudodiamesa* is surely more strict than with *Diamesa*, because of the synaphomorphy represented by the presence of seven elongate scales in the larval pecten of epipharyngis. These are a serious drawback in the formulation of zoogeographic conclusions.

Brundin (1966) was convinced that Chironomidae have a history that goes far back into the Jurassic and that the bipolar distribution pattern is a consequence of a transtropic dispersal northwards.

Serra-Tosio (1973) attempted to explain the geographic distribution of Diamesinae according to the Hennig (1966) and Brundin (1966) principles of systematic phylogenetic and vicariance biogeography.

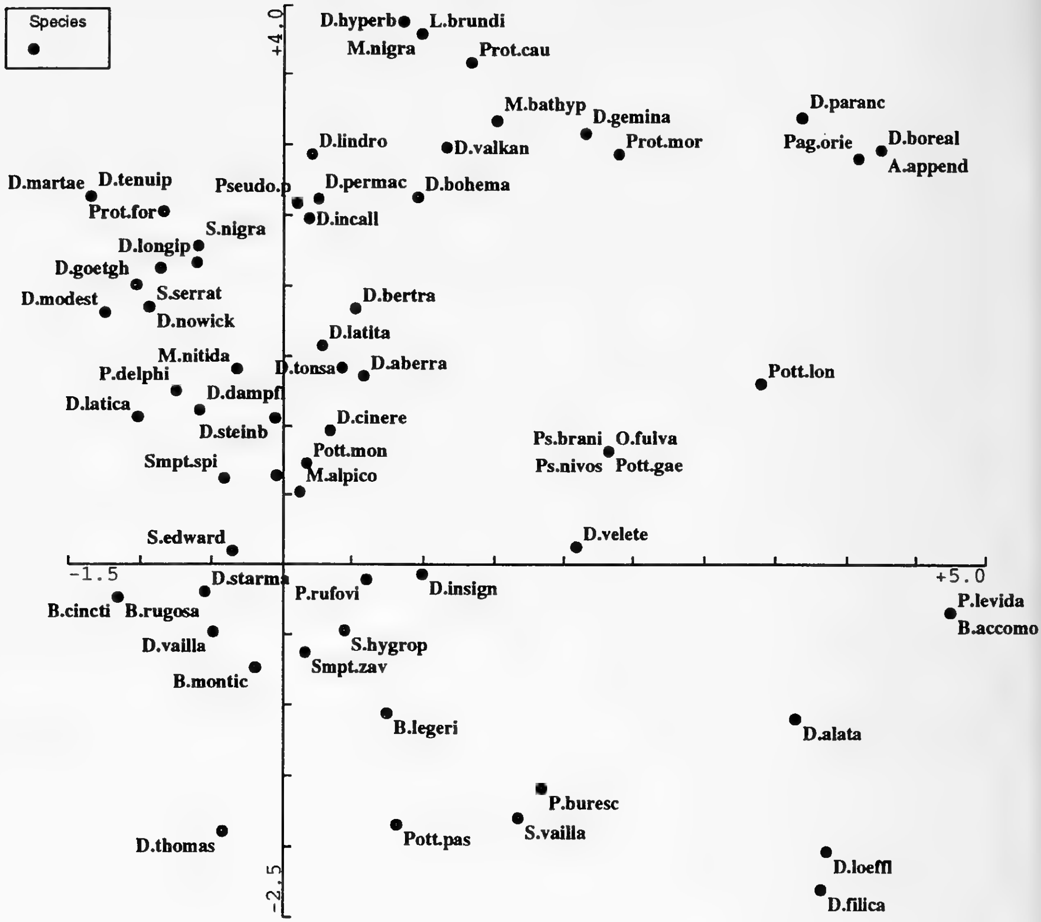


Fig. 4. Detrended correspondence analysis results, species scores; abscissa 1st axis, ordinate 2nd axis; abbreviations of genera names: B: *Boreoheptagyia*; Prot: *Protanypus*; Pag: *Pagastia*; Ps: *Pseudodiamesa*; D: *Diamesa*; S: *Syndiamesa*; Pseudo: *Pseudokiefferiella*; Pott: *Potthastia*; Smpt: *Sympotthastia*; M: *Monodiamesa*; P: *Prodiamesa*.

The centre of origin of Diamesini was supposed to be in south Africa. The tribe was considered of Gondwanian origin, because Harrisonini, the plesiomorph sister group of Diamesini, are endemic of south Africa. East African mountains were suggested to be the principal way in which ancestral Diamesini reached Europe and north America by dispersion: this event should have happened in Miocene-Pliocene. The absence in the east Africa mountains of plesiomorph species was interpreted as the result of extinction, in other words Laurasia was supposed to be colonised by dispersion from south to north. The presence of fossils of Chironomidae in northern latitudes since the Jurassic-Cretaceous time (Kalugina 1976) does not support this hypothesis, even if it does not contradict it, because the presence of fossils of Diamesini is not unequivocally demonstrated in the northern regions during Jurassic. Willassen & Cranston (1986) are convinced that it is more likely that African species arrived in recent times (mid Tertiary) following an high altitude dispersal route from Europe to Africa, that is from north to south. This is supported by the fact that ecological conditions were suitable in the mid Tertiary for dispersal from north. If Diamesini are of northern origin, it is expected that Diamesini actually discovered in regions that are of Gondwanian origin be more related to the Laurasian ones than to each other. The problem is to demonstrate a very ancient presence of Diamesinae in the northern hemisphere.

Humphries & Parenti (1986) postulated a pre-Pangaea continent with austral and boreal zones adjacent to give account of the amphitropical distribution of many taxa. They emphasised that Diamesinae and Podonominae are a classic example of an amphitropically distributed group. Banarescu (1990, 1991) discussed the distribution of the aquatic insects and stated that many groups (Trichoptera and Diptera Blephariceridae for example) were present and widely distributed throughout Pangea. The analysis of the causes of the amphitropic distribution of Chironomid subfamilies is out of the scope of the present work, both the pre-Pangea or the Pangea hypothesis overrides the problem of a migration from Gondwana to Laurasia by dispersal and postulates a very ancient presence of Diamesinae in the Boreal regions. This means that the origin of Chironomidae should predate the breakage of Pangea: Chironomidae should have been widely distributed in Pangea before the Jurassic breakage of it. The austral-boreal disjunction of subfamilies should be a vicariance phenomenon, not a dispersion from south to north.

The analysis of the distribution of the tribes of Diamesinae within the Palaearctic region suggests the hypothesis that Boreoheptagyini never reached the British Isles and Scandinavia, whereas Protanypini never reached the Mediterranean area. This supports arguments in favour of a vicariant distribution of Boreoheptagyini in the south and Protanypini in the north of the Palaearctic region.

The tribe Diamesini is widespread in the Palaearctic. The analysis of the distribution of genera within the tribe shows that the most plesiomorph genus (*Pagastia*) is restricted to Siberia and Canada and does not reach Europe. This suggests an east-west vicariance within the tribe Diamesini. It is difficult to reconstruct the colonisation pattern within the Palaearctic, because different genera have their plesiomorph species in different provinces. The plesiomorph (?) genera *Pseudokiefferiella* and *Lappodiamesa* have a northern distribution, whereas the apomorph genera *Sympotthastia* and *Potthastia* are widespread. Because the relationships between these genera are still uncertain it is very difficult to formulate hypotheses.

When the distribution of species belonging to a group is analysed, it is often evident that the plesiomorph species have a southern area of distribution. This is true for many groups *(aberrata, latitarsis, zernyi, cinerella)* within the genus *Diamesa*. The straightforward explanation may be that during glacial epochs north Europe was devoid of fauna and the colonisation of northern provinces in post glacial periods was from the south.

Conclusions

The distribution of taxa within the Palaearctic region suggests that the process of colonisation is very ancient and goes back to a time preceding the breakage of Pangea. The model is that older branches of the phylogenetic tree (tribes) split in very ancient times (Mesozoic), whereas the younger ones split in Cenozoic (species within a species group in Pleistocene). Vicariance phenomena go back to Jurassic if the tribes distribution is considered, go back to Pleistocene if species distribution within a group is considered. The complete colonisation pattern of the subfamily followed many steps in different geological epochs and in each step the dispersion route had a different direction: south-north (Boreoheptagyini, Protanypini), east-west (*Pagastia* against other genera within Diamesini), north-south *(Pseudokiefferiella + Lappodiamesa* against *Diamesa)*, south-north (different species within groups of *Diamesa*), west-east (species within *Symphottastia* and *Potthastia*). Many zoo-geographers (Jeannel 1942) state that colonisation of Europe became from the east, but this cannot be confirmed. Kownacki (1978) is convinced that the distribution centre of the *Diamesa steinböcki*-group are the mountains of Central Asia. The alternating glacial and interglacial periods enforces the hypothesis that the Palaearctic region was colonised repeatedly many times with different dispersion routes. This explains the species distribution within a species group.

Multivariate ordination methods suggest both an east-west and a south-north gradient of taxa, but the lack of taxonomy and distribution knowledge allows only main features be outlined.

Future needs are a better knowledge of phylogenetic relationships between genera to each other, between species within a species group and species distribution in critical areas (Himalaya, Siberia etc.).

References

Ashe P. & P. S. Cranston 1991. Family Chironomidae. In: So_s, A. & L. Papp: Catalogue of Palaearctic Diptera, Psychodidae-Chironomidae: 113-355

Banarescu, P. 1990. General distribution and dispersal of freshwater animals. **1**: 1-523

-- 1991. Distribution and dispersal of freshwater animals in north America and Eurasia. **2**: 524-1091

Brundin, L. 1966. Transantarctic relationships and their significance, as evidenced by Chironomid midges, with a monograph of the Subfamilies Podonominae and Aphroteniinae and the austral Heptagyiae. - Kungl. Svenska Vetenskap. Handl. **11**: 1-472

Hennig, W. 1966. Phylogenetic systematics. - Univ. Illinois Press, Urbana: 263 pp.

Humphries, C. J. & L. R. Parenti 1986. Cladistic Biogeography. - Oxford Monographs on Biogeography No. **2**: 98 pp.

Jeannel, R. 1942. La genèse des faunes terrestres. Eléments de biogéographie. - P.U.F. Paris: 513 pp.

Kalugina, N. S. 1976. Non biting midges of the subfamily Diamesinae (Diptera Chironomidae) from the Upper Cretaceous of the Taymyr. - Paleontol. J. **1**: 78-83

Kownacki, A. 1978. Ecology and biogeography of the *Diamesa steinböcki* group. - Acta Univ. Carol. Biol. **12**: 95-102

Page, R. D. M. 1993. Component Version 2.0. User's Guide. - The Natural History Museum, London

Sæther, O. A. & E. Willassen 1988. A review of *Lappodiamesa* Serra-Tosio, with the description of *L. boltoni* spec. nov. from Ohio, USA (Diptera, Chironomidae). - Spixiana, Suppl. **14**: 75-84

Serra-Tosio. B. 1968. Taxonomie phylogénétique des Diamesini: les genres *Potthastia* Kieffer, *Sympotthastia* Pagast, *Parapotthastia* n. g. et *Lappodiamesa* n. g. (Diptera, Chironomidae). - Trav. Lab. Hydrobiol. piscicult. Grenoble **59-60**: 117-164

-- 1973. Ecologie et biogéographie des Diamesini d'Europe (Diptera, Chironomidae). - Trav. Lab. Hydrobiol. piscicult. Grenoble **63**: 5-175

-- 1983. Nouveaux Diamesinae de la Paléarctide méridionale et orientale (Diptera, Chironomidae). - Spixiana **6**:1-26

-- 1989. Ecologie et Biogéographie des *Boreoheptagyia* (Diptera, Chironomidae, Diamesinae). - Acta Biol. Debr. Oecol. Hung. **3**: 289-294

Soós, A. & L. Papp 1991. Catalogue of Palaearctic Diptera, Psychodidae-Chironomidae. **2**: 499 pp. Elsevier Ed.

Ter Braak, C. J. F. 1988. CANOCO, a FORTRAN program for canonical community ordination by (sorted) (detrended) (canonical) correspondence analysis and redundancy analysis (version 3.0)

-- & I. C. Prentice 1988. A theory of gradient analysis. - Advances ecol. res. **18**: 271-317

Thienemann, A. 1950. Verbreitungsgeschichte der Süßwassertierwelt Europas. Versuch einer historischen Tiergeographie der europäischen Binnengewässer. - Die Binnengewässer: XVIII + 809 pp. Stuttgart

Willassen, E. & P. S. Cranston 1986. Afrotropical montane midges (Diptera, Chironomidae, *Diamesa*). - Zool. J. Linn. Soc. **87**: 91-123

SPIXIANA	18	2	187–199	München, 01. Juli 1995	ISSN 0341–8391

The ecological significances of trees' bark during ecosystem dynamics

By **Volker Nicolai**

Nicolai, V. (1995): The ecological significances of trees' bark during ecosystem dynamics. – Spixiana **18/2:** 187-199

The thermal properties of different types of bark were investigated on central European, north American and south African tree species. Tree species with white barks avoid overheating by reflecting the solar radiation. Species with fissured and scaly bark types shade inner parts of their barks and some species show high insulation across their barks. Smooth and thin barks show little insulation and no reflection of global radiation. These tree species have to form closed stands and are not able to grow in open stands as tree species with more structured or with white bark types. In virgin forests, treefall gaps and other openings of the stands due to biotic or abiotic factors are typical components. Often a balance of mixed species composition with different bark types is found there. Species with white bark surfaces form the pioneer tree species in treefall gaps. During succession later, however, tree species with structured bark types and tree species with smooth bark types may follow. Tree species with thin barks are restricted to closed stands as they have no mechanism to tolerate strong global radiation on their trunks. The barks of trees have ecological functions for the trees themselves, for the tree species composition of natural forests, and for an arthropod community living exclusively in this microhabitat. The natural mosaic change within the tree species composition in the above mentioned forest ecosystems is discussed. The importance of such natural processes and possible utilization in the forest management are pointed out. The arthropod communities living exclusively on the barks of trees show adaptations to this changing tree species composition and also reflect this in their own species composition. Results from studies about the arthropod communities living on the barks of trees in the studied forest ecosystems are given. The effects by the forest managements to these arthropod communities are discussed.

Priv.-Doz. Dr. Volker Nicolai, Philipps-Universität, Fachbereich Biologie/Zoologie, Postfach 1929, D-35032 Marburg, Germany.

Introduction

Natural forests are heterogeneous and ever changing in space and time, thus natural disturbances of various kinds and degrees are the ecological forces. The dynamics of forest ecosystems have been studied for a long time (Drury and Nisbet 1973, Koike 1986, Mayer 1971, Mayer et al. 1979, Mayer & Neumann 1981, Schrempf 1986, Simak 1951) in nearly all parts of the world (Connell & Slatyer 1977, Forcier 1975, Jackson & Abrell 1977, Pickett & White 1985, Shugart & West 1980, Veblen et al. 1981, Veblen 1989). The theory of cyclic mosaically changing forest ecosystems is accepted widely (Lieberman & Lieberman 1987, Lieberman et al. 1989, Nicolai 1986, 1989, Pickett 1976, Schupp et al. 1989, Swaine & Hall 1988, Remmert 1987, Runkle 1989, Torquebian 1986). A cyclic mosaically changing forest ecosystem with its heterogenity in community structure, light conditions, young, mature, and dying species and individuals presents the habitats and resources for all its species in a large area. Tree trunks are one of the typical components in forest ecosystems. Different bark types have different physiological properties which are related to the ecology of the different tree species and provide different habitats for bark-living animals. The thermal properties of bark, which depend on its structure, have essential ecological functions enabling forests to survive disturbances. The species communities of bark-living arthropods reflect the dynamics of the ecosystem in their community structures. Structure and microclimate of the barks determine the distribution and phenology of arthropods living exclusively in this habitat.

Material and Methods

Study sites. The thermal properties on different types of barks were investigated on central European tree species near Marburg (50°48'N, 8°48'E), Federal Republic of Germany (Nicolai 1986); on south African tree species in a subtropical forest near George, Cape (33°57'S, 22°31'E) and in a savanna near Nylsvley, Transvaal (24°30'S, 28°45'E) (Nicolai 1989); on north American tree species in a mixed forest (Itasca State Park, Minnesota, U.S., 47°10'N, 95°15'W) (Nicolai 1993) and in an oak savanna at Cedar Creek Natural History Area, Minnesota (45°25'N, 39°10'W) (Nicolai 1991).

Microclimate. The temperatures on the barks of trees were measured using thermocouples (Cu/Konst., ∅: 0.1 mm) which were placed in and on the barks at a standard 1.5 m above groundlevel. The errors in temperature measurements due to solar radiation were checked using a radiometer and found to be negligible. Global radiation was measured using a pyranometer (300-3.000 nm) placed on the tree trunks. Due to the lack of tiny sensors no measurements of the relative humidity were conducted. Wind speed is reduced to 10 % of the surrounding air conditions in crevices of fissured barks. Absorption of radiation of barks of trees were measured in the laboratory using a Shimadzu multi-spectrophotometer. The methods are described in detail by Nicolai (1985).

The barks of trees may be roughly separated into four different types: smooth, white, fissured, and

Tab. 1. Insulation properties (°C/Joule · cm^{-2} · min^{-1}) of barks of south African trees.

Tree species	Insulation per mm bark (°C/Joule · cm^{-2} · min^{-1})	Insulation per whole bark (°C/Joule · cm^{-2} · min^{-1})
Forest		
Podocarpus latifolius	9.6	57.6
Ekebergia capensis	7.6	30.4
Olinia ventosa	8.0	20.0
Podocarpus falcatus	7.8	19.5
Apodytes dimidiata	4.2	16.8
Gonioma kamassi	1.8	15.3
Nuxia floribunda	0.9	9.9
Ilex mitis	0.9	9.0
Pittosporum viridiflorum	2.3	5.7
Cassine peragua	0.07	0.6
Scolopia mundii	0.01	0.1
Ochna arborea	0.01	0.03
Savanna		
Strychnos cocculoides	2.6	56.4
Strychnos pungens	4.5	40.4
Ochna pulchra (1.0 m)	4.2	37.8
O.pulchra (1.7 m)	2.8	16.8
Combretum apiculatum	1.6	19.2
Faurea saligna	1.3	13.0
Sclerocarya birrea	0.6	12.6
Albizia tanganyicensis	1.4	11.9
Peltophorum africanum	1.8	11.7
Securidaca longipedunculata	2.3	11.5
Burkea africana	1.9	4.0
Terminalia sericea	0.6	3.6
Acacia karroo	0.3	3.3

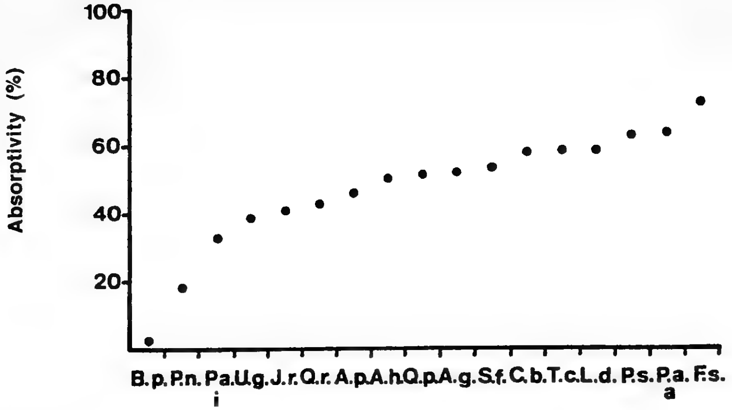


Fig. 1. Infrared absorptivity (%) of barks of different central European trees (mean 700-1.600 nm). Bp: *Betula pendula*, Pn: *Populus nigra*, Paj: *Picea abies* (girth > 50 cm), Ug: *Ulmus glabra*, Jr: *Juglans regia*, Qr: *Quercus robur*, Ap: *Acer pseudoplatanus*, Qp: *Quercus petraea*, Ag: *Alnus glutinosa*, Sf: *Salix fragilis*, Cb: *Carpinus betulus*, Ld: *Larix decidua*, Ps: *Pinus sylvestris*, Paa: *Picea abies* (girth > 50 cm), Fs: *Fagus sylvatica*.

scaly barks. In central Europe I investigated the thermal properties on smooth barks of 8 tree species; on white barks of one tree species; on fissured barks of 9 tree species; on scaly barks of 6 tree species (in total 24 tree species). In southern Africa I investigated the thermal properties on smooth barks of 11 tree species; on white barks of two tree species; on fissured barks of 10 tree species; on scaly barks of 3 tree species (in total 26 tree species). In northern America I investigated the thermal properties on smooth barks of one tree species; on white barks of two tree species; on fissured barks of 11 tree species; on scaly barks of 6 tree species (in total 20 tree species).

Fauna. The fauna living on the outer surface on the bark of healthy trees was only investigated on

Tab. 2. Insulation properties (°C/Joule · cm^{-2} · min^{-1}) of barks of north American trees.

Tree species	Insulation per mm bark (°C/Joule · cm^{-2} · min^{-1})	Insulation per whole bark (°C/Joule · cm^{-2} · min^{-1})
Pinus banksiana	0.76	61.43
Pinus strobus	0.51	61.27
Pinus resinosa	0.54	43.54
Quercus ellipsoidalis	0.25	15.60
Fraxinus nigra	0.61	15.32
Quercus macrocarpa	0.22	13.24
Populus grandidentata (0.5 m)	0.54	10.86
Thuja occidentalis	0.56	8.53
Acer rubrum	0.33	8.32
Ulmus rubra	0.37	5.55
Ulmus americana	0.24	4.87
Prunus serotina	0.32	4.83
Quercus rubra	0.56	4.81
Quercus alba	0.30	4.58
Tilia americana	0.52	3.70
Fraxinus pennsylvanica	0.21	2.61
Acer saccharinum	0.19	1.94
Betula papyrifera	0.22	1.59
Populus grandidentata (1.5 m)	0.14	1.02
Populus tremuloides	0.09	0.64
Picea mariana	0.08	0.62

adult trees, since the typical bark surfaces are only formed by older individuals. Animals were mainly collected by hand. Starting from 20 cm above the ground up to 2.5 m, all animals around the trunk of the entire tree were collected in pooters and preserved in 70 % ethanol. Additional collections were made by using a vacuum cleaner on previously marked areas on the barks. Tree species, time of day, weather conditions, girth and position of the tree, and behaviour of the bark fauna was noted. Animals were sorted, identified, and counted. Statistics follow Sachs (1969) and Mühlenberg (1993). Methods are described in detail by Nicolai (1985). The fauna on the barks was investigated on the same bark types as the microclimatic studies were done. This was carried out in central Europe on smooth bark of *Fagus sylvatica*, on white bark of *Betual pendula*, on fissured barks of *Quercus robur*, *Ulmus glabra*, and *Salix alba*, on scaly bark of *Acer pseudoplatanus*. It was also completed in southern Africa on smooth barks of

Tab. 3. Oribatei living on the barks of central European trees (mean number per collection). Fs: *Fagus sylvatica*, Qr: *Quercus robur*, Bp: *Betual pendula*, Ap: *Acer pseudoplatanus*, Sa: *Salix alba*, Ug: *Ulmus glabra*. w: white bark type, s: scaly bark type, f: fissured bark type, sm: smooth bark type.

Tree species bark type	Fs sm	Qr f	Bp w	Ap s	Sa f	Ug f
Phthiracarus sp. Petry		0.01	0.01	0.3		0.07
Camisia spinifer (C. L. Koch)	0.005	0.01	0.01			
Camisia horrida (Hermann)	0.06	0.05	0.05	2.03		
Camisia segnis (Hermann)			0.38		1.0	
Camisia sp.	0.005			0.75		
Belba gracilipes Kulcz.	0.06	0.01	0.02	0.28	0.12	0.07
Belba sp.	0.005	0.09	0.06			
Eremaeus hepaticus C. L. Koch		0.09	0.02	0.43	43.62	0.03
Eremaeus oblongus C. L. Koch		0.02				
Ceratoppia bipilis (Hermann)				0.08		
Oribata geniculatus (L.)				0.97	1.06	
Xenillus clypeator Rob. -Desv.		0.04				0.07
Xenillus tegeocranus Hermann		0.02				0.07
Carabodes labyrinthicus (Mich.)	90.70	24.91	10.36	71.02	143.76	0.62
Cepheus dentatus (Mich.)	0.01					
Tectocepheus velatus (Mich.)	0.03	0.08		0.23	151.85	
Caleremaeus monilipes (Mich.)		0.5		0.1		
Cymberemaeus cymba (Nic.)	0.63	1.03		5.93	5.18	0.03
Micreremaeus brevipes (Mich.)					1.5	
Phauloppia lucorum (C. L. Koch)		0.06				
Oribatula exilis (Nic.)	0.005			0.05	11.0	0.07
Oribatula tibialis (Nic.)	0.01					
Eporibatula rauschenensis (Sell.)		0.14		13.67	54.76	
Scheloribates laevigatus (Koch)	0.02	0.01			2.0	
Scheloribates latipes (Koch)					2.0	0.03
Trichoribates trimaculatus (Koch)		0.01				
Chamobates spinosus Sell.		0.02				
Chamobates subglobosus (Oud.)		0.01		0.08		
Chamobates lapidarius (Lucas)		0.14				
Chamobates schützi (Oud.)					13.5	
Oribatella calcarata (C. L. Koch)		0.03	0.02	0.13	0.5	
Oribatella reticulata Berl.		0.07				
Parachipteria punctata (Nic.)		0.03				
Pelops plicatus (C. L. Koch)				0.17		
Number of species (N)	12	23	9	16	14	9
Mean number of specimens per m^2 (n/m^2)	45.6	13.0	10.9	41.5	48.9	1.1
diversity (Shannon-Weaver)	0.06	0.42	0.28	0.96	1.59	1.62
evenness (Shannon-Weaver)	0.02	0.14	0.13	0.34	0.60	0.70

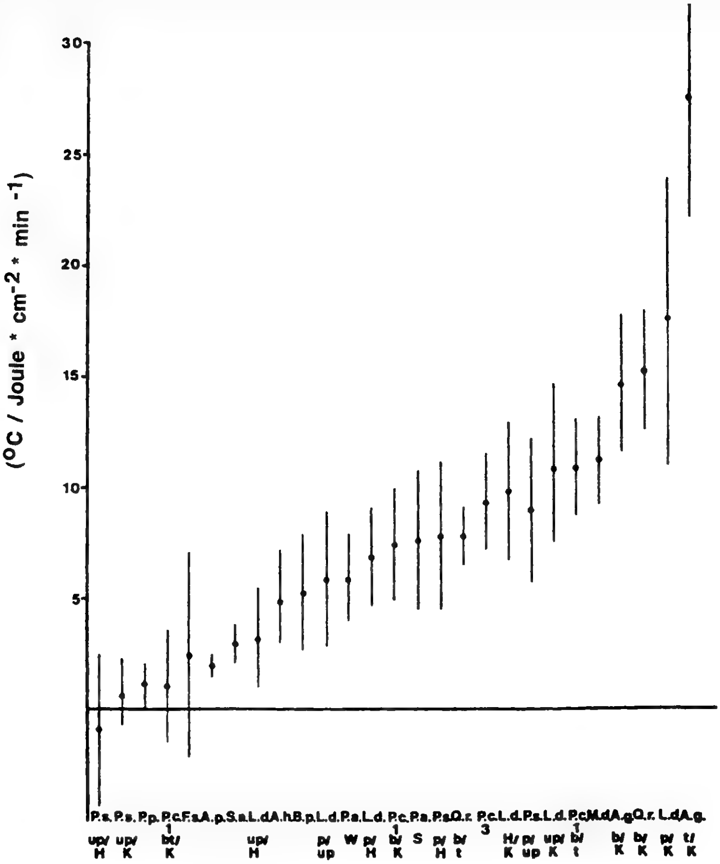


Fig. 2. Insulation properties (°C/Joule · cm^{-2} · min^{-1}) of barks of central European trees (averages and standard deviation of all values > 0.2 Joule · cm^{-2} · min^{-1}). Trees on forest edges facing south. Ps: *Pinus sylvestris*, Pp: *Prunus persica*, Pc: *Populus canadensis*, Fs: *Fagus sylvatica*, Ap: *Acer platanoides*, Sa: *Salix alba*, Ld: *Larix decidua*, Ah: *Aesculus hippocastaneum*, Bp: *Betual pendula*, Pa: *Prunus avium* (w: winter, s: summer), Qr: *Quercus robur*, Pc3: *Prunus domestica x cerasifer*, Md: *Malus domestica*, Ag: *Alnus glutinos*. Thermocouples are measuring temperature differences between: up/w: under bark plate/wood, up/c: under bark plate/cambium, bv/c: barkvalley/cambium, p/up: plate/under plate, p/w: plate/wood, h/c: barkhill/cambium, h/v: barkhill/barkvalley, c/w: cambium/wood, p/c: plate/cambium.

Apodytes dimidiata and *Cassine peragua*, on white barks of *Albizia tanganyicensis*, on fissured barks of *Olinia ventosa*, *Ocotea bullata*, *Peltophorum africanum*, and *Acacia karroo*, on scaly barks of *Podocarpus falcatus*, *Sclerocarya birrea*, and *Burkea africana*; and in north America on smooth bark of *Abies balsamea*, on white bark of *Betula papyrifera* and *Populus tremuloides*, on fissured barks of *Pinus strobus*, *Acer saccharum*, *Fraxinus pennsylvanica*, *Tilia americana*, *Quercus macrocarpa*, and *Quercus ellipsoidalis*, on scaly barks of *Pinus resinosa*, *P. banksiana*, and *Picea mariana*.

Results

1. Microclimate

Both the temperature of the air surrounding the trunk and the bark temperature were taken at the same time. To compare bark temperatures of different trees, an "absolute bark temperature" (bark temperature minus air temperature) was calculated for every value. If the surface temperature of the bark, the cambial temperature, and global radiation on the same spot are measured at the same time, the variation of absolute bark temperature per unit solar radiation, and per mm bark or across the whole bark can be calculated and compared within the different tree species. Although there are other definitions these values may be called insulation of the bark (°C/Joule · cm^{-2} min^{-1}). The calculations were made for all tree species and for all values of global radiation > 0.2 Joule · cm^{-2} min^{-1}.

Tree species with white barks avoid overheating of their surface by reflecting the strong solar radiation which reaches the trunk (Fig. 1). Species with fissured and scaly bark types shade inner parts of their barks, and some species show high insulation across their barks (Fig. 2, Tab. 1, Tab. 2). Smooth and thin barks show little insulation and may have high values of absorptivity (700-1.600 nm), e.g. *Fagus sylvatica* (Fig. 1). When this strong overheating occurs on the surface and even in the cambium, the bark cracks off leading to irreparable damages, and in the long run the trees die. In central Europe, species that suffer from this so-called "sun-burn" are especially beeches (*Fagus sylvatica*). In southern Africa shade tolerant tree species which naturally occur inside dense forests (e.g. *Apodytes dimidiata*) are known to suffer similar damage and also have a smooth bark type. In my study area in north America, no tree species with a smooth bark type appears. East of that area *Fagus grandifolia* occurs in large well-known dense stands showing a smooth bark.

In the open savanna ecoysystems of South Africa and of North America, all tree species show high insulating properties of their mostly fissured or scaly bark types (Nicolai 1989, 1991) or they have white bark types owing high values of reflection.

2. Fauna

Europe. The arthropod communities living exclusively on the barks of trees consist of about 100 different species belonging mainly to the Oribatei (Acari), Araneae, Psocoptera and Brachycera. Results of these studies are given in detail by Nicolai (1985, 1986). Other taxonomical groups, e.g. Coleoptera, were found to be migrants on trunks of healthy trees and are therefore no exclusive inhabitants in this sense. One example for a taxonomical group may be presented. Within the oribatid mites on barks of central European trees (Tab. 3), the dominant species are quite similar on the barks of *Fagus sylvatica*, *Quercus robur*, and *Betual pendula*. On barks of *F. sylvatica* live only few species of Oribatei, which coexist with *Carabodes labyrinthicus* (Tab. 3). More species were found on more structured bark types (Tab. 3). The values of diversity and evenness (Shannon-Weaver) calculated for Oribatei living on the trunks with richly structured barks (fissured and scaly) differ markedly from the values on smooth and white bark types (Tab. 3). Thus the structure of the bark determines the species communities of Oribatei on tree trunks. Similar results were found for other arthropod groups (Araneae, Psocoptera, Brachycera) (Nicolai 1986). The different epiphytic plant communities on the barks had no significant influence on the distribution of the bark living fauna (Nicolai 1986).

America. A comparison between the bark-living arthropods on deciduous and on coniferous tree species is only feasible in an area where both types of trees grow together in similar proportions under the same natural conditions of soil and climate. This cannot be found in central Europe but in North America, e.g. in the Itasca State Park, MN, USA. This park with an area of 3.200 ha was founded in 1891 and since then little or no managements or man-made disturbances are known.

On the barks of deciduous trees in this park, similar results to that of central Europe were found. A more diverse arthropod fauna lives on richly structured bark types of e.g. *Tilia americana* or *Acer saccharum* compared to poorly structured bark types of e.g. *Populus tremuloides* or *Betula papyrifera* (Nicolai 1993). Surprisingly, in this area the opposite was found on the barks of coniferous tree species. On the smooth bark of *Abies balsamea* nearly the same amount of species but more individuals per m^2 were found then on the richly structured (fissured and scaly) barks of *Picea mariana*, *Pinus resinosa*, and *Pinus strobus* (Tab. 4).

On the whole, more arthropod species live on bark of deciduous tree species then were found on the bark of coniferous tree species. Only a few arthropod species live on the barks of both types of trees species (Nicolai 1993). The arthropod communities on the bark of deciduous and coniferous tree species are well separated from each other.

To investigate the reactions of the bark living arthropod fauna to the intensities and frequencies of a naturally occurring disturbance factor I visited the Cedar Creek Natural History Area (Nicolai 1991).

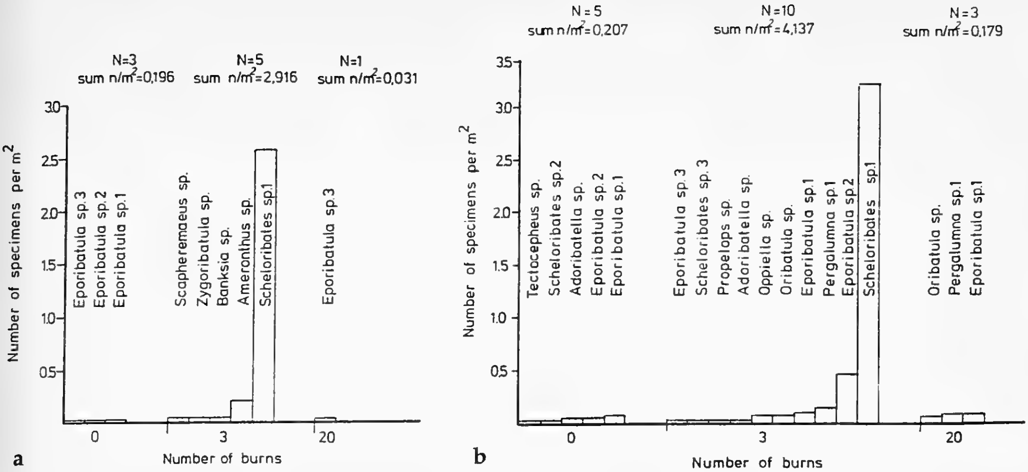


Fig. 3. Oribatei on trunks of *Quercus macrocarpa* (a) and *Quercus ellipsoidalis* (b). Number of specimens (n) per m² of bark of the given species (N) in relation to the number of burns in areas of the Cedar Creek Natural History Area.

Here oaks *(Quercus ellipsoidalis* and *Q. macrocarpa)* with their fissured bark type are the dominant tree species and a program of prescribed burning has been conducted since 1964. Initially, this program was started to restore the oak savanna (Irving 1985). The effects of the different fire frequencies on the vegetation and soils are summarized by Tester (1989). The highest numbers of species and individuals of bark living arthropods on the fissured barks of the oaks were found in areas with a moderate frequency of fires (Fig. 3). Fewer bark living species and individuals live in areas with a very high frequency of disturbances or in areas with no disturbances at all since 1964 (Nicolai 1991). The bark-living arthropods could be divided into three main groups: "Undisturbed-adapted" species occur on trunks of trees in the area not disturbed by fires at least since 1964. "Disturbed-adapted" species occur on trunks of trees in moderate disturbed areas, and "true-fire-adapted" species were found in correlation to the frequencies of fires on trunks of trees (Nicolai 1991).

Africa. In the indigenous forest at southern Africa, both the number of species and the number of individuals found on a trunk differ according to the bark type. The most diverse fauna is found on the scaly bark of *Podocarpus falcatus,* followed by that on the fissured bark of *Olinia ventosa* and *Ocotea bullata*. The bark fauna of *Cassine peragua* has medium values of diversity, and the bark fauna of *Apodytes dimidiata* (smooth bark type) has the lowest value. Only two species of oribatid mites make up 87 % of all specimens found on the bark of *Apodytes dimidiata* per m².

The dominant species composition of the arthropod fauna (>5 % of all collected animals on the barks of one tree species) on trunks with richly structured barks (scaly and fissured bark types) are closely related. This may be calculated by the similarity of the dominant species. Of the dominant species on the bark of *Podocarpus falcatus* (scaly bark) 54.2 % are also found to be dominant on the bark of *Olinia ventosa* (fissured bark type). On the other hand, the diverse fauna on richly structured bark types differs from that found on the smooth bark of *Apodytes dimidiata*; only 13.8 % of the dominant species are the same. If the bark types are ordered by the complexity of their structure (smooth - white - fissured - scaly), the values of similarity in the dominant species composition as well as species richness increases from poorly to richly structured bark types (Fig. 4).

In savanna ecosystems, richly structured bark types (fissured and scaly) are more often found then smooth bark types. All types in the savanna provide suitable microhabitats for many species. The arthropod fauna on all investigated tree species was as diverse as that on richly structured bark types in the subtropical forest. One indicator of the structure of bark may be its thickness. Smooth bark types are always thin, while fissured and scaly bark types are thicker. In the subtropical forest the diversity of the bark living arthropod fauna is related to the structure of the bark. The bark thickeness of the tree species from which the fauna was collected were all significantly different from each other, whereas bark thickeness of the savanna tree species were similar to each other and sometimes identical.

Therefore, the correlation bark thickeness : diversity of the arthropod fauna was not significant in the savanna ecosystem (Fig. 4). The arthropod fauna on the bark of trees may be separated into herbivorous, fungivorous species and carnivorous species. In the subtropical forest the ratio of herbivorous and fungivorous species to carnivorous species was much higher (2.2:1) than in the dry savanna (1.1:1). The frequency of carnivorous species per m^2 of bark on trunks of trees is higher in the savanna ecosystem then in subtropical forests.

Discussion

The process of the natural mosaic change in the tree species composition was found to be similar in the investigated three different forest ecosystems. Treefall gaps and other openings are typical and important components of forest ecosystems (Connell 1989, Frehlich et al. 1993, Lang & Knight 1983, Nicolai 1986, 1989, 1993, Palik & Pregnitzer 1993, Remmert 1985, 1987, 1991 a,b, 1993, Schrempf 1986) and all the tree species have to be adapted to this factor. Pioneer tree species with white barks (*Betula pendula* in central Europe; *Betula papyrifera* and *Populus tremuloides* in north America; *Albizia tanganyicensis* in south Africa) colonize these open areas. There are other characteristics of these pioneer tree species such as wind dispersed seeds (Whitemore 1989), limited life span (about 100 years), and fast growth. This is the reason that the timber of those tree species is often of low quality for man's use. Tree species with white bark types avoid overheating of their trunks by reflection of solar radiation and are able to form open stands. They even occur on natural and man-made forest edges. Tree species with more structured bark types may follow these pioneer tree species during succession. Some of them are even able to form open stands as they show high insulating properties across their bark. Most of them have fissured, although some have scaly bark types; they often have animal dispersed seeds, and a longer life span than the pioneer tree species. They are slower growing and their timber is of more value to man. Species with high insulating properties may even survive wild fires and thus are able to exist inside a pioneer tree species stand after a fire (or other disturbances). In both types of stands tree species having structured bark types and even tree species with a smooth and thin bark type which have low values of insulation across their bark may grow; but they have to form closed stands. These tree species save energy not producing a thick structured bark (Pavlov 1973), but they do not survive to exist on edges of treefall gaps. If the trunks are exposed to solar radiation strong overheating occurs, the bark cracks off, and in the long run the trees die. From the evolutionary point of view, smooth and thin bark of adult trees may be seen as neoteny. In the forest ecosystem the risk of an opening, which cannot be stopped by tree species with thin and smooth bark types, is reduced by the presence of trees with richly structured bark types and better insulating properties, which can survive on natural forest edges. Light regime in gaps in relation to geographical factors describe Poulson & Platt (1989).

Diversity of forest ecosystems is related to the degree of disturbance (Bradshaw 1993, Connell &

Tab. 4. Number of species (N) and sum of the number of individuals per m^2 (n/m^2) of main arthropod groups (> 5 % of all) living exclusively on barks of north American trees. Pt: *Populus tremuloides*, Bp: *Betual papyrifera*, As: *Acer saccharum*, Ta: *Tilia americana*, Fp: *Fraxinus pennsylvanica*, Ab: *Abies balsamea*, Pm: *Picea mariana*, Pb: *Pinus banksiana*, Pr: *Pinus resinosa*, Ps: *Pinus strobus*. w: white bark type, s: scaly bark type, f: fissured bark type, sm: smooth bark type.

Tree species	Pt	Bp	As	Ta	Fp	Ab	Pm	Pb	Pr	Ps	sum
	deciduous					coniferous					
bark type	w	w	s	f	f	sm	s	s	s	f	
Oribatei	1	3	6	6	3	6	1	3	4	1	19
Araneae	1	5	2	3	3	3	4	1	2	2	11
Psocoptera	2	5	2	2	3	2	3	3	3	3	8
Diptera	6	4	8	6	4	1	3	3	3	5	14
Lepidoptera	2	1	1	5	1	1	1	–	2	–	8
sum(N)	12	18	19	22	14	13	12	10	14	11	60
sum (n/m^2) all	1.4	5.9	7.9	7.2	2.3	13.1	1.9	2.8	1.5	0.7	

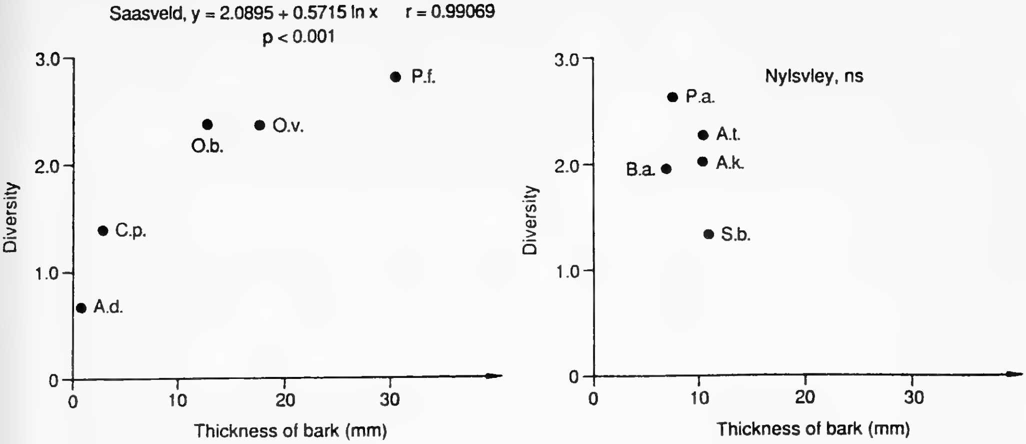


Fig. 4. Diversity (Shannon-Weaver) of arthropods living on the bark of trees in relation to the thickness of the bark in a subtropical forest (Saasveld) and a savanna (Nylsvley). Pf: *Podocarpus falcatus*, Ov: *Olinia ventosa*, Ob: *Ocotea bullata*, Ad: *Apodytes dimidiata*, Cp: *Cassine peragua*, Pa: *Peltophorum africanum*, Sb: *Sclerocarya birrea*, Ba: *Burkea africana*, Ak: *Acacia karroo*, At: *Albizia tanganyicensis*.

Slatyer 1977, Connell 1978, Drake & Mueller-Dombois 1993, Jacobs 1989, Maarel 1993, Whitemore 1989). In virgin forests of Europe, a mosaic representing the different successional stages of a forest in time and space was found by Mayer & Neumann (1981) in a large area at the same time.

Gaps in forests are necessary for successful regeneration of certain tree species (Bongers et al. 1988). Besides natural death disturbances in forest ecosystems may be caused by abiotic factors like fire (Foster & Zebryk 1993, Granström 1993, Lamont et al. 1993, Steward 1986), wind (Brewer & Merritt 1978, Matlack et al. 1993), drought (Clinton et al. 1993), or even volcanic eruptions (Spies & Franklin 1989). Disturbance may also be caused by biotic factors: animals (Basey et al. 1988, Doucet & Fryxel 1993, Gerken et al. 1992, Naiman 1988, Pastor et al. 1993, Prins & Jeugd 1993), phytophagy (Baltensweiler 1993, Molvar et al. 1993, Whitney 1984), diseases (Menges & Loucks 1984). Shure & Wilson (1993) describe the effect of patch size to plant phenolics. Wayne & Bazzaz (1993) give results for seed germination of birches on west and east sides of gaps. Davidson (1993) summarizes the worldwide effects of herbivory and granivory on terrestrial plant succession. Langvatn and Hanley (1993) show that deers feed mainly in gaps.

Many of these disturbance factors are extinguished in central Europe and tree species composition has been influenced by man for a long time [compare Motzkin et al. (1993) for the situation in north America]. Only few native species (mainly *Fagus sylvatica*, *Quercus robur*, *Q. petraea*, and *Picea abies*, *Pinus* spp.) form most of the production area for the forest industry in central Europe. *F. sylvatica* (smooth and thin bark type) does not survive openings exposed to south. Sun burn of the bark occurs, the bark cracks off and in the long run one line after the other of a stand dies back. At every man-made border of stands of *F. sylvatica* this type of damage can be seen (especially on edges facing south). In southern Africa, the same holds for *Apodytes dimidiata* on north facing edges of forest openings. Economic assessment of these damages has not been attempted. Oaks and many other tree species but not beeches are able to produce branches on the trunks which shade them if suddenly exposed to the sun.

These results support well-known consequences for forest managements which were recently summarized by Sturm (1993): large clearcuttings in forests formed mainly by *F. sylvatica* or other tree species with smooth and thin bark types should be avoided. Newly constructed roads and highways through closed forests should be avoided. However, if there is a strong demand to do so, there should be a plan to establish pioneer tree species with white bark types along the opened sides prior to construction.

In natural forests many trees species coexist beneath each other and they show the different bark types. The arthropod fauna living on the outer surface of healthy tree trunks is highly specialized to this microhabitat and cannot be found in other habitats of forest ecosystems (e.g. litter, soil) (Nicolai

1985, 1986, 1991, 1993, Weigmann & Jung 1992). The diversity of the arthropod communities living exclusively on the bark of trees is related to the structure of the bark. Smooth and thin bark types own a fauna dominated by one or two species (within the different arthropod groups), which may live there in high numbers per m^2. On richly structured bark types (fissured and scaly) a richer fauna can be found consisting of more species (within the different arthropod groups) in equal numbers per m^2 of bark. Even considering that the surface area of fissured bark is larger, the values of diversity are at least twice as high as on smooth bark types. Another key factor in forest ecosystems is the life time of the different tree species.

The life time of many tree species forming a fissured bark type (in central Europe and America e.g. oak species, in southern Africa *Podocarpus* species, *Olinia ventosa*) lasts considerably longer than that of tree species forming a smooth bark type (in central Europe *Fagus sylvatica*, in north America *F. grandifolia*, in southern Africa *Apodytes dimidiata*). The arthropod fauna shows an interesting correspondence to the habitat bark of trees in the investigated study areas. Many of the species found are very small in body size, many of the insects are wingless, some of them reproduce parthenogenetically while their offsprings colonize the new habitats. Some spider species were found to reproduce even during winter, but these are restricted to live on fissured bark types. In the crevices on fissured barks during winter there exist higher temperatures compared to the surrounding air temperature (Nicolai 1986). These adaptations are summarized by Nicolai (1987). For instance, a group of a wingless Psocopteran species reproducing twice a year on the fissured bark of oaks may produce 1,000 generations in this habitat with its physical conditions producing juveniles which may colonize the same area on the trunk again, different areas on the same trunk, or on other trunks (assuming a life span of about 500 years of the tree species which is no overestimation). Only about 200 generations are possible on the bark of a tree species showing a smooth bark type (assuming a life span of about 100 years for the tree species).

The bark fauna responds to the natural changing tree species composition in the forest. A change of the natural tree species composition will give rise to changes in the bark arthropod species composition and the number of individuals of the bark arthropods, but the dominant bark arthropods will not die out.

Arthropod species that were found only on fissured bark types will die out in forests formed by a tree species with a smooth bark type. Uniform stands dominated by one tree species should be avoided by the forest management. There should be given attention to the natural processes of regeneration in forest ecosystems and these may be used to avoid risks in forest stands.

In savanna ecosystems, high insulation properties of trees' bark help to avoid damages due to strong solar radiation reaching the trunks and help to survive fires. In a long term study program at the Cedar Creek Natural History Area, the arthropod fauna reacts to the different fire regimes. High numbers of arthropod species and arthropod specimens were found on areas with a moderate frequency of fires, low numbers were found at areas which are burned annually or are protected from fires at least since 1964. The suppression of fires for only 25 years in this ecosystem lead to a reduction of the typical savanna species inhabiting the barks of *Quercus macrocarpa* and *Q. ellipsoidalis*. This shows that a change of the natural disturbance regime has strong consequences on species adapted to the disturbance factors and changes the typical species composition e.g. living on the barks of trees. This corresponds well with other studies which showed that a change of the natural disturbance regime give rise to a decrease of several native species (Bergeron & Danserau 1993, Negi et al. 1993) and increases the probability of invasions of foreign species (Drake & Mooney 1989). Hobbs & Huenneke (1992) summarized this "intermediate disturbance hypotheseis". In this study Jack pine (*Pinus banksiana*) was found to have the highest values of insulation properties per mm of bark (Table 2). This corresponds well with other studies which showed that Jack pines are only able to colonize areas where fire occurs as the typical disturbance factor in a high frequency (Desponts & Payette 1993, Frissell 1973). On the other hand this may be one reason that on smooth bark of coniferous trees a richer arthropod fauna was found then on the barks of coniferous trees with more structured bark types (Nicolai 1993).

Due to the low latitude in the African savannas, the sun reaches the trunks only for short periods of time during sunrise and sunset per day. Most of the day the trunks are shaded by their own crown and sun burn could not be observed. Almost all of the tree species had high insulating properties across their barks which may help them again to survive fires which are frequent events in the savanna ecosystem (Gandar 1982).

Acknowledgements

For helpful discussions, comments and support I would like to thank Prof. Dr. H. Remmert (Marburg) very much. I wish to thank Prof. Dr. W. R. Siegried (Cape Town) for the invitation to South Africa and Prof. Dr. D. Parmellee (Minneapolis) for his help during my stay in the U.S.A.

References

Baltensweiler, W. 1993. Why the larch bud-moth cycle collapsed in the subalpine larch-cembran pine forests in the year 1990 for the first time since 1850. - Oecologia **94**: 62-66

Basey, J. M., Jenkins S. H. & P. E. Busher 1988. Optimal central-place foraging by beavers: Tree size selection in relation to defensive chemicals of quaking aspen. - Oecologia **76**: 278-282

Bergeron, Y., & P. R. Dansereau 1993. Predicting the composition of Canadian southern boreal forest in different fire cycles. - J. Veg. Sc. **4**: 827-832

Bongers, F., Popma, J., & S. Iriate-Vivar 1988. Response of *Cordia megalantha* Blake seedlings to gap environments in tropical rain forest. - Funct. Ecol. **2**: 379-390

Bradshaw, R. H. W. 1993. Tree species dynamics and disturbance in three Swedish boreal forest stands during the last two thousand years. - J. Veg. Sc. **4**: 759-764

Brewer, R., & P. G. Merritt 1978. Wind throw and tree replacement in a climax beech-maple forest. - Oikos **30**: 149-152

Clinton, B. D., Boring, L. R. & W. T. Swank 1993. Canopy gap characteristics and drought influences in oak forests of the Coweeta basin. - Ecology **74**: 1551-1558

Connell, J. H. 1978. Diversity in tropical rain forests and coral reefs. - Science **199**: 1302-1310

-- 1989. Some processes affecting the species composition in forest gaps. - Ecology **70**: 560-562

-- & R. O. Slatyer 1977. Mechanisms of succession in natural communities and their role in community stability and organization. - Amer. Nat. **111**: 1119-1144

Davidson, D. W. 1993. The effects of herbivory and granivory on terrestrial plant succession. - Oikos **68**: 23-35

Desponts, M. & S. Payette 1993. The holocene dynamics of jack pine at its northern range limit in Quebec. - J. Ecol. **81**: 719-727

Doucet, D. M. & J. M. Fryxell 1993. The effect of nutritional quality on forage preference by beavers. - Oikos **67**: 201-208

Drake, D. R. & D. Mueller-Dombois 1993. Population development of rain forest trees on a chronosequence of Hawaiian lava flows. - Ecology **74**: 1012-1019

Drake, J. A. & H. A. Mooney 1989 (eds). Biological invasions: A global perspective. - Scope **37**, Wiley & Sons, 489 pp.

Drury, W. H. & J. C. Nisbet 1973. Succession. - J. Arn. Arbor **54 (3)**: 331-368

Forcier, L. K. 1975. Reproductive strategies and the co-occurrence of climax tree species. - Science **189**: 808-810

Foster, D. R. & T. M. Zebryk, 1993. Long-term vegetation dynamics and disturbance history of a *Tsuga*-dominated forest in New England. - Ecology **74**: 982-998

Frelich, L. E., Cakote, R. R., Davis, M. B. & J. Pastor 1993. Patch formation and maintenance in an old-growth hemlock-hardwood forest. - Ecology **74**: 513-527

Frissell, S. S. 1973. The importance of fire as a natural ecological factor in Itasca State Park, Minnesota. - Quatern. Res. **3**: 397-407

Gandar, M. V. 1982. The dynamics and trophic ecology of grasshopper (Acridoidea) in a South African savanna. - Oecologia **54**: 370-378

Gerken, B., Kriedemann, K. & M. Grupe 1992: Dynamik im Rotbuchenwald durch Eisbruch und Vogelkolonien - Ein Beitrag zum Verständnis der Verlichtungsdynamik im mitteleuropäischen Wald. - Laufener Seminarbeiträge **2/92**: 71-79

Granström, A. 1993. Spatial and temporal variation in lightning ignitions in Sweden. - J. Veg. Sc. **4**: 737-744

Hobbs, R. J. & L. F. Huenneke 1992. Disturbance, diversity, and invasion: Implications for conservation. - Conservation Biology **6**: 324-337

Irving, F. D. 1985: Field instruction in prescribed burning techniques at the University of Minnesota. - Naturalist **36 (4)**: 28-31

Jacobs, M. 1988. The Tropical Rain Forest. - Springer, Berlin/Heidelberg/New York

Jackson, M. T. & D. G. Abrell 1977. Volume changes in an old-growth beech maple forest over a 10-year period. - Proc. Ind. Acad. Sc. **86**: 177-181

Koike, F. 1986. Canopy dynamics estimated from shoot morphology in an evergreen broadleaved forest. - Oecologia **70**: 348-350

Lamont, B. B., Witkowski, E. T. F. & N. J. Enright 1993. Post-fire litter microsites: safe for seeds, unsafe for seedlings. - Ecology **74**: 501-512

Lang, G. E. & D. H. Knight 1983. Tree growth, mortality recruitment, and canopy gap formation during a 10-year period in a tropical moist forest. - Ecology **64**: 1075-1080

Langvatn, R. & T. A. Hanley 1993. Feeding-patch choice by red deer in relation to foraging efficiency. - Oecologia **95**: 164-170

Lieberman, D. & M. Lieberman 1987. Forest tree growth and dynamics at La Selva, Costa Rica (1969-1982). - J. Trop. Ecol. **3**: 347-358

Lieberman, M., Lieberman, D. & R. Peralta 1989. Forests are not just like Swiss cheese: Canopy stereogeometry of non-gaps in tropical forests. - Ecology **70**: 550-552

Maarel, E. 1993. Some remarks on disturbance and its relation to diversity and stability. - J. Veg. Sc. **4**: 733-736

Matlack, G. R., Gleeson, S. K. & R. E. Good 1993. Treefall in a mixed oak-pine coastal plain forest: Immediate and historical causation. - Ecology **74**: 1559-1566

Mayer, H. 1971. Das Buchen-Naturwaldreservat Dobra-Kampleiten im niederösterreichischen Waldviertel. - Schweiz. Zeit. Forstwesen 122: 45-66

-- & M. Neumann 1981. Struktureller und entwicklungsdynamischer Vergleich der Fichten-Tannen-Buchen Urwälder Rothwald/NÖ und Corkova Uvala/Kroatien. - Forstwiss. Centralbl. **100 (2)**: 111-132

-- , -- & W. Schrempf 1979. Der Urwald Rothwald in den niederösterreichischen Kalkalpen. - Ver. Schutz. Bergwelt **44**

Menges, E. S. & O. L. Loucks 1984. Modeling a disease-caused patch disturbance: Oak wilt in the midwestern United states. - Ecology **65**: 487-498

Molvar, E. M., Bowyer, R. T. & V. V. Ballenberghe 1993. Moose herbivory, browse quality, and nutrient cycling in an Alascan treeline comunity. - Oecologia **94**: 472-479

Motzkin, G., Patterson, W. A. III & N. E. R. Drake 1993. Fire history and vegetation dynamics of a *Chamaecyparis thyoides* wetland on Cape Cod, Massachusetts. - J. Ecol. **81**: 391-402

Mühlenberg, M. 1993. Freilandökologie. - Quelle & Meyer, 3. Aufl.

Naiman, R. J. 1988. Animal influences on ecosystem dynamics. - BioScience **38**: 750-752

Nicolai, V. 1985. Die ökologische Bedeutung verschiedener Rindentypen bei Bäumen. - PhD thesis, University of Marburg, 240 pp.

-- 1986. The bark of trees: Thermal properties, microclimate and fauna. - Oecologia **69**: 148-160

-- 1987. Anpassungen rindenbewohnender Arthropoden an Borkenstruktur und Feinddruck. - Spixiana **10**: 139-145

-- 1989. Thermal properties and fauna on the bark of trees in two different African ecosystems. - Oecologia **80**: 421-430

-- 1991. Reactions of the fauna on the bark of trees to the frequency of fires in a North American savanna. - Oecologia **88**: 132-137

-- 1993. The arthropod fauna on the bark of deciduous and coniferous trees in a mixed forest of the Itasca State Park, MN, USA. - Spixiana **16**: 61-69

Negi, G. C. S., Rikhari, H. C., Ram, J. & S. P. Singh 1993. Foraging niche characteristics of horses, sheep, and goats in an alpine meadow in the Indian Central Himalaya. - J. Appl. Ecol. **30**: 383-394

Palik, B. J. & K. S. Pregnitzer 1993. The vertical development of early successional forests in northern Michigan, USA. - J. Ecol. **81**: 271-285

Pastor, J. Dewey, B., Naiman, R. J., McInnes, P. F. & Y. Cohen 1993. Moose browsing and soil fertility in the boreal forests of Isle Royale National Park. - Ecology **74**: 467-480

Pavlov, M. B. 1973. Tabellen der Biomasse, der Energie- und Bioelementgehalte der Buche in einem bodensauren Buchenwald (Luzulo-Fagetum) des Solling. - Gött. bodenkdl. Ber. **29**: 193-210

Pickett, S. T. A. 1976. Succession: An evolutionary interpretation. - Amer. Nat. **110**: 107-119

-- & P. S. White (eds.) 1985. The ecology of natural disturbance and patch dynamics. - Acad. Press, New York

Poulson, T. L. & W. J. Platt 1989. Gap light regimes influences canopy tree diversity. - Ecology **70**: 553-555

Prins, H. H. T. & H. P. Jeugd 1993. Herbivore population crashes and woodland structure in East Africa. - J. Ecol. **81**: 305-314

Remmert, H. 1985. Was geschieht im Klimax-Stadium? - Naturwiss. **72**: 505-512

-- 1987. Sukzessionen im Klimax-System. - Ver. Ges. Ökol. **16**: 27-34

-- (ed.) 1991a. The mosaic-cycle concept of ecosystems. - Ecological studies **85**. Springer

-- 1991b. Das Mosaik-Zyklus-Konzept und seine Bedeutung für den Naturschutz: Eine Übersicht. - Laufener Seminarbeiträge **5/91**: 5-15

-- 1993. Diversität, Stabilität und Sukzession im Licht moderner Waldforschung. - Rundgespr. Komm. - Ökol. **6**: 15-22

Runkle, J. R. 1989. Synchrony of regulation, gaps, and latitudinal differences in tree species diversity. - Ecology **70**: 546-547

Sachs, L. 1969. Statistische Auswertungsmethoden. - 2. ed., Springer, Berlin/Heidelberg/New York

Schrempf, W. 1986. Waldbauliche Untersuchungen im Fichten-Tannen-Buchen-Urwald Rothwald und in Urwald-Folgebeständen. - Diss. University of Wien

Schupp, E. W., Howe, H. F., Augspurger, C. K. & D. J. Levey 1989. Arrival and survival in tropical treefall gaps. - Ecology **70**: 562-564

Shugart, H. H. & D. C. West 1980. Forest succession models. - Biosc. **30**: 308-313

Shure, D. J. & L. A. Wilson 1993. Patch-size effects on plant phenolics in southern Appalachians. - Ecology **74**: 55-67

Simak, M. 1951. Untersuchungen über den natürlichen Baumartenwechsel in schweizerischen Plenterwäldern. Mitt.

Schweiz. - Anst. Forst. Versuchswesen **27**: 406-468

Spies, T. A. & J. F. Franklin 1989. Gap characteristics and vegetation response in coniferous forests of the pacific northwest. - Ecology **70**: 543-545

Steward, G. H. 1986. Population dynamics of a montaine coniferous forest, Western Cascade Range, Oregon, USA. - Ecology **67**: 534-544

Sturm, K. 1993. Prozeßschutz im Wald. - Z. Ökol. Natursch. 3: 181-192

Swaine, M. D. & J. B. Hall 1988. The mosaic theory of forest regeneration and the determination of forest composition in Ghana. - J. Trop. Ecol. **4**: 253-269

Tester, J. R. 1989. Effects of fire frequency on oak savanna in east central Minnesota. - Bull. Terrey Bot. Club **116 (2)**: 134-144

Torquebian, E. F. 1986. Mosaic pattern in dipterocarp rain forests in Indonesia, and their implication for practical forestry. - J. Trop. Ecol. **2**: 301-325

Veblen, T. T. 1989. Tree regeneration responses to gaps along a transandean gradient. - Ecology **70**: 541-543

-- , Donosco, C., Schlege, F. M. & B. Escobar 1981. Forest dynamics in south-central Chile. - J. Biogeogr. **8**: 211-247

Wayne, P. M. & F. A. Bazzaz 1993. Morning vs. afternoon sun patches in experimental forest gaps: Consequences of temporal incongruency of resources to birch regeneration. - Oecologia **94**: 235-243

Whitemore, T. C. 1989. Canopy gaps and the two major groups of forest trees. - Ecology **70**: 536-538

Whitney, G. G. 1984. Fifty years of change in the arboreal vegetation of Heart's content, an old-growth Hemlock-White-Pine-Northern hardwood stand. - Ecology **65**: 403-408

Weigmann, G. & E. Jung 1992. Die Hornmilben (Acari, Oribatei) an Straßenbäumen in Stadtzonen unterschiedlicher Luftbelastung in Berlin. - Zool. Beitr. **34**: 273-288

27. Mebs, D.: Gifttiere. Ein Handbuch für Biologen, Toxikologen, Ärzte, Apotheker. - Wiss. Verl.-Ges., 1992. 280 S., über 191 Abb.

Gifte sind im Tierreich sehr weit verbreitet, und sie werden von den "Produzenten" aktiv oder passiv dem vielfach unspezifischen Objekt 'Mensch' appliziert. So werden Gifte von den Meeres- wie Landtieren, eine Gliederung wie sie im vorliegenden Buch herausgestellt wird, zum Beuteerwerb oder zur Verteidigung eingesetzt. Letzteres findet auch gegen den Menschen statt und so kann es zu Vergiftungen nach Biß, Stich oder nach Verzehr giftiger Tiere kommen, manche sogar mit tödlichem Ausgang. Dieser zusammenfassende Bildband umfaßt eine Fülle von Beispielen giftiger Tiere, die systematisch in Folge aufgeführt werden. Neben der Beschreibung der jeweiligen Tiergruppe oder einzelner Vertreter werden die Vergiftungsumstände, die zu beachtenden Vorsichtsmaßnahmen, der Giftapparat selbst und das Gift als organochemische Substanz beschrieben. Die Wirkung beim Menschen wird dokumentiert mit einer Angabe von Erste-Hilfe-Maßnahmen. Den Abschluß jeden Kapitels, das sehr gut in die Biologie und die Gefährdung einführt, bildet eine Fallbeschreibung, bei vielfach tödliche Verlauf der Vergiftung eine Gegenüberstellung eines mittelschweren und letalen Krankheitsbildes. So erfährt der Leser, daß nicht nur der Kontakt mit Schwämmen Nesseltieren , Schnecken und Tintenfischen, Borstenwürmern, Stachelhäutern sowie Fischen mit giftigen Hautsekreten oder Giftstacheln zu Vergiftungen führen können, sondern auch durch mikroskopisch kleine Algen, die beim Verzehr von Meerestieren wie Muscheln, Schnecken, Krebsen, Fischen und Schildkröten durch ihre toxischen Inhaltsstoffe auch zum Tode führen können. Bei den terrestrischen Gifttieren werden die typischen Vertreter der Spinnen, Skorpione, Skolopender, Insekten mit aktivem Stechverhalten aber auch passiver Wirkung durch Haare (Schmetterlingsraupen) oder Pflanzeninhaltsstoffe behandelt. Diesen folgen die Beschreibungen zu den giftigen Hautsekreten der Amphibien und das besonders ausführliche Kapitel der Giftschlangengifte und deren Wirkungen. Die Schlangen selbst werden getrennt nach zoogeographischen Regionen mit ihren Merkmalen, ihrer Verbreitung und der Lebensweise vorgestellt. Dieser herausragenden Zusammenstellung der einzelnen giftigen Organismen ist ein kurzer aber besonders informativer Grundlagenteil vorangestellt, der die Giftwirkungen präzisiert bis hin zu Tips für die Taucher, Fern- und Abenteuerreisende und für die Reiseapotheke enthält. Die im Titel angesprochenen Leserkreise finden hier zahllose, möglicherweise lebensrettende Hinweise. E.-G. Burmeister

28. Weberling, F. & T. Stützel: Biologische Systematik - Grundlagen und Methoden. - Wissenschaftliche Buchgesellschaft, Darmstadt, 1994. 209 S. ISBN 3-534-10554-0.

Die zunehmende Beachtung der biologischen Systematik in der Lehre vieler Universitäten spiegelt sich darin wider, daß in neuester Zeit mehrere Lehrbücher zu diesem Fachgebiet erschienen sind. Das vorliegende Buch beschäftigt sich mit der Theorie und Praxis der botanischen und der zoologischen Systematik. Es wird dabei immer wieder deutlich, daß die Autoren Botaniker sind. Aber gerade deshalb ist das Buch auch für Zoologen sehr zu empfehlen. Es ist interessant zu sehen, wie sehr sich manche Teilgebiete der Systematik (z.B. die Artkonzepte) in Zoologie und Botanik unterscheiden. In dem Buch werden sowohl altbewährte, aber auch neuere Arbeitsmethoden vorgestellt. Sehr interessant ist auch die Gegenüberstellung der botanischen und zoologischen Nomenklaturregeln. Das Buch kann allen, die an Theorie und Praxis der biologischen Systematik interessiert sind, uneingeschränkt empfohlen werden. R. Melzer

29. Pfannenstiel, H.-D. (Hrsg.): Verhandlungen der Deutschen Zoologischen Gesellschaft. Teil 1: Hauptvorträge, Teil 2: Kurzpublikationen. - G. Fischer Verlag Stuttgart, 1993. 236 und 294 S.

Die Hauptthemen der Jahresversammlung in Salzburg, von denen im ersten Band die Plenarvorträge vorgestellt sind, waren: Anpassungen an den alpinen Raum, Zellinteraktionen und -kommunikation, Verwandschaftsforschung bei Mensch und Tier, neuronale Netzwerke, Stoffwechselphysiologie, Zoologische Systematik und Morphologie. Wie jedes Jahr geben die Kurzpublikationen eine gute Übersicht über die im deutschen Sprachraum aktuelle zoologische Forschung. Die im letzten Jahr erstmals vollzogene Aufteilung der Verhandlungen in zwei getrennte Bände hat sich bewährt. K. Schönitzer

30. Minelli, A.: Biological Systematics. The State of the Art. - Chapman & Hall, London, 1993. 387 S. ISBN 0-412-36440-9.

Schon der Untertitel dieses Buches enthält eine persönliche Wertung des Autors und ist gezielt provokativ: Ist die Systematik eine Kunst oder eine Wissenschaft? Minelli versteht es in hervorragender Weise, einerseits die wichtigste Literatur über den Stand der biologischen Forschung knapp und gut zusammenzufassen, aber gleichzeitig auch persönliche Wertung, Meinung und Erfahrung einfließen zu lassen. Das vorliegende Buch ist dadurch sowohl ein wichtiger Beitrag zur wissenschaftlichen Diskussion einer Reihe von aktuellen Themen, als auch eine umfassendes Nachschlagewerk über den Stand der Systematik. In einem längeren Anhang sind systematische Übersichten aus wichtigen Arbeiten der letzten Jahre extrahiert. Daß das Buch auch flüssig zu lesen ist, macht es besonders wertvoll und empfehlenswert. K. Schönitzer

SPIXIANA – Zeitschrift für Zoologie

herausgegeben von der

Zoologischen Staatssammlung München

SPIXIANA – Journal of Zoology

published by

The Zoological State Collection Munich

SPIXIANA bringt Originalarbeiten aus dem Gesamtgebiet der Zoologischen Systematik mit Schwerpunkten in Morphologie, Phylogenie, Tiergeographie und Ökologie. Manuskripte werden in Deutsch, Englisch oder Französisch angenommen. Pro Jahr erscheint ein Band zu drei Heften. Umfangreiche Beiträge können in Supplementbänden herausgegeben werden.

Ein Jahresabonnement kostet 120,- DM oder 60 US-$. Supplementbände werden gesondert nach Umfang berechnet. Mitglieder der "Freunde der Zoologischen Staatssammlung München" können die Zeitschrift zum ermäßigten Preis von 50,- DM beziehen.

SPIXIANA publishes original papers on Zoological Systematics, with emphasis on Morphology, Phylogeny, Zoogeography and Ecology. Manuscripts will be accepted in German, English or French. A volume of three issues will be published annually. Extensive contributions may be edited in supplement volumes.

Annual subscription rate is 60 US-$ or any internationally convertible currency in the value of 120,- DM. Supplements are charged at special rates depending on the number of printed pages. Members of the "Freunde der Zoologischen Staatssammlung München" may order the journal at the reduced rate of 50,- DM.

Bestellungen sind zu richten an die

Orders should be addressed to the library of the

Zoologische Staatssammlung München
Münchhausenstraße 21
D-81247 München

Hinweise für Autoren

Die Manuskripte sollen in zweifacher Ausfertigung eingereicht werden. Sie sollen einseitig und weitzeilig mit mindestens vier cm breitem Rand geschrieben sein. Sie müssen den allgemeinen Bedingungen für die Abfassung wissenschaftlicher Manuskripte entsprechen. Für die Form der Manuskripte ist die jeweils letzte Ausgabe der SPIXIANA maßgebend und genau zu beachten. Eine englische Zusammenfassung ist der Arbeit voranzustellen. Tabellen und Abbildungsvorlagen sind gesondert beizufügen. Der Gesamtumfang eines Beitrages sollte nicht mehr als 2 Druckbogen (32 Druckseiten) umfassen.

Manuskripte auf Computerdisketten werden bevorzugt. In diesem Falle müssen die Diskette und zwei gedruckte Exemplare eingereicht werden. Der Text sollte keine Absatzformatierungen enthalten, die Tabellen sollten aber mit Tabulatoren formatiert sein. Gattungs- und Artnamen können kursiv gesetzt werden. Von der Verwendung anderer Zeichenformatierungen ist abzusehen. Anstelle von ♀ und ♂ sollte eine Zeichenkombination, welche im Text sonst nicht vorkommt, z. B. '#w' und '#m', verwendet werden. Es sollten 3,5" und 5,25" Disketten, lesbar auf IBM-kompatiblen Computern mit MS-DOS, eingereicht werden.

Die Herausgabe dieser Zeitschrift erfolgt ohne gewerblichen Gewinn. Mitarbeiter und Herausgeber erhalten kein Honorar. Die Autoren erhalten 1 Heft mit ihrer Arbeit. Sonderdrucke werden nach Wunsch gegen Rechnung angefertigt. Die Bestellung sollte bei Rückgabe der Fahnenkorrektur erfolgen.

Notice to Contributors:

The manuscript should be presented in two complete copies. It must be typed on one side of the paper only and double spaced with a margin of at least four centimetres. It should correspond to the universal composition of scientific manuscripts. The form should observe the SPIXIANA standard outlay set up in the previous issue. An English abstract should precede the paper. Tables, graphs and illustrations must be enclosed separately. The total text of a contribution should not exceed two galley proofs (32 printed pages).

Manuscripts on word processor discs are preferred. The floppy disc with text (and graphic-files, if present) and two hard copies shoud be send to the Editor. Do not format the text, except for italics (for names of genera and species) and tabs (only for tables !). Instead of ♀ and ♂ use '#f' and '#m' or any other combinations of signs which do not occur elsewhere in the text. The text should be on 3.5" or 5.25" discs, readable on IBM-compatibles with MS-DOS.

The publication of this journal ensues without material profit. Co-workers and publishers receive no payment. The authors will receive 1 copy of the part of the volume in which their paper appears. Reprints can be ordered when the proofs are returned.

17. DM 328.-; **18.** DM 148.-; **19.** DM 128.-; **20.** AUD 29.95; **21.** DM 54.-; **22.** DFL 300.-; **23.** DFL 200.-, USD 118.-; **24.** DFL 250.-, USD 142.-; **25.** GBP 59.90; **26.** DFL 250.-, USD 157.50; **27.** DM 148.-; **28.** DM 39.80; **29.** DM 198.-; **30.** GBP 45.-.

SPIXIANA	18	2	105–200	München, 01. Juli 1995	ISSN 0341–8391

INHALT - CONTENTS

zoologische staatssammlung münchen

SPIXIANA

Zeitschrift für Zoologie

SPIXIANA • Band 18 • Heft 3 • 201-320 • München, 01. November 1995 • ISSN 0341-8391

SPIXIANA

ZEITSCHRIFT FÜR ZOOLOGIE

herausgegeben von der

ZOOLOGISCHEN STAATSSAMMLUNG MÜNCHEN

SPIXIANA bringt Originalarbeiten aus dem Gesamtgebiet der Zoologischen Systematik mit Schwerpunkten in Morphologie, Phylogenie, Tiergeographie und Ökologie. Manuskripte werden in Deutsch, Englisch oder Französisch angenommen. Pro Jahr erscheint ein Band zu drei Heften. Umfangreiche Beiträge können in Supplementbänden herausgegeben werden.

SPIXIANA publishes original papers on Zoological Systematics, with emphasis on Morphology, Phylogeny, Zoogeography and Ecology. Manuscripts will be accepted in German, English or French. A volume of three issues will be published annually. Extensive contributions may be edited in supplement volumes.

Manuskripte, Korrekturen und Besprechungsexemplare sind zu senden an die

Manuscripts, galley proofs, commentaries and review copies of books should be addressed to

Redaktion SPIXIANA
ZOOLOGISCHE STAATSSAMMLUNG MÜNCHEN
Münchhausenstraße 21, D-81247 München
Tel. (089) 8107-0 – Fax (089) 8107-300

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Spixiana: Zeitschrift für Zoologie / hrsg. von der Zoologischen Staatssammlung München. – München : Pfeil.
Erscheint jährlich dreimal. - Früher verl. von der Zoologischen Staatssammlung, München. - Aufnahme nach Bd. 16, H. 1 (1993)
ISSN 0341-8391
Bd. 16, H. 1 (1993) -
Verl.-Wechsel-Anzeige

Satz: Desktop Publishing mit PageMaker®
Druck: Druckerei Braunstein, München

ISSN 0341-8391

Printed in Germany

– Gedruckt auf chlorfrei gebleichtem Papier –

Verlag Dr. Friedrich Pfeil, P.O. Box 65 00 86, D-81214 München, FRG
Tel. (089) 74 28 27-0 – Fax (089) 72 42 772

SPIXIANA	18	3	201–209	München, 01. November 1995	ISSN 0341-8391

Free-living marine nematodes from Deseado river estuary, Santa Cruz, Argentina. 12

(Ironoidea, Leptosomatidae, Thoracostomatinae)

By **Catalina T. Pastor de Ward**

Pastor de Ward, C. T. (1995): Free-living marine nematodes from Deseado river estuary, Santa Cruz, Argentina. 12. (Ironoidea, Leptosomatidae, Thoracostomatinae). – Spixiana **18/3**: 201-209

Three species of the family Leptosomatidae are discussed from various habitats of the Deseado river estuary. Two species are new to science: *Pseudocella chincha*, spec. nov. and *Thoracostoma dentatum*, spec. nov. The diagnostic feature of *Pseudocella chincha*, spec. nov. is the presence of teeth on the mandibular ridges. *Thoracostoma dentatum*, spec. nov. has a typical teeth configuration. The description of the genital apparatus of *Thoracostoma setosum* is added.

Catalina T. Pastor de Ward, Centro Nacional Patagónico, C. C. 128, (9120) Puerto Madryn, Chubut, Argentina

Introduction

This work is the twelfth of a series about marine nematodes from various habitats of the Deseado river estuary, Santa Cruz, Argentina. Within the family Leptosomatidae two new species are described. *Thoracostoma setosum* Linstow, 1896, a well known species is reported from Argentine coasts, and details of the genital apparatus are given for the first time, with other additional information not included in the previous description.

All species described in this paper have been found in the microhabitat formed between surface valve crests of *Aulacomya atra atra* and the colonial ascidean *Didemnum studeri*.

Material

Deseado river estuary is located 47°45'S and 65°55'W. The samples were taken during the period 1976-1979. The specimens have been fixed following Ditlevsen's (1911) method, stained with blue Nilo and preserved in pure glycerine. The drawings were made using a Zeiss microscope drawing device and photographs were taken with a Zeiss photomicroscopy equipped with differential interference contrast (DIC). The material, including the type specimens, has been deposited in the Museo de Ciencias Naturales, Bernardino Rivadavia, Buenos Aires. The De Man's ratios used in this paper are explained as follows: L = total length; a = L/maximum width (at the middle of the body in males and at the vulva level in females); b = L/esophageal length; c = L/tail length; Spic. (A. D.) = spicular length in microns (in anal diameters); %V = distance for anterior end to the vulvae opening in percentage of the total length.

The abbreviations used are: m = male; f = female; AD. = anal diameter; Cg. = glandular cell; ODD. = dorsal odontium; ODL. = lateral odontium; ON. = onchium; TRO. = trophies; cl = cloaca; SUP. = pre-cloacal organ; V. = vulva.

Results

All species belong to Ironoidea, family Leptosomatidae, subfamily Thoracostomatinae.

Pseudocella chincha, spec. nov.
Figs 1A-J, 2a-j

Types. Holotype: ♂, No. 962; allotype: ♀, No. 967, Isla Quiroga, 5/5/77.

Description

De Man's ratios. ♂. L: 7.700 µm; a: 38.5; b: 5.9; c: 45.3; Spic.: 170; Gub.: 80. – ♀. L: 7.30 µm; a: 36.5; b: 5.9; c: 52.1; %V: 60.3.

Six labial papillae and 6+4, 15 µm long cephalic setae. Buccal cavity formed by three microlabium with well developed mandibular ridges. The dorsal mandibular ridge is oval shaped and the sublateral triangular shaped with one tooth pointing upwards. Onchium present, 7 µm wide and 15 µm long. Irregular cephalic capsule 50-25 µm long and 25-50 µm wide, with anchor shaped channels in front of the amphids (Fig. 1B). Interlobular channels in subdorsal and subventral position, long, narrow and wide in lateral position, behind the amphids. Amphids 10 µm in diameter.

Cervical setae in series 4-2-2-1-1 and 4-2-2-1-2, have been observed, 5 µm or just behind cephalic capsule. Strong pigmentation on oesophageal walls.

Male genitalia. Testes opposite in left position to the intestine. Asymmetrical spicules 170 µm long (1.2 A. D.). Gubernaculum, 40 µm long with dorso-caudal median piece 40 µm long and a ventro-caudal apophysis 80 µm long. Pre-cloacal cup organ presents 100 µm from the cloaca and seven bursal papillae. Sixteen bursal setae, 15 µm long also have been observed, from pre-cloacal organ to 60 µm behind the cloaca.

Female genitalia. Antidromously reflexed ovaries.

Discussion. *Pseudocella chincha* is related to *Pseudocella panamaense* (Allgen, 1947), *P. wieseri* Hope, 1967, *P. elegans* (Ditlevsen, 1926), and *P. coeca* (Ssaweljev, 1912). From these the new species is differentiated by the presence of teeth on the microlabium. *Pseudocella chincha* differs from *P. pseudocellum* (Filipjev, 1927) in general measurements and by position and number of cervical setae.

Thoracostoma dentatum sp. nov
Figs 4a-d, 5A-J, 6a-h

Types. Holotype: ♂, No. 940; allotype: ♀, No. 942. Ba. Uruguay, La Trampa, 27/1/75. In eulittoral mud.

Description

De Man's ratios. ♂. L: 14.800 µm; a: 59.2; b: 7.0; c: 74; Spic.: 270; Gub.: 160. – ♀. L: 14.500 µm; a: 48.3; b: 6.0; c: 96.6; V%: 59.3.

Six labial papillae and 6+4 cephalic setae, six 12 µm and four 15 µm long. Cephalic diameter 70-60 µm. Three microlabium present with mandibular ridges, one dorsal with three central pieces having two teeth each and a small tooth on both sides. On sublateral microlabium there are three teeth on each lateral side. Pigment spot, cup shaped 130 µm (1.8 C. D.). Trophies 10 µm long and 8 µm wide. Cephalic capsule 20 µm in its longer zone and 40 µm in the trophies zone and presents a lot of holes and channels 10 µm long in subdorsal and subventral position. Amphids 10 µm wide and 10 µm long. Cervical setae present, the first two crowns have four setae in sublateral position and one in subventral and subdorsal position. The third and fourth crown have two setae in sublateral position and one in subdorsal and subventral position respectively.

Female genitalia. Antidromously reflexed ovaries.

Male genitalia. Two opposite testis. Bicephalized spicules with velum, 270 µm long (1.35 A. D.), paired gubernaculum 180 µm long with distal ornamentation transverse to the spicules. A pair of gubernaculum pieces around the spicules in ventral position (Fig. 5A). Cup shaped pre-spicular organ,

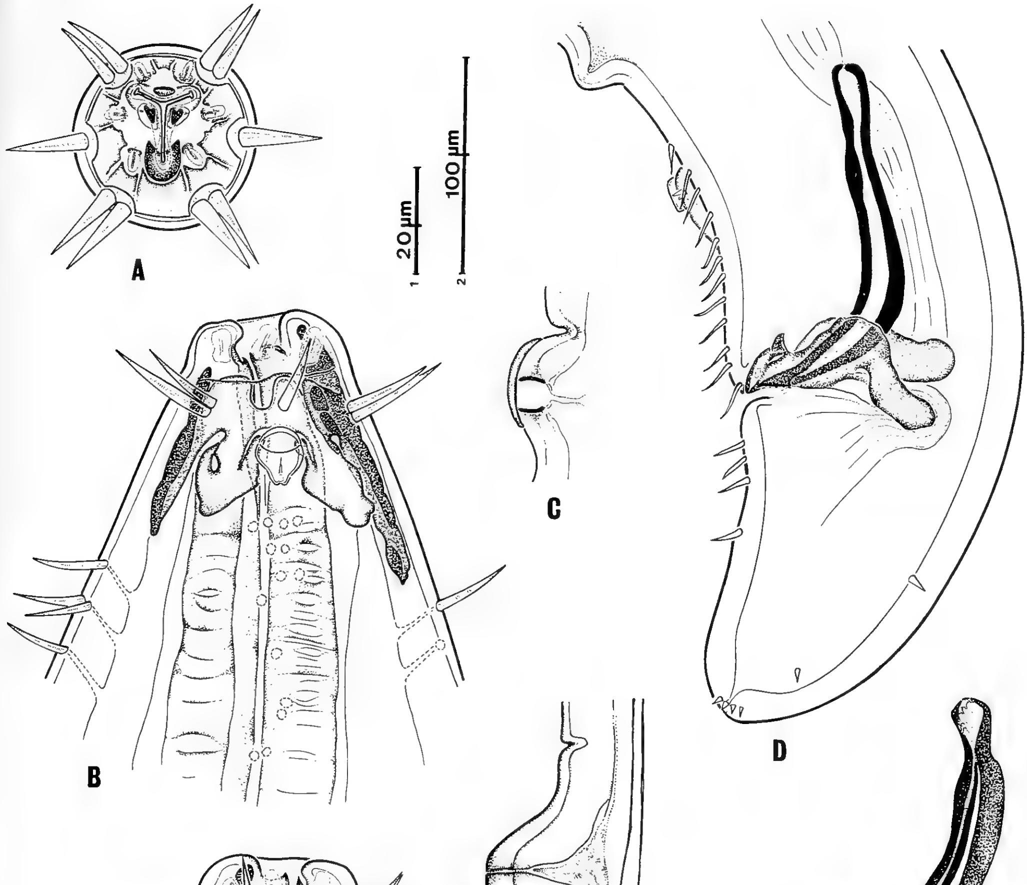


Fig. 1. *Pseudocella chincha,* spec. nov. A. Head, face view. B, F. Lateral view of anterior part of body. C. Cloacal supplement. D. Spicular apparatus. E. Pre-cloacal papillae. G. Amphid. H. Gubernaculum (right). I-J. Right and left spicules. Scales. 1: A, B, C, E, F, G; 2: D, H, I, J.

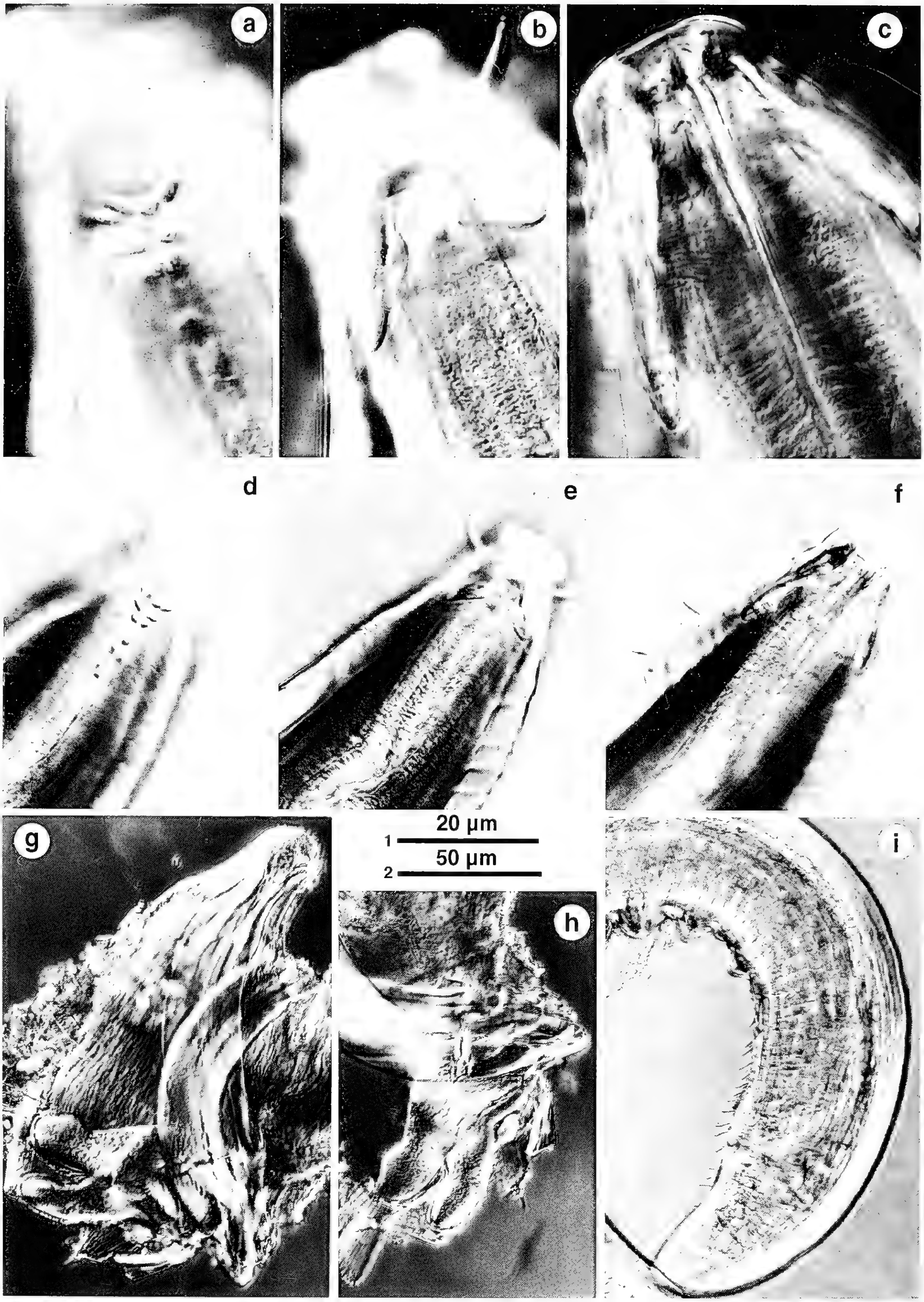


Fig. 2. *Pseudocella chincha*, spec. nov. a-c. Head, lateral view. e-g. Anterior end, lateral view. h. Spicula. i. Gubernaculum. j. Pre-cloacal organ and bursal setae. Scales. 1: a, b, c; 2: e, r, g, h, i, j.

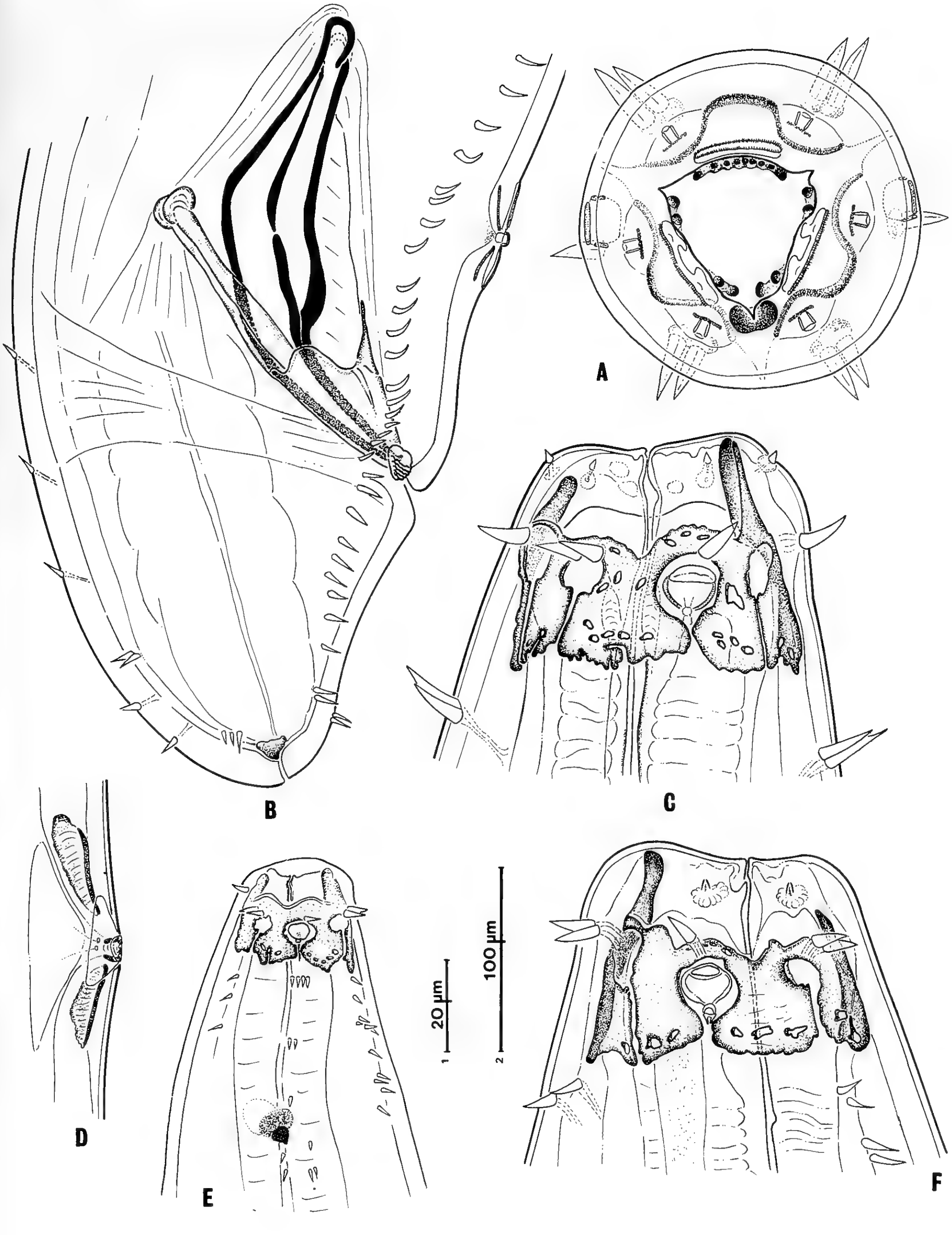


Fig. 3. *Thoracostoma setosum* forma 1. A. Head, face view. B. Posterior end, lateral view. C, F. Head, lateral view. D. Pre-cloacal organ. E. Anterior end, lateral view, pigment spot. Scales. 1: A, C, D, F; 2: B, E.

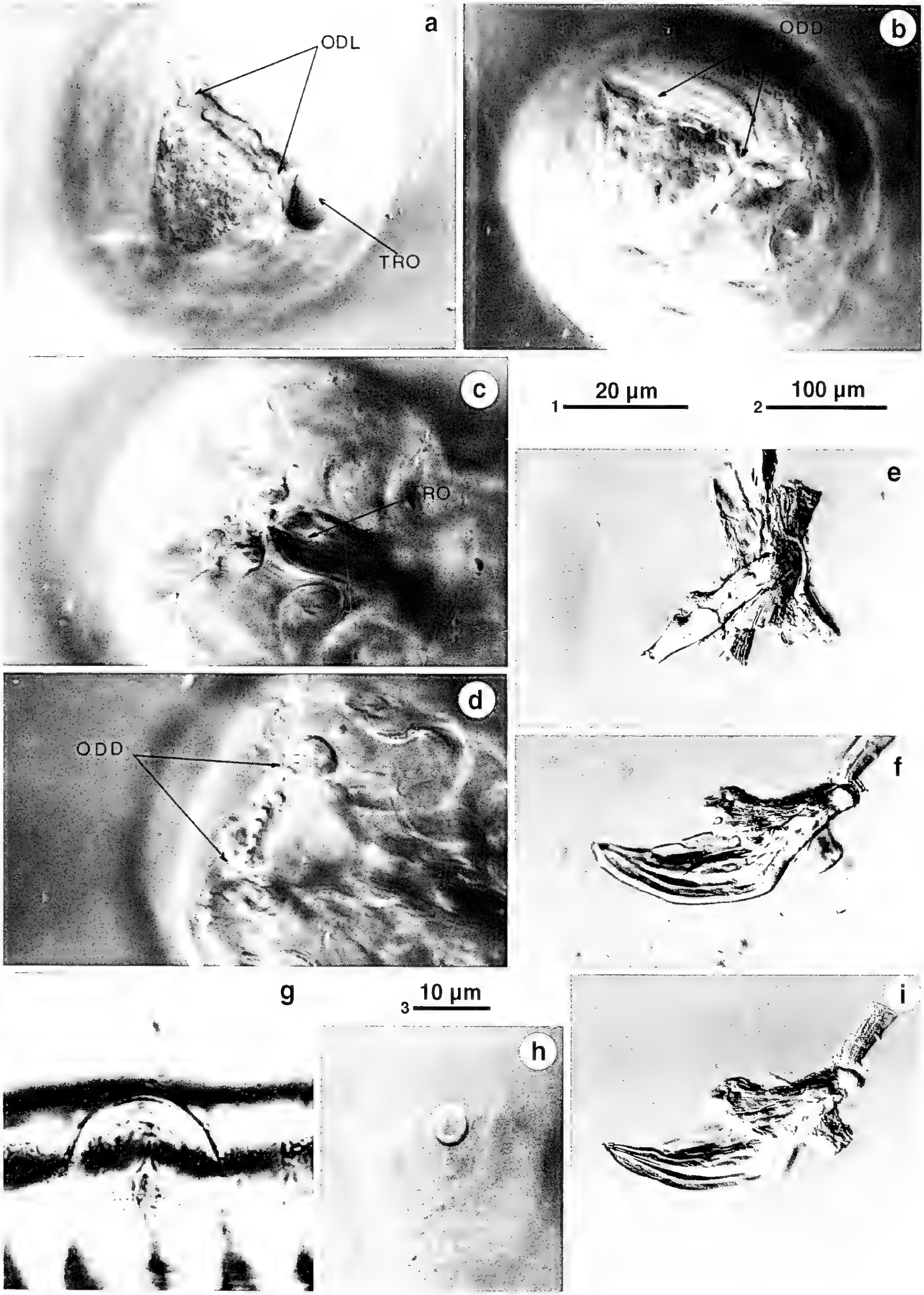


Fig. 4. a-d. *Thoracostoma dentatum*. a-b. Head, face view. c, d. Head, face subventral view. e-i. *Thoracostoma setosum*. e. Gubernaculum. f, i. Spicules. g. Pre-cloacal organ, lateral view. h. Pre-cloacal organ, ventral view. Scales. 1: a, b, c, e, g: 2: d, f, h.

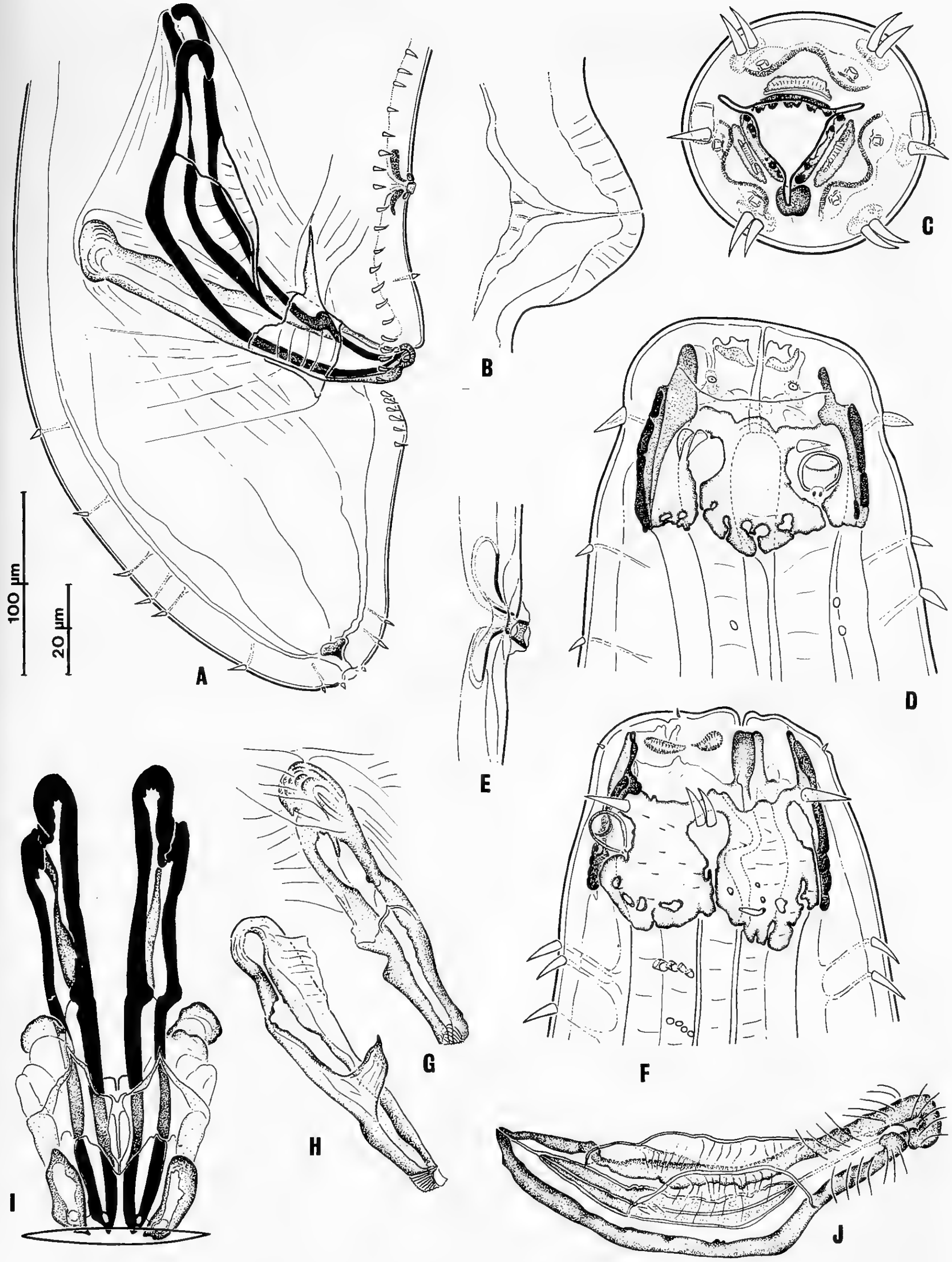


Fig. 5. *Thoracostoma dentatum*. A. Spicular apparatus. B. Pre-cloacal papillae. C. Head, face view. D-F. Head, lateral view. E. Pre-cloacal organ. G-H. Gubernaculum. I. Spicular apparatus, ventral view. J. Spicule. Scales. 1: A, G, H, I, J; 2: B, C, D, E, F.

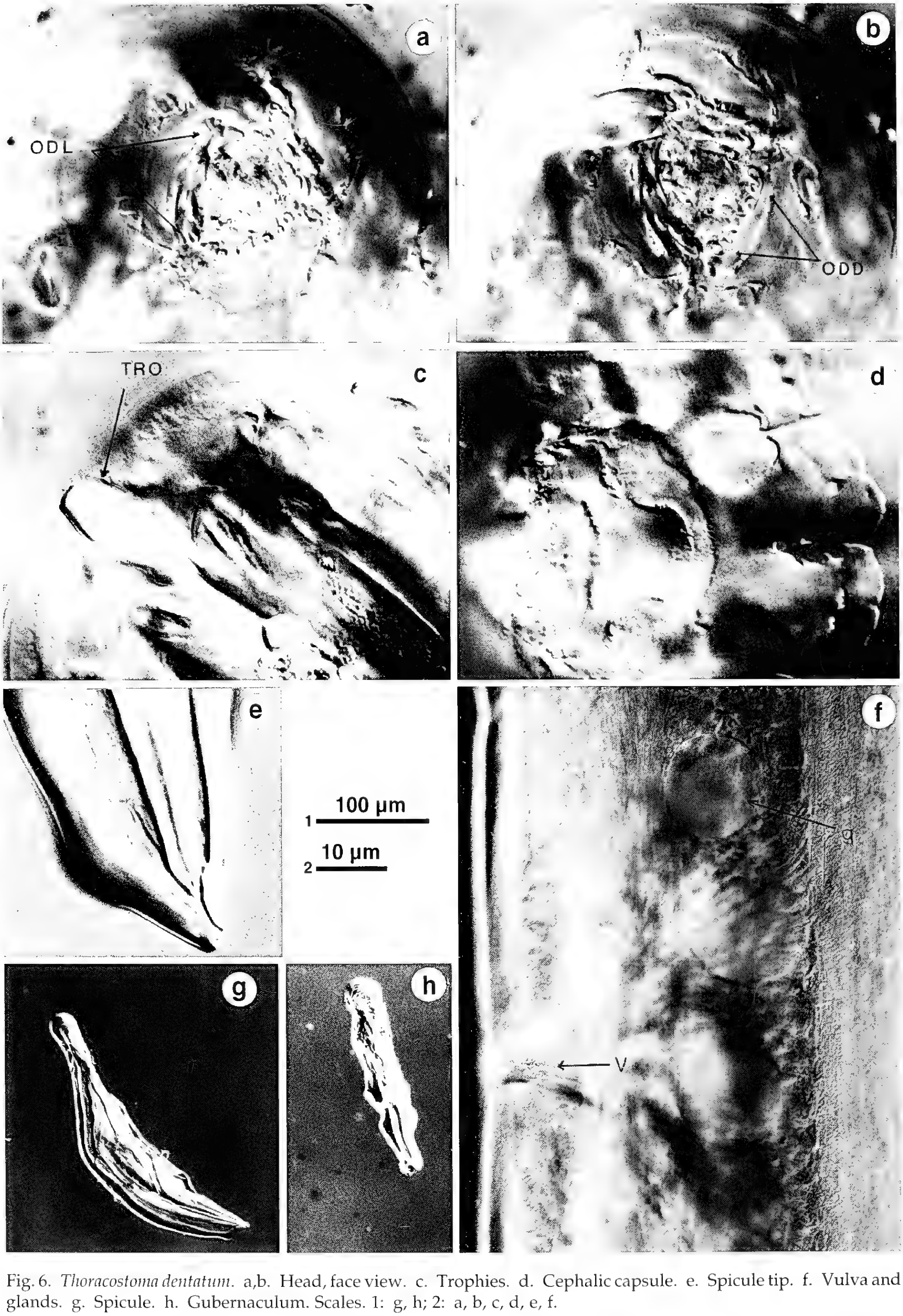


Fig. 6. *Thoracostoma dentatum*. a,b. Head, face view. c. Trophies. d. Cephalic capsule. e. Spicule tip. f. Vulva and glands. g. Spicule. h. Gubernaculum. Scales. 1: g, h; 2: a, b, c, d, e, f.

100 µm (0.4 A. D.) in front of the cloacal opening (Fig. 5e). In subventral position 18 bursal setae and five papillae have been observed.

Discussion. *Thoracostoma dentatum*, spec. nov. is a species closely related to *Thoracostoma setosum* (Linstow, 1896) but differs by the following diagnostic features: teeth configuration on dorsal and sublateral microlabium, number of cervical setae, and position of pigment organ.

Thoracostoma setosum (Linstow, 1896)

Figs 3A-F, 4e-h

Types. Paratypes: ♂, No. 919. Isle Quiroga, 5/5/77. Littoral fringe microhabitat *Didemnum-Aulacomya*; 1♀, 1♂, No. 911, 912. 1/2/78. Isle Quinta, infralittoral coarse sand.

Geographical distribution: Fuegian Archipelago; South Georgia Island; Chile.

Description

De Man's ratios. ♂ (1). 14.040 µm; a: 56.2; b: 6.40; c: 63.8; Spic.: 280; Gub.: 200. – ♂ (2). 19.400 µm; a: 64.6; b: 10.7; c: 97.0; Spic.: 270; Gub.: 200. – ♀. 19.600 µm; a: 57.6; b: 7.00; c: 98.0; V%: 57.1.

Six labial papillae and 6+4 cephalic setae, six 10 µm and four 15 µm long. Cephalic diameter 50-60 µm. Three microlabium present with mandibular ridges. One dorsal mandibular ridge with seven small teeth centrally positioned and a tooth on both sides. Two sublateral mandibular ridges with a pair of big teeth on each lateral side. Pigment spot, cup shaped 180 µm (3 C. D.). Trophies 10 µm long and 5 µm wide. Cephalic capsule 20 µm in its longer zone and 50 µm in the trophies zone, presents a lot of holes and channels 15 µm long in subdorsal and subventral position. Amphids 10 µm wide and 10 µm long. Cervical setae present, the first crown has four setae in sublateral position and two in subventral and subdorsal position. The second crown has two setae in sublateral position, one in subdorsal and subventral respectively.

Female genitalia. Antidromously reflexed ovaries.

Male genitalia. Two opposite testis. Bicephalized spicules with velum, 280-270 µm long, paired gubernaculum 160-200 µm long with distal ornamentation transverse to the spicules. Small crus present. Cup shaped pre-spicuclar organ, 100-145 µm in front of the cloacal opening (Fig. 4h). In subventral position 22 bursal setae and five papillae have been observed.

Discussion. The mentioned specimens agree totally with the excellent redescription of *Thoracostoma setosum* (Linstow, 1896) by De Man (1904).

References

Allgen, C. 1947. West American marine nematodes (Papers from Dr. Th. Mortensen's Pacific Expedition 1914-16). - Vidensk. Meddr. dansk. naturh. Foren. **110**: 65-219

De Man, J. G. 1904. Nematodes libres (Expedit. Antarctique Belge). - Result. Voyage S. Y. Belgica: 1-51.

Ditlevsen, J. 1911. Danish free-living nematodes. - Vidensk. Meddr. dansk naturh. Foren. **63**: 213-256

– – 1926. Free-living Nematodes. - The Danish Ingolf-Exped. **4** (6): 1-42

Filipev, I. 1927. Les nematodes libres des mers septeptrionales appartenant à la famille des Enoplidae. - Arch. Naturgesch. **91** A (6): 1-126

Hope, D. 1967. Free-living marine nematodes of the genera *Pseudocella* Filipjev, 1927, *Thoracostoma* Marion, 1870 and *Deontostoma* Filipjev, 1916 (Nematoda: Leptosomatidae) from the west coast of North America. - Trans. Am. microsc. Soc. **86**: 307-334

Linstow, O. v. 1896. Nemathelminthen. - Hamburger Magelhaensische Sammelreise (Hamburg), 22 pp.

Ssaweljev, S. 1912. Zur Kenntnis der freilebenden Nematoden des Kolafjords und des Relictensee Mogilnoje. - Trudy imp. S.Petersb. Obshch. Estest. **43**: 108-126

33. Gruner, H.-E., Moritz, M. & W. Dunger: Arthropoda (ohne Insecta). In: Gruner, H.-E. (ed.): Lehrbuch der speziellen Zoologie, begründet von A. Kästner. Band I, 4. Teil. - Gustav Fischer Verlag Jena, Stuttgart, New York, 1993. 1279 S., c. 700 Abb.

"Der neue Kästner ist da". Nicht nur wegen der - fast schon gewohnt - langen Erscheinungsdauer, sondern auch wegen der umfassenden und detailreichen Darstellung der Themen wird jede neue Auflage der "Bibel" der deutschsprachigen Zoologen mit Spannung erwartet. Auch der hier vorliegende Band "Arthropoda" entspricht allen Anforderungen im vollen Umfang seiner fast 1300 Seiten und 700 Abbildungen. Der Band ist als Nachschlagewerk sowohl für fortgeschrittene Studenten als auch für Zoologen der verschiedenen Fachrichtungen eine unentbehrliche Hilfe: Der Phylogenetiker z.B. findet die wesentlichen Merkmale, nach denen bestimmte Tiergruppen eingeordnet werden, zumindest andiskutiert, und der Neurobiologe kann sich einen Überblick zur Morphologie etwa des Crustaceengehirns verschaffen, der weit über die Darstellung anderer Fachbücher hinausgeht.

Die einzelnen Kapitel sind in der schon von den älteren Auflagen her bewährten Weise gegliedert, wobei die Trennung von Eidonomie und Anatomie, sowie das Vorhandensein eigener Kapitel zur Entwicklung und Stammesgeschichte besonders hervorzuheben sind. Die "Diagnose" zu Beginn eines jeden Abschnitts erleichtert den Einstieg in die einzelnen Themenkomplexe. Natürlich ist auch dieser Band eine Fundgrube mit vielen hochinteressanten Angaben zur Lebensweise und zu morphologischen Anpassungen, über die man sonst näheres nur mühsam in der Originalliteratur finden kann. Die Abbildungen sind durchweg hochwertig und zum großen Teil der neuen, oft sogar der neuesten relevanten Literatur entlehnt. In Anbetracht der hohen Zahl von Abbildungen ist es fast erstaunlich, daß sich hierbei selbst in den komplexen Darstellungen von Ultrastrukturen (z.B. sehr schön: die Sinnesorgane!) nur wenige Beschriftungsfehler eingeschlichen haben (etwa in Abb. 649). Gleiches gilt für den trotz seiner Länge dichten und hochinformativen Text. Es ist besonders hervorzuheben, daß er hierbei immer verständlich und lesbar bleibt. Der Lehrbuch-Charakter des Kästner ist daher voll und ganz gewahrt.

Phylogenetische Fragen werden ausführlich und kompetent diskutiert, bei kritischen Fragen, wie etwa der systematischen Stellung der Pantopoda, bleiben die Autoren vorsichtig und diskutieren mögliche Alternativen. Warum allerdings das in der angelsächsischen Literatur so verbreitete Uniramier-Konzept (Polyphylie der Arthropoda) nicht ausführlicher diskutiert wird, ist nicht klar. Auffällig ist der in diesem Band vollzogene Abschied von den (paraphyletischen) "Myriapoda". Die Insecta werden neueren Untersuchungen zufolge als Schwestergruppe der Progoneata (Symphyla, Pauropoda, Diplopoda), also nur eines Teils der "Myriapoda" betrachtet. Fossile Gruppen werden in ausreichendem Maße berücksichtigt, wenn auch über manche (z.B. die Euthycarcinoidea, die in die Stammguppe der Arthropoden gestellt werden) keine Information zu finden ist.

Insgesamt scheint den - bewundernswert wenigen - Autoren des "neuen Kästner" zu gelingen, was viele vielleicht für unlösbar gehalten hätten: eine wirkliche Synopsis des außerordentlich facettenreichen und in seiner Gesamtheit schwer überblickbaren Stammes der Arthropoda. Mit Spannung erwarten wir daher den Band über die Insekten. In Anbetracht der Qualität und des Umfangs des Werks relativiert sich der im Vergleich zu früher erschienenen Bänden zunächst doch recht hoch erscheinende Preis erheblich. Außerdem ist die Druckqualität deutlich verbessert, so daß der vorliegende Band jedem Interessierten nur wärmstens empfohlen werden kann.

Ein Hinweis an den Verlag: mit einer gewissen Sorge stellten die Rezensenten bereits nach kurzem Blättern ein verdächtiges Knacken in der Bindung fest. Wir schließen daher die Besprechung mit der Hoffnung, daß sich dieses großartige Standardwerk nicht über kurz oder lang in viele kleine "Kästner" auflösen wird (außerdem sind in dem uns vorliegenden Exemplar einige Seiten falsch gebunden).

R. Melzer, K. Schönitzer

34. Seifert, G.: Entomologisches Praktikum. - G. Thieme Verlag, Stuttgart und New York, 3. Aufl., 1995. 322 S., zahlr. Abb.

Das seit 1970 existierende und erfolgreiche "Entomologische Praktikum" will elementares Wissen an möglichst "typischen" Objekten vermitteln. Es versucht also gar nicht enzyklopädisch vollständig zu sein, sondern orientiert sich am Einzelbeipiel und stellt vor allem funktionsmorphologische Gesichtspunkte in den Vordergrund. In der nun vorliegenden, gründlich überarbeiteten dritten Auflage sind viele neuere Ergebnisse der Feinstrukturforschung mit aufgenommen. Besonders wertvoll erscheinen mir die vielen Originalaufnahmen von Semidünnschnitten und elektronenmikroskopischen Aufnahmen. Für Studenten sehr angenehm sind insbesondere die Begriffsdefinitionen, die Schemazeichnungen und die im Anhang zusammengestellten Rezepte für Puffer, Fixierlösungen und Färbungen. Dieses bewährte Praktikumsbuch kann auch in seiner neuen Auflage uneingeschränkt empfohlen werden.

K. Schönitzer

SPIXIANA	18	3	211–249	München, 01. November 1995	ISSN 0341-8391

New species and records of *Anacroneuria* (Klapálek) from Venezuela

(Insecta, Plecoptera, Perlidae)

By **Bill P. Stark**

Stark, B. P. (1995): New species and records of *Anacroneuria* (Klapálek) from Venezuela (Insecta, Plecoptera, Perlidae). – Spixiana **18/3:** 211-249

A minimum of 31 species of the genus *Anacroneuria* (Klapálek) are recorded from Venezuela, including 18 described as new species. Eight species are described from Cerro de la Neblina and other remote sites in Territorio Federal Amazonas, 6 are described from Cordillera de Merida or Sierra de Perija, 3 are described from the Maracay area, and one is described from a site in the state of Bolivar. *A. bifasciata* (Pictet) and *A. fenestrata* (Pictet) are redescribed and notes are given for *A. intermixta* (Walker) and *A. signata* (Walker). Nine additional species represented by unassociated females are described under informal designations. A few unassociated and associated nymphs are also described.

Dr. Bill P. Stark, Mississippi College, Dept. of Biological Sciences, Box 4045, Clinton, Mississippi, 39058, USA.

Introduction

Anacroneuria is a widespread and diverse neotropical stonefly genus with over 130 nominal but poorly known species. 23 species have been described from the northern Andes of Colombia and Venezuela but types are available for only 15 of these and most are known from single type specimens (Stark unpublished, Benedetto unpublished). Two species, *A. intermixta* (Walker) and *A. signata* (Walker), both known from female types, were described from Venezuela, otherwise the "known" *Anacroneuria* fauna of Venezuela consists of *A. bifasciata* (Pictet) (Zwick 1972, 1973), *A. schmidti* (Enderlein) (Jewett 1959), and *A. iridescens* Klapalek (Klapalek 1922). The latter two species records should not be considered valid until the specimens can be located and reexamined.

Presently, no *Anacroneuria* have been identified from the isolated table top mountains along the Venezuelan-Brazilian border. This study is based largely on 1984-1985 collections made on the expedition to the Cerro de la Neblina National Park, under the direction of the Fundacion para el Desarrollo de las Ciencias Fisicas, Mathematicas y Naturales of Venezuela, and the Smithsonian Institution. Collections from this locality have already produced a number of previously undescribed species in several insect orders, including four species in the relatively rare stonefly genera, *Enderleina* and *Macrogynoplax* (Stark 1989, Stark & Zwick 1989).

Specimens from other Venezuelan localities were obtained from the Smithsonian or from the Departmento de Zoologia Agricola, U.C.V., Maracay, Venezuela, through O. S. Flint, Jr. of the Smithsonian. The Venezuelan samples were carefully compared with a large series of *Anacroneuria* from Bolivia, Colombia, Costa Rica, and localities throughout the Neotropics. Study of this material suggests minimal overlap of Venezuelan species with those known from Colombia, and no overlap with Costa Rica and other Neotropical regions. A recently described species from Colombia (Rojas and Baena 1993) does not appear to be closely related to any of the species included in this study. The Venezuelan material represents 31 species including 18 which are described as new. Holotypes are deposited in the National Museum of Natural History (USNM) and paratypes in the Mississippi Entomological Museum, Mississippi State University (MEM) and the Departmento de Zoologia Agricola, U.C.V., Maracay, Venezuela (DZAM). Material has been also compared from The Natural History Museum, London (BMNH), Museum für Naturkunde, Berlin (MNHB), Naturhistorisches Museum, Wien (NHMW, and Zoologische Staatssammlung, München (ZSM). The following key should permit separation of males of known Venezuelan *Anacroneuria*.

Provisional key to Venezuelan male *Anacroneuria*

1\. Wings banded in amber and dark brown (Fig. 131) .... *A. bifasciata* (Pictet)
– Wings variable, but without bands .... 2.

2\. Forewing length greater than 13.5 mm .... 3.
– Forewing length less than 13 mm .... 9.

3\. Hammer low, scarcely elevated above sternum (Fig. 85) .... *A. chorrera*, spec. nov.
– Hammer length equal to apical diameter .... 4.

4\. Hammer apex quadrate (Fig. 97); aedeagal hooks with foot-like apices (Fig. 98) .... *A. cuadrada*, spec. nov.
– Hammer apex circular; aedeagal hooks without foot-like apices .... 5.

5\. Dorsal aspect of aedeagus with a transverse subapical arcuate lobe (Fig. 55) .... *A. arcuata*, spec. nov.
– Aedeagus without a dorsal arcuate lobe .... 6.

6\. Hammer tiny (Fig. 118); aedeagal apex notched (Fig. 119) .... *A. muesca*, spec. nov.
– Hammer thimble-shaped (Fig. 28); aedeagal apex rounded .... 7.

7\. Aedeagal apex strongly trilobed (Fig. 137); pale mesal pronotal stripe not extending laterally beyond ocelli (Fig. 135) .... *A. fenestrata* (Pictet)
– Aedeagal apex simple (Figs 30, 124); pale mesal pronotal stripe extending laterally beyond ocelli (Fig. 26) .... 8.

8\. Aedeagal apex abruptly narrowed (Fig. 30) .... *A. shamatari*, spec. nov.
– Aedeagal apex gradually tapered (Fig. 126) .... *A. paleta*, spec. nov.

9\. Aedeagal apex simple (Figs 60, 65) .... 10.
– Aedeagal apex multilobed (Fig. 21) .... 16.

10\. Aedeagal hooks straight, dagger-like (Fig. 91) .... *A. cruza*, spec. nov.
– Aedeagal hooks curved, scythe-like (Figs 6, 105) .... 11.

11\. Apex of aedeagal hooks finger-like, apex of aedeagus surmounting a distinct neck (Fig. 105) .... *A. digitata*, spec. nov.
– Apex of aedeagal hooks normal; subapical area of aedeagus without neck (Figs 6, 109) .... 12.

12\. Ventral aspect of aedeagus with a pair of large membranous lobes (Fig. 59) .... *A. baniva*, spec. nov.
– Ventral membranous aedeagal lobes small or absent .... 13.

13\. Aedeagal apex gradually narrowed to a point (Figs 65, 67) .... *A. bari*, spec. nov.
– Aedeagal apex truncate or broadly rounded (Figs 6, 109) .... 14.

14\. Apices of aedeagal hooks falcate (Fig. 79); ventral aspect of aedeagus with a small membranous lobe (Fig. 80) .... *A. chiquita*, spec. nov.
– Apices of aedeagal hooks gradually tapered; ventral aedeagal aspect without membranous lobe .... 15.

15. Projecting apical process of aedeagus subequal to shoulder (Fig. 109) .... *A. llana*, spec. nov.
– Projecting apical process of aedeagus about 2 × as long as shoulder (Fig. 6) .... *A. blanca*, spec. nov.

16. Aedeagal apex with a dorsolateral pair of small horn-like processes (Fig. 72) .... *A. caraca*, spec. nov.
– Aedeagal apex without horn-like processes .... 17.

17. Ventral aspect of aedeagus with a large membranous lobe (Fig. 16) .... *A. pequena*, spec. nov.
– Ventral aspect of aedeagus without membranous lobe .... 18.

18. Lateral lobes of aedeagal apex scarcely projecting (Fig. 114) .... *A. menuda*, spec. nov.
– Lateral lobes of aedeagal apex distinctly projecting (Figs 42, 154) .... 19.

19. Lateral lobes of aedeagal apex about as wide as median lobe (Figs 21, 42) .... 20.
– Lateral lobes of aedeagal apex about half as wide as median lobe (Fig. 154) .... *A.* sp. VZ-10

20. Wings with a large clear spot beyond cord, and an irregular clear costal stripe before cord (Fig. 41) .... *A. vistosa*, spec. nov.
– Wings rather uniformly pigmented .... *A. pinza*, spec. nov.

Anacroneuria blanca, spec. nov.

Figs 1-11, 45

Types. Holotype ♂, 2♂♂ and 3♀♀ paratypes from Venezuela, Territorio Federal Amazonas, Cerro de la Neblina, Basecamp, 140 m, 21-29 February 1984, D. Davis, T. McCabe (USNM). Additional paratypes, all from Cerro de la Neblina: Basecamp, 140 m, 1-10 March 1984, D. Davis, T. McCabe, 2♂♂, 3♀♀ (USNM). Same location, 24 November-1 December 1984, R. L. Brown, 1♂, 1♀ (MEM). Same location, 4-12 February 1984, D. Davis, T. McCabe, 4♂♂, 2♀♀ (USNM, DZAM). Same location, 20-24 March 1984, O. Flint, J. Louton, 2♂♂, 3♀♀, 7 nymphs (USNM). Same location, 13-15 March 1984, O. Flint, J. Louton, 2♂♂ (USNM). Same location, 5 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 2♂♂, 2♀♀ (USNM). Same location except Rio Baria, 12 February 1985, P. J. Spangler, P. M.Spangler, R. Faitoute, W. Steiner, 1♂, 1♀ (USNM). Same location, 27 January 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♀, 6 nymphs (USNM). Same location, 21-28 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 4♂♂, 10♀♀ (USNM, DZAM). Same location except Aqua Blanca, 160 m, 20-21 March 1984, O. Flint, J. Louton, 2♂♂ (USNM).

Description

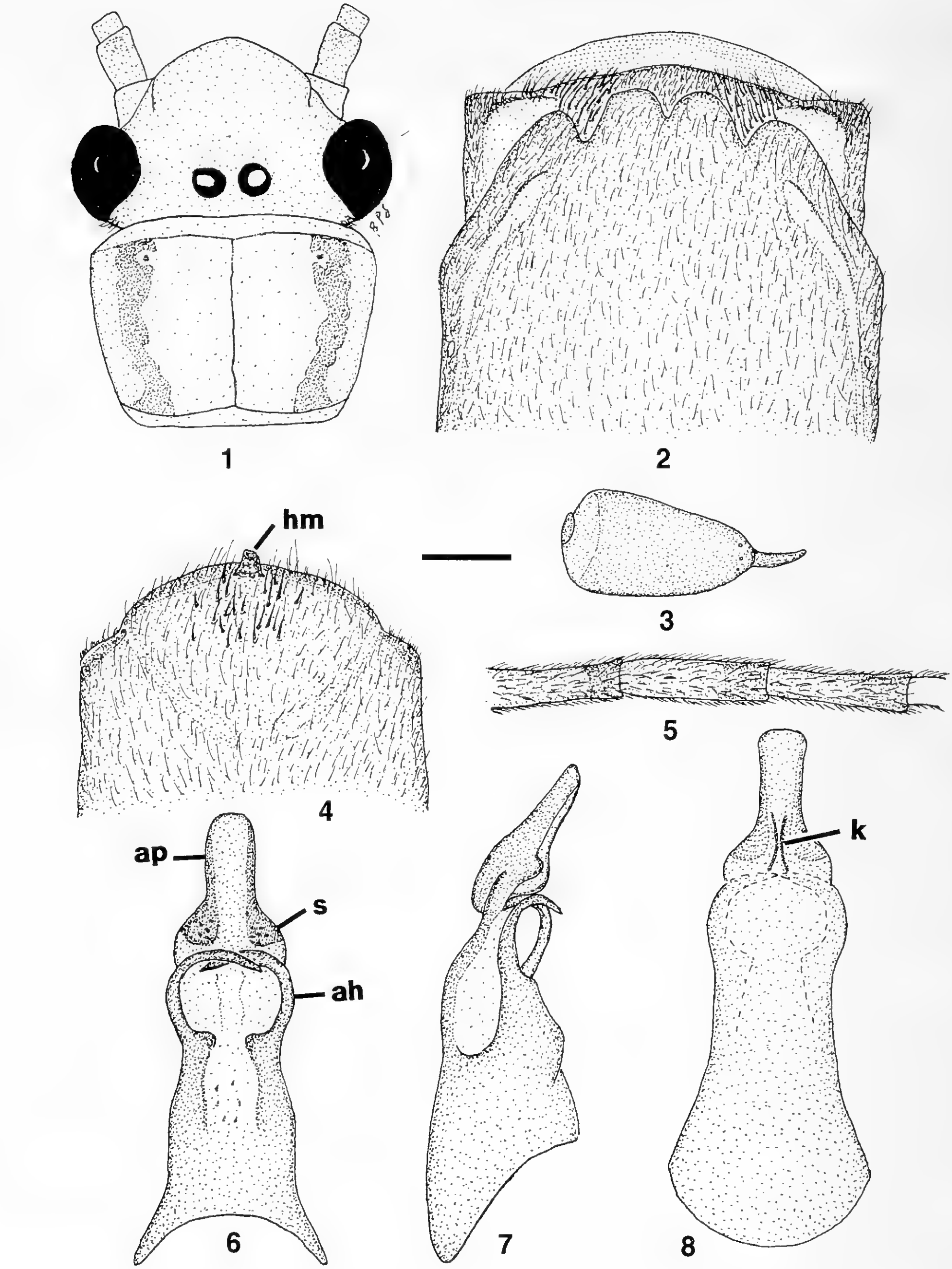
Adult color pattern. Head yellow, pronotum with a pair of dark, parenthesis-like, mid-lateral stripes bordering a broad median yellow area (Fig. 1). Wing membrane and veins pale, with an obscure pale spot beyond the cord. Apical antennal and cercal segments banded (Fig. 5).

Male. Forewing length 10-12 mm. Hammer longer than apical diameter; area surrounding hammer with scattered long bristles which form an irregular brush (Fig. 4). Aedeagus scoop-like and slender apically (Figs 6-8); dorsal aspect with a short, low, median keel (Fig. 8).

Female. Forewing length 13-14 mm. Subgenital plate with 4 subequal lobes; lateral notches deeper than median notch. Posterior margin of sternum 9 with a narrow sclerotized band and a pair of low, lateral, anteapical humps. Median field of sternum 9 covered with a patch of red-brown setae; setae in center of field short, longer setae clustered around edges. Posterior membrane of sternum 9 bearing a dense band of microtrichia (Fig. 2).

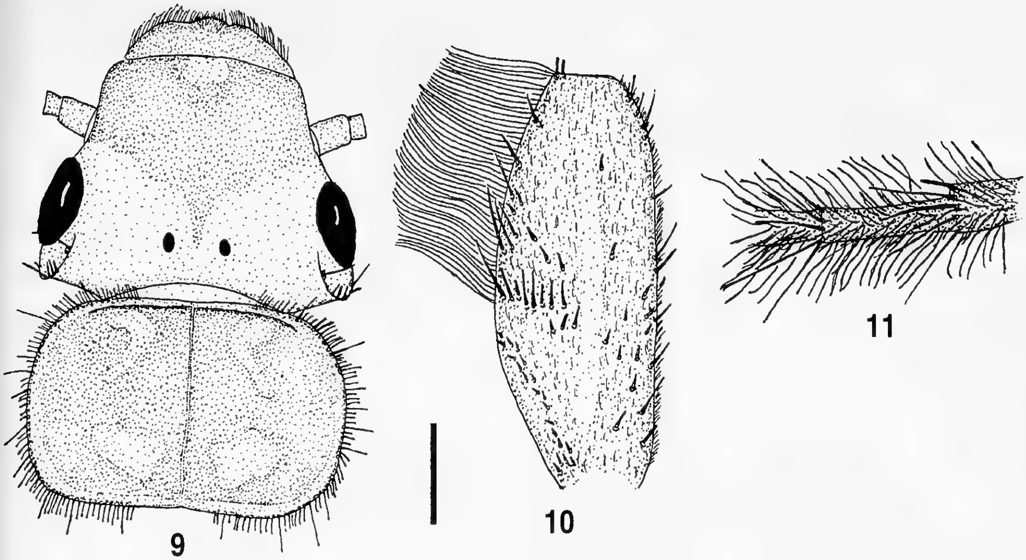
Egg. Length 0.45 mm, width 0.19 mm. Spindle shaped with a low, button-like collar and a long (0.09 mm) spine on the posterior pole. Chorion smooth; micropyles located around base of spine (Figs 3, 45).

Nymph. Body length 10-12 mm. Anterior half of head brown except for pale anteromesal spot. Pronotum brown with obscure pale spots on disc and along lateral margins (Fig. 9). Fore femur with a linear patch of short bristles extending from the basal area to near the marginal fringe. Transverse bristle row of 7 long bristles near midlength; 10 scattered long bristles beyond row (Fig. 10). Mid and



Figs 1-8. *A. blanca*, spec. nov. 1. Head and pronotum. 2. Female sterna 8 and 9. 3. Egg. 4. Male sternum 9. 5. Apical cercal segments. 6. Aedeagus, ventral. 7. Aedeagus, lateral. 8. Aedeagus, dorsal. Hm=hammer, AP=apical process, S=shoulder, AH=aedeagal hook. Scales: 0.6 mm (1), 0.3 mm (2, 4, 5), 0.15 mm (3, 6, 7, 8).

hind femora without bristle row; hind femora without dorsal setal fringe. Apical 16 cercal segments fringed with long setae (Fig. 11). Posterior membrane of abdominal segment 10 forming a triangular projection between paraproct bases.



Figs 9-11. *A. blanca*, spec. nov. nymphal structures. 9. Head and pronotum. 10. Left fore femur. 11. Apical cercal segments. Scales: 0.6 mm (9), 0.3 mm (10), 0.15 mm (11).

Etymology. The species name *blanca* refers to the pale habitus of the adults of this species, and to the stream site, "Aqua Blanca", where a few of the specimens were collected.

Discussion. Several species with this general color pattern are known throughout the neotropics, but they differ in details of internal male genitalia. The egg of this species is similar to that of *A. shamatari*, a much larger species found above 700 m on Neblina, and *A. fuscicosta* (Enderlein) from Santa Catarina, Brazil (Zwick, 1973). Nymphs were associated by dissecting the female genitalia from a mature specimen.

The type locality is a blackwater stream about 20 m wide with rapids about 0.6-0.9 m deep interspersed between deep silty pools (O. S. Flint, pers. comm.).

Anacroneuria pequena, spec. nov.

Figs 12-18, 46, 49

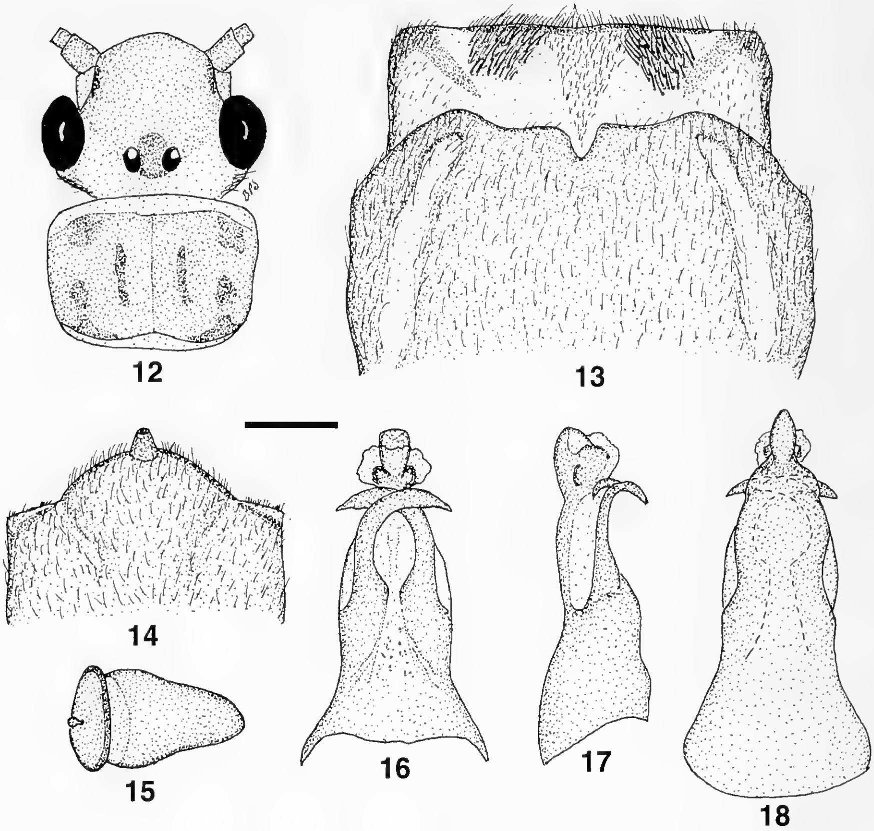
Types. Holotype ♂, 1♂ and 1♀ paratype from Venezuela, Territorio Federal Amazonas, Cerro de la Neblina, Basecamp 140 m, 1-10 March 1984, D. Davis, T. McCabe (USNM). Additional paratypes, all from same locality: 24 November-1 December 1984, R. L. Brown, 1♂, 1♀ (MEM). 20-24 March 1984, O. Flint, J. Louton, 1♂ (USNM). 21-28 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♂, 6♀♀ (USNM, DZAM). 21-29 February 1984, D. Davis, T. McCabe, 1♂, 1♀ (USNM). 26-27 January 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W.Steiner, 1♂, 2♀♀ (USNM). 19 March 1984, O. Flint, J. Louton, 4♂♂, 1♀ (USNM, DZAM). 10-20 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♂ (USNM).

Description

Adult color pattern. Head yellow-brown with darker area over ocelli and lappets. Pronotum brown with obscure darker markings (Fig. 12). Antennae and maxillary palpi brown, labial palpi pale. Basal cercal segments pale, mesal and apical segments brown. Wings and veins brown except for pale costal area.

Male. Forewing length 7.5-8.5 mm. Hammer cone shaped, apex flat (Fig. 14). Apical area of aedeagus with a small digitate mesal process extending from scalloped basal wings; apex covered on ventral surface by a flattened membranous structure. Hooks somewhat chelate (Figs 16-18, 49).

Female. Forewing length 9.5-11.5 mm. Subgenital plate with a shallow mesal notch; lobes wide,



Figs 12-18. *A. pequena*, spec. nov. 12. Head and pronotum. 13. Female sterna 8 and 9. 14. Male sternum 9. 15. Egg. 16. Aedeagus, ventral. 17. Aedeagus, lateral. 18. Aedeagus, dorsal. Scales: 0.6 mm (12), 0.3 mm (13, 14), 0.15 mm (15-18).

posteriorly emarginate. Posterior margin of sternum 9 with a narrow sclerotized band. Short lateral bars present. Mesal field of sternum 9 with a trilobed setal patch; lateral setae long and thick, mesal setae short and thin (Fig. 13).

Egg. Length 0.3 mm, width 0.19 mm. Spindle shaped, chorion smooth. Anchor brown and beret-like, with a bulbous mesal structure (Figs 15, 46).

Nymph. Unknown.

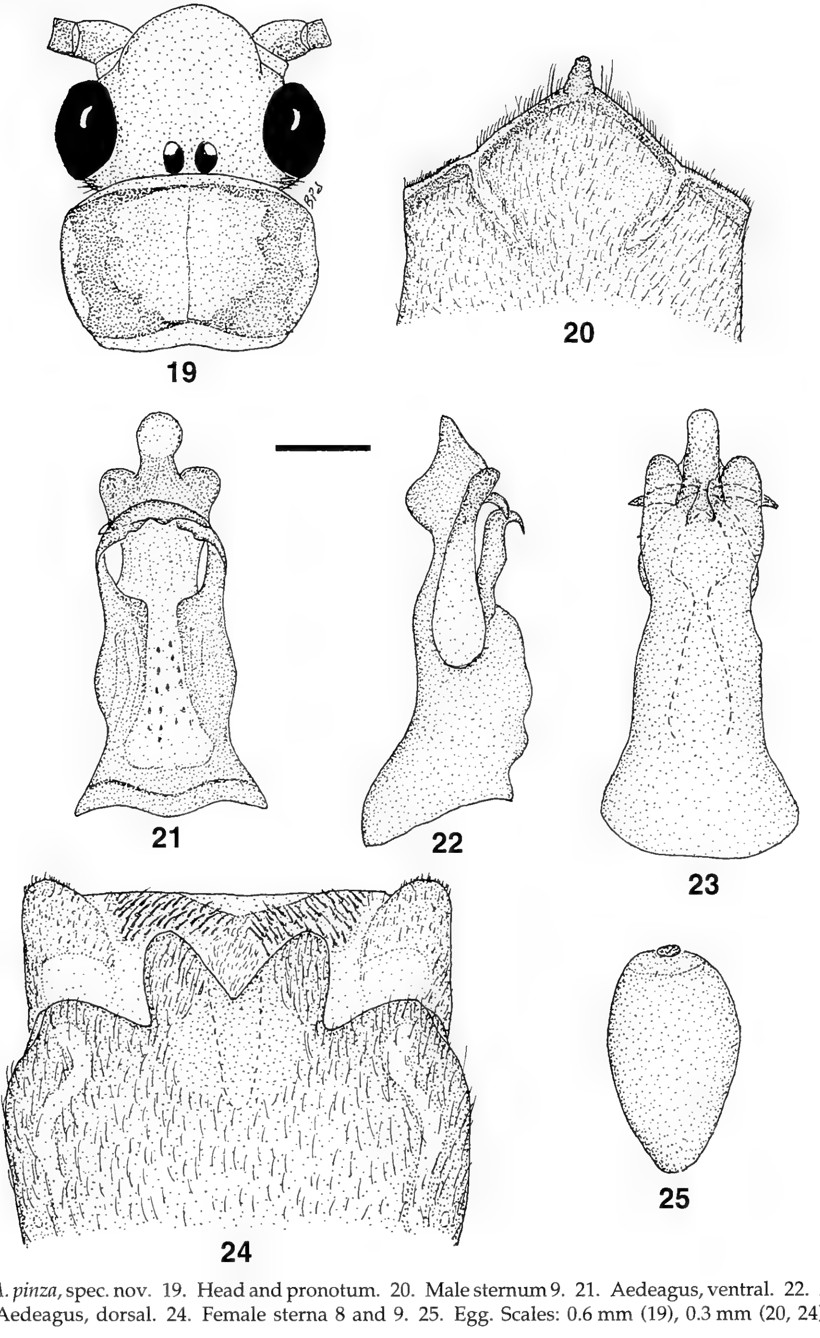
Etymology. Pequena means small in the Spanish language.

Discussion. The Basecamp locality is described above under *A. blanca*.

Anacroneuria pinza, spec. nov.

Figs 19-25

Types. Holotype ♂ and 9♀♀ paratypes from Venezuela, Territorio Federal Amazonas, Cerro de la Neblina, Camp IV, 760 m, 15-18 March 1984, O. Flint (USNM, DZAM). Additional paratypes, all from Cerro de la Neblina, Basecamp, 140 m. 19 March 1984, O. Flint, J. Louton, 1♂ (USNM). 20 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♂ (USNM). 5 December 1984, R. L. Brown, 2♂♂ (MEM). 24 November-1 December 1984, R. L. Brown, 2♂♂ (MEM). 21-29 February 1984, D. Davis, T. McCabe, 1♂ (USNM). 28 January 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♀ (USNM).

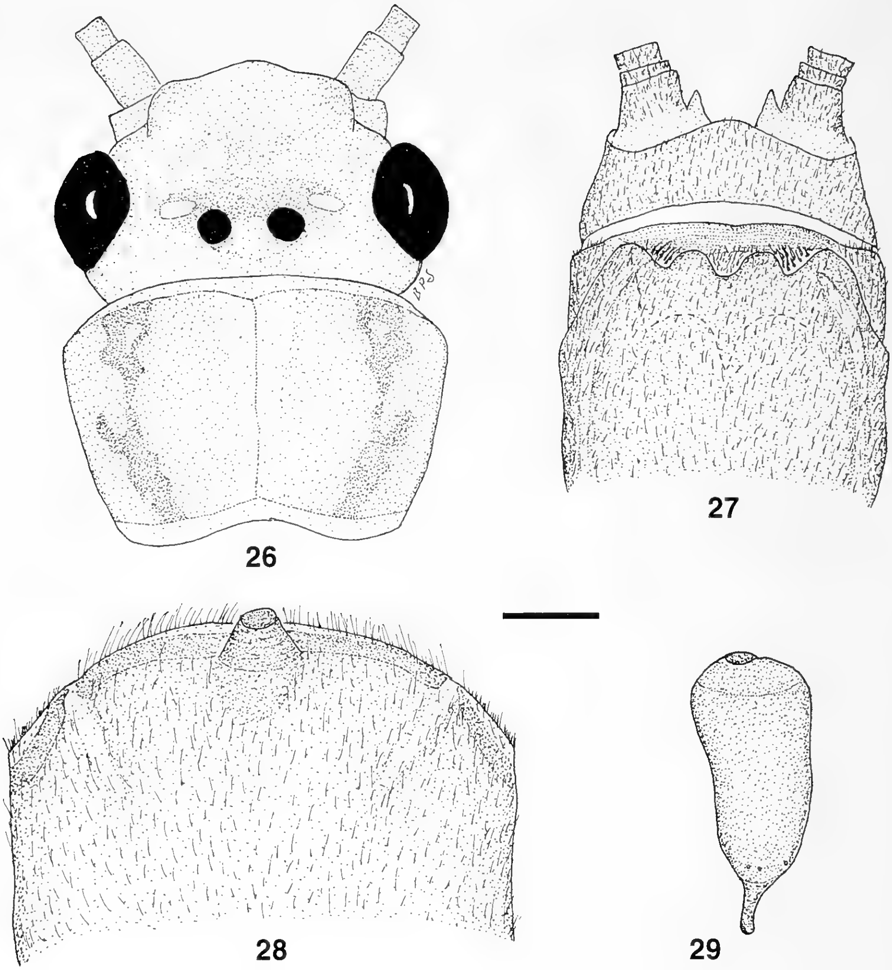


Figs 19-25. *A. pinza*, spec. nov. 19. Head and pronotum. 20. Male sternum 9. 21. Aedeagus, ventral. 22. Aedeagus, lateral. 23. Aedeagus, dorsal. 24. Female sterna 8 and 9. 25. Egg. Scales: 0.6 mm (19), 0.3 mm (20, 24), 0.15 mm (21-23, 25).

Description

Adult color pattern. Head yellow, pronotal disc yellow but surrounded by dark brown pigment (Fig. 19). Wing membrane pale brown, veins brown, R and cord darker.

Male. Forewing length 9.5-10 mm. Hammer twice as long as basal width, strongly narrowed apically (Fig. 20). Aedeagal apex trilobed, lateral lobes short, rounded and projecting laterally (Figs 21-23).



Figs 26-29. *A. shamatari*, spec. nov. 26. Head and pronotum. 27. Female sterna 8 and 9. 28. Male sternum 9. 29. Egg. Scales: 0.6 mm (26, 27), 0.3 mm (28), 0.15 mm (29).

Dorsal aspect with a narrow mesal keel. Hooks chelate with flattened, incised margins forming scoop-like apices (Fig. 21). Base with a distinct subapical ridge on venter (Fig. 21).

Female. Forewing length 12 mm. Mesal lobes of subgenital plate much longer than lateral lobes. Mesal field of sternum 9 weakly sclerotized and covered with a setal patch. Lateral setae long and thick, mesal setae short and thin (Fig. 24).

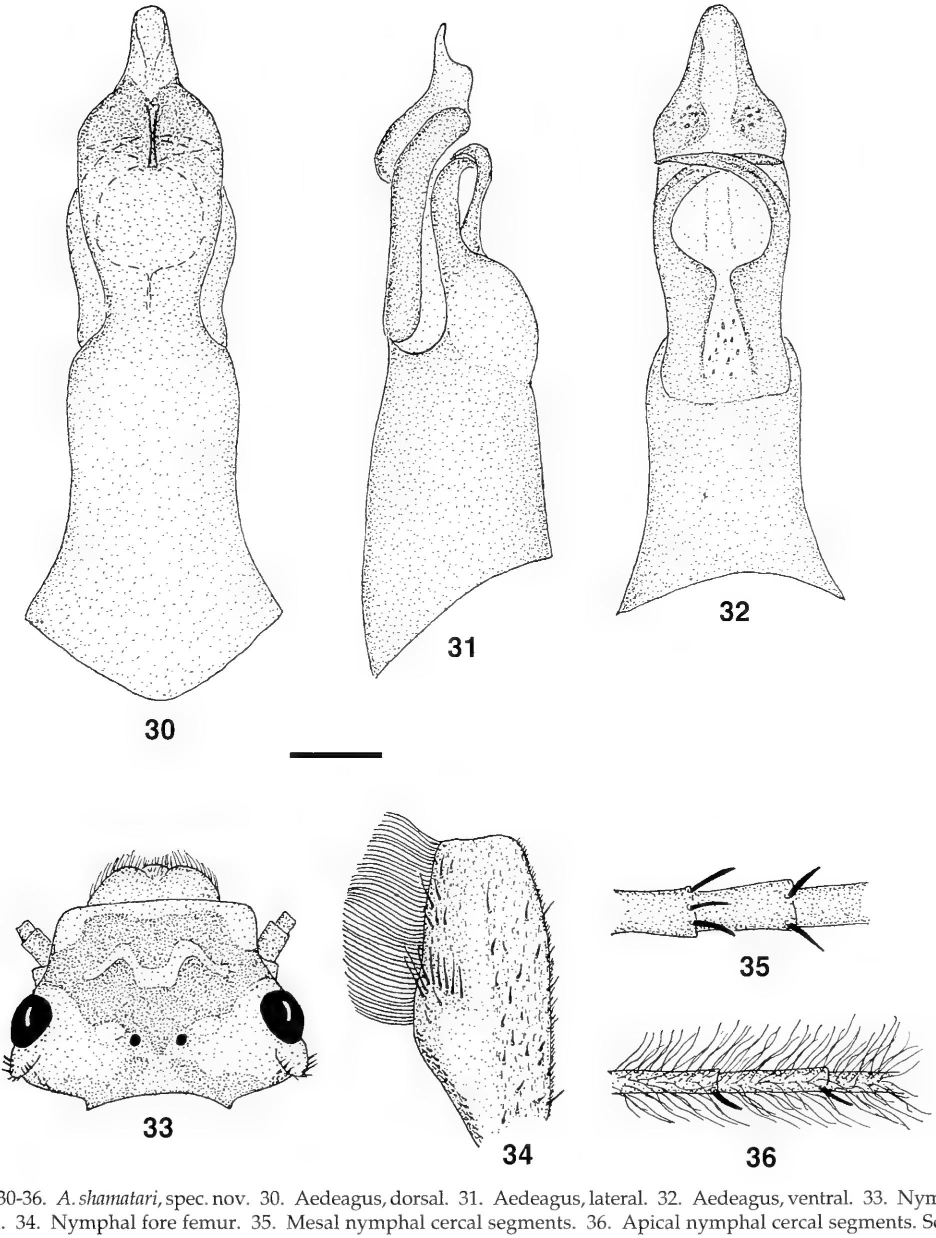
Egg. Length 0.4 mm, width 0.29 mm. Spindle shaped with small button-like collar. Chorion smooth (Fig. 25).

Nymph. Unknown.

Etymology. The species name, *pinza*, refers to the claw-like hooks on the aedeagus.

Discussion. This species is strikingly similar in size, general appearance, and aedeagal structure to *A. vistosa*. The two species are reliably separated by the clear apical spot on the wing of *A. vistosa* and by fine details of the aedeagus. The lateral lobes of the aedeagal apex are shorter in *A. pinza*, and the hooks and dorsal keel also differ. The female subgenital plate and egg readily distinguish these species.

The type locality, Camp IV, is upstream of the Basecamp site. At this site the stream is about 15 m wide and the substrate includes boulders and bedrock (O. S. Flint, pers. comm.).



Figs 30-36. *A. shamatari*, spec. nov. 30. Aedeagus, dorsal. 31. Aedeagus, lateral. 32. Aedeagus, ventral. 33. Nymphal head. 34. Nymphal fore femur. 35. Mesal nymphal cercal segments. 36. Apical nymphal cercal segments. Scales: 1.2 mm (33), 0.6 mm (34), 0.3 mm (35, 36), 0.15 mm (30-32).

Anacroneuria shamatari, spec. nov.

Figs 26-36, 50

Types. Holotype ♂ and 13♀♀ paratypes from Venezuela, Territorio Federal Amazonas, Cerro de la Neblina, Camp IV, 760 m, 15-18 March 1984, O. S. Flint (USNM, DZAM). Additional paratypes, all from Cerro de la Neblina: Camp VII, 1800 m, 30 January-10 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 3♂♂, 7nymphs (USNM). Same location, 30 January-10 February 1985, A. L. Gardner, A. Conover, 5♂♂, 3♀♀ (USNM, DZAM). Same location, 2-4 December 1984, R. L. Brown, 2♂♂, 9♀♀ (MEM). Camp II, 2100 m, 29 January 1985, W. Steiner, 1♂ (USNM). Same location, 16-18 March 1984, J. Louton, 1♂, 1♀ (USNM).

Description

Adult color pattern. Head yellow with obscure brown area forward of ocelli. Pronotum with a pair of narrow, dark mid-lateral stripes bordering a broad median yellow area (Fig. 26). Wing membrane pale brown, veins, including costa, pale brown. Antennae and cerci brown.

Male. Forewing length 17.5-19 mm. Hammer broad basally, length subequal to apical diameter (Fig. 28). Ventral aedeagal apex broadly triangular, hooks with a low anteapical keel (Figs 32, 50); dorsal aspect with a broad low keel (Figs 30-31). Basal section cylindrical, offset on venter by a suture (Fig. 32).

Female. Forewing length 22-24 mm. Subgenital plate with 4 subequal lobes; median notch slightly deeper than lateral notches. Posterior margin of sternum 9 without sclerotized bar. Median field of sternum 9 covered with a patch of brown setae; lateral setae thicker and longer than mesal setae. Posterior membrane of sternum 9 bearing a dense band of microtrichia (Fig. 27).

Egg. Length 0.45 mm, width 0.22 mm. Spindle shaped with a low button-like collar and a long (0.08 mm), blunt spine on the posterior pole. Chorion smooth; micropyles located at base of spine (Fig. 29).

Nymph. Body length 16-19 mm. Head forward of ocelli brown except for narrow pale M-line, anterolateral corners, and mesal spot along labrum (Fig. 33). Pronotum brown except for narrow pale stripe along mesal suture. Fore femur with a patch of short thick bristles extending along the dorsal margin from the trochanter to mid-femoral length; a transverse row of 7 long bristles present at mid-length, but absent on mid and hind femora; 12 long bristles scattered on dorsal half of fore femur beyond bristle row (Fig. 34). Apical 9-10 cercal segments bear whorls of long silky hairs which form a fringe along the entire segment (Fig. 36).

Etymology. This species is named for the Shamatari people whose homeland included the rainforest east of Neblina.

Discussion. Nymphs were associated by dissecting eggs from mature individuals. Camp VII and Camp II where many of the paratypes were collected are on top of the tepui in a wet morass characterized by blackwater streams (O. S. Flint, pers. comm.). Camp IV, the type locality, is described above under *A. pinza*.

Anacroneuria vistosa, spec. nov.

Figs 37-44, 47, 51

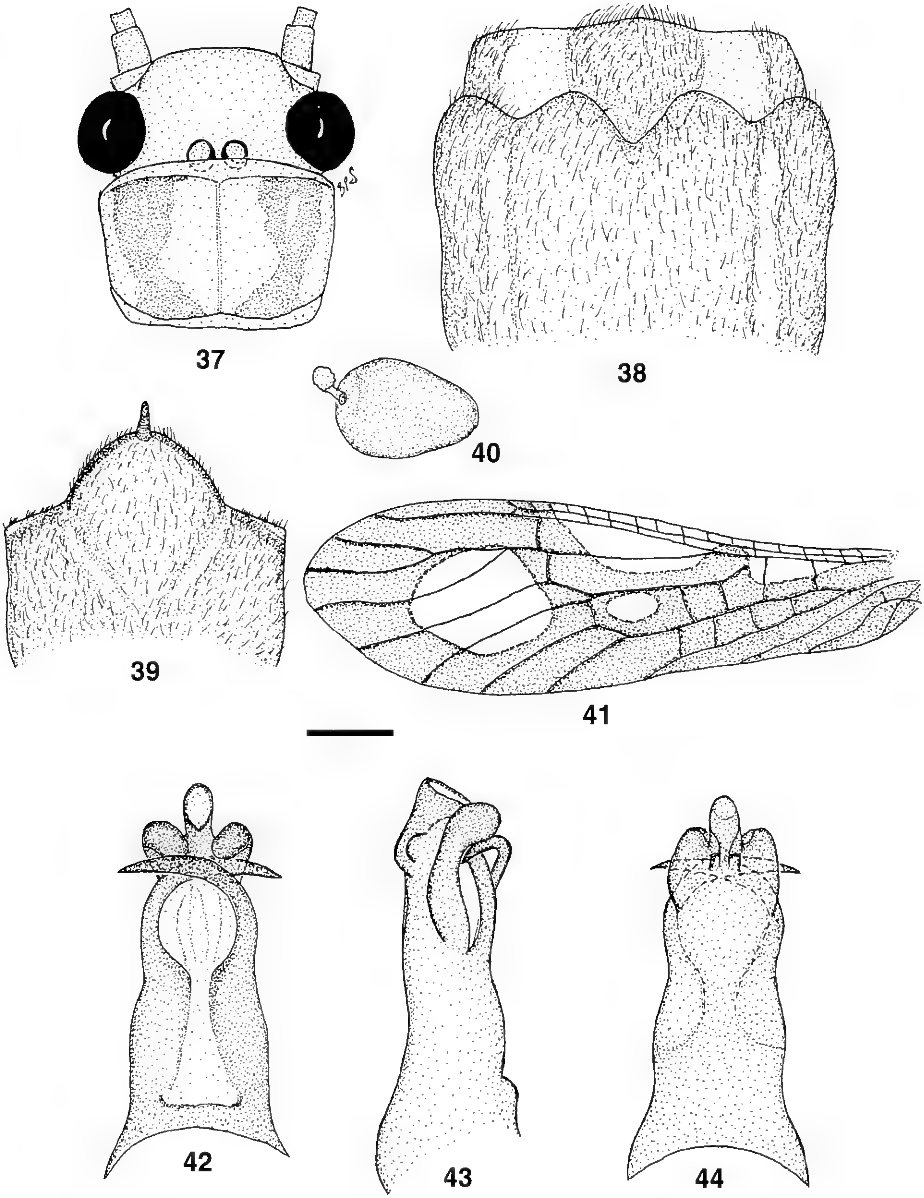
Types. Holotype ♂ and 1♀ paratype from Venezuela, Territorio Federal Amazonas, Cerro de la Neblina, Basecamp, 140 m, 11 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner (USNM). Additional paratypes all from same locality: 4-12 February 1984, D. Davis, T. McCabe, 4♂♂, 9♀♀ (USNM, DZAM). 1-10 March 1984, D. Davis, T. McCabe, 3♂♂ (USNM). 13-20 February 1984, D. Davis, T. McCabe, 3♀♀ (USNM). 21-29 February 1984, D. Davis, T. McCabe, 4♂ (USNM). 14 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 2♂♂ (USNM). 26-31 January 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 3♂♂ (USNM). 5 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 4♂♂, 2♀♀ (USNM). 20 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♂ (USNM). 10 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 4♂♂, 2♀♀ (USNM). 21-28 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 5♂♂, 2♀♀ (USNM). 10-20 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 5♂♂, 3♀♀ (USNM, DZAM). 1-9 February 1985, P. J.Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 2♀♀ (USNM). 7 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 2♂♂, 1♀ (USNM). 3 February 1985, W. Steiner, 3♂♂ (USNM). 20-24 March 1984, O. Flint, J. Louton, 10♂♂, 2♀♀ (USNM). 24 November-1 December 1984, R. Brown, 2♂♂, 3♀♀ (MEM). 5 December 1984, R. Brown, 2♂♂, 5♀♀ (MEM).

Description

Adult color pattern. Head yellow, pronotum with dark mid-lateral stripes and a broad median yellow area (Fig. 37). Wings amber with wide pale band along costal margin which extends posteriorly over R and Rs, and pale spots on either side of cord (Fig. 41).

Male. Forewing length 8.5-9.5 mm. Hammer long and slender (Fig. 40). Ventral aspect of aedeagus trilobed; lateral lobes finger-like and curved (Figs 42, 51). Dorsal aspect with a pair of small sclerotized lobes on base of median process (Figs 43-44).

Female. Forewing length 12.5-13.5 mm. Subgenital plate with 4 subequal lobes; median notch



Figs 37-44. *A. vistosa*, spec. nov. 37. Head and pronotum. 38. Female sterna 8 and 9. 39. Male sternum 9. 40. Egg. 41. Left front wing. 42. Aedeagus, ventral. 43. Aedeagus, lateral. 44. Aedeagus, dorsal. Scales: 1.2 mm (41), 0.6 mm (37), 0.3 mm (38, 39), 0.15 mm (40, 42-44).

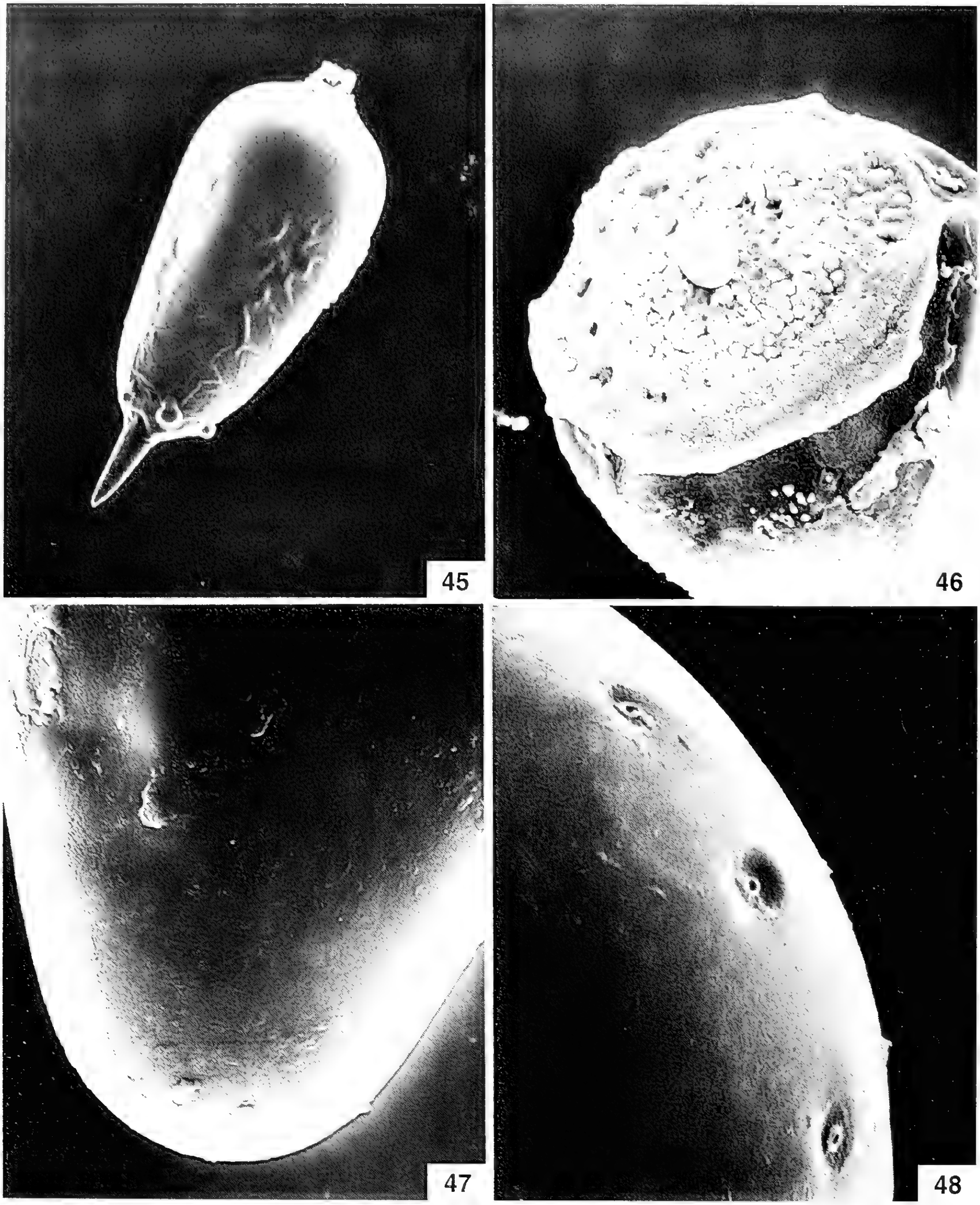
deeper than lateral notches. Sternum 9 weakly sclerotized in median field; sclerite covered with short thin setae (Fig. 38).

Egg. Length 0.25 mm, width 0.19 mm. Spindle shaped with small button-like collar and stalked, mushroom-like anchor. Chorion smooth, micropyles located on posterior pole (Figs 39, 47).

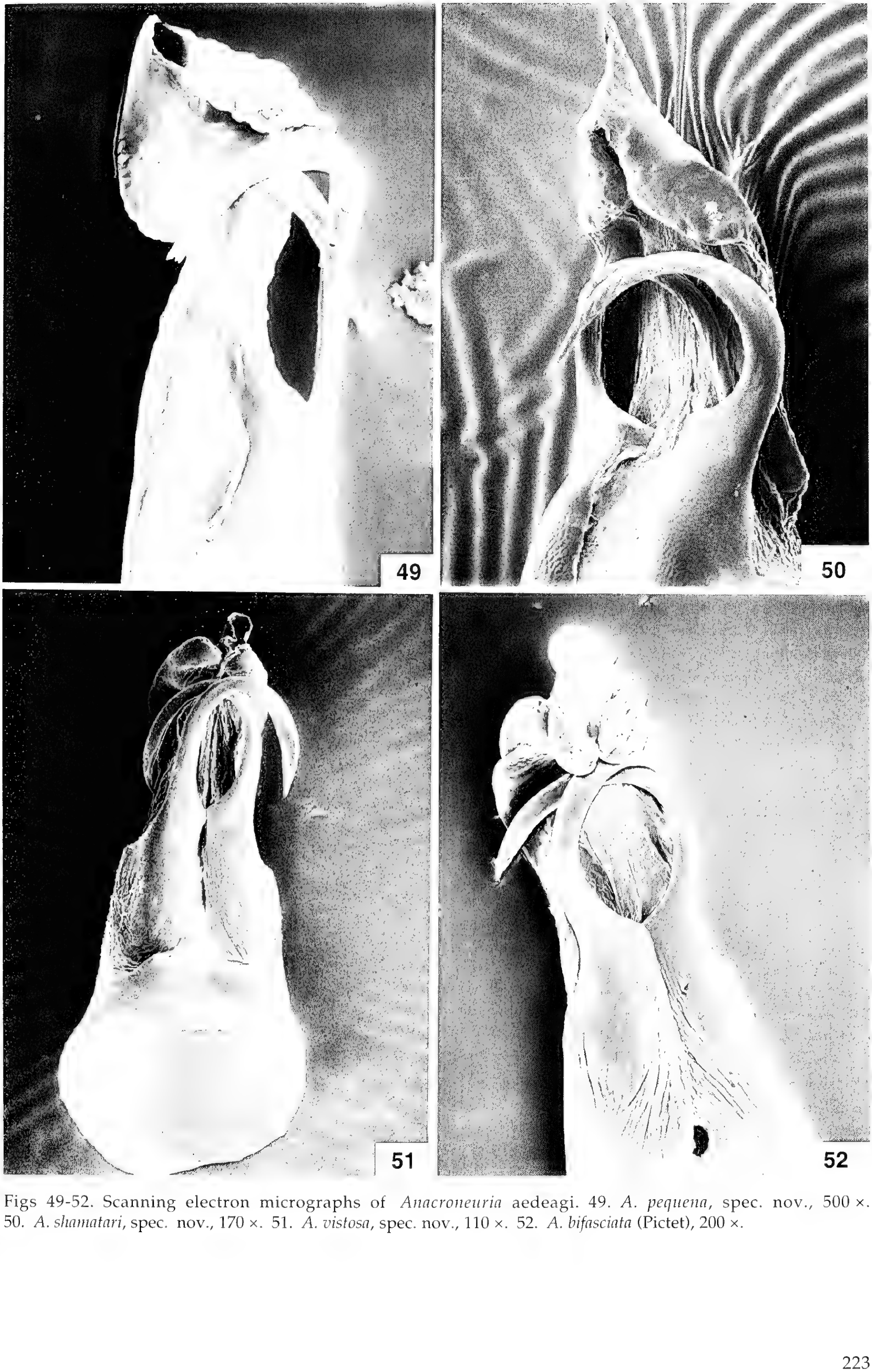
Nymph. Unknown.

Etymology. The species name, *vistosa,* refers to the distinctive and showy color pattern on the wings.

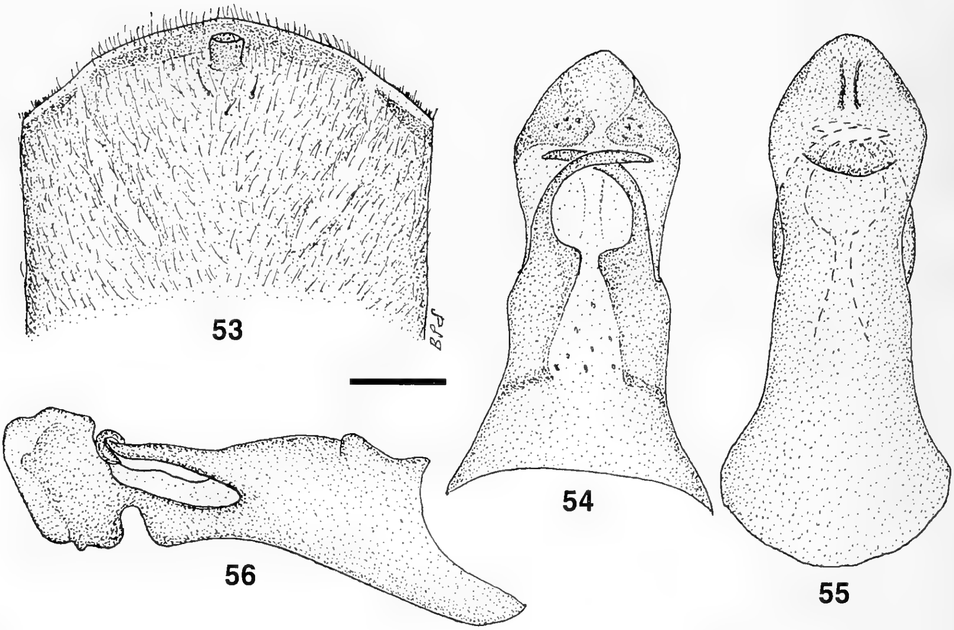
Discussion. The Basecamp locality is described above under *A. blanca*.



Figs 45-48. Scanning electron micrographs of *Anacroneuria* eggs. 45. *A. blanca*, spec. nov., 200 ×. 46. *A. pequena*, spec. nov., 720 ×. 47. *A. vistosa*, spec. nov., 950 ×. 48. *A. chorrera*, spec. nov., 2000 ×.



Figs 49-52. Scanning electron micrographs of *Anacroneuria* aedeagi. 49. *A. pequena*, spec. nov., 500 ×. 50. *A. shamatari*, spec. nov., 170 ×. 51. *A. vistosa*, spec. nov., 110 ×. 52. *A. bifasciata* (Pictet), 200 ×.



Figs 53-56. *A. arcuata*, spec. nov. 53. Male sternum 9. 54. Aedeagus, ventral. 55. Aedeagus, dorsal. 56. Aedeagus, lateral. Scales: 0.3 mm (53), 0.15 mm (54-56).

Anacroneuria arcuata, spec. nov.
Figs 53-56

Types. Holotype ♂ from Venezuela, Aragua, Dos Riitos, 6 km N Rancho Grande, 4 February 1976, C. M. Flint, O. S. Flint (USNM). Paratype: Venezuela, Aragua, Rancho Grande, 1100 m, E. Aragua, 1 May 1951, F. Fernandez Yepez, 1♂ (DZAM).

Description

Adult color pattern. Obscured by specimen condition. Head apparently yellow, pronotum apparently with a wide pale mesal stripe. Wing membrane pale; C, Sc and R pale, Cu, cord, and part of Rs brown.

Male. Forewing length 14 mm. Hammer cylindrical but somewhat compressed (Fig. 53). Aedeagal apex broadly triangular; dorsal aspect with an arcuate, basally directed mesal lobe and a subapical keel. Hooks slender (Figs 54-56).

Female. Unknown.

Egg. Unknown.

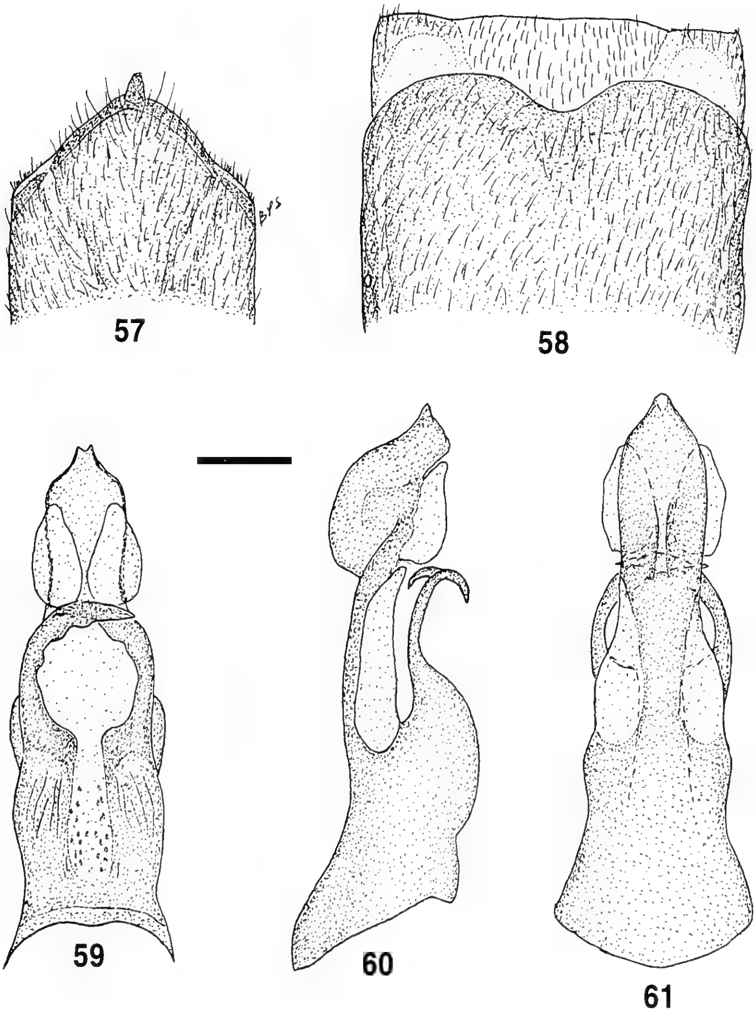
Nymph. Unknown.

Etymology. The species name, *arcuata*, is based on the shape of the dorsal aedeagal lobe.

Discussion. The type locality includes a pair of small cascading rills in high elevation cloud forest (O. S. Flint, pers. comm.).

Anacroneuria baniva, spec. nov.
Figs 57-61

Types. Holotype ♂ and 2♀♀ paratypes (pinned) from Venezuela, Territorio Federal Amazonas, Rio Cataniapo, 10 km S Puerto Ayacucho, 9 March 1984, O. S. Flint (USNM, DZAM).



Figs 57-61. *A. baniva*, spec. nov. 57. Male sternum 9. 58. Female sterna 8 and 9. 59. Aedeagus, ventral. 60. Aedeagus, lateral. 61. Aedeagus, dorsal. Scales: 0.3 mm (57-58), 0.15 mm (59-61).

Description

Adult color pattern. Head yellow, pronotal pattern obscure. Wing membrane pale, veins brown except C, Sc and R, which are pale.

Male. Forewing length 7.5 mm. Hammer somewhat conical (Fig. 57). Ventral aspect of aedeagal apex bearing a pair of large membranous lobes; apex notched; inner margins of hooks irregularly incised (Figs 59-60). Dorsal aspect with a low median keel (Fig. 61).

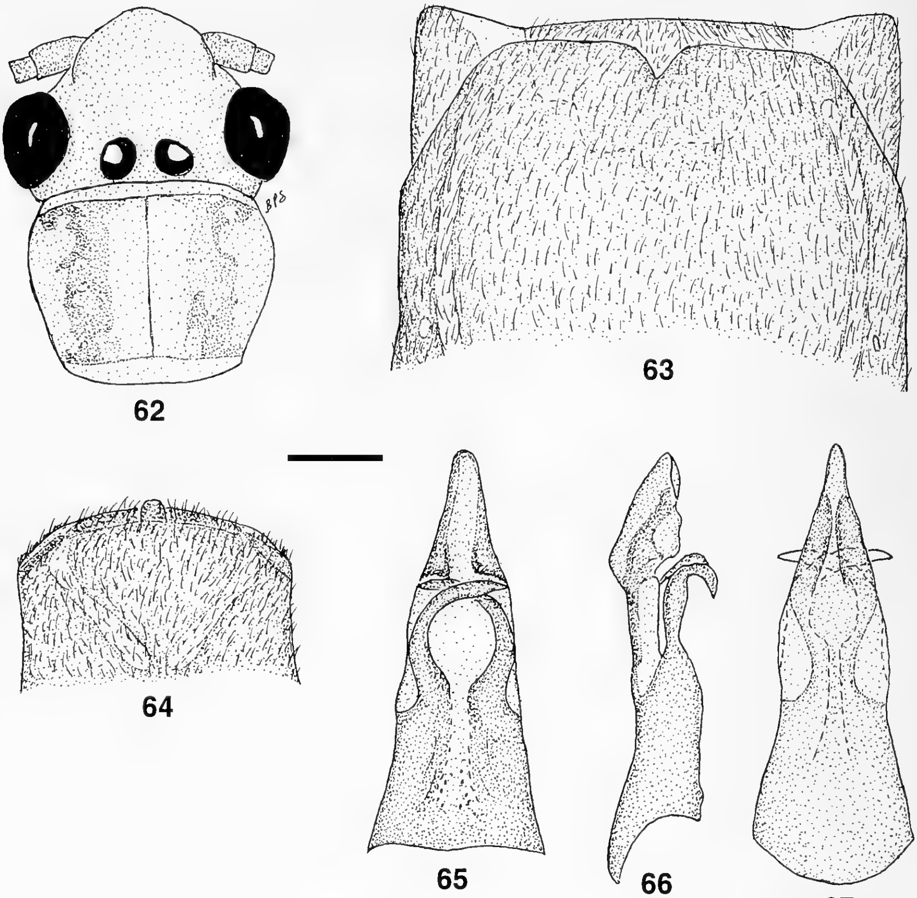
Female. Forewing length 8.5 mm. Subgenital plate broadly bilobed, notch shallow. Posterior margin of sternum 9 without sclerotized band; mesal field covered with a sparse patch of fine setae (Fig. 58).

Egg. Unknown.

Nymph. Unknown.

Etymology. This species is named for the Baniva people of the upper Orinoco region of southwest Venezuela.

Discussion. Rio Cataniapo is a large clearwater stream with abundant submerged vegetation in silty pools (O. S. Flint, pers. comm.).



Figs 62-67. *A. bari*, spec. nov. 62. Head and pronotum. 63. Female sterna 8 and 9. 64. Male sternum 9. 65. Aedeagus, ventral. 66. Aedeagus, lateral. 67. Aedeagus, dorsal. Scales: 0.6 mm (62), 0.3 mm (63, 64), 0.15 mm (65-67).

Anacroneuria bari, spec. nov.
Figs 62-67

Types. Holotype ♂ from Venezuela, Zulia, El Tucuco, 45 km SW Machiques, 5-6 June 1976, A. S. Menke, D. Vincent (USNM). Paratypes, all from Venezuela: Barinas, Barinitas, 22-23 February 1969, P. J. Spangler, P. M. Spangler, 3♂♂, 3♀♀ (USNM, DZAM). Miranda, Aqua Blanca, P. N. Guatopo, 7 February 1976, C. M. Flint, O. S. Flint, 1♂ (USNM).

Description

Adult color pattern. Head yellow, pronotum with dark mid-lateral stripes and a median pale stripe (Fig. 62). Wing membrane pale brown, veins darker except for costal area.

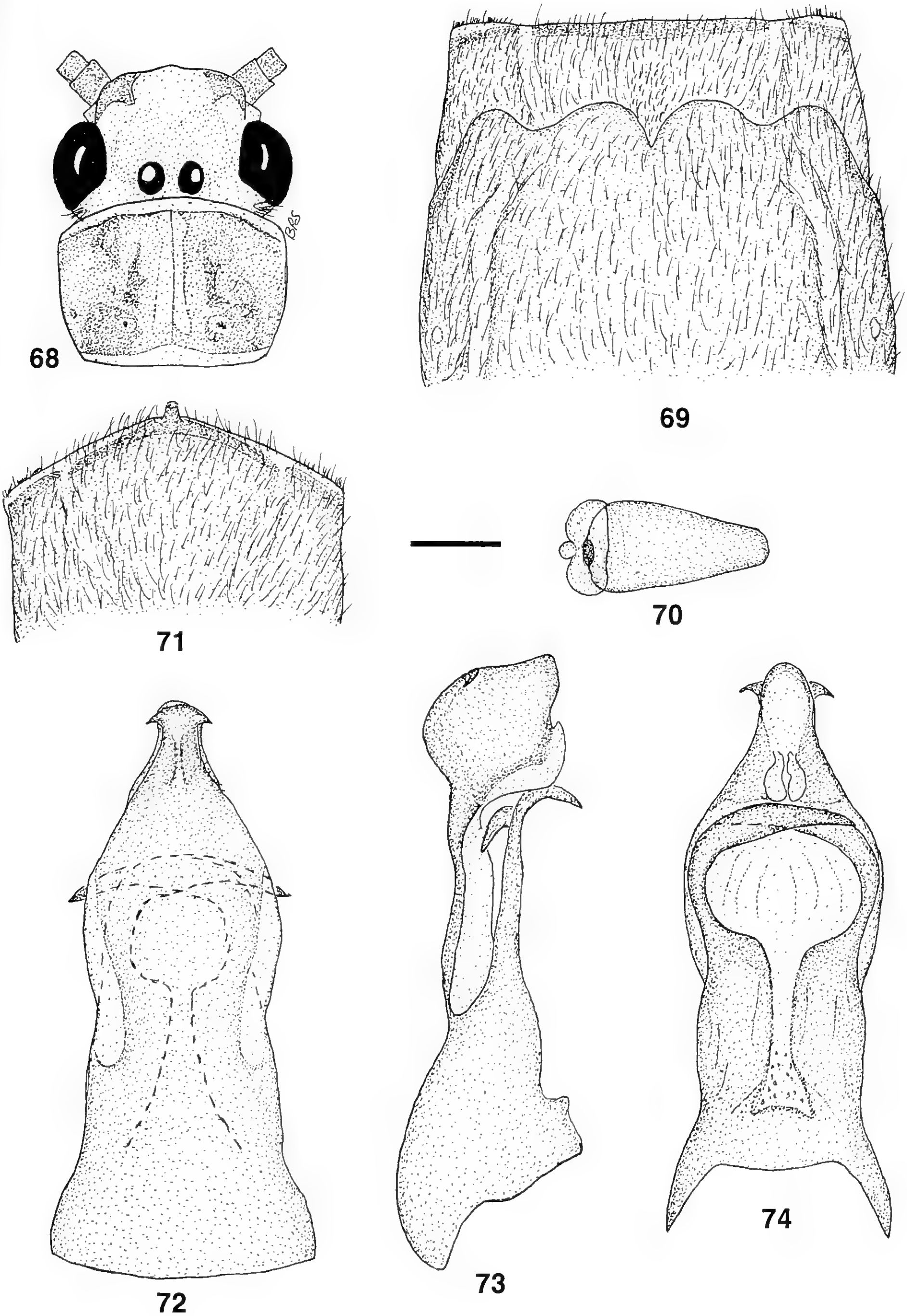
Male. Forewing length 9 mm. Hammer rounded apically, length subequal to width (Fig. 64). Aedeagal apex gradually narrowed, dorsal aspect with a long keel; hooks slender (Figs 65-67).

Female. Forewing length 12 mm. Subgenital plate lobes truncate with a shallow V-shaped notch. Sternum 9 with a weakly sclerotized posterior band. Mesal field covered with fine setae (Fig. 63).

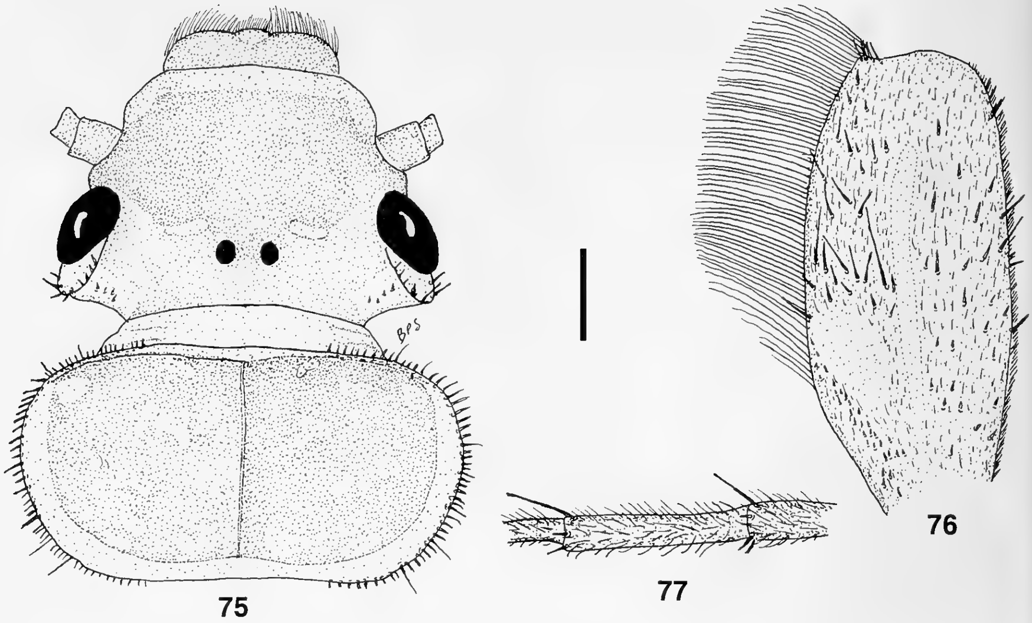
Egg. Unknown.

Nymph. Unknown.

Etymology. This species is named for the Bari people of western Venezuela.



Figs 68-74. *A. caraca*, spec. nov. 68. Head and pronotum. 69. Female sterna 8 and 9. 70. Egg. 71. Male sternum 9. 72. Aedeagus, dorsal. 73. Aedeagus, lateral. 74. Aedeagus, ventral. Scales: 0.6 mm (68), 0.3 mm (69, 71), 0.15 mm (70, 72-74).



Figs 75-77. *A. caraca*, spec. nov., nymphal structures. 75. Head and pronotum. 76. Left fore femur. 77. Apical cercal segments. Scales: 0.6 mm (75), 0.3 mm (76), 0.15 mm (77).

Anacroneuria caraca, spec. nov.

Figs 68-77

Types. Holotype ♂ from Venezuela, Aragua, P. N. Henri Pittier, nr. El Limon, Rio Limon, 500 m, 10-12 November 1979, H. M. Savage (USNM). Paratypes, all from Venezuela: Aragua, Rio El Limon, Maracay, Fish Hatchery, 3-4 January 1975, F. H. Weibezahn, 5♂♂, 8♀♀ (USNM, DZAM). Same location, 30 January 1975, F. H. Weibezahn, 11♂♂, 10♀♀ (USNM). Same location, 24 January-2 February 1983, O. S. Flint, 2♂♂ (USNM). Same location, 3-6 February 1976, C. M. Flint, O. S. Flint, 7♂♂, 3♀♀ (USNM). Same location, 12-13 February 1975, F. H. Weibezahn, 13♂♂, 15♀♀ (USNM, DZAM). Same location, 7-8 April 1975, F. H. Weibezahn, 12♂♂, 14♀♀ (USNM). Same location, 3-4 June 1975, F. H. Weibezahn, 4♂♂, 11♀♀ (USNM). Same location, 26-28 June 1974, H. B. N. Hynes, 1♂, 5♀♀ (USNM). Same location, 15-16 July 1975, F. H. Weibezahn, 1♂, 2♀♀ (USNM). Same location, 25-26 September 1975, F. H. Weibezahn, 3♂♂, 5♀♀ (USNM). Same location, 22-23 October 1974, F. H. Weibezahn, 1♂, 7♀♀ (USNM). Same location, 18-19 December 1974, F. H. Weibezahn, 4♂♂, 17♀♀ (USNM). Same location, 2-6 February 1976, C. M. Flint, O. S. Flint, 3♂♂, 3♀, 11 nymphs, 4 exuvia (USNM). Barinas, Barinitas, 22-23 February 1969, P. J. Spangler, P. M. Spangler, 1♂, 2♀♀ (USNM).

Description

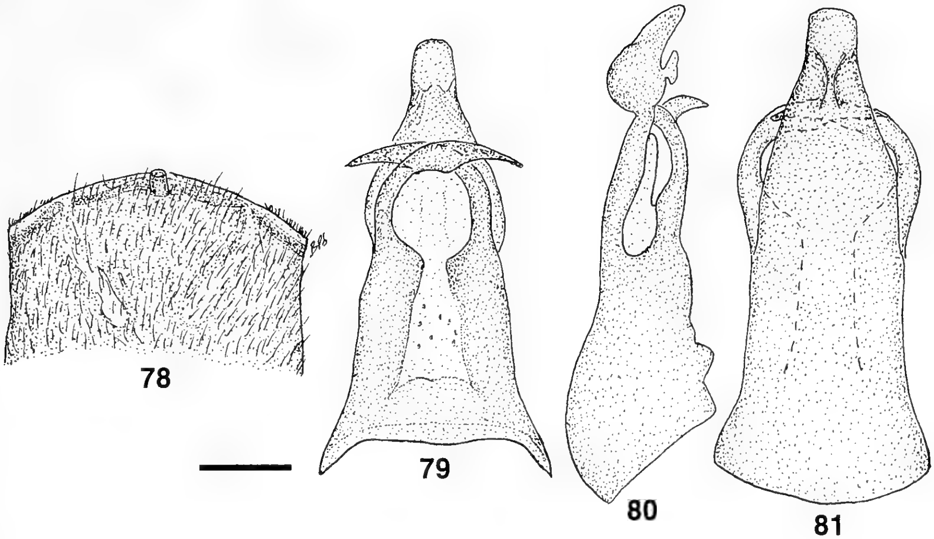
Adult color pattern. Head yellow with dark lappets and an obscure pale brown area forward of ocelli. Pronotum brown with a narrow mesal yellow stripe (Fig. 68). Wing membrane and veins brown except for pale costal area.

Male. Forewing length 9-10 mm. Hammer a slender cylinder about twice as long as diameter (Fig. 71). Aedeagal apex with a pair of small, dorsolateral horns and a narrow dorsal keel (Figs 72-74); hooks wide at mid-length (Fig. 74).

Female. Forewing length 11-12 mm. Subgenital plate with 4 subequal lobes. Posterior margin of sternum 9 with a narrow sclerotized band; median field covered with a sparse setal patch; longer setae laterally, short fine setae mesally (Fig. 69).

Egg. Length 0.32 mm, width 0.17 mm. Spindle shaped with a low button-like collar. Chorion smooth, anchor membranous with a small mesal knob (Fig. 70).

Nymph. Body length 8-11 mm. Head forward of ocelli brown except for pale area at base of labrum. Pronotum brown with scattered pale spots on disc and pale lateral margins (Fig. 75). Fore femur with a linear patch of short bristles extending from base to near the marginal fringe. Transverse bristle row



Figs 78-81. *A. chiquita*, spec. nov. 78. Male sternum 9. 79. Aedeagus, ventral. 80. Aedeagus, lateral. 81. Aedeagus, dorsal. Scales: 0.3 mm (78), 0.15 mm (79-81).

of 5-7 long bristles at mid-length; about 15 stout bristles beyond row (Fig. 76). Apical cercal segments with a sparse fringe of short setae (Fig. 77).

Etymology. This species is named for the Caraca people of Venezuela.

Discussion. Twenty three collections made by F. H. Weibezahn at the Maracay fish hatchery site included 68♂♂ and 168♀♀ specimens. Adults were found in every month, but no males were included in the March, May, August, and November samples. The paratype series above was selected to represent the flight period of this species at Rio El Limon.

Although *A. caraca* may be the only species at the Maracay fish hatchery site, nymphs were positively associated by dissection of male genitalia from one individual. This species is closely related to the Trinidad species, *A. aroucana* Kimmins, but is readily distinguished by the more prominent dorsoapical aedeagal horns and by the bluntly rounded egg apex. Nymphs of the two species may be inseparable (Stark, 1994).

The type locality, a small clear stream with rapid flow, was described by Flint (1981).

Anacroneuria chiquita, spec. nov.

Figs 78-81

Types. Holotype ♂ from Venezuela, Zulia, El Tucuco, 45 km SW Machiques, 5-6 June 1976, A. Menke, D. Vincent (USNM).

Description

Adult color pattern. Head and pronotal pattern obscured by specimen condition. Wing membrane and veins brown except for pale costal area.

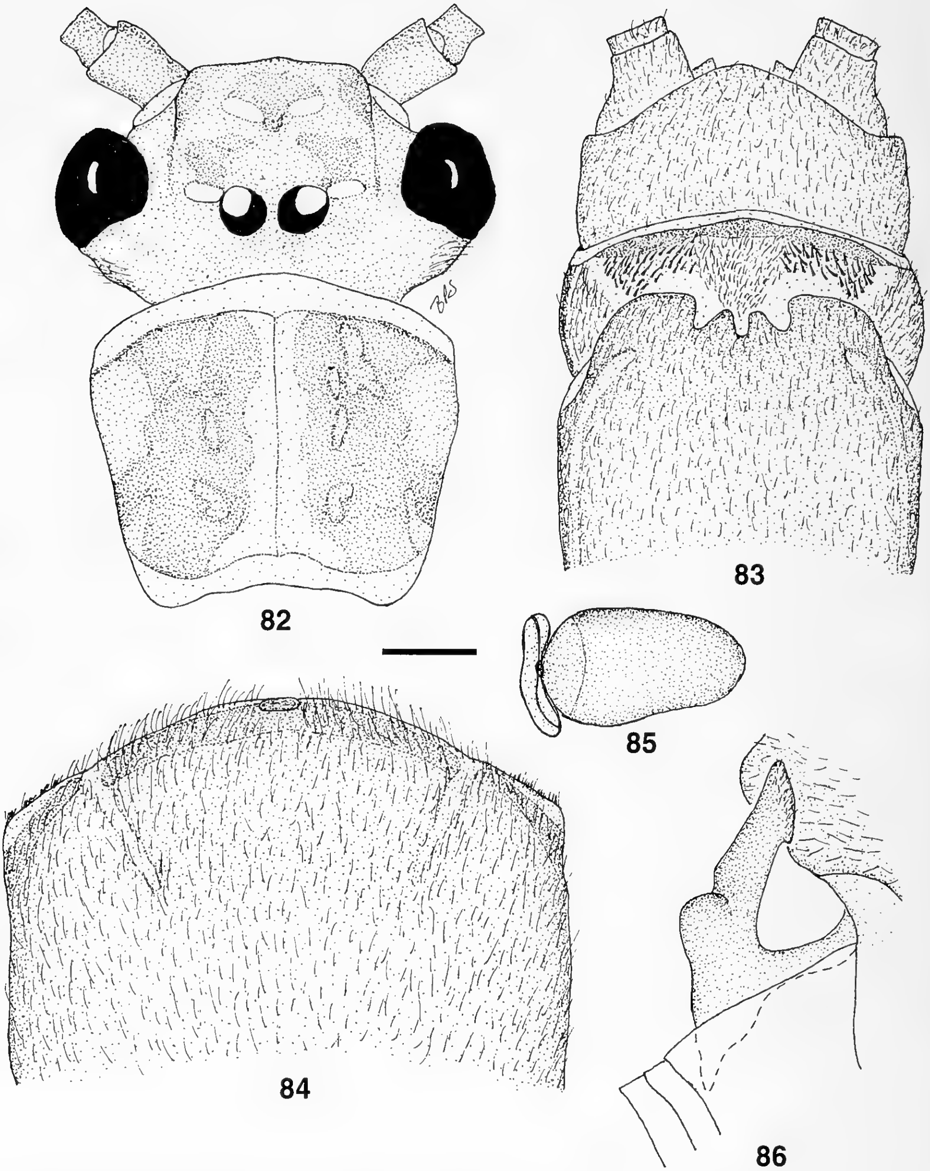
Male. Forewing length 8 mm. Hammer cylindrical, height about 2 × width (Fig. 78). Aedeagal apex simple, slightly constricted subapically, and bearing a small membranous ventral lobe. Dorsomesal keel present; hooks falcate (Figs 79-81).

Female. Unknown.

Egg. Unknown.

Nymph. Unknown.

Etymology. Chiquita is Spanish for small.

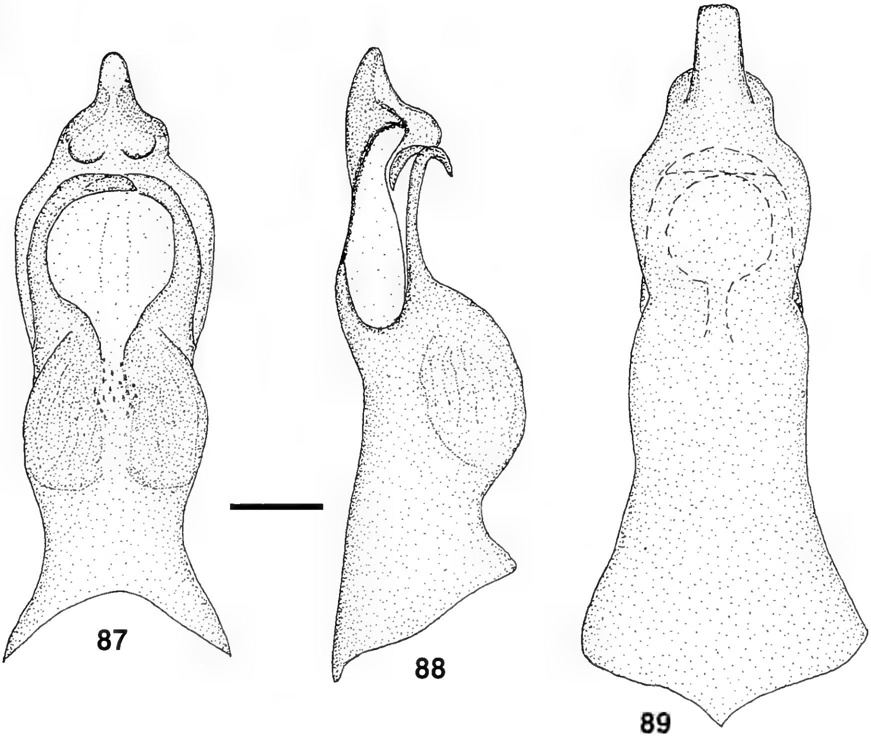


Figs 82-86. *A. chorrera*, spec. nov. 82. Head and pronotum. 83. Female sterna 8 and 9. 84. Male sternum 9. 85. Egg. 86. Male right paraproct, lateral. Scales: 0.6 mm (82, 83), 0.3 mm (84, 86), 0.15 mm (85).

Anacroneuria chorrera, spec. nov.

Figs 48, 82-89

Types. Holotype ♂, 1♂ and 1♀ paratype from Venezuela, Merida, La Chorrera Canyon, 6500 ft., 8 February 1978, J. B. Heppner (USNM). Additional Paratypes all from Venezuela: Merida, 6 km N Merida, 5000 ft, Andean mountain forest, 9 February 1978, J. B. Heppner, 2♂♂ (USNM). Merida, Rio Santo Domingo, 5 km NW Santo Domingo, 19 February 1976, C. M. Flint, O. S. Flint, 3♂♂ (USNM). Merida, Rio Montalban, Rt. 4, 19 km W. Merida, 20 February 1976, C. M.Flint, O. S. Flint, 3♂♂ (USNM, DZAM). Merida, La Pedregosa, Merida, 21 Februrary 1976, C. M. Flint, O. S. Flint, 2♂♂ (USNM). Distrito Federal, Rio Petaquire below Bajo Seco, 25 January 1983, O. S. Flint, 3♂♂ (USNM, DZAM). Aragua, Est. Exp. Cataurito, 1 February 1983, O. S. Flint, 1♂, 1♀ (USNM).



Figs 87-89. *A. chorrera*, spec. nov. 87. Aedeagus, ventral. 88. Aedeagus, lateral. 89. Aedeagus, dorsal. Scale: 0.15 mm.

Description

Adult color pattern. Head pale brown with darker blotches anterolateral to ocelli and in median field near labrum; lappets brown. Pronotum brown with a narrow, pale mesal stripe (Fig. 82). Wing membrane and veins pale brown, Cu and cord darker.

Male. Forewing length 18 mm. Hammer a low, quadrangular callus, about twice as wide as long (Fig. 85). Paraprocts with an enlarged basal callus (Fig. 86). Ventral aedeagal apex narrowly rounded with a pair of small knobs distal to hooks (Fig. 87); dorsal aspect without a mesal keel (Figs 88-89). Basal section with a pair of low membranous mounds basal to hooks (Fig. 87).

Female. Forewing length 25 mm. Subgenital plate with 4 lobes; lateral lobes about twice as wide and slightly longer than mesal lobes. Sternum 9 with a wide sclerotized posterior band. Median field covered with a setal patch; lateral areas with short, thick red setae, mesal area with short fine setae (Fig. 83).

Egg. Length 0.35 mm, width 0.21 mm. Spindle shaped; chorion smooth, anchor beret-like and membranous. Micropyles set in shallow pits located near posterior pole (Figs 48, 84).

Nymph. Unknown.

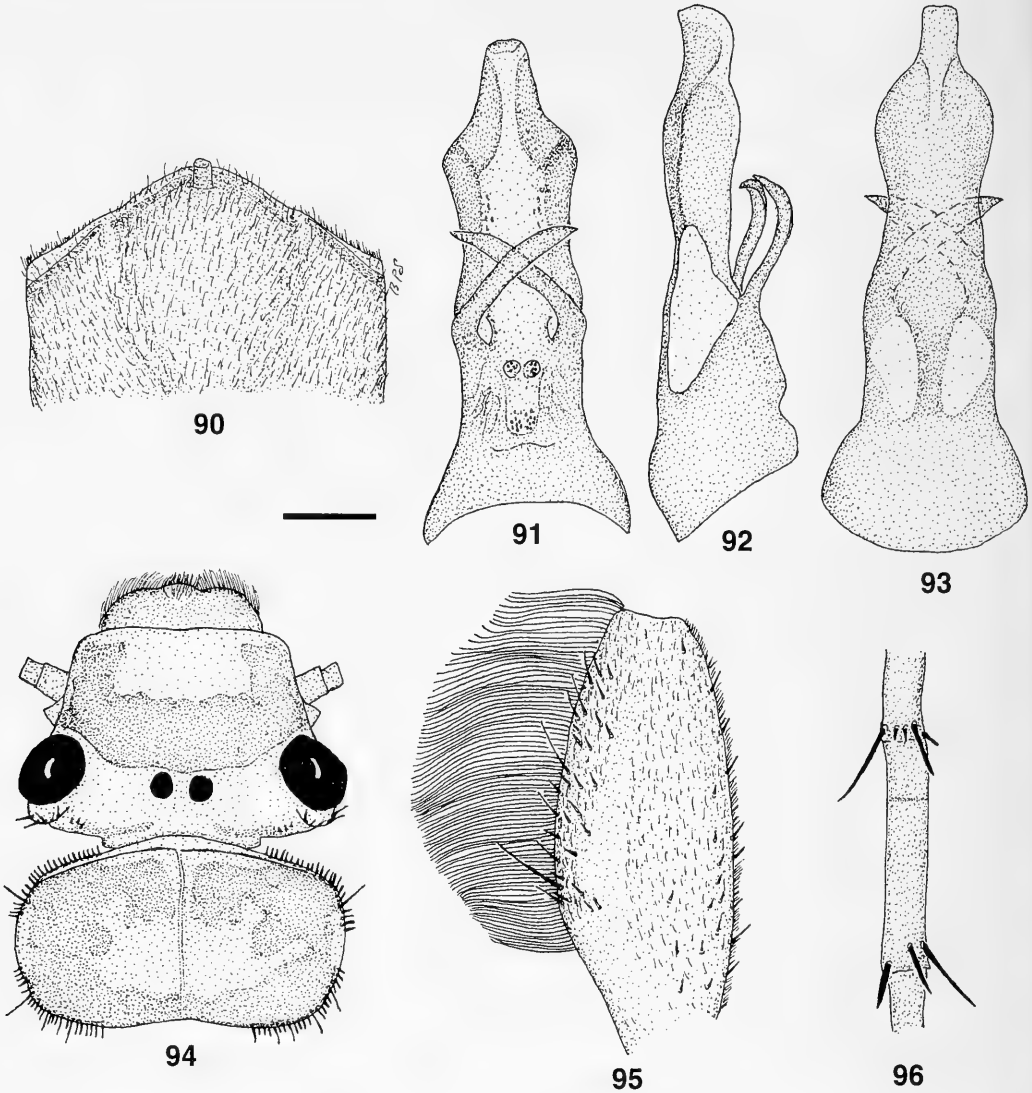
Etymology. Named for the type locality.

Discussion. Many of the paratypes were collected along small, clearwater streams about 1-3 m wide, with gravel-rubble-boulder substrates (O. S. Flint, pers. comm.).

Anacroneuria cruza, spec. nov.

Figs 90-96

Types. Holotype ♂ from Venezuela, Territorio Federal Amazonas, Exp. Culebra [03 33'N, 65 65'W], N. Duida, 7-16 April 1950, J. Maldonado Capriles (USNM). Paratypes, all from Venezuela: Territorio Federal Amazonas, Cerro de la Neblina, Agua Blanca, 160 m, 20-21 March 1984, O. Flint, J. Louton, 2 nymphs, 2 exuvia (USNM).



Figs 90-96. *A. cruza*, spec. nov. 90. Male sternum 9. 91. Aedeagus, ventral. 92. Aedeagus, lateral. 93. Aedeagus, dorsal. 94. Nymphal head and pronotum. 95. Nymphal left fore femur. 96. Nymphal apical cercal segments. Scales: 0.6 mm (94), 0.3 mm (90, 95), 0.15 mm (91-93, 96).

Description

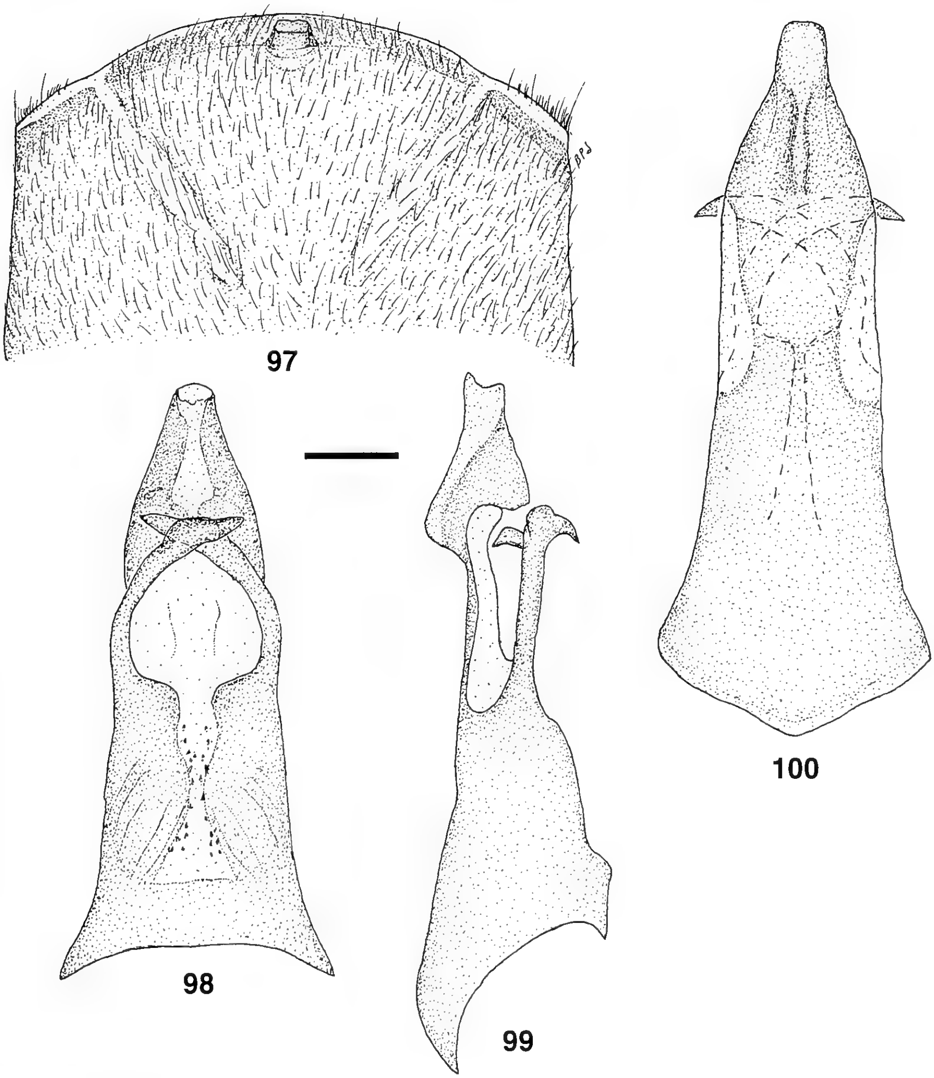
Adult color pattern. Head and pronotal pattern obscure. Head apparently brown, pronotum dark brown with a narrow pale mesal stripe. Wing membrane and veins dark brown.

Male. Forewing length 8 mm. Hammer cylindrical and twice as long as wide (Fig. 90). Aedeagal apex long, slender and strongly sclerotized. Hooks dagger-like, forming a cross pattern. Membranous basal strip short, bearing a small pair of membranous knobs near base of hooks (Figs 91-93).

Female. Unknown.

Egg. Unknown.

Nymph. Body length 10-13 mm. Head with a large brown area forward of ocelli; anteromesal area of brown pigment invaded by a large quadrangular area of yellow pigment. Pronotum brown with mesal areas of pale pigmentation (Fig. 94). Fore femur with 30 scattered anterodorsal bristles of



Figs 97-100. *A. cuadrada*, spec. nov. 97. Male sternum 9. 98. Aedeagus, ventral. 99. Aedeagus, lateral. 100. Aedeagus, dorsal. Scales: 0.3 mm (97), 0.15 mm (98-100).

variable length; basal bristle patch and transverse bristle row absent (Fig. 95). Apical cercal segments bear whorls of bristles; fringe absent (Fig. 96).

Discussion. The nymphs were associated by dissecting the aedeagus from a mature individual.

Anacroneuria cuadrada, spec. nov.

Figs 97-100

Types. Holotype ♂ (pinned) from Venezuela, Merida, Rio Santo Domingo, 5 km NW Santo Domingo, 19 February 1976, C. M. Flint, O. S. Flint (USNM).

Description

Adult color pattern. Head yellow except for dark spot over ocelli. Pronotum with mid-lateral dark brown stripes; pale mesally and on lateral margins.

Male. Forewing length 18 mm. Hammer quadrate, height subequal to apical width (Fig. 97). Aedeagal apex simple; broadly cleft ventrally and with a low dorsomesal keel (Figs 98-100). Hooks expanded to form a foot-like apical section (Fig. 98).

Female. Unknown.

Egg. Unknown.

Nymph. Unknown.

Etymology. Cuadrada, Spanish for square, refers to the quadrate shape of the hammer.

Discussion. Rio Santo Domingo is a small clearwater stream about 3 m wide with gravel-rubble-boulder substrate (O. S. Flint, pers. comm.).

Anacroneuria digitata, spec. nov.

Figs 101-107

Types. Holotype ♂ and 8♀♀ paratypes from Venezuela, Barinas, Rio Santo Domingo, Barinas, 17 February 1976, C. M. Flint, O. S. Flint (USNM, DZAM).

Description

Adult color pattern. Head yellow with an indistinct dark blotch forward of ocelli and on lappets. Pronotum with a narrow pale median stripe (Fig. 101). Wing membrane and veins pale brown.

Male. Forewing length 11.5 mm. Hammer rounded, about twice as long as wide (Fig. 104). Apical section of aedeagus sinuate in lateral aspect (Fig. 106); apex expanded beyond subapical constriction (Figs 105-107); hooks abruptly narrowed forming finger-like apices (Fig. 105).

Female. Forewing length 14.5 mm. Lateral lobes of subgenital plate low, mesal lobes longer and separated by a wide U-shaped notch. Vaginal sclerites visible through cuticle. Posterior margin of sternum 9 with a narrow sclerotized band; median field of sternum 9 with a dense patch of fine, medium length setae (Fig. 102).

Egg. Length 0.3 mm, width 0.16 mm. Spindle shaped with a small button-like collar and a membranous anchor and mesal knob (Fig. 103). Chorion smooth.

Nymph. Unknown.

Etymology. The species name, *digitata*, refers to the finger-like apical section of the aedeagal hooks.

Anacroneuria llana, spec. nov.

Figs 108-111

Types. Holotype ♂ (pinned) from Venezuela, Bolivar, La Escalera, 108 km S Rio Cuyuni, 11-12 February 1976, C. M. Flint, O. S. Flint (USNM).

Description

Adult color pattern. Head and pronotal pattern obscured by specimen condition. Wing membrane pale, veins brown except for C, Sc and R.

Male. Forewing length 10.5 mm. Hammer thimble shaped, flat apically (Fig. 108). Aedeagal apex simple with a narrow, scoop-like area projecting from a broadly rounded subapical region. Dorsomesal keel present; hooks slender (Figs 109-111).

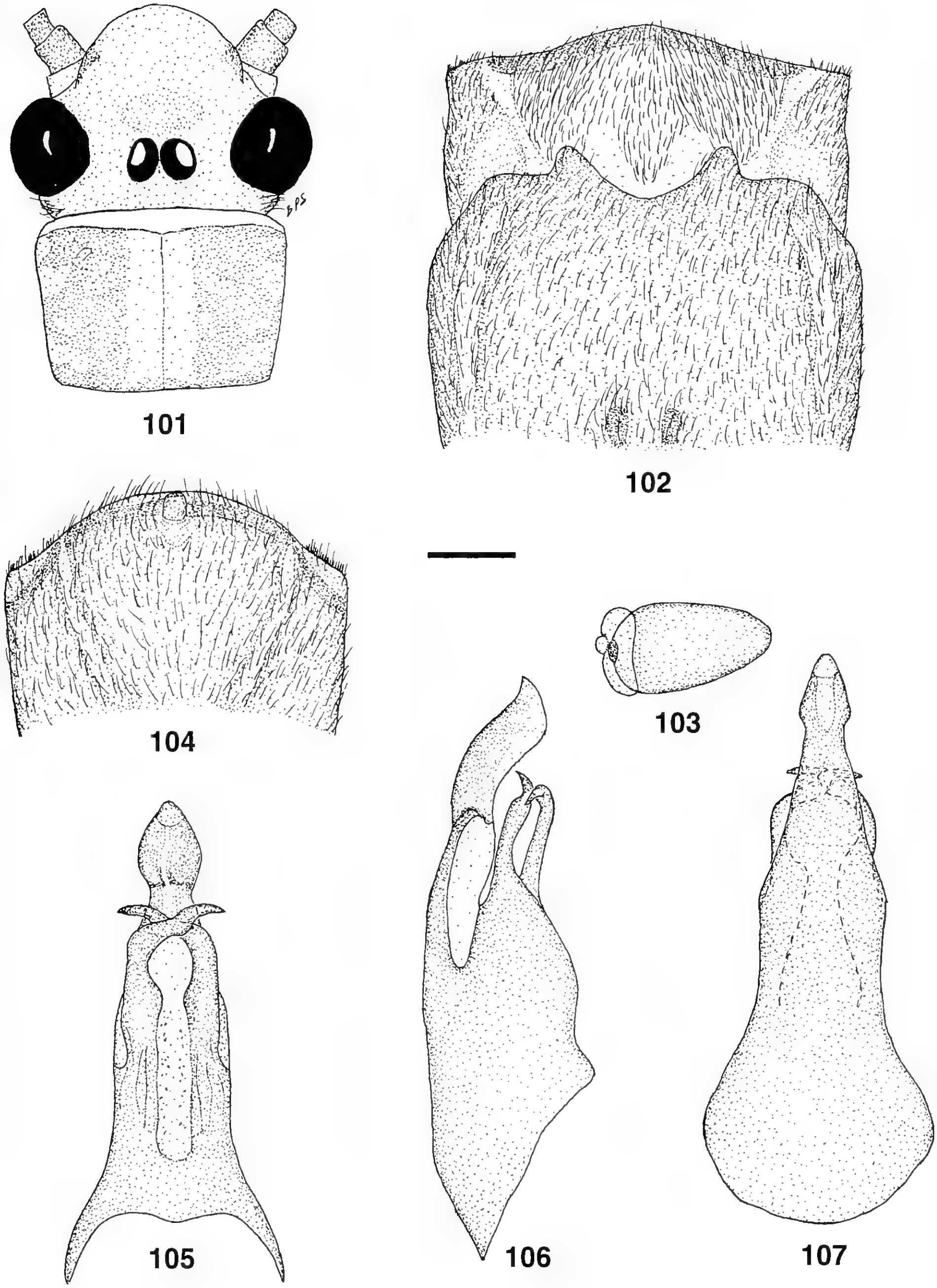
Female. Unknown.

Egg. Unknown.

Nymph. Unknown.

Etymology. Llana, Spanish for plain, refers to the non-descript color pattern of this species.

Discussion. La Escalera is a cold, cascading blackwater stream about 5 m wide. At the type locality, the substrate is quite rocky with boulders and rubble over bedrock (O. S. Flint, pers. comm.).



Figs 101-107. *A. digitata*, spec. nov. 101. Head and pronotum. 102. Female sterna 8 and 9. 103. Egg. 104. Male sternum 9. 105. Aedeagus, ventral. 106. Aedeagus, lateral. 107. Aedeagus, dorsal. Scales: 0.6 mm (101), 0.3 mm (102, 104), 0.15 mm (103, 105-107).

Anacroneuria menuda, spec. nov.
Figs 112-116

Types. Holotype ♂ from Venezuela, Territorio Federal Amazonas, Rio Aqua Blanca, 29 km S Puerto Ayacucho, 20 February 1986, P. J. Spangler, W. Sanchez (USNM).

Description

Adult color pattern. Head yellow except for dark pigment on lappets and an obscure pale spot over ocelli. Pronotum with irregular mid-lateral dark pigment bands (Fig. 112).

Male. Forewing length 8 mm. Hammer thimble shaped, 2.5 × long as wide (Fig. 113). Aedeagal apex multilobed; ventral aspect appearing trilobed, dorsal aspect with five lobes. Median lobe with a small dorsomesal keel; hooks slender (Figs 114-116).

Female. Unknown.

Egg. Unknown.

Nymph. Unknown.

Etymology. Menuda is Spanish for small.

Anacroneuria muesca, spec. nov.
Figs 117-121

Types. Holotype ♂ from Venezuela, Aragua, Est. Exp. Cataurito, 32 km E Villa de Cura, 28 January 1983, O. S. Flint (USNM).

Description

Adult color pattern. Head patterned with a pale brown band across ocelli, and a pale brown area forward of M-line. Lappets dark; pronotum with a pale median band, dark laterally (Fig. 117). Wing membrane and veins brown.

Male. Forewing length 16 mm. Hammer slender, 2 × as long as wide (Fig. 118). Aedeagal apex simple, consisting of a slender notched process projecting beyond a swollen subapical section. Median dorsal keel absent; hooks slender (Figs 119-121).

Female. Unknown.

Egg. Unknown.

Nymph. Unknown.

Etymology. Muesca, Spanish for notched, refers to the aedeagal apex.

Discussion. The type locality is a small stream with numerous bedrock chutes and plunge basins (O. S. Flint, pers. comm.).

Anacroneuria paleta, spec. nov.
Figs 122-126

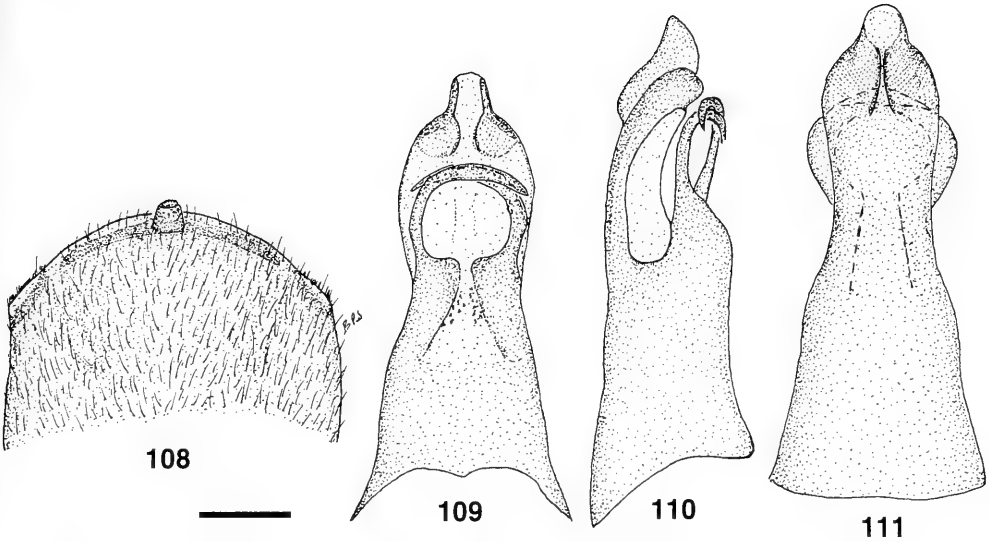
Types. Holotype ♂ from Venezuela, Merida, 4 km S Santo Domingo, 19-23 February 1976, C. M. Flint, O. S. Flint (USNM). Paratypes, all from Venezuela: Barinas, 22 km N Barinitas, 24 February 1976, C. M. Flint, O. S. Flint, 1♂ (USNM). Merida, Rio Montalban, Rt. 4, 19 km W Merida, 20 February 1976, C. M. Flint, O. S. Flint, 4♂♂ (USNM, DZAM). Merida, La Pedregosa, Merida, 21 February 1976, C. M. Flint, O. S. Flint, 1♂ (USNM).

Description

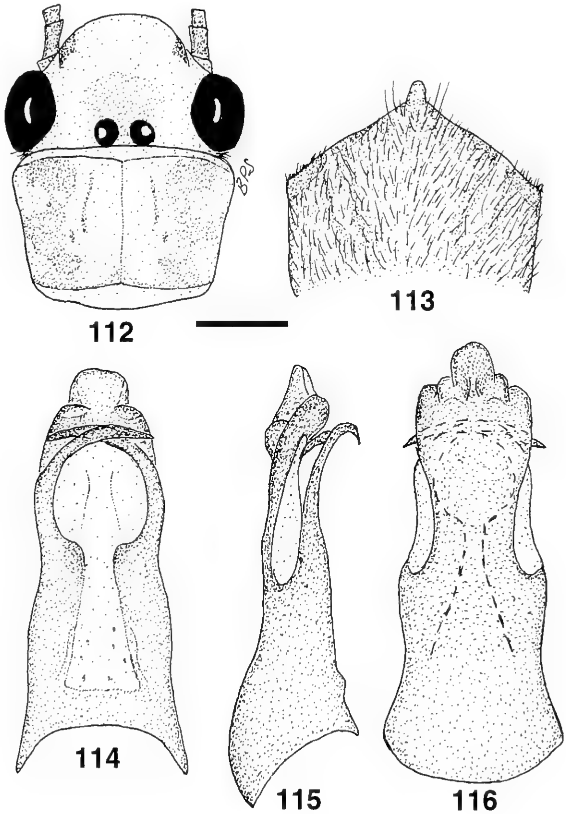
Adult color pattern. Head yellow except for lappets. Pronotum with dark brown mid-lateral stripes and a broad median pale stripe (Fig. 122). Wing membrane and veins brown, costal area pale.

Male. Forewing length 14-15 mm. Hammer thimble-like and twice as long as apical diameter; apex flat (Fig. 123). Aedeagal apex scoop-like, with a pair of partially sclerotized ventral processes and a low dorsal keel; hooks slender (Figs 124-126).

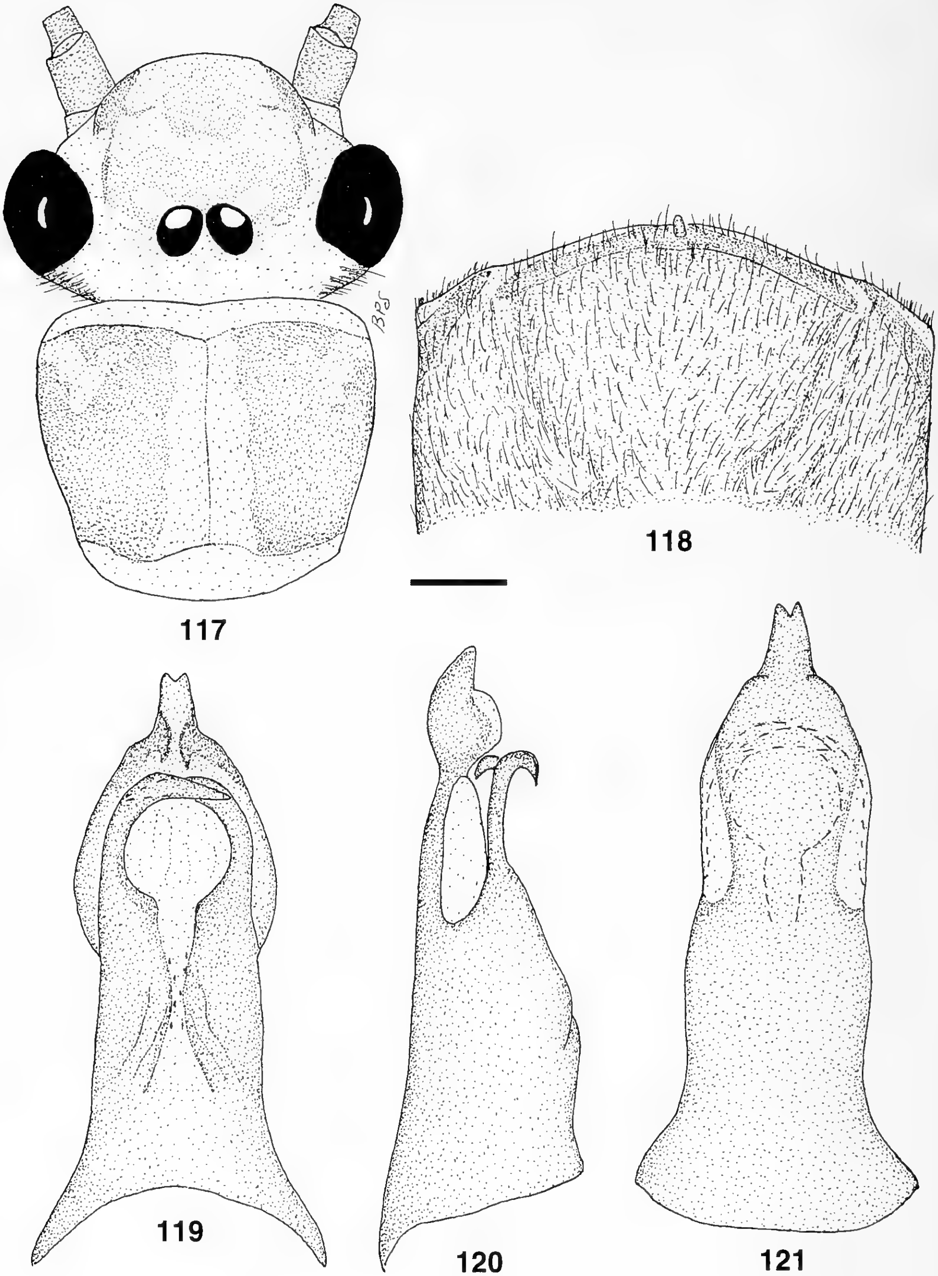
Female. Unknown.



Figs 108-111. *A. llana*, spec. nov. 108. Male sternum 9. 109. Aedeagus, ventral. 110. Aedeagus, lateral. 111. Aedeagus, dorsal. Scales: 0.3 mm (108), 0.15 mm (109-111).



Figs 112-116. *A. menuda*, spec. nov. 112. Head and pronotum. 113. Male sternum 9. 114. Aedeagus, ventral. 115. Aedeagus, lateral. 116. Aedeagus, dorsal. Scales: 0.6 mm (112), 0.3 mm (113), 0.15 mm (114-116).



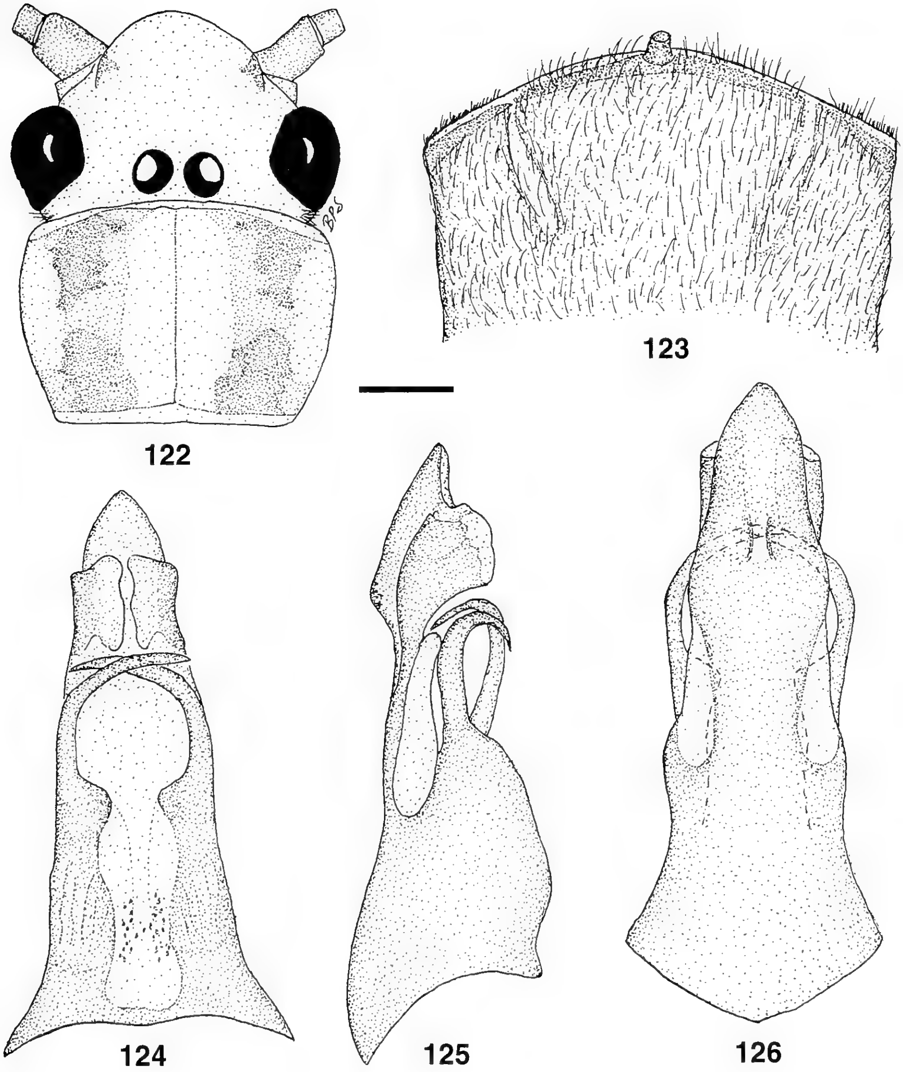
Figs 117-121. *A. muesca*, spec. nov. 117. Head and pronotum. 118. Male sternum 9. 119. Aedeagus, ventral. 120. Aedeagus, lateral. 121. Aedeagus, dorsal. Scales: 0.6 mm (117), 0.3 mm (118), 0.15 mm (119-121).

Egg. Unknown.

Nymph. Unknown.

Etymology. The species name, *paleta*, refers to the scoop-like aedeagal apex.

Discussion. The type locality is a tumbling cascade about 3 m wide with clear cool water (O. S. Flint, pers. comm.).



Figs 122-126. *A. paleta*, spec. nov. 122. Head and pronotum. 123. Male sternum 9. 124. Aedeagus, ventral. 125. Aedeagus, lateral. 126. Aedeagus, dorsal. Scales: 0.6 mm (122), 0.3 mm (123), 0.15 mm (124-126).

Anacroneuria bifasciata (Pictet)

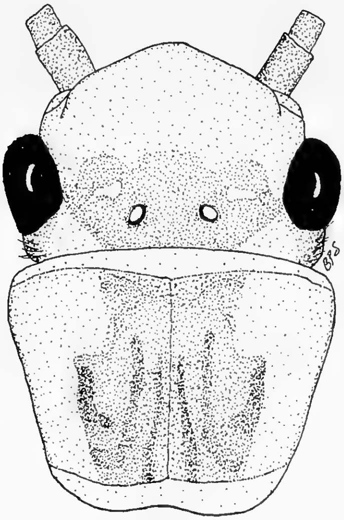
Figs 52, 127-134

Perla bifasciata Pictet, 1841. Holotype ♀ #2672, Moritz, Colombia (MNHB).
Anacroneuria bifasciata, Zwick 1972.

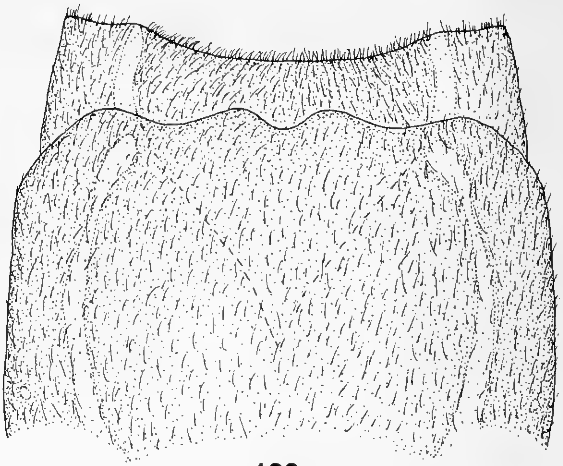
Redescription.

Adult color pattern. Head with a dark brown band between compound eyes, anterior area yellow. Median half of pronotum dark brown, pale laterally (Fig. 127). Wings banded; dark brown bands basally, at cord, and apically, separated by amber bands (Fig. 131). Antennae dark brown, cerci pale.

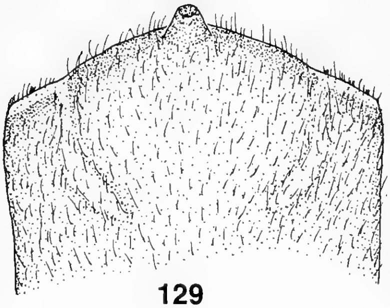
Male. Forewing length 10.5-11.5. Hammer broad basally, length greater than apical diameter (Fig. 130). Ventral aspect of aedeagal apex with a pair of small lobes forward of hooks; apex bluntly



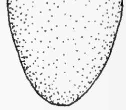
127



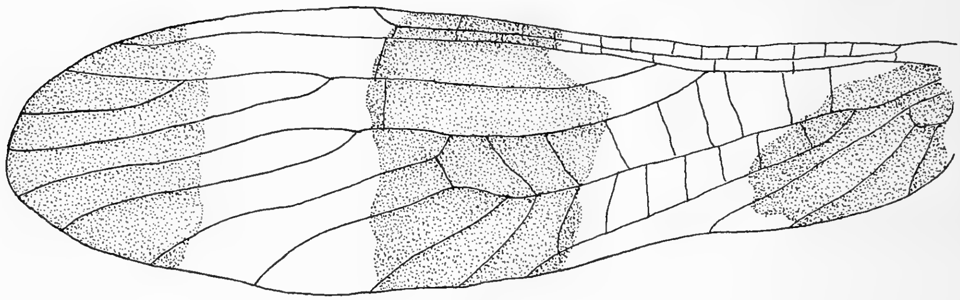
128



129



130



131

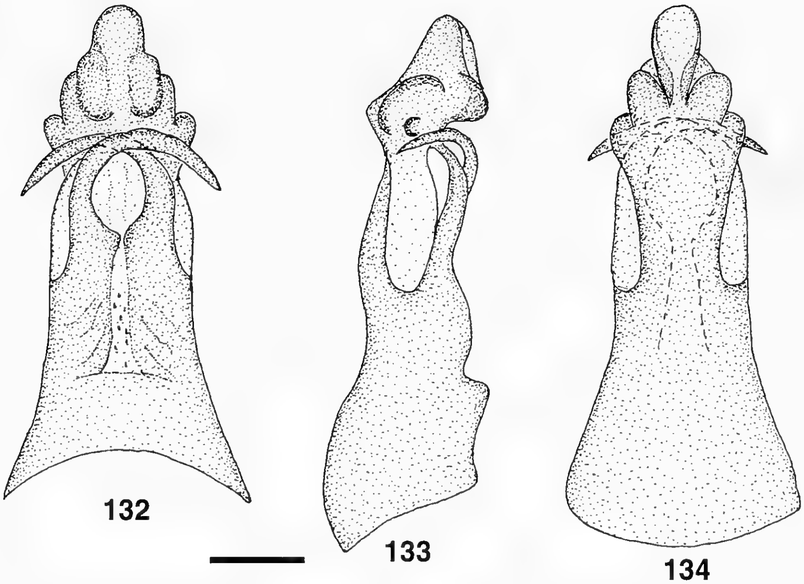
Figs 127-131. *A. bifasciata* (Pictet). 127. Head and pronotum. 128. Female sterna 8 and 9. 129. Male sternum 9. 130. Egg. 131. Left front wing. Scales: 1.2 mm (131), 0.6 mm (127), 0.3 mm (128, 129), 0.15 mm (130).

rounded with a pair of elongate, subapical lobes (Figs 52, 132). Dorsal aspect terminating in a slender mesal lobe with a pair of basal lobes (Figs 133, 134).

Female. Forewing length 14-15 mm. Subgenital plate lobes emarginate, mesal notch shallow. Mesal field of sternum 9 weakly sclerotized and covered with a patch of small, thin setae (Fig. 128).

Egg. Length 0.28 mm, width 0.2 mm. Spindle shaped with a low button-like collar. Chorion smooth (Fig. 129).

Nymph. Unknown.



Figs 132-134. *A. bifasciata* (Pictet), aedeagus. 132. Ventral. 133. Lateral. 134. Dorsal. Scale: 0.15 mm.

Material examined. Venezuela: Aragua, Rancho Grande Nat. Pk., 1100 m, 22-24 June 1984, D. S. Bogar, 1♀ (USNM). Aragua, 1 km S Rancho Grande, 5 February 1976, C. M. and O. S. Flint, 1♀ (USNM). Aragua, Rancho Grande, 1100 m, S. S. and W. D. Duckworth, 1♀ (USNM). Rancho Grande, E Aragua, 1 May 1951, F. Fernandez Yepez, 3♂♂, 2♀♀ (DZAM). Rancho Grande, 25 April 1955, F. Fernandez Yepez, C. Rosales, 1♂ (DZAM). Rio Borbureta, E. Carabobo, 300 m, 20 June 1955, F. Fernandez Yepez, C. Rosales, 1♀ (DZAM). Distrito Federal, Macizo de Naguata, Vertiente Norte, 720 m, 3 September 1959, F. Fernandez Yepez, R. Lichy, 1♀ (DZAM). Aragua Est. Exp. Caturito, 1 February 1983, O. S. Flint, 1♂ (USNM). Lara, Cerro Negro, S P. N. Yacambu, 12 November 1989, C. N. Duckett, 1♂ (USNM). Aragua, Henri Pittier N. P., 10 April 1990, C. N. Duckett, 1♀ (USNM).

Discussion. This distinctive and beautiful species was first reported from Venezuela by Zwick (1972). A male specimen from "El Pillar, Carupano, Venezuela, 1000 m" in the NHMW Vienna Museum was used as the basis for a description of the male genitalia and a single female from Maracay was also reported in the ZSM. Presently no males are known from areas other than Venezuela so it is possible that the Colombian populations might be distinct. According to Benedetto (pers. comm.) the type specimen of *Anacroneuria signata* (Walker) exhibits a similar pigment pattern but has a different type of subgenital plate. *A. bifasciata* is thought to be a mimic of a species of lycid beetle (Flint, pers. comm.).

Anacroneuria fenestrata (Pictet)

Figs 135-139

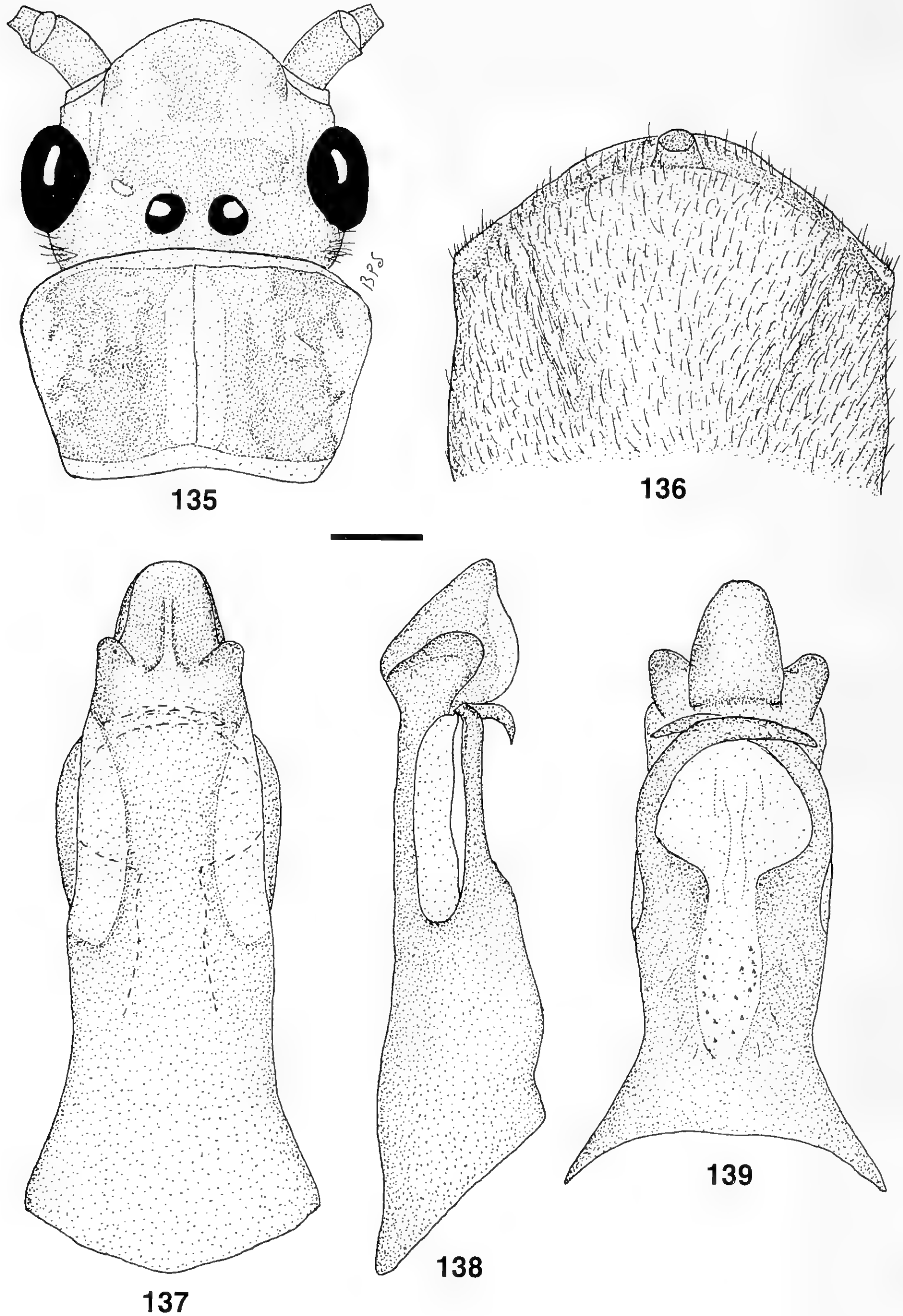
Perla fenestrata Pictet, 1841. Holotype ♂ #2697, Colombia (MNHB).
Anacroneuria fenestrata, Zwick 1972.

Redescription.

Adult color pattern. Head with a pale brown band between eyes and a pale brown blotch forward of M-line; lappets dark. Pronotum with a narrow pale median stripe and margins (Fig. 135). Wing membrane and veins brown; costal area pale.

Male. Forewing length 16 mm. Hammer short, wide and flat apically (Fig. 136). Aedeagal apex trilobed; lateral lobes small and ear-like. Dorsal aspect with a mesal keel; hooks slender (Figs 137-139).

Female. Unknown.



Figs 135-139. *A. fenestrata* (Pictet). 135. Head and pronotum. 136. Male sternum 9. 137. Aedeagus, dorsal. 138. Aedeagus, lateral. 139. Aedeagus, ventral. Scales: 0.6 mm (135), 0.3 mm (136), 0.15 mm (137-139).

Egg. Unknown.
Nymph. Unknown.

Material examined. Venezuela: Merida, Mucuy Fish Hatchery, 7 km E Tabay, 6600 ft, 10-13 February 1978, J. B. Heppner, 1♂ (USNM).

Discussion. The forewing length of this specimen is about twice that of the holotype (Zwick 1972), but the aedeagus appears to be the same. The two may well be distinct, but a direct comparison with the holotype is needed.

Anacroneuria intermixta (Walker)

Perla intermixta Walker, 1852. Holotype ♀, Venezuela (BMNH).
Perla intermixta, Illies 1966. Nomen oblitum.
Perla intermixta, Kimmins 1970.

I have not seen the holotype of this species, but Dr. Stephen Brooks of BMNH compared the specimen with some of my figures and generously provided notes on the type which are summarized below.

Adult color pattern. Head pale brown with an obscure brown patch over ocelli and a pair of brown rectangular patches anterolateral to ocelli. Pronotum pale brown with a median brown stripe. Wing membrane and veins pale brown.

Male. Unknown.

Female. Forewing length 29 mm. Subgenital plate bilobed, somewhat like Fig. 140, but the lobes are said to be narrower.

Egg. Unknown.
Nymph. Unknown.

Discussion. Only *A. chorrera* and *A. shamatari* of theknown Venezuelan species approach *A. intermixta* in size, and both of these species have four-lobed subgenital plates. According to Kimmins (1970) the type bears the label "*Anacroneuria intermixta*" placed there in 1968 by C. G. Froehlich.

Anacroneuria signata (Walker)

Perla signata Walker, 1852. Holotype ♀, Venezuela (BMNH)
Perla signata: Kimmins, 1970.

Redescription

The following description is based on notes provided by Dr. Stephen Brooks of BMNH.

Adult color pattern. Head yellow brown, becoming paler in the anterior third. Pronotal pattern obscured by specimen condition, but with no apparent stripes. Wing membrane hyaline, but with brown bars medially and over apex. In general, similar to Fig. 131, but without basal pigment band.

Male. Unknown.

Female. Forewing length 13 mm. Subgenital plate with four lobes, similar to Fig. 146, but with the outer lobes broader.

Egg. Unknown.
Nymph. Unknown.

Discussion. This species is apparently quite similar to *A. bifasciata* in wing pattern but may not be as closely related as this similarity might suggest. Additional data on other life stages are needed to evaluate the species.

Unassociated females

Anacroneuria VZ-1
Figs 140-141

Description

Adult color pattern. Obscured by specimen condition. Head apparently pale, perhaps with a dark ocellar spot. Pronotum dark laterally, possibly with a pale median stripe. Wing membrane pale, veins pale brown except for C, Sc, and R.

Female. Forewing length 20 mm. Subgenital plate with a wide notch. Sternum 9 with a posterior sclerotized band and a mesal field covered with short thin setae (Fig. 140).

Egg. Length 0.33 mm, width 0.2 mm. Spindle shaped with a small button-like collar. Chorion smooth (Fig. 141).

Material examined. Venezuela: Merida, La Chorrera Canyon, 6500 ft, 37 km W Merida, 8 February 1978, J. B. Heppner, 1♀ (USNM). Merida, Rio Montalban, Rt. 4, 19 km W Merida, 20 February 1976, C. M. Flint, O. S. Flint, 2♀♀ (USNM). Lara, P. N. Yacambu, 11-12 November 1989, C. N. Duckett, 2♀♀ (BPS).

Anacroneuria VZ-2
Figs 142-143

Description

Adult color pattern. Head pale except for dark areas over ocelli and lappets. Pronotum with narrow mid-lateral dark stripes and a broad pale median stripe. Wing membrane pale, veins brown.

Female. Forewing length 18 mm. Subgenital plate with four lobes; lateral lobes larger than median lobes. Posterior margin of sternum 9 with a broad sclerotized band; median field with a trilobed setal patch; lateral setae larger and thicker than mesal setae (Fig. 142).

Egg. Length 0.38 mm, width 0.2 mm. Spindle shaped with a small button-like collar. Chorion smooth (Fig. 143).

Material examined. Venezuela: Merida, La Mucuy Cloud Forest, 2500 m, 9 July 1991, G. S. Vick, 1♀ (USNM).

Anacroneuria VZ-3
Fig. 144

Description

Adult color pattern. Head pale brown from ocelli forward, pronotum with a narrow mesal pale stripe and pale lateral margins. Wing membrane and veins pale brown; costal area white.

Female. Forewing length 16.5 mm. Subgenital plate with four lobes; mesal lobes separated by a wide shallow notch, lateral lobes wide. Posterior margin of sternum 9 with a wide sclerotized band; mesal field with lateral patches of thick setae; area between patches bare, or sparsely covered with short thin setae (Fig. 144).

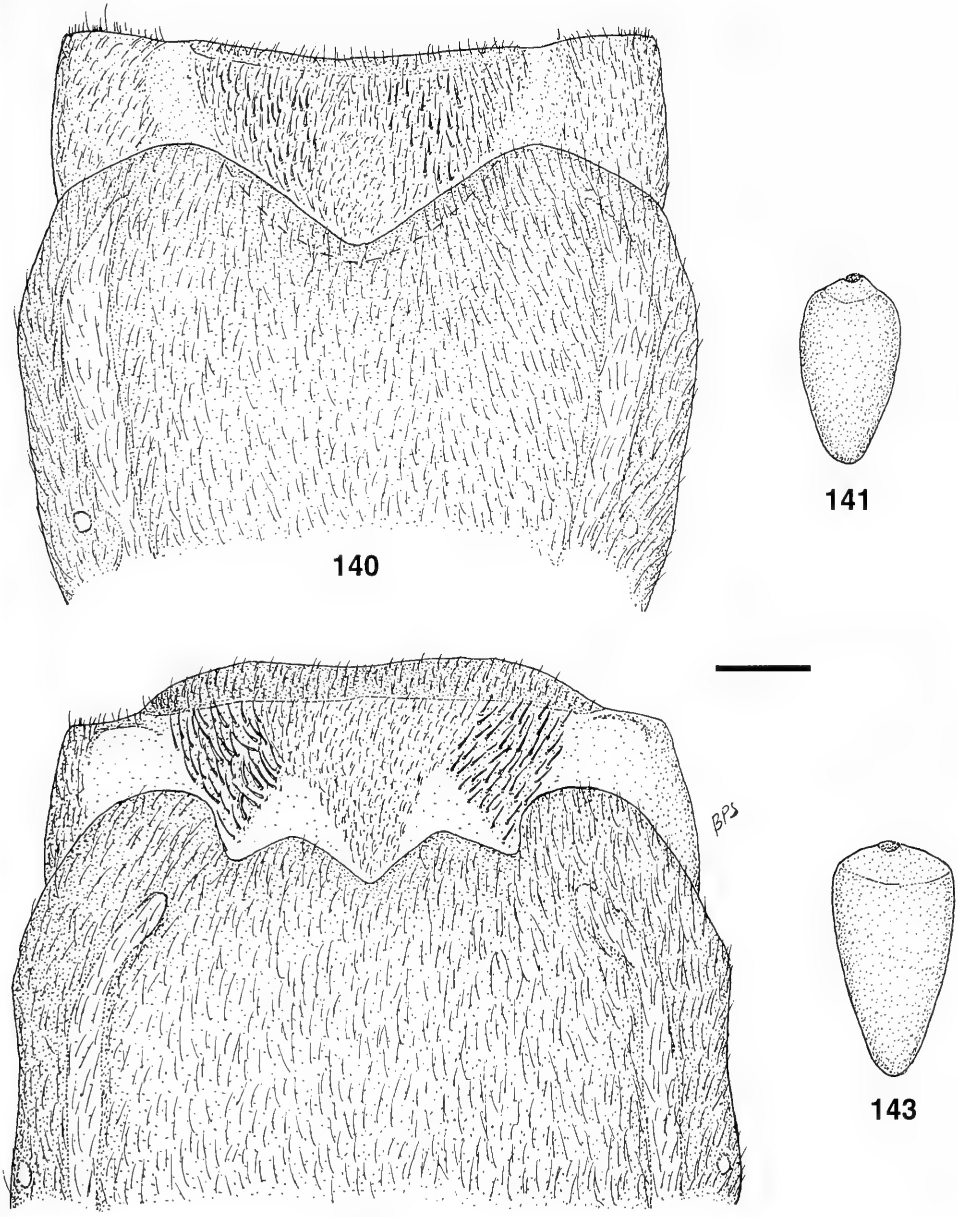
Egg. Unknown.

Material examined. Venezuela: Bolivar, La Escalera, 108 km S Rio Cuyuni, 11-12 February 1976, C. M. Flint, O. S. Flint, 1♀ (USNM).

Anacroneuria VZ-4
Fig. 145

Description

Adult color pattern. Head pale, pronotum with narrow dark mid-lateral stripes and a broad median pale stripe. Wing membrane and veins pale except Rs, Cu and cord which are darker.

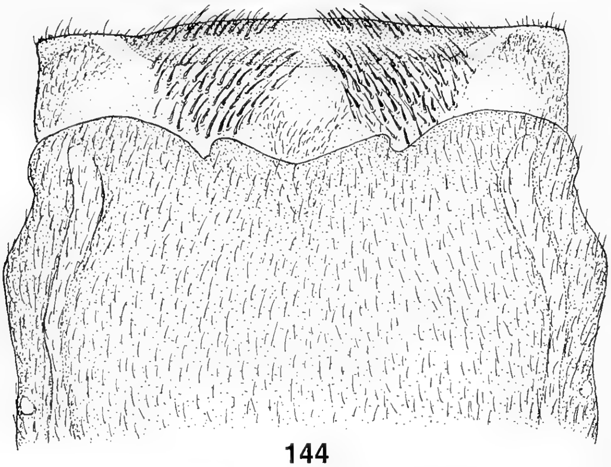


Figs 140-143. *Anacroneuria* structures. 140. VZ-1 female sterna 8 and 9. 141. VZ-1 egg. 142. VZ-2 female sterna 8 and 9. 143. VZ-2 egg. Scales: 0.3 mm (140, 142), 0.15 mm (141, 143).

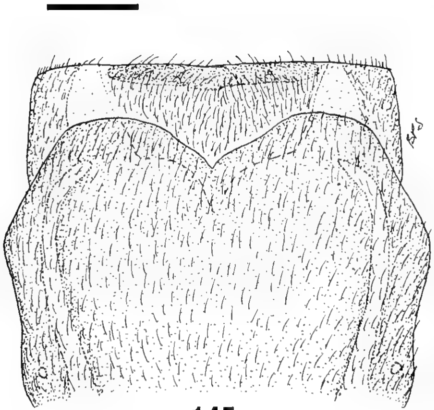
Female. Forewing length 13 mm. Subgenital plate with a wide acute notch separating the lobes. Posterior margin of sternum 9 with a sclerotized band; median field covered by a patch of thin setae (Fig. 145).

Egg. Unknown.

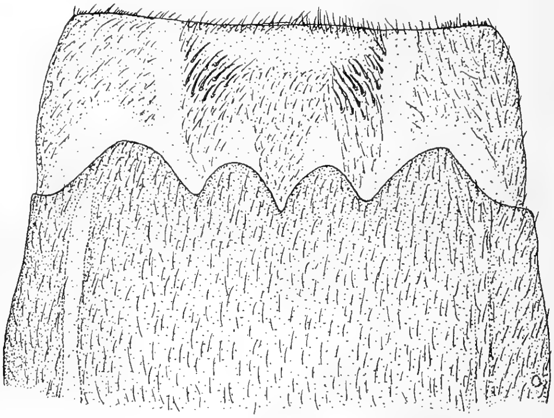
Material examined. Venezuela: Lara, P. N. Yacambu, 11-12. November 1989, C. N. Duckett, 1♀ (BPS). Zulia, El Tucuco, 45 km SW Machiques, 5-6 June 1976, A. Menke, D. Vincent, 1♀ (USNM).



144



145



146

Figs 144-146. *Anacroneuria* structures. 144. VZ-3 female sterna 8 and 9. 145. VZ-4 female sterna 8 and 9. 146. VZ-5 female sterna 8 and 9. Scale: 0.3 mm.

Anacroneuria VZ-5
Fig. 146

Description

Adult color pattern. Obscured by specimen condition. Wing membrane pale, veins brown.

Female. Forewing length 13.5 mm. Subgenital plate with four subequal lobes. Posterior margin of sternum 9 without sclerotized band; area forward of margin bare; a few thick setae in lateral patches (Fig. 146).

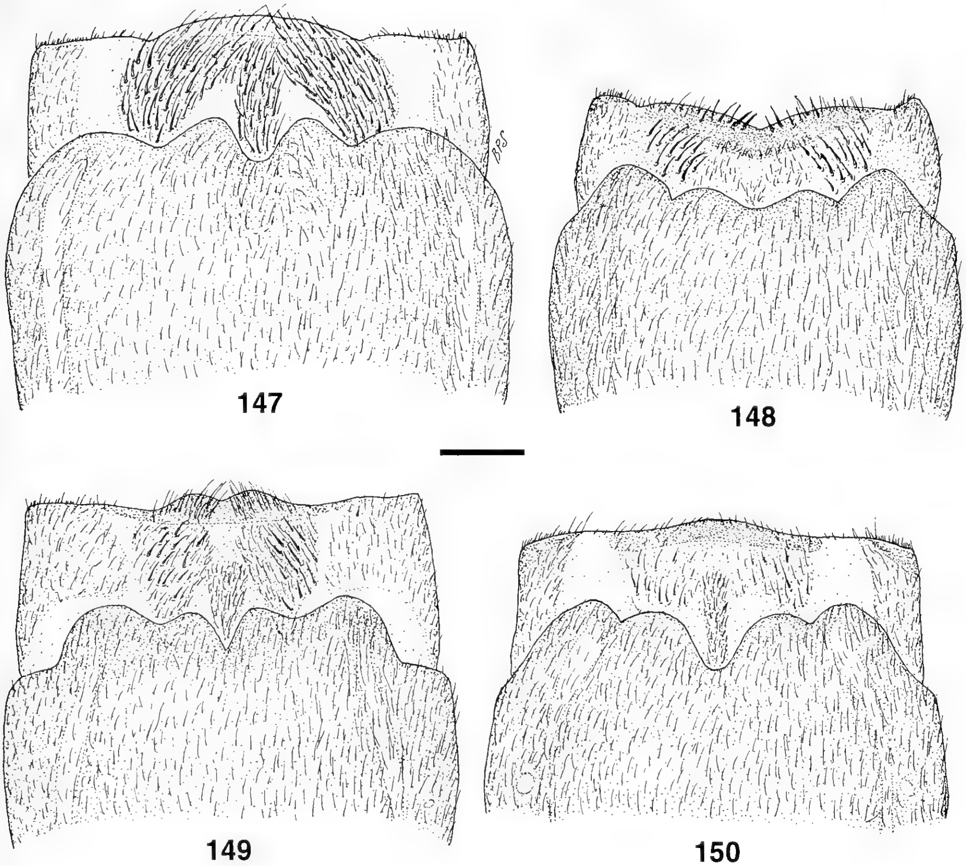
Egg. Unknown.

Material examined. Venezuela: Merida, El Vigia, 2 June 1976, A. Menke, D. Vincent, 4♀♀ (USNM).

Anacroneuria VZ-6
Fig. 147

Description

Adult color pattern. Head yellow brown, pronotum withnarrow pale median stripe. Wing membrane and veins brown.



Figs 147-150. *Anacroneuria* structures. 147. VZ-6 female sterna 8 and 9. 148. VZ-7 female sterna 8 and 9. 149. VZ-8 female sterna 8 and 9. 150. VZ-9 female sterna 8 and 9. Scale: 0.3 mm.

Female. Forewing length 12-13 mm. Subgenital plate with four lobes; median lobes separated by moderate rounded notch, lateral notches shallow, lobes wide. Posterior margin of sternum 9 without sclerotized band; median field covered with a tri-lobed patch of thick red-brown setae (Fig. 147).

Egg. Unknown.

Material examined. Venezuela: Territorio Federal Amazonas, Cerro de la Neblina, Aqua Blanca, 20-21 March 1984, O. Flint, J. Louton, 3♀♀ (USNM).

Anacroneuria VZ-7

Fig. 148

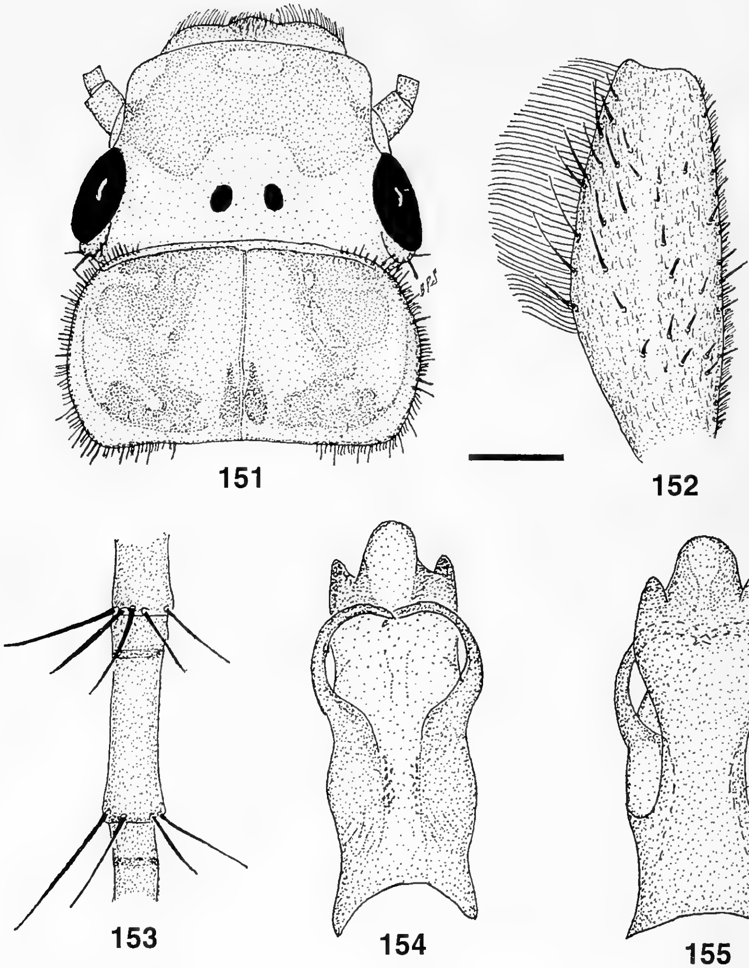
Description

Adult color pattern. Head with a dark band between eyes, yellow forward. Pronotum with narrow pale median stripe. Wing membrane and veins brown.

Female. Forewing length 10 mm. Subgenital plate with four lobes; lateral lobes project beyond mesal lobes. Posterior margin of sternum 9 with a broad sclerotized band. Lateral patches include thick setae, mesal patch sparse (Fig. 148).

Egg. Unknown.

Material examined. Venezuela: Territorio Federal Amazonas, 29 km S Rio Aqua Blanca, 17 November 1987, P. J. Spangler, R. Faitoute, 2♀♀ (USNM).



Figs 151-155. *Anacroneuria* VZ-10 structures. 151. Nymphal head and pronotum. 152. Nymphal left fore femur. 153. Apical nymphal cerci. 154. Aedeagus, ventral (dissected from nymph). 155. Aedeagus, dorsal. Scales: 0.6 mm (151), 0.3 mm (152), 0.15 mm (153-155).

Anacroneuria VZ-8
Fig. 149

Description

Adult color pattern. Head dark brown laterally, yellow mesally. Pronotum with narrow pale median stripe. Wing membrane and veins brown.

Female. Forewing length 11 mm. Subgenital plate broadly 4-lobed; lateral notches shallow, median notch acute. Posterior margin of sternum 9 with sclerotized band; lateral setal patches with mixed fine and thick setae, median patch sparse (Fig. 149).

Egg. Unknown.

Material examined. Venezuela: Zulia, El Tucuco, 45 km SW Machiques, 5-6 June 1976, A. Menke, D. Vincent, 1♀ (USNM).

Anacroneuria VZ-9
Fig. 150

Description

Adult color pattern. Obscured by specimen condition. Wing membrane and veins pale brown.

Female. Forewing length 11 mm. Subgenital plate with four lobes. Lateral notches shallow, median notch deep and U-shaped. Posterior margin of sternum 9 with a sclerotized band. Setal patches sparse laterally, median patch narrow (Fig. 150).

Egg. Length 0.31 mm, width 0.16 mm. Spindle shaped; collar button-like, chorion smooth.

Material examined. Venezuela: Sucre, Carupana, 25 June 1968, J. Maldonado C., 1♀ (USNM).

Uassociated nymphs

Anacroneuria VZ-10
Figs 151-155

Description

Nymph. Body length 8-9 mm. Head with a dark transverse pigment band between antennal bases; band with a broad U-shaped notch forward of ocelli. Mesal pronotal area pale, mid-lateral area with irregular longitudinal bands of dark pigment (Fig.151). Fore femur with about 17 scattered bristles; most bristles long. Basal bristle patch and transverse bristle row absent (Fig. 152). Apical cercal segments bear whorls of long bristles; fringe absent (Fig. 153). Gill trunks long with few branches.

Material examined. Venezuela: Territorio Federal Amazonas, Cerro de la Neblina, Camp XI, 1450 m, 25-28 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 11 nymphs (USNM).

Discussion. The aedeagus dissected from a male nymph (Figs 154-155) does not match other Neblina species.

Acknowledgements

I thank O. S. Flint, Jr. (United States National Museum) and R. L. Brown (Mississippi State University) for the loan of specimens. I also thank P. Zwick, L. Benedetto and S. Brooks for sharing notes on types. O. S. Flint, Jr. and B. C. Kondratieff made helpful comments on an early draft of this manuscript, and O. S. Flint, Jr. generously provided field notes from his collecting in Venezuela.

References

Flint, O. S., Jr. 1981.Studies of Neotropical caddisflies, XXVIII: The Trichoptera of the Rio Limon Basin, Venezuela. - Smithson. Cont. Zool. **330**: 1-61

Illies, J. 1966. Katalog der rezenten Plecoptera. - Das Tierreich, 82. Walter de Gruyter and Co., Berlin. 632 pp.

Jewett, S. G. 1959. Seven species of *Anacroneuria* from Peru (Plecoptera). - Wasmann J. Biol. **17**: 105-114

Kimmins, D. E. 1970. A list of the type-specimens of Plecoptera and Megaloptera in the British Museum (Natural History). - Bull. Brit. Mus. Nat. Hist. **24**: 335-361

Klapalek, F.1922. Plecoptères nouveaux. - Ann. Soc. Ent. Belg. **62**: 89-95

Pictet, F. J. 1841. Histoire naturelle generale et particuliere des insectes Neuropteres. - Famille des Perlides. 1. Partie: 1-423

Rojas, A. M. & M. L. Baena 1993. *Anacroneuria farallonensis* (Plecoptera: Perlidae) una neuva especie para Colombia. - Bol. Mus. Ent. Univ. Valle **1**: 23-28

Stark, B. P. 1989. The genus *Enderleina* (Plecoptera: Perlidae). - Aquatic Insects **11**: 153-160

-- (1994). *Anacroneuria* from Trinidad and Tobago (Plecoptera: Perlidae). - Aquatic Insects **16**: 171-175

-- & P. Zwick 1989. New species of *Macrogynoplax* from Venezuela and Surinam (Plecoptera: Perlidae). - Aquatic Insects **11**: 247-255

Walker, F. 1852. Catalogue of the specimens of neuropterous insects in the collection of the British Museum. Part I. - London, 192 pp.

Zwick, P. 1972. Die Plecopteren Pictets und Burmeisters, mit Angaben über weitere Arten (Insecta). - Rev. Suisse Zool. **78**: 1123-1194

-- 1973. Die Plecopteren-arten Enderleins (Insecta); Revision der Typen. - Ann. Zool. **30**: 471-507

35. Hentschel, E. J. & G. H. Wagner: Zoologisches Wörterbuch. - UTB 367, G. Fischer Verl. Jena, 5. Aufl., 1993. 576 S.

Daß dieses Taschenlexikon bewährt ist, zeigt sich schon alleine daran, daß es bereits in der 5. Auflage vorliegt. Es enthält über 15.000 Stichwörter, die definitorisch und etymologisch erklärt sind. Sehr hilfreich sind die vielen Kurzbiographien. Bei der unübersehbar großen Anzahl von Tiernamen ist es sicherlich verständlich, daß man nicht alles, was man sucht, in dem Lexikon finden kann. Zum Beispiel haben die Rezensenten Zoroaptera, Dictyoptera und Dicondyla vermißt, was aber die speziellen Interessen widerspiegelt und nicht unbedingt als Kritik zu sehen ist. Daß aber "Tribus" nicht männlich sondern weiblich ist, sollte in der nächsten Auflage verbessert werden. Außerdem sollte die Systematische Übersicht überarbeitet werden. Hier ist die Gliederung der Protozoa überholt, es fehlen die Cubozoa, und die Pogonophora stehen noch bei den Deuterostomiern. In der insgesamt sehr guten Einführung zu den zoologischen Nomenklaturregeln wird leider noch auf die 2. Auflage von 1973 (nicht die derzeit gültige von 1985) bezug genommen. Es ist zu hoffen, daß die angemerkten Kritikpunkte in einer baldigen Neuauflage bereinigt werden. Insgesamt ist das vorliegende Zoologische Wörterbuch aber sehr oft eine angenehme Nachschlagmöglichkeit, die in keiner Fachbibliothek fehlen darf. K. Schönitzer, J. Schuberth

36. Becker, P.-R.: Werkzeuggebrauch im Tierreich - wie Tiere hämmern, bohren, streichen. - Edition Universitas, S. Hirzel Wissenschaftliche Verl. Ges. Stuttgart, 1993. 134 S.

Der Gebrauch von Werkzeugen ist im Tierreich viel weiter verbreitet, als man allgemein annimmt. Der Autor hat die weit verstreute Literatur zu diesem Thema umnfassend zusammengestellt und zeigt Beispiele für Wekzeuggebrauch nicht nur bei Säugetieren und Vögeln, sondern auch bei Schnecken, Krebsen, Insekten und Fischen. Jedes Kapitel beginnt mit einer allgemeinen zoologischen Einführung für den Laien. Diese Einführungen enthalten allerdings einzelne Fehler (z.B. S. 67: die Säugetiere sind durch eine Reihe von Apomorphien charakterisiert; S. 27: es ist recht trivial, daß Hymenopteren "ein Paar Fühler" mit unterschiedlich vielen Gliedern haben). Insgesamt ist das Buch sehr angenehm und leicht zu lesen und steckt doch voller interessanter Informationen, die sowohl für Laien als auch für Zoologen übersichtlich zusammengestellt sind. K. Schönitzer

37. Fortuner, R. (Hrsg.): Advances in Computer Methods for Systematic Biology. Artificial Intelligence, Databases, Computer Vision. - John Hopkins University Press, Baltimore & London, 1993. 560 S. (36 Einzelautoren)

Dieses Werk enthält die einzelnen Beiträge des ARTISYST "Workshops", einer interdisziplinären Konferenz vom September 1990 in Davis (California) über die Anwendung moderner Computermethoden in der biologischen Systematik. Bei dieser Konferenz sind Biologen und Informatiker zusammengekommen. Diese Vielfalt spiegelt sich auch in dem vorliegenden Band wider, indem manche Beiträge für Biologen nur schwer zu lesen sind. Nach einigen einführenden Kapiteln werden unter anderem Grundlagen zur Künstlichen Intelligenz, die Möglichkeiten und Probleme bei der Erstellung von Programmen zum Bestimmen und verschiedene Datenbanksysteme dargestellt. Einige Kapitel beschäftigen sich mit den Problemen der Bildverarbeitung. Leider muß man davon ausgehen, daß in der schnell-lebigen Zeit einzelne Kapitel seit ihrer Drucklegung teilweise schon überholt sein dürften. Sehr wertvoll sind das ausführliche Literaturverzeichnis und die Liste mit Wortdefinitionen. Für den interessierten Systematiker sicher eine hilfreiche und kompetente Zusammenstellung. K. Schönitzer

38. Otte, D.: The Crickets of Hawaii - Origin, Systematics and Evolution. - Publications on Orthopteran Diversity, published by The Orthopterists'Society at The Academy of Natural Sciences of Philadelphia, Philadelphia, 1994. 396 S.

Hawai hat mindestens doppelt so viele Arten von Gryllidae wie die kontinentalen Länder der USA und Kanada zusammen. Verglichen mit der Fläche ist also die Grillenfauna mehr als 2.000 mal so reich. Es sind vor allem Vertreter der Unterfamilien Oecanthinae und Trigonidiinae (Gryllidae) vertreten. Der vorliegende Band ist eine exzellente Monographie, in der sowohl die Taxonomie und Nomenklatur als auch phylogenetische und evolutive Probleme umfassend dargestellt werden. Auch eingeführte Arten werden behandelt. Besonderer Wert wird auch auf die Gesänge gelegt. Der Band ist reich und gut bebildert und ist nicht nur für den Orthoperen-Spezialisten, sondern auch für alle jene interessant, die sich für evolutive Prozesse auf Inseln oder für die Biologie von Hawaii interessieren.
K. Schönitzer

SPIXIANA	18	3	251–254	München, 01. November 1995	ISSN 0341–8391

Nouvelles données sur *Ernodes vicinus* (McL., 1879) et *E. botosaneanui* Vaillant, 1982

(Insecta, Trichoptera, Beraeidae)

Par **Lazare Botosaneanu**

Botosaneanu, L. (1995): Nouvelles données sur *Ernodes vicinus* (McL., 1879) et *E. botosaneanui* Vaillant, 1982 (Insecta, Trichoptera, Beraeidae). – Spixiana **18/3:** 251-254

E. vicinus and *E. botosaneanui* are perfectly distinct, and even not closely related species, differing in the structure of ♂ and ♀ mesothorax, in almost all parts of the ♂ genitalia, as well as in the structure of the last abdominal segments of the female. Whereas *E. botosaneanui* is known only from the Western Alps (Alpes de Haute Provence and Alps of Liguria) *E. vicinus* has a wider distribution in the mountains of central and eastern Europe, and coexistence of these two crenobiont species is unknown.

Dr. L. Botosaneanu, Zoölogisch Museum (Entomologie), Plantage Middenlaan 64, NL-1018 DH Amsterdam.

Introduction

Ernodes vicinus (McL., 1879) est connu des Alpes, des moyennes montagnes d'Europe centrale, du nord-ouest de la Peninsule Balkanique, et des Carpathes. *E. botosaneanui* a été décrit par Vaillant (1982) d'une source à habitat madicole dans les Alpes de Haute Provence, près Rouaine; dans ce travail les deux espèces sont considérées comme étant étroitement apparentées, et plusieurs caractères nettement distinctifs des genitalia des mâles sont énumérés. *E. botosaneanui* a été ensuite simplement mentionné par Cianficconi & Moretti (1992: 290) des Alpes occidentales italiennes. Néanmoins, cette espèce a été ignorée dans un atlas des Trichoptères d'Europe (Malicky 1983), et dans une publication par Sipahiler (1993: 66)* on trouve l'affirmation suivante: "*Ernodes botosaneanui* ... is probably a synonym of *E. vicinus* McLachlan, 1879".

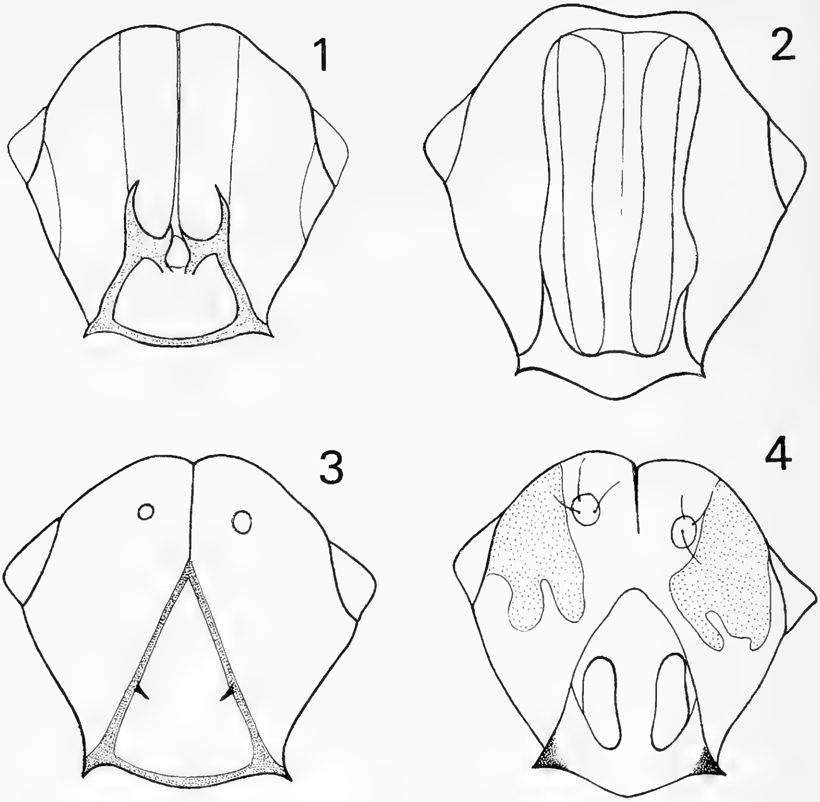
Pour la présente mise au point j'ai utilisé des exemplaires d'*E. botosaneanui* déterminés comme tels par le Professeur G. P. Moretti et gracieusement mis à ma disposition par lui et par Dr. Fernanda Cianficconi; ces exemplaires, actuellement dans le Musée Zoologique de l'Université d'Amsterdam (Z.M.A.), sont étiquetés "Liguria (Imperia): Stilliciglio su ruscello tra Colle San Bartolomeo e Pieve di Teco"; ils avaient été collecté le 21 juin 1965, dans un habitat madicole à 600 m d'altitude, par A. Viganò. Le matériel d'*E. vicinus* utilisé pour la comparaison, provient de plusieurs localités de divers massifs des Carpathes de Roumanie; il est, lui aussi, gardé dans les collections du Z.M.A.

Comparaison des deux espèces

Je vais insister ici seulement sur les caractères distinctifs les plus importants.

Le mesothorax du ♂ (Figs 1 et 2) présente chez *E. botosaneanui* une vaste zone longitudinale médiane à relief surtout négatif, avançant vers l'arrière de manière à rendre le scutellum pratiquement obsolète;

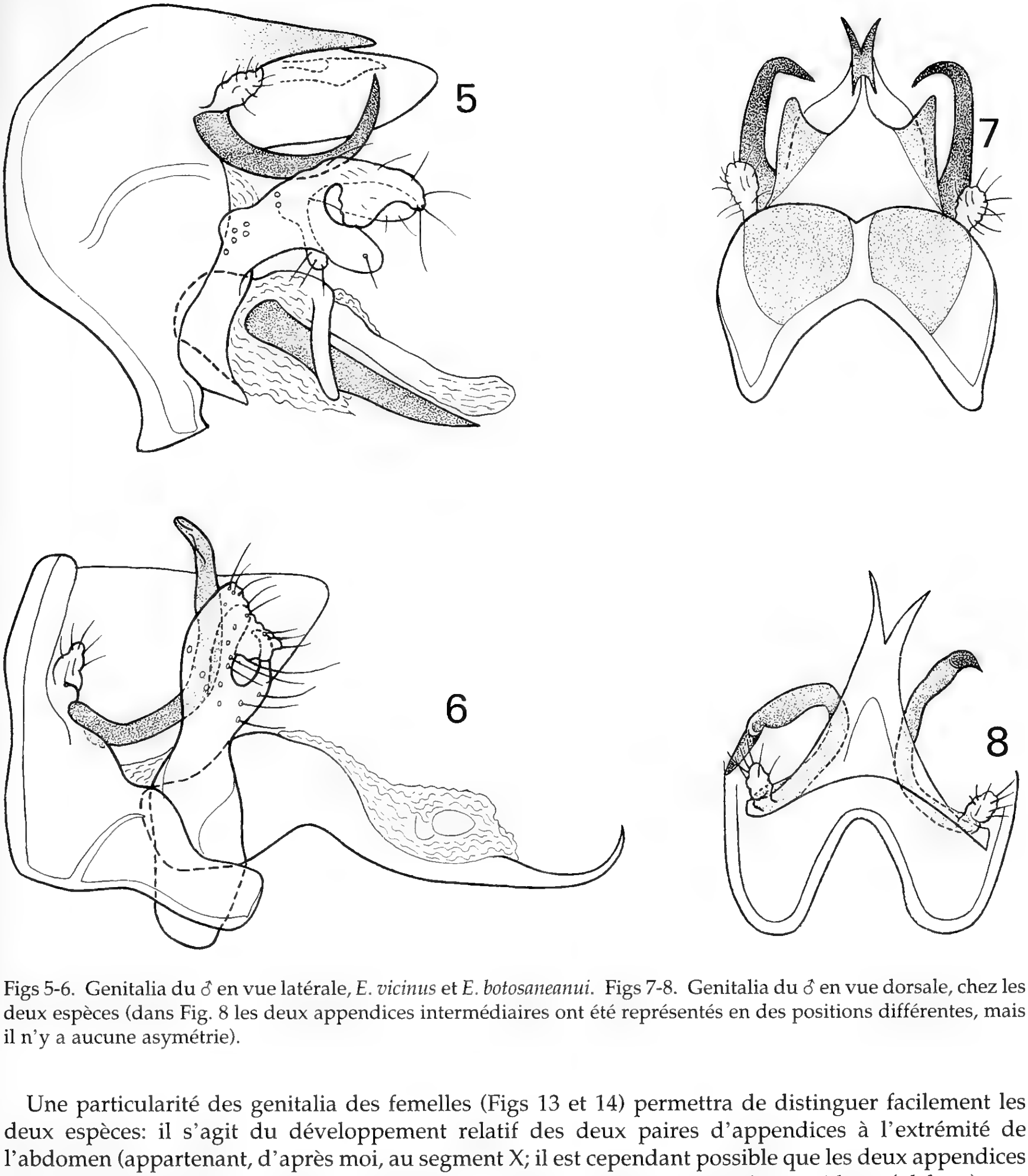
* D'autres commentaires sur ce travail seront publiés ailleurs.



Figs 1-2. Mesothorax du ♂, *E. vicinus* et *E. botosaneanui.* Figs 3-4. Mesothorax de la ♀, chez les deux espèces.

tandis que chez *E. vicinus* cette zone est moins creuse et développée, le scutellum restant bien visible et délimité par un cadre foncé d'aspect caractéristique. Le mesothorax de la ♀ (Figs 3 et 4) diffère aussi très nettement: chez *E. botosaneanui* il y a une paire de verrues rondes sur le scutum et une paire de grandes verrues oblongues sur le scutellum, la suture médiane du scutum n'atteignant pas le scutellum; chez *E. vicinus* il n'y a pas de verrues sur le scutellum dont les bords latéraux envoient de courts traits foncés vers la ligne médiane et l'arrière, et la suture médiane du scutum atteint la pointe du scutellum.

Nombreuses sont les différences au niveau des genitalia ♂. Le segment IX en vue latérale (Figs 5 et 6) est nettement plus massif chez *E. vicinus.* Le segment X en vue dorsale (Figs 7 et 8) diffère considérablement: trapu et avec des "ailes" latérales chitineuses fort développées (et bien visibles aussi latéralement) chez *E. vicinus*, il est élancé et dépourvu de ces ailes chez *E. botosaneanui* (la pointe du segment est nettement bifide chez les deux espèces!). Les appendices intermédiaires (Figs 5-8) sont relativement plus longs chez *E. botosaneanui.* Les appendices inférieurs (Figs 5 et 6 et surtout 9 et 10) sont quadrifides dans les deux espèces, mais semblent se distinguer par des détails difficiles à décrire (et dont, d'ailleurs, une légère modification de l'angle d'observation suffit à modifier l'aspect). L'appareil phallique asymétrique (Figs 5 et 6 et surtout 11 et 12) est complètement différent: chez *E. vicinus* ses deux "volets" sclérifiés sont bien obtus à leurs extrémités, de la base du "volet" gauche se détache un fort éperon (bien visible aussi latéralement) et il y a une épine "interne" foncée, longue, forte, parfaitement individualisée; chez *E. botosaneanui* les deux "volets" finissent en pointes aiguës, il n'y a pas d'éperon asymétrique du côté gauche, et il ne m'a pas été possible - sur le matériel à ma disposition - de distinguer une épine "interne" individualisée, mais seulement des épaississements chitineux foncés.

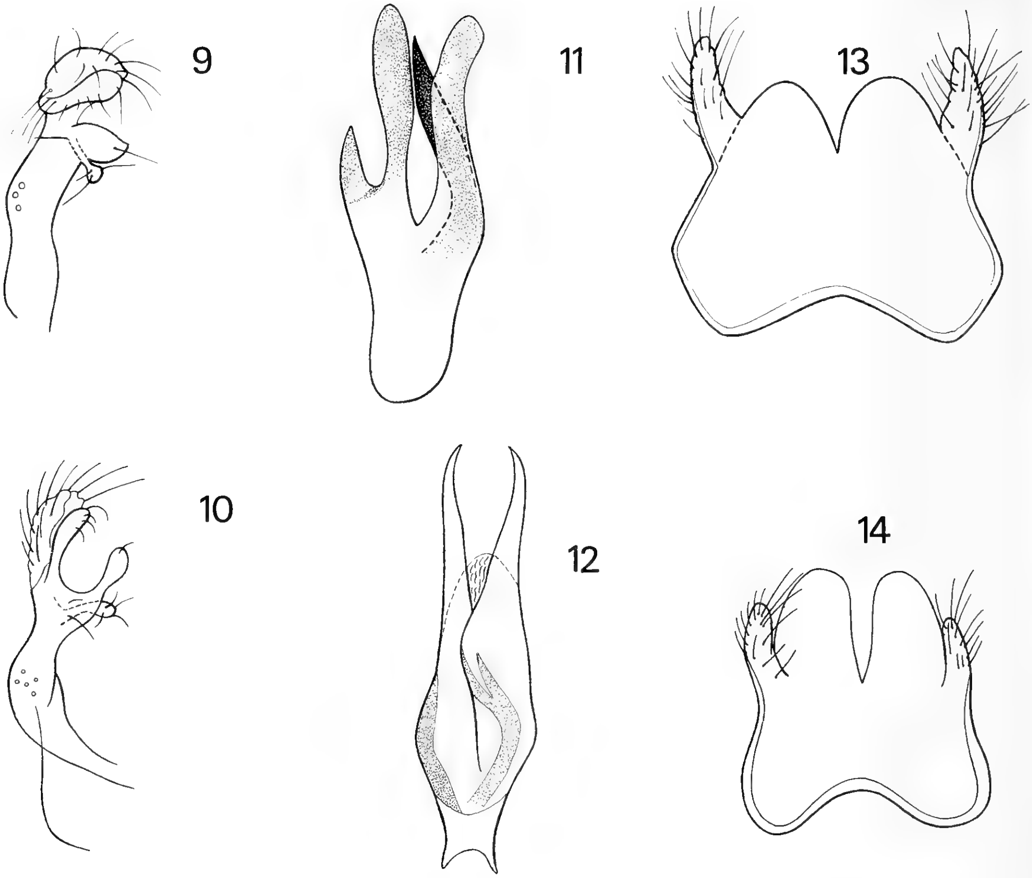


Figs 5-6. Genitalia du ♂ en vue latérale, *E. vicinus* et *E. botosaneanui.* Figs 7-8. Genitalia du ♂ en vue dorsale, chez les deux espèces (dans Fig. 8 les deux appendices intermédiaires ont été représentés en des positions différentes, mais il n'y a aucune asymétrie).

Une particularité des genitalia des femelles (Figs 13 et 14) permettra de distinguer facilement les deux espèces: il s'agit du développement relatif des deux paires d'appendices à l'extrémité de l'abdomen (appartenant, d'après moi, au segment X; il est cependant possible que les deux appendices latéraux hirsutes appartiennent au segment IX). Chez *E. vicinus* les appendices médians (glabres) sont nettement plus courts que les latéraux; le contraire est valable pour *E. botosaneanui.*

Conclusions

Ernodes vicinus et *E. botosaneanui* sont des espèces parfaitement distinctes dans les deux sexes. A mon avis, elles ne peuvent même pas être considérées comme étroitement apparentées. Les deux sont des crenobiontes, comme tous les congénères; la deuxième a apparemment un aréal fort limité, à l'intérieur de l'aréal de la première, mais des cas de syntopie ne sont pas connus.



Figs 9-10. Gonopode gauche en vue ventrale, chez *E. vicinus* et *E. botosaneanui.* Figs 11-12. Appareil pénial, en vue ventrale, chez les deux espèces. Figs 13-14. Extrémité de l'abdomen de la ♀, en vue dorsale, chez *E. vicinus* et *E. botosaneanui.*

Remerciements

Je remercie Prof. Gianpaolo Moretti et Dr. Fernanda Cianficconi (Perugia) pour les exemplaires d'*E. botosaneanui* de Ligurie dont ils m'ont fait don et pour des renseignements divers.

Références bibliographiques

Cianficconi, F. & G. Moretti 1992. Catalogo dei tricotteri delle Alpi occidentali - Considerazioni zoogeografiche. - Biogeographia **16**: 257-295

Malicky, H. 1983. Atlas of European Trichoptera. - Dr. W. Junk Publishers, the Hague - Boston-London, 298 pp.

Sipahiler, F. 1993. A contribution to the knowledge of Trichoptera of France. - Entomofauna **14 (5)**: 65-80

Vaillant, F. 1982. The Trichoptera Beraeidae from the eastern part of France. - Aquatic Insects **4 (4)**: 253-259

SPIXIANA	18	3	255–258	München, 01. November 1995	ISSN 0341–8391

A peculiar new species of *Pogonoglossus* Chaudoir from New Guinea

(Insecta, Coleoptera, Carabidae, Helluodinae)

By **Martin Baehr**

Baehr, M. (1995): A peculiar new species of *Pogonoglossus* Chaudoir from New Guinea (Insecta, Coleoptera, Carabidae, Helluodinae). – Spixiana **18/3:** 255-258

Pogonoglossus laevissimus, spec. nov. is described from the western part of Irian Jaya (New Guinea) and is distinguished from the other species of *Pogonoglossus* of the Australian region.

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

Introduction

Pogonoglossus is a moderately large genus of odd-shaped beetles ranging from southern Asia through Indonesia, New Guinea, New Britain to northern Australia. Because specimens are rarely collected, most species are very unsatisfactorily represented in collections and several species are even known from single specimens or from the type locality only. Hence the distribution of the species is generally poorly known. It seems, however, that Indonesia and in particular New Guinea are especially rich in terms of species numbers (Andrewes 1937, Darlington 1968, Baehr 1987), whereas Australia has significantly fewer species (Baehr 1989, 1993).

The species live apparently under bark in rain forest, but in Australia also in more open forest types. Adults have been collected most commonly at light. Actually very little is known about their biology.

Measurements

Measurements have been taken under a stereo microscope using an ocular micrometer. Length has been measured from tip of labrum to apex of elytra, hence measurements may slightly differ from those of other authors. Some width/length ratios have been taken in the same manner as in Baehr (1988, 1993). It should be noted that for the width/length ratio of pronotum length has been measured from apex of anterior angles.

Location of type

The holotype of the new species is presented to the Zoologische Staatssammlung, München, but is retained as permanent loan in the working collection of the author (ZSM-CBM).

Pogonoglossus laevissimus, spec. nov.

Figs 1, 2

Types. Holotype: ♂, Irian Jaya, Panai-Pr., Nabire, Pemukiman, 200 m, 17.8.1991, leg. A. Riedel (ZSM-CBM).

Diagnosis. Easily recognized from all New Guinean and Australian species by the combination of the following characters: complete black colour without light markings on vertex; wide head with laterally exceptionally protruding eyes; presence of a conspicuously projecting tooth **below** eye that is divided from eye by a deep furrow; very short and wide though cordiform pronotum with peculiar dentiform basal angles; short elytra with almost impunctate and very sparsely pilose intervals and with asetose and barely serrate marginal borders; very glossy surface.

Description

Measurements. Length: 9.6 mm; width: 3.7 mm. Ratios. Base/apex of pronotum: 0.96; width/length of pronotum: 1.60; with of pronotum/width of elytra: 0.77; length/width of elytra: 1.58; length/width of 10th antennomere: 1.44.

Colour. Glossy black, mouth parts, lateral parts of labrum, four basal antennomeres, and base of abdomen piceous, terminal antennomeres reddish with dark median stripe.

Head. Very wide, though slightly narrower than pronotum, wide between eyes, posteriorly markedly triangular. Frons with two deep, irregular impressions, neck separated by a deep furrow. Eyes large, semicircular, laterally remarkably projecting. Orbits very small. Below and slightly behind eye with a large, projecting tooth, separated from orbit by a deep furrow, at apex with a single elongate seta. This tooth far less projecting than eye. Behind eye without any elongate setae. Clypeus with four elongate setae, median setae as long as lateral ones. Labrum 6-setose, lateral seta far longer than inner setae. Mandibles elongate, though for genus comparatively short and stout, inner border almost straight, only near apex incurved. Palpi moderately elongate, very sparsely pilose. Antenna short, rather sparsely setose, scapus short and thick, distinctly shorter than width of base of clypeus, median antennomeres $<1.5 \times$ as long as wide. Surface of head very sparsely punctate and pilose. Microreticulation absent, surface remarkably glossy.

Pronotum. Remarkably wide, widest in anterior third. Apex deeply and widely excised, anterior angles projecting though rounded off. Lateral borders anteriorly strongly convex, posteriorly feebly sinuate. Base in middle slightly concave, laterally straight thouth faintly oblique. Basal angles acute, dentiform, lateral margin just in front of angles incurved, hence border here slightly impressed. Lateral explanation rather wide, lateral borders upturned. Near base a rather deep transverse furrow, median line distinct. Puncturation and pilosity very sparse, microreticulation absent, surface remarkably glossy.

Elytra. Rather short and wide, laterally parallel, without any sinuation in anterior third. Apex laterally rounded, in middle obliquely obtuse, with wide membraneous area. Marginal channel very narrow. Striae well impressed, impunctate, intervals convex, in middle impunctate, though on either side with a fine row of spaced punctures near striae, median intervals almost impilose, lateral ones sparsely pilose. Microreticulation absent. Surface markedly glossy. Lateral border barely serrate, without fringe of setae. Marginal setae moderately elongate. Fully winged.

Lower surface. Comparatively sparsely punctate and setose. Metepisternum elongate, twice as long as wide. Terminal sternite in male on either side with one elongate seta in middle and 2 setae near apical border.

Legs. Moderately elongate. In particular tarsi rather sparsely pilose. Male protarsus with a small tuft of adhesive hairs on 1st-3rd tarsomeres.

♂ genitalia. Rather elongate, slightly widened in apical third, lower surface almost straight, apex obtusely rounded. Inner sac complexly folded, with a large, on upper side open, only partly sclerotized fold, and with a small heavily sclerotized sclerite on left side. Parameres very dissimilar, left paramere very large, apex of right paramere unusually narrow and elongate.

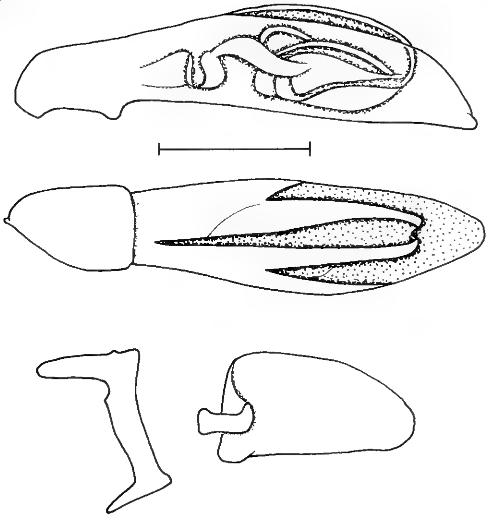
♀ genitalia. Unknown.

Variation. Unknown.

Distribution. Western part of Irian Jaya, New Guinea. Known only from type locality.

Examined material (1). Only the holotype.

1



2

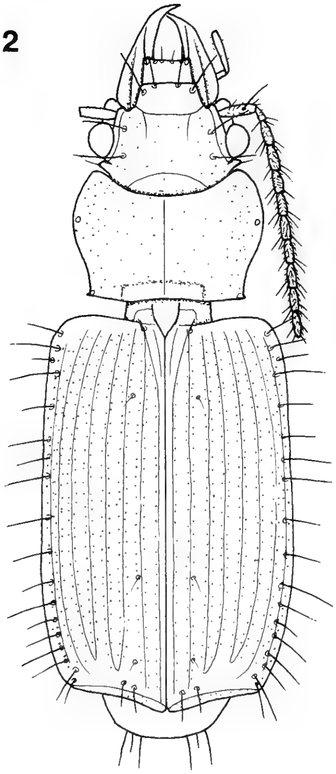


Fig. 1. *Pogonoglossus laevissimus*, spec. nov. ♂ genitalia. Scale: 0.5 mm.
Fig. 2. *Pogonoglossus laevissimus*, spec. nov. Habitus. Length: 9.6 mm.

Habits. Largely unknown, though the specimen was presumably collected by sieving bark or litter from beneath fallen logs in rain forest.

Etymology. The name refers to the exceptionally smooth and glossy surface.

Recognition

In the key to the species of *Pogonoglossus* from New Guinea (Darlington 1968, p. 223) *P. laevissimus* would run to couplet 8. This must be changed as following:

8. Gena **behind** eye tuberculate, without a deep furrow between eye and tubercle(s); lateral margin of elytra distinctly serrate and setulose; intervals densely punctulate and setose; colour brownish to piceous, vertex always with light markings .... 8a.

– Gena **below** eye angulate, with a deep furrow between eye and tubercle; lateral margin of elytra not distinctly serrate, not setulose; intervals very sparsely punctulate, barely setose; colour glossy black, vertex without light markings .... *laevissimus*, spec. nov.

8a. Length 9.6-11.0 mm .... *grossulus* Darlington

– Length 7.0-9.0 mm .... *parvus* Darlington

Note. In the form of the postocular area *P. laevissimus*, spec. nov. is unlike any known New Guinean species, but rather similar to the Australian *P. porosus* (Sloane) and *P. rufopiceus* Baehr. In the very wide shape of head and pronotum and the glossy, almost impilose surface of the elytra, however, it differs from all known species in the Australian region.

References

Andrewes, H. E. 1937. On the species of *Pogonoglossus* found in Java and Sumatra. - Bull. Soc. ent. Fr. **42**: 152-156

Baehr, M. 1987. *Pogonoglossus arfakensis* sp. nov. from New Guinea (Coleoptera, Carabidae, Helluodinae). - Dt. ent. Z., N. F. **34**: 363-366

-- 1988. Revision of the Australian species of the genus *Pogonoglossus* Chaudoir (Insecta: Coleoptera: Carabidae: Helluodinae). - Invertebr. Taxon. **2:** 961-972

-- 1993. A new species of *Pogonoglossus* Chaudoir from Australia (Insecta, Coleoptera, Carabidae, Helluodinae). - Spixiana **16**: 141-144

Darlington, P. J. Jr. 1968. The Carabid beetles of New Guinea. Part III. Harpalinae continued. Perigonini to Pseudomorphini. - Bull. Mus. Comp. Zool. **139**: 1-253

SPIXIANA	18	3	259–262	München, 01. November 1995	ISSN 0341–8391

Typenrevision der von Josef Breit beschriebenen *Ischyromus*-Arten

(Insecta, Coleoptera, Chrysomelidae)

Von **I. Lopatin**

Lopatin, I. (1995): Revision of the types of *Ischyromus* species described by Josef Breit (Insecta, Coleoptera, Chrysomelidae). – Spixiana **18/3:** 259-262

Breit's *Ischyromus* species from Tibet are revised. *I. affinis* and *I. banghaasi* are synonymized with *Macrocoma himalayensis* (Jacoby) and *M. indica* (Baly), respectively. For *Ischyromus marquardti* Brt. a lectotypus is designated. Two new species from Afghanistan (*Macrocoma schereri*, spec. nov. and *M. micula*, spec. nov.) are described.

Prof. Dr. Igor Lopatin, Chair of Zoology Byelorussian St. University, prosp. Skoryny 4, 220050 Minsk, Belarus.

Einleitung

Im Jahre 1913 beschrieb J. Breit drei neue *Ischyromus*-Arten aus Süd-Tibet (Po-o). Später (Lopatin 1976) wurde die Gattung *Ischyromus* mit zur *Macrocoma* Chap. synonymisiert, aber die systematische Stellung der Breit'schen Arten blieb unklar.

Dank der Liebenswürdigkeit von Herrn Dr. Gerhard Scherer habe ich alle typischen Exemplare der von J. Breit beschriebenen Arten, die in der Zoologischen Staatssammlung München aufbewahrt sind, zum Studium erhalten. Es wurden insgesamt 38 Exemplare von *I. marquardti*, 3 Exemplare von *I. banghaasi* und 3 Exemplare von *I. affinis* durchgesehen. *I. sarvadensis* (Sols.) war in der Sammlung von J. Breit durch 30 Exemplare repräsentiert, aber ich habe zusätzlich mehr als 100 Exemplare dieser Art aus verschiedenen Orten Mittelasiens bearbeitet.

Wie es sich im Lauf meiner Studien herausstellte, ist nur *I. marquardti* Breit eine selbständige Art, während *I. banghaasi* und *I. affinis* als Synonyme von *Macrocoma indica* (Baly) und *Macrocoma himalayensis* (Jacoby) zu betrachten sind. Das ♂ von *Ischyromus marquardti* Breit habe ich als Lectotypus bezeichnet. Die gesamte Synonymie und die Aedoeagus-Zeichnungen von allen hier angeführten Breit'schen Arten sind unten angegeben.

Macrocoma sarvadensis (Solsky, 1882)
Fig. 1

Pseudocolaspis sarvadensis Solsky, 1882: 65.
Ischyromus sarvadensis, Jacobson 1898: 240; Breit 1913: 297.
Macrocoma sarvadensis, Lopatin 1976: 112.

Macrocoma indica (Baly, 1877)
Fig. 2

Eubrachys indica Baly, 1877: 249.
Ischyromus banghaasi Breit, 1913: 296 (syn. nov.)

Macrocoma himalayensis (Jacoby, 1900)
Fig. 3

Pseudocolaspis himalayensis Jacoby, 1900: 436.
Eubrachys himalayensis, Jacoby 1908: 436.
Ischyromus affinis Breit, 1913: 295 (syn. nov.).

Macrocoma marquardti (Breit, 1913), stat. nov.
Fig. 4

Ischyromus marquardti Breit, 1913: 294.

Noch 2 Arten und 1 Unterart aus Afghanistan beschrieb L. Medvedev (1985). Ich besitze Paratypen, die mir Herr L. Medvedev seinerzeit liebenswürdigerweise übergab. Bezüglich *Macrocoma indica afghana* Medv. kann ich behaupten, daß diese Form nicht mehr als eine andersgefärbte *M. indica* und dadurch als Synonym dieser Art zu betrachten ist: *Macrocoma indica afghana* L. Medvedev, 1985 = *M. indica* (Baly, 1877), syn. nov.

Nachfolgend werden noch 2 weitere neue Arten aus Ost-Afghanistan beschrieben. Man sieht daraus, daß das Hindukusch-Himalaya-Gebiet (nach dem Mittelmeergebiet) als das zweite Verbreitungszentrum der Arten von *Macrocoma* zu betrachten ist.

Macrocoma schereri, spec. nov.
Fig. 5

Typen. Holotypus: ♂, Ost-Afghanistan: Prov. Nengrahar, Jalalabad, 580 m, 16.-17.IV.1967, leg. D. Povolny, F. Tenora (ZSM). - Paratypen: 1♂, Darunta, 750 m, 18.IV.1966; 1♀, ebenda, 750 m, 24.IV.196; beide leg. D. Povolny, F. Tenora (ZSM).

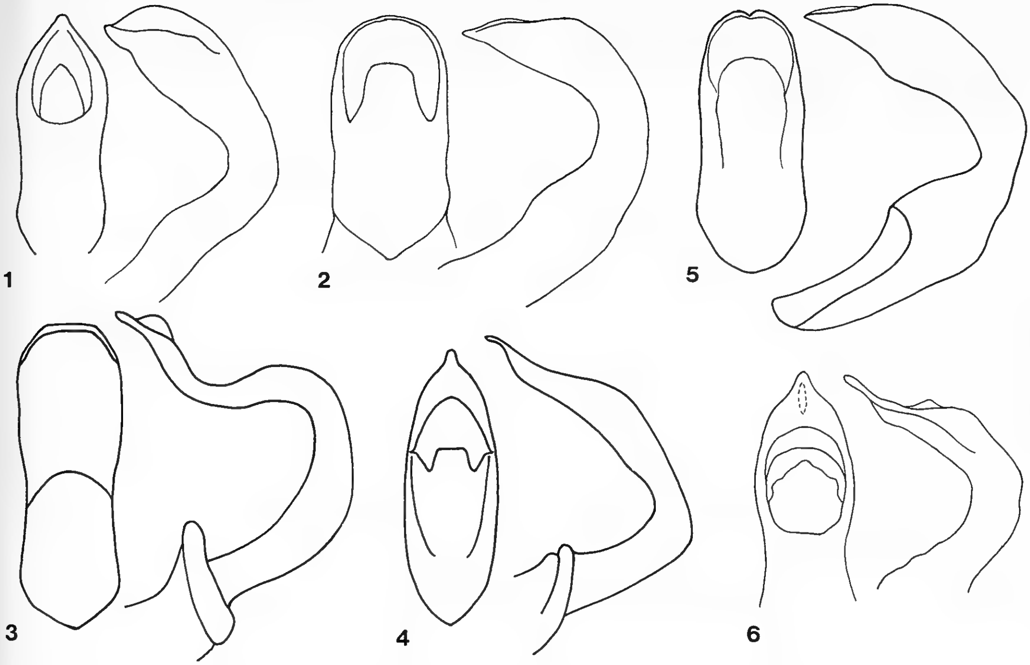
M. schereri, spec. nov. scheint *M. indica* (Baly) am nächsten zu kommen, unterscheidet sich aber durch die folgenden Merkmale: Halsschild in der Mitte am breitesten, zur Basis und zur Spitze gleichmäßig verschmälert; Schienen vollständig und Schenkel an der Basis rötlich-braun; Aedoeagus von anderer Form. Von *M. kabakovi* Medv., mit welcher die neue Art durch den kurzen Seitensaum des Halsschildes übereinstimmt, unterscheidet sie sich durch die schwach glänzende Oberseite, dicht punktiertes Halsschild und die Aedoeagusform.

Holotypus (♂). Länge 4.6 mm (♂ Paratypus 5.1 mm). Metallisch-grün mit leichtem goldig-bronzenem Schimmer am Halsschild und an der Schulterbeule der Flügeldecken, mäßig glänzend. Oberlippe und basale (1-6) Fühlerglieder rötlich-gelb, die folgenden oben pechbraun mit rötlich-gelben Gelenken. Beine rötlich-braun, Schenkel oberseits braun mit grünlichem Schimmer.

Stirn und Scheitel mit sehr dichten und tiefen, aber nicht großen Punkten versehen, die sich zu feinen Runzeln verbinden. Die Härchen kurz, fein, nicht dicht, anliegend. Vorderrand des Clypeus tief dreieckig ausgerandet. Fühler kurz, Glieder 2-6 kurz, 3. Glied so lang wie Glieder 4 und 5 zusammen. Halsschild fast quadratisch (1.1 × breiter als lang), stark gewölbt, an den Seiten gleichmäßig gerundet, zur Basis und Spitze kurz verschmälert. Punktierung des Halsschildes tief und deutlich, Zwischenräume schmäler als Durchmesser der Punkte, auf der Scheibe nicht quergerunzelt. Diskale Punktierung auf einer schmalen Zone längs der Mitte verschwindend. Härchen sehr fein, kurz und spärlich, anliegend, nur bei stärkerer Vergrößerung bemerkbar. Seiten des Halsschildes in der basalen Hälfte mit abgekürztem Saum. Schildchen quer, in basaler Hälfte punktiert, sein Spitzenrand in der Mitte vorgezogen.

Flügeldecken 1.8 × länger als Halsschild und 1.3 × länger als an den Schultern breit, mit hoher Schulterbeule, hinter der Schulter im vorderen Drittel fast parallelseitig, von der Mitte nach hinten allmählich verschmälert und an der Spitze breit gerundet. Punktierung dicht, in der Basalhälfte gerunzelt, stellenweise geordnet. Härchen abstehend, fein, unregelmäßig gereiht.

Schenkel mit kleinem Zahn am Innenrand, dieser am Hinterschenkel sehr klein und rückwärts aufgerichtet. Aedoeagus (Fig. 5) an der Spitze breit verrundet und in der Mitte ausgerandet.



Figs 1-6. Aedoeagus von oben und von der Seite: 1. *Macrocoma sarvadensis* (Sols.). 2. *M. indica* (Baly). 3. *M. himalayensis* (Jacoby). 4. *M. marquardti* (Breit). 5. *Macrocoma schereri*, spec. nov. 6. *M. micula*, spec. nov.

Paratypus (♀). Länge 4,3 mm. Dunkelbraun mit bronzenem Schimmer. Kopf und Halsschild deutlich behaart; Flügeldecken zweifach behaart: zwischen den Reihen von langen, aufrecht gestellten Härchen noch mit den kurzen und schief gestellten Härchen versehen.

Zu Ehren meines lieben Freundes Dr. Gerhard Scherer benannt.

Macrocoma micula, spec. nov.

Fig. 6

Typen. Holotypus: ♂, Ost-Afghanistan: Nuristan, Kamu, Baschgul-Tal, 20 km ö. Kamdesch, 1500 m, 26.VI.1953, J. Klapperich (ZSM). - Paratypen: 1♂, Ost-Afghanistan: Nuristan, Kamu, Baschgultal, 1200 m, 20.IV.1953, J. Klapperich ( ); 1♂, Paghmangebirge, 2300 m, 30.V.1952, J. Klapperich (ZSM).

Dem *M. marquardti* (Breit) ähnlich, aber merklich kleiner, kürzer gebaut, die Extremitäten lichter gefärbt und die Fühler einfarbig rötlich-gelb, auch Aedoeagus von anderer Form. Von *M. minuta* Medv., die von der Umgebung von Kabul beschrieben wurde, durch die Flügeldeckenpunktierung, die gröber und gedrängter als am Halsschild ist, sowie die Aedoeagusform unterschieden.

Holotypus (♂). Länge 3 mm. Körper klein. Oberseite metallisch dunkelgrün mit goldigem Schimmer. Oberlippe, Taster, Fühler, Tibien und Tarsen aller Beine rostrot.

Clypeus tief dreieckig ausgerandet. Stirn fein und deutlich, nicht dicht punktiert. Fühler kurz, sie erreichen zurückgelegt die Mitte der Schulterbeule; Glieder 2-3 gleich lang und gleich dick, schlank; 4. Glied 1.5 × länger als 5. Glied, zur Spitze schwach verbreitert; 7.-11. stark verdickt, die Glieder 8-10 gleich lang. Halsschild 1.15 × breiter als lang, Seitenränder schwach gebogen und nur unmittelbar an der Basis und Spitze merklich eingeschnürt. Punktierung deutlich, nicht groß, Zwischenräume breit, flach, glänzend. Härchen fein, kurz, nicht dicht, anliegend. Schildchen ebenso punktiert und behaart.

Flügeldecken 1.37 × länger als an den Schultern breit, mit stark heraustretender Schulterbeule, innen durch tiefen Eindruck getrennt. Punktierung dicht, größer als am Halsschild, stellenweise dicht, unregelmäßig geordnet. Punkte in der Basalhälfte merklich kleiner, Zwischenräume schwach gewölbt. Härchen aufrecht, deutlich, regelmäßig gereiht.

Alle Schenkel mit kleinem, spitzem Zahn am Innenrand, dieser an den Vorderschenkeln merklich größer. Glieder 1.-3. der Vordertarsen schwach verbreitert, gleich breit. Aedoeagus (Fig. 6).

Katalog der orientalischen Arten der Gattung *Macrocoma* Chap.

1. *M. sarvadensis* (Solsky, 1882) - Z.-Asien: Turkmenistan, Uzbekistan, Tadzhikistan, Kazakhstan.
2. *M. rubripes turcmena* Lopatin, 1976 - Z.-Asien: Turkmenistan, Kopet-Dag.
3. *M. indica* (Baly, 1877) - N.-Indien, S.-Tibet, O.-Afghanistan.
   syn. *M. banghaasi* (Breit, 1913)
   syn. *M. indica afghanica* Medvedev, 1985
4. *M. himalayensis* (Jacoby, 1900) - N.-Indien, S.-Tibet.
   syn. *M. affinis* (Breit, 1913)
5. *M. marquardti* (Breit, 1913) - S.-Tibet.
6. *M. kabakovi* Medvedev, 1985 - O.-Afghanistan, Pakistan; Hinduradj-Gebirge.
7. *M. minuta* Medvedev, 1985 - Afghanistan: Kabul; Baschgul-Tal.
8. *M. schereri*, spec. nov. - O.-Afghanistan: Prov. Nengrahar, Jalalabad.
9. *M. micula*, spec. nov. - Afghanistan: Baschgul-Tal und Paghman-Gebirge.

Danksagung

Für die liebenswürdige Übersendung der Typen bin ich Herrn Dr. G. Scherer zu Dank verpflichtet. Herrn Dr. L. Medvedev danke ich herzlich für Überlassung der Paratypen der von ihm beschriebenen Arten für meine Sammlung.

Literatur

Baly, J. 1877. Descriptions of new species of Phytophagous Beetles. - J. Linn. Soc. **14**: 249

Breit, J. 1913. Beiträge zur palaearktischen Coleopterenfauna. - Ent. Bl. **11-12**: 294-297

Jacoby, M. 1900. Contribution to the knowledge of Indian Phytophagous Coleoptera. - Mem. Soc. Ent. Belg. **7**: 111

Lopatin, I. 1976. New and little known leaf-beetles (Coleoptera, Chrysomelidae) from the USSR. - Rev. Ent. URSS. **55**, 1: 112

Medvedev, L. 1985. On the fauna of leaf-beetles (Coleoptera, Chrysomelidae) of Afghanistan. II. - Rev. Ent. URSS. **64**, 2: 371-372

Solsky, S. 1882. Novye ili maloizvestnye zhestkokrylye Ross. Imperii. - Trudy russ. ent. obstsch. **13**: 65 (russ.)

SPIXIANA	**18**	3	263–265	München, 01. November 1995	ISSN 0341–8391

Micropsectra spinigera, spec. nov. from Maine, U.S.A.

(Insecta, Diptera, Chironomidae)

By **Friedrich Reiss**

Reiss, F. (1995): *Micropsectra spinigera*, spec. nov. from Maine, U.S.A. (Insecta, Diptera, Chironomidae). – Spixiana **18/3:** 263-265

A new Tanytarsini species, *Micropsectra spinigera*, is described as male adult from light trap catches near Dryden, Maine, U.S.A. Specific characters at the hypopygium are the spinous dark brown crests on the anal point, the deeply divided superior volsella, and the branched setae on the inferior volsella. These autapomorphic characters distinguish *M. spinigera* from all other members of the genus.

Dr. Friedrich Reiss, Zoologische Staatssammlung, Münchhausenstraße 21, D-81247 München, Germany

Introduction

The mainly holarctic distributed genus *Micropsectra* is well represented in North America (Oliver & Dillon 1990, 1994), but most species are yet undescribed. During determinations of light trap samples from Maine, an unusual species was found. The striking characters at the hypopygium therefore justify a description. For most of the unknown *Micropsectra* species with the usual character combinations a complete revision of at least the species group is neccessary for a worthwile description.

Micropsectra spinigera, spec. nov.

Types. Holotype: ♂ adult, U.S.A., Maine, Mt. Blue near Dryden, 8.-22.8.1978, leg. G. Heinrich. – Paratypes: 1♂, as holotype; 1♂, Dryden, Bryant Pont, 24.7-4.8.1978, leg. G. Heinrich (type series in Zoologische Staatssammlung Munich).

Diagnostic characters. Three characters, the dark brown, strong spinous crests on the anal point, the branched setae on the inferior volsella, and the deeply divided superior volsella at the hypopygium separate *spinigera* from all other *Micropsectra* species. In addition, the species has a short digitus, and a long median volsella with an apical brush of slender and long lamellae.

Description
Male adult (n = 3)

Wing length 2.0-2.3 mm. Colouration in alcohol preserved specimens light brown. Anal point dark brown.

Head. AR: 1.41-1.45 (n = 2). Frontal tubercles minute, 5-7 µm long (n = 2).

Thorax. Dorsocentrals 10-11, acrostichals 18-24, prealars 3-4, scutellars 8-12.

Wing. Membrane with dense setation, covering all cells. Also all veins, except of Sc and An with uniserial or multiserial setation.

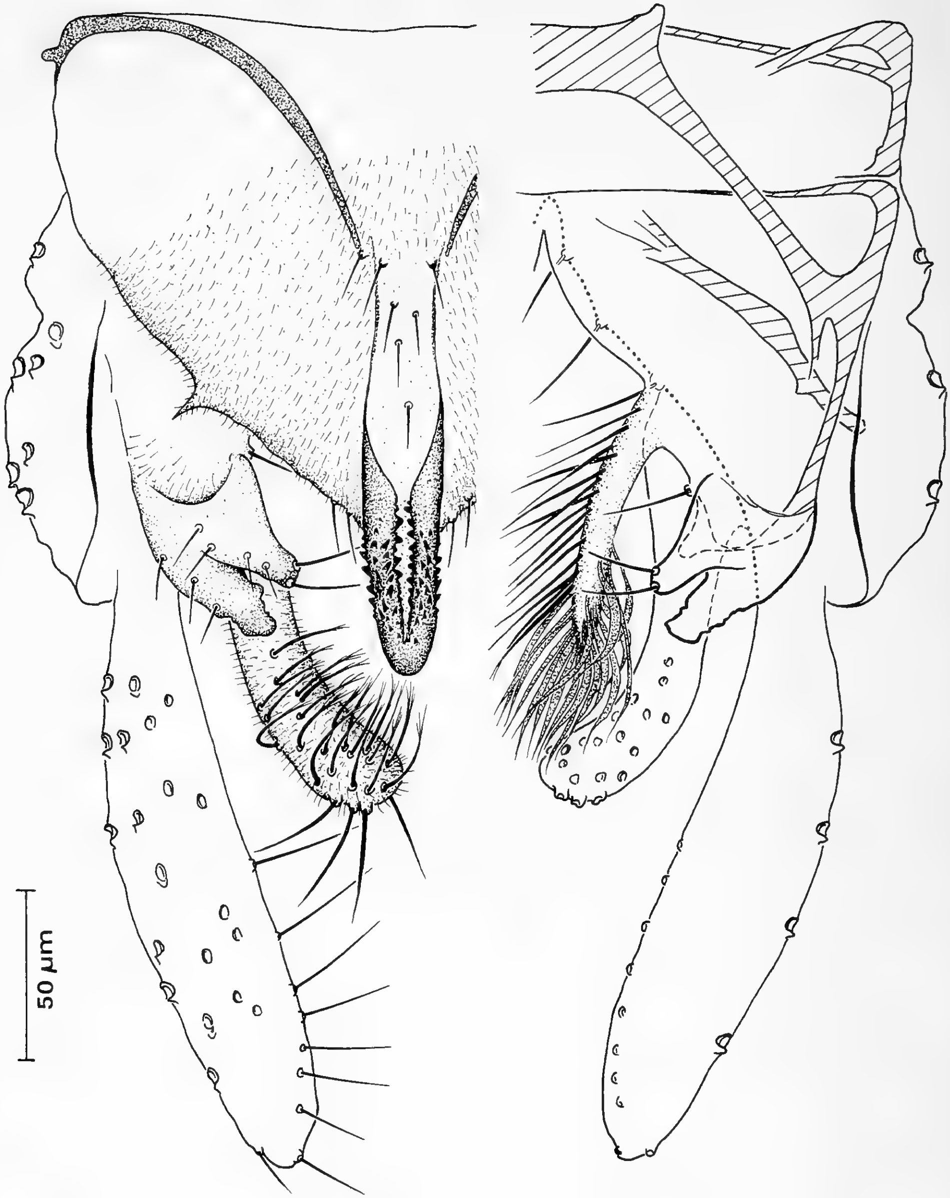


Fig. 1. *Micropsectra spinigera*, spec. nov. Hypopygium, dorsal view.

Legs. Apex of fore tibia with short spur. Combs of mid and hind tibiae contiguous, without spurs. LR_{p1} = 1.73 (n = 1). Lenghts of legs in µm (holotype):

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	1200	900	1550	750	590	480	220
p_2	–	–	–	–	–	–	–
p_3	1320	1290	900	560	420	290	150

Hypopygium (Fig. 1). Anal point strong, apically rounded. Crests high and long, margins serrated, surface spinous. Both, anal point and crests dark brown. Anal tergal bands completely separate, followed by 5-7 median setae, which partially insert between the basal parts of the crests. Margin of the anal tergite with a long lateral, pointed tooth. Superior volsella deeply divided into two fingerlike lobes; posterior lobe with irregular outline. Basal depression of the superior volsella covered with microtrichia. Digitus short, rounded, not extending beyond the margin of the superior volsella. Median volsella straight, 45-65 µm long, with an apical brush of slender unbranched lamellae. Inferior volsella long, slightly curved medially, not swollen in the apical half; setae strongly branched. Gonostyle straight, apically rounded, median setae long, slightly shortened towards the end.

Systematic position

The generic position of *M. spinigera* is confirmed by genital features: arrangement of median setae on anal tergite; lack of spines between anal point crests; superior volsella with basal depression carrying microtrichia; basal median seta at superior volsella ("*Micropsectra* seta").

Micropsectra spinigera is the only species within the genus with dark spinous and serrated anal point crests. An analogous structure occurs in the palaearctic species *Rheotanytarsus nigricauda*, where the crests are also dark and marginally serrated, but not spinous on the surface (Fittkau 1960). A deeply divided superior volsella does not occur in another described *Micropsectra* species, but a similar, shallower division is present in an undescribed species from the Banff National Park, Canada, provisionally called *Micropsectra* sp.g. Also several described and undescribed *Tanytarsus* species possess analogous structures of the superior volsella. Branched setae on the inferior volsella of a *Micropsectra* species are not described. But this character is sometimes difficult to see, if no phase-contrast microscope is available. The 32 described and several undescribed *Micropsectra* species in the Munich collection show without exception simple setae on the inferior volsella.

The group relationship of *Micropsectra spinigera* is open, since the species does not fit in one of the three accepted species groups: *notescens*, *bidentata*, and *attenuata*.

References

Fittkau, E. J. 1960. *Rheotanytarsus nigricauda* n.sp. (Chironomidenstudien VI). - Abh. naturw.Ver. Bremen **35**: 397-407

Oliver, D. R. & M. E. Dillon 1990. A catalog of Nearctic Chironomidae. - Research Branch, Agricult. Canada, Publ. **1857/B**, Ottawa, 89p.

-- & -- 1994. Systematics of some species of *Micropsectra* (Diptera: Chironomidae) living in low-order streams in Southern Ontario, Canada. - Can. Entomol. **126**: 199-217

39. Brown, D.: Freshwater snails of Africa and their Medical Importance. - Taylor & Francis, Ltd. London, 1994. 608 S.

Die erste Auflage dieses Buches ist 1980 erschienen, seitdem sind so viele Fortschritte auf diesem Forschungsgebiet gemacht worden, die in diese zweite Auflage eingebracht werden mußten, daß es nicht mehr genügte, sie einzufügen, sondern eine völlig neue Konzeption nötig war. Es wurden neue Arten beschrieben, Nomenklaturänderungen erfolgten und viele zusätzliche ökologische Daten wurden erhoben. Eine sehr nützliche Seite gleich am Anfang ist die Auflistung der derzeit offiziellen Namen der afrikanischen Staaten, denen die früheren Bezeichnungen gegenübergestellt sind.

Die erste Hälfte des Buches nimmt die systematische Übersicht über diese Schneckengruppe ein, die mit einem Glossar, Bestimmungsschlüssel für die Gattungen und eine Liste der Arten beginnt. In der Synopsis der Prosobranchier und Pulmonaten werden bei jeder Art kurze Angaben über Ökologie und Verbreitung gemacht. Am Ende dieser ersten 4 Kapitel folgt ein ausführliches Literaturverzeichnis. Im Kapitel 5 werden die Beziehungen zwischen den Schnecken und den Schistosomen beschrieben. Ein ganzes Kapitel ist der Biologie der Gattung Bulinus gewidmet, deren Arten eine große Diversität aufweisen. Schneckenbekämpfung mit chemischen Mitteln, durch Umweltfaktoren, Räuber oder Konkurrenten, aber auch durch Genmanipulation folgt darauf. Kapitel 9 führt die lokalen Faunen in den verschiedenen afrikanischen Ländern an. Die abiotischen Faktoren, die diese lokalen Faunen beeinflussen, sind Thema von Kapitel 10. Das darauffolgende Kapitel beschäftigt sich mit den Lebenszyklen und den Populationen. Das letzte Kapitel schließlich bringt eine Übersicht über die verschiedenen Faunenregionen, die Seen und Flüsse. Ein umfassendes Buch über diesen wichtigen Themenkreis, wenn man bedenkt, daß das Wohlergehen der Menschen in Afrika von einer Versorgung mit sauberem, nicht kontaminiertem Wasser abhängt. R. Fechter

40. Matsukuma, A., Okutani, T. & T. Habe: World Seashells of Rarity and Beauty. - Tokyo 1991. 206 S., zahlr. Taf.

Wieder eines der mit ausgezeichneten Farbaufnahmen ausgestatteten, typischen "Tafelwerke" über seltene und schöne Molluskengehäuse. Sonst kann über dieses Buch wenig gesagt werden, da der äußerst spärliche Text, bis auf die lateinischen Namen ausschließlich japanisch ist. Es gibt auch kein allgemeines einleitendes Kapitel. Ein kurzes Vorwort (dies wenigsten in englisch) besagt, daß die Vorlagen für die Photos der Kawanura-Collection entstammen, die 1983 dem National Science Museum Tokio geschenkt wurde. Und so ist auch der eigentliche Zweck dieses Buches klar: Im Zusammenhang mit der Schenkung fand eine Ausstellung statt, deren schönste Stücke in einem Büchlein über World Seashells of Rarity and Beauty vorgestellt wurden. Dies hier ist unter demselben Titel eine erweiterte und revidierte Ausgabe und der greise Sammler (92 Jahre) will noch ein weiteres Werk folgen lassen.

Wie gesagt, ein schön aufgemachtes Buch, das zu empfehlen ist, wenn man es als das betrachtet, was sicherlich auch das Anliegen der Autoren ist, eine Darbietung der schönsten und wertvollsten Stücke einer bekannten Molluskensammlung. R. Fechter

41. Wilson, B.: Australian marine shells. 2 Vol. - Odyssey Verlag, Kallaroo, W-Australia, 1993, 1994. 408 S., 44 Taf. und 370 S., 53 Taf.

Die beiden Bände geben einen umfassenden Überblick über die australische Meeresschneckenfauna, wobei Band 1 die Archaeogastropoda, Architaenioglossa und Neotaenioglossa, Band 2 die Neogastropoda behandelt. Das Werk ist hervorragend und reich bebildert und mit 600 Zeichnungen versehen. Über 2400 Arten sind auf diese Weise beschrieben und dargestellt. Die beiden Bücher beschränken sich fast ausschließlich auf die Beschreibung der einzelnen Arten, mit knappen Angaben zur Biologie, Verbreitung und Synonymie. Ein einleitender, allgemeiner Teil, so man ihn bei der Kürze überhaupt als solchen bezeichnen kann, bringt Informationen über Sammeln, Präparieren und Aufbewahren von Schneckengehäusen, über geschützte Arten, sowie die Klassifizierung der Gastropoda und Nomenklaturregeln. Sonst läßt sich über dieses ausgezeichnete Werk nur sagen, daß es wärmstens zu empfehlen und unerläßlich ist, wenn man die Gastropodenfauna dieser Region bearbeiten will. R. Fechter

42. Wells, F. E. & C. W. Bryce: Sea Slugs of Western Australia. - Western Australian Museum, Perth, 1993. 184 S.

Dieser reich mit ausgezeichneten Farbaufnahmen bebilderte Führer durch die Opisthobranchierfauna der westaustralischen Meeresgebiete basiert auf Material, das vom Western Australian Museum im Laufe von vielen Exkursionen gesammelt wurde. 226 verschiedene Arten wurden auf diese Weise zusammengetragen und abgebildet. Die Familienmerkmale werden kurz aufgeführt, bei den einzelnen Arten aber wird nur die jeweilige Verbreitung angegeben. Die Literatur ist unter der Familienbeschreibung zusammengestellt. Eine Kartenskizze am Anfang des Buches zeigt die Küstenbereiche in denen gesammelt wurde. Was ist eine Meeresnacktschnecke? In diesem Kapitel wird eine komprimierte Charakterisierung dieser Unterklasse der Gastropoden gegeben: wie sich schalenlose Schnecken verteidigen und entwickeln, ihre Nahrungsquellen, die Fortpflanzung. Man findet in diesem Büchlein Ratschläge für das Auffinden und Sammeln und eine Beschreibung der Meeresregionen Westaustraliens. Das Glossar könnte etwas ausführlicher sein. Das Buch ist auf jeden Fall ein sehr wertvoller Beitrag zur Vervollständigung der Kenntnis der Artenfülle der marinen Opisthobranchier. R. Fechter

SPIXIANA	18	3	267–270	München, 01. November 1995	ISSN 0341–8391

Bavarismittia reissi, gen. nov., spec. nov., a new orthoclad from Germany

(Insecta, Diptera, Chironomidae)

By **Ole A. Sæther**

Saether, O. A. (1995): *Bavarismittia reissi*, gen. nov., spec. nov., a new orthoclad from Germany (Insecta, Diptera, Chironomidae). – Spixiana **18/3**: 267-270

Bavarismittia reissi, gen. nov., spec. nov. is described as a male imago from Murnauer Moos in Bavaria, Germany. The genus differs from other orthoclad genera with bare eyes and squama, with sinuate Cu_1, and with no pulvilli and acrostichals by having no microtrichial tuft, moderately coarse punctation of microtrichiae, R_{4+5} ending opposite to end of M_{3+4}, broadly based, triangular anal point; and single, triangular virga. The genus may be related to *Mesosmittia* Brundin and related genera.

Prof. Ole A. Sæther, Museum of Zoology, University of Bergen, Muséplass 3, N-5007 Bergen

Introduction

While, together with Dr. L. C. Ferrington Jr., revising the genus *Pseudosmittia* Goetghebuer several apparently related genera as well as specimens tentatively identified as belonging to the genus were examined. The genus *Pseudosmittia* previously was not well delimited and as a result several species were transferred to other genera, one genus resurrected, and several new genera erected. Most of the new genera were from the southern hemisphere. However, one of the new genera, *Lobosmittia* Sæther & Andersen (1993), also was found in Turkey, and one male imago which could not be placed in any known genus was present in material from Murnauer Moos in Bavaria, Germany. This new genus and species is described here.

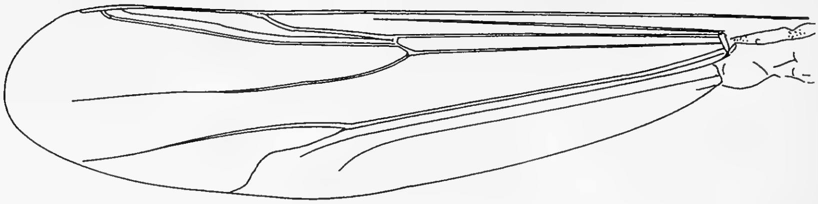
Methods and terminology

The general terminology follows Sæther (1980) with the additions given in Sæther (1990). In the drawing of the male hypopygium the dorsal view is shown to the left, the ventral view and the apodemes to the right. The holotype is returned to the Zoologische Staatssammlung, München, Germany.

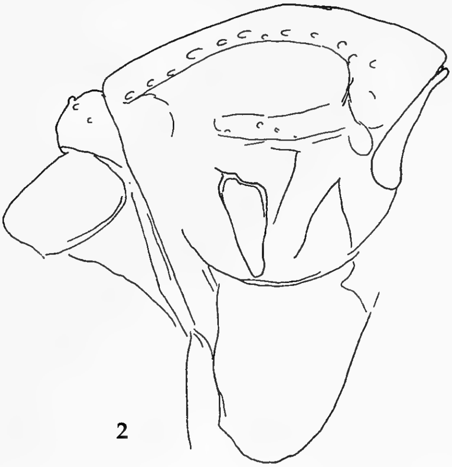
Bavarismittia, gen. nov.

Type species: *Bavarismittia reissi*, spec. nov. by present designation.

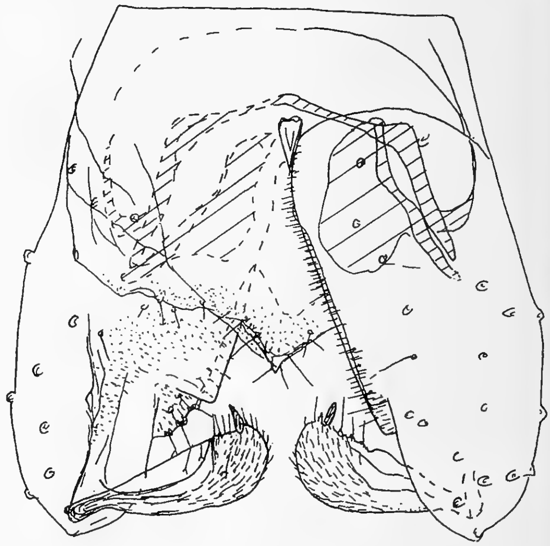
Diagnostic characters. The genus differ from other orthoclads with bare eyes and squama, no pulvilli and sinuate Cu_1 by lacking any trace of acrostichals, median hump or microtrichial tuft; by having moderately coarse punctation of microtrichiae on the wing barely visible at 100×, R_{4+5} ending opposite to end of M_{3+4}; single, triangular virga, and anal point broadly triangular with downturned apex.



1



2



3

Figs 1-3. *Bavarismittia reissi*, gen. nov., spec. nov. 1. Wing. 2. Thorax. 3. Hypopygium.

The pupa and larva are unknown.

Etymology. From Bavaria and *Smittia*, an orthoclad genus and the common ending for several orthoclad genera.

Description

Male imago. Small species (wing length about 1.5 mm).

Antenna. With 13 flagellomeres; groove starting on flagellomeres 3-4; flagellomere 2 and 3 each with 2 sensilla chaetica, 13 with about 14 sensilla chaetica and no subapical strong seta. Antennal ratio lower than 1.0.

Head. Eyes bare, rentiform, no dorsomedian extension. Temporals consisting of few inner and outer verticals and perhaps 1-2 postorbitals. Clypeus with few setae. Palp with 5 segments; third palpomere longer than fourth, with 1 lanceolate sensillum clavatum; fifth palpomere longer than third. Coronal suture complete.

Thorax. Antepronotum relatively well developed, with a few lateral setae. Acrostichals, median scutal hump or microtrichial tuft all absent; dorsocentrals few, uniserial; prealars few; supraalars absent. Scutellum with few setae in single, transverse row.

Wing. Membrane with moderately coarse punctation of microtrichiae visible at 100×, free of setae. Anal lobe absent, wing nearly cuneiform. Costa moderately extended, R_{2+3} running approximately in the middle between R_1 and R_{4+5}, ending close to R_{4+5}, R_{4+5} ends opposite to end of M_{3+4}, FCu lies clearly distally of RM, Cu_1 sinuate, postcubitus ends distally of FCu, anal vein ends below FCu. Brachiolum with 1 seta, other veins bare. Sensilla campaniformia in normal numbers (about 13 at base, 3 below setae and 13 at apex of brachiolum, 2 on subcosta, 1 on FR, and 1 at base of R_1). Squama bare.

Legs. Tibial spurs and combs normal. Pseudospurs absent, sensilla chaetica apparently absent (tarsi of mid leg lost). Pulvilli absent or vestigial, empodium large.

Abdomen. Tergites with few setae in an irregular anterior and an irregular posterior row. Sternites with a group of few median setae.

Hypopygium. Anal point extending from posterior margin of tergite IX, broadly based with blunt apparently downcurved apex, with setae and microtrichiae to apex. Phallapodeme well developed; transverse sternapodeme slightly curved, oral projections weak. Virga present, single, tapering to point. Gonocoxite with double, elongate inferior volsella, dorsal part angled and bare at apex; no superior and median volsellae. Gonostylus widest at apex, with rounded outer apical margin; crista dorsalis weak; megaseta normal, well developed.

Immature stages. Unknown.

Systematics

In the key to Holarctic chironomids (Cranston et al. 1989) *Bavarismittia* will key to *Psilometriocnemus* Sæther if the costa is regarded as strongly extended, to *Pseudosmittia*, except for the anal point, if regarded as moderately extended. However, none of these genera appear to be closely related to this new genus.

In *Psilometriocnemus* the anal point is parallel-sided with no microtrichiae at apex; the virga consists of 7-9 long, tightly clustered spines; the inferior volsella is square; crista dorsalis is conspicuous; and R_{4+5} ends distal to end of M_{3+4}; and at least vein R carries setae. However, there are agreement in several other characters such as the moderately coarse punctation of microtrichiae, and absence of acrostichals, pulvilli, pseudospurs and sensilla chaetica.

In *Pseudosmittia* the anal point, when present, never extends beyond the margin of tergite IX; there are either 2 or 4-16 median acrostichals on the scutum; the virga may consists of a single plate, but than the plate normally is of a different shape; and other details of the hypopygium differ.

The single virga and other details makes it most likely that the genus is related to genera near *Mesosmittia* Brundin (Sæther 1985). However, without knowledge of the female and the immatures a more definite placement is not possible.

Bavarismittia reissi, spec. nov.

Holotype: ♂, Germany: Bavaria, Murnauer Moos, Ramsach, Bruchwald beim Langen Kögel, 5.VI.1978, F. Reiss (Zoologische Staatssammlung München).

Diagnostic characters. See generic description.

Male imago (n=1). Total length: 2.62 mm; wing length: 1.53 mm. Total length/wing length: 1.72; wing length/length of profemur: 3.05. Coloration fully brown.

Head. AR 0.88. Ultimate flagellomere 397 µm long. Temporal setae obscured, apparently 4 inner verticals, 2 outer verticals, and 1 or 2 postorbitals. Clypeus with about 6 setae. Tentorium 120 µm long, 30 µm wide. Stipes 113 µm long. Palp lengths (micrometers): 28, 41, 79, 68, 98.

Thorax (Fig. 1). Chaetotaxy obscured by dirt. Antepronotum with about 3 lateral setae. Dorsocentrals 12, prealars about 4. Scutellum with about 6 setae.

Wing (Fig. 2). VR 1.26. C extension 45 µm long.

Legs. Spur of front tibia 49 µm long, spurs of middle tibia 19 µm and 17 µm long, of hind tibia 41 µm and 21 µm long. Width at apex of front tibia and middle tibia each 30 µm, of hind tibia 38 µm. Comb with 11 setae, 19-38 µm long. Lengths and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	501	619	255	156	109	57	47	0.41	3.73	4.39	3.3
p_2	595	605	–	–	–	–	–	–	–	–	–
p_3	581	624	340	170	156	61	57	0.55	3.48	3.54	5.4

Hypopygium (Fig. 3). Tergite IX including anal point with 12 setae, laterosternite IX with 5 setae. Phallapodeme 73 µm long, transverse sternapodeme 83 µm long. Virga 26 µm long. Gonocoxite 180 µm long, with divided, well developed, but low inferior volsell; dorsal part with bluntly angled apex, without microtrichia. Gonostylus 83 µm long, megaseta 11 µm long. HR 2.18, HV 3.15.

Etymology. Named in honour of my friend and colleague Dr. Friedrich Reiss, Zoologische Staatssammlung München.

Acknowledgement

I am indebted to Dr. F. Reiss, Zoologische Staatssammlung München, Munich/Germany, for the loan of the holotype of *Bavarismittia reissi.*

References

Cranston, P. S., Oliver, D. R. & O. A. Sæther 1989. The adult males of Orthocladiinae (Diptera: Chironomidae) of the Holarctic region. - Keys and diagnoses. In: Wiederholm, T. (ed.): Chironomidae of the Holarctic region. Keys and diagnoses. Part 3. Adult males. - Ent. scand. Suppl. **34**: 165-352

Sæther, O. A. 1980. Glossary of chironomid morphology terminology (Diptera: Chironomidae). - Ent. scand. Suppl. **14**, 51 pp.

– – 1985. The imagines of *Mesosmittia* Brundin, 1956, with descriptions of seven new species (Diptera, Chironomidae). - Spixiana Suppl. **11**: 37-54

– – 1990. A review of the genus *Limnophyes* Eaton from the Holarctic and Afrotropical regions (Diptera: Chironomidae, Orthcladiinae). - Ent. scand. Suppl. **35**: 1-139

– – & T. Andersen 1993. *Lobosmittia*, a new genus of orthoclads from Tanzania and turkey (Diptera: Chironomidae). - Tijdschr. ent. **136**: 283-287

SPIXIANA	18	3	271–275	München, 01. November 1995	ISSN 0341–8391

Collartomyia discaudata, spec. nov. from Ghana, with an emendation of the genus

(Insecta, Diptera, Chironomidae)

By **Joseph S. Amakye**

Amakye, J. S. (1995): *Collartomyia discaudata*, spec. nov. from Ghana, with an emendation of the genus (Insecta, Diptera, Chironomidae). – Spixiana **18/3:** 271-275

Collartomyia discaudata, spec. nov. from the dry rain forest of Ghana is described as male and female imago. The presence of a well developed ventrolateral lobe and a distinct apodeme lobe of the female gonapophysis VIII together with normal, unreduced palpomeres reinforce the closeness of *Collartomyia* Goetghebuer to *Polypedilum* Kieffer.

J. S. Amakye, Institute of Aquatic Biology, P. O. Box 38, Achimota, Ghana.

Introduction

The larvae of the hitherto monotypic Afrotropical genus *Collartomyia* Goetghebuer are found in pupal cases of Hydropsychidae feeding on the caddis fly pupae. Amakye & Sæther (1992) found that *Collartomyia* was closely related to *Polypedilum* Kieffer as, for instance, indicated by the anterior tapering of male tergite VIII. Perhaps the most significant autapomorphy was a conelike projecting scutum with a depression at the angular apex of the cone.

As part of an ongoing study of the chironomids of Ghana (Amakye & Sæther 1992) I collected a species of Chironomini from the dry rainforest of southeastern Ghana with the same combination of an anterior tapering tergite VIII and a conelike projecting scutum. The male and female imagines are described here and placed in *Collartomyia* Goetghebuer. *C. discaudata*, spec. nov., however, differs significantly in many aspects from *C. hirsuta* (Goetghebuer) and the placement will remain tentative until the immature stages have been discovered and described.

Methods

Specimens were mounted on slides following the procedure outlined by Sæther (1969: 1). Terminology follows Sæther (1980).

Collartomyia Goetghebuer

Collartomyia Goetghebuer, 1948: 15; Amakye & Sæther 1992: 434.
Collartiella Goetghebuer, 1936: 457 (preoccupied).

Imago. As in Amakye & Sæther (1992) with the following additions: Palpomere 3- or 5-segmented, reduced or normal. Mid and hind tibial combs fused or separate, each with 1-2 tibial spurs; sensilla chaetica few or absent, at apex of tarsomere 1 of all legs or apparently present on mid leg of female only. Legs densely or normally hairy with setae tending to be concentrated in tufts or normally distributed.

Abdomen more or less densely setose. Male laterosternite IX with few to numerous setae; anal tergite bands absent to well developed; anal point present or absent. Female gonapophysis VIII with well developed to vestigial or absent microtrichiose ventrolateral lobe, apodeme lobe distinct or indistinct, genital plate pointed or rounded.

Collartomyia discaudata, spec. nov.

Types. Holotype: ♂, Ghana: Volta region, Wli, river Agomatsa, Malaise trap marked as GH 140-1. – Para type: 1♀, as holotype, marked as GH 140-2 (Museum of Zoology, University of Bergen, Norway, ZMB, Type No. 190).

Diagnostic characters. The imagines are separable from *C. hirsuta* (Goetghebuer) by having normal palp, separate tibial combs with single spur, and pseudospurs present. The male imago differs by lacking an anal point and by having a strong, scythe-shaped, bilobed superior volsella with medial portion strongly curved and bare, and lateral portion with truncate and microtrichiose apex. The female imago differs by having a well developed ventrolateral lobe and a small and pointed postgenital plate.

Description

Male imago (n=1). Total length: 4.49 mm; wing length: 2.40 mm. Total length/wing length: 1.98; wing length/length of profemur: 1.74. Coloration pale yellow. Legs yellowish.

Head. AR 1.44. Ultimate flagellomere 1804 µm. Longest seta 680 µm. Temporal setae 17, including 6 inner verticals, 6 outer verticals and 5 postorbitals. Clypeus with 24 setae. Tentorium 160 µm long, 47 µm wide. Palpomere lengths (in µm): 54, 40, 214, 176, and lost.

Thorax (Fig. 1A). Antepronotum bare. Dorsocentrals 45, in 2-3 rows, including 9 scattered humerals; acrostichals 23 in anterior half of strongly projecting scutum; prealars 11, in 2 rows. Scutellum with 24 setae in 2 transverse rows.

Wing (Fig. 1B). VR 1.20. Brachiolum with 7 setae, R with 32 setae, R_1 with 31 setae, R_{4+5} with 45 setae. Squama with 19 setae.

Legs (Fig. 1C). Scale of fore tibia 24 µm long, without spine. Middle leg with 70 µm long separate combs, with single spur 80 µm long; hind legs with combs 48 µm and 84 µm long, separate with single spur 90 µm long. Sensilla chaeticae apparently absent, 2 pseudospurs on ta_{1-3} on middle and hind legs Lengths (in µm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	1376	780	–	–	–	–	–	–	–	–	
p_2	1435	1138	584	400	277	164	82	0.51	3.42	4.40	4.4
p_3	1517	1312	984	595	482	279	123	0.75	2.58	2.88	6.3

Hypopygium (Figs 1D, E). Anal point absent; anal tergite truncate and slightly depressed at apex, strongly microtrichiose with posterior, dorso-lateral margin bearing 58 strong, short setae arranged in 2-3 rows around indented apex, 20 long setae in oval median area enclosed by strong anal tergite bands. Laterosternite IX with 5 setae. Phałapodeme 74 µm long, transverse sternapodeme 74 µm long. Gonocoxite 200 µm long, gonostylus 152 µm long with many long setae. Superior volsella with distal portion bilobed; inner digitiform portion strongly curved, bare; outer portion curved, very large, apex truncate, microtrichiose, and with 1 long apical seta: bulbous base with 4 strong setae along inner margin. Inferior volsella 134 µm long, parallel-sided, with short, strong subapical setae and 1 long apical seta. HR 1.28; HV 2.77.

Female imago (n=1). Total length: 3.36 mm; wing length: 2.41 mm. Total length/wing length: 1.41; wing length/length of profemur: 1.78. Coloration as in male.

Head (Fig. 2A). Length (in µm) of flagellomeres: 158, 104, 86, 118, 80, 148. AR 0.27. Temporal setae 13, including 4 inner verticals, 6 outer verticals and 3 postorbitals. Palpomere lengths (in µm): 66, 50, 226, 186, 342. Clypeus with 13 setae.

Thorax. Antepronotum bare. Dorsocentrals 42, biseral, including 6 humerals; acrostichals 19; prealars 10, biserial. Scutellum with 22 setae, biserial.

Wing. VR 1.19. Brachiolum with 5 setae, R with 32, R_1 with 39, R_{4+5} with 79 setae. Squama with 17 setae.

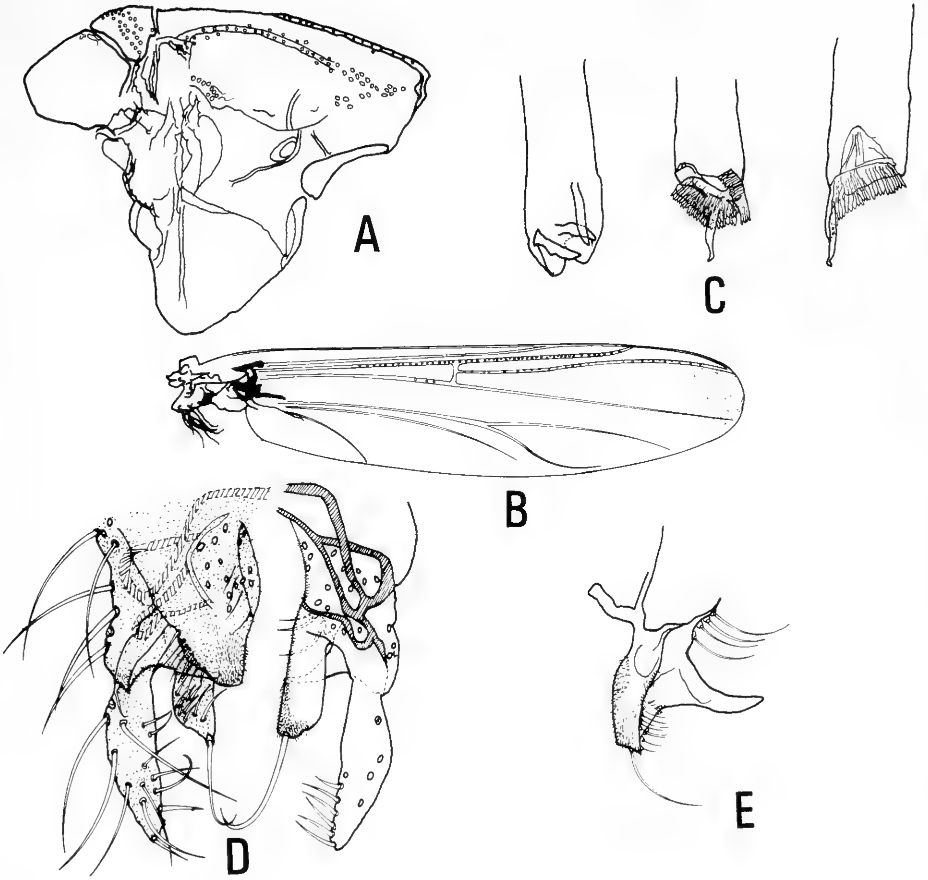


Fig. 1. *Collartomyia discaudata*, spec. nov., male imago. A. Thorax. B. Wing. C. Apices of tibiae. D. Hypopygium, dorsal view to the left, ventral view to the right. E. Superior volsella.

Legs. Scale of front tibia 18 µm long. Combs of middle tibia 52 µm long including 84 µm long spur, of hind tibia 42 µm and 74 µm long including 90 µm long spur. Width at apex of front tibia and middle tibia each 74 µm, of hind tibia 82 µm. Sensilla chaeticae 10, at apical 1/5 of ta_1 of middle leg; 2 pseudospurs on each of ta_1, to ta_3 of middle and hind legs. Lengths (in µm) and proportions of legs.

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	1368	840	1472	1040	776	652	244	1.75	1.36	1.50	2.7
p_2	1440	1112	616	400	280	168	92	0.55	3.37	4.14	3.8
p_3	1512	1272	992	576	472	264	108	0.78	2.66	2.81	4.1

Abdomen. Tergite VII with 77 setae, VIII with 60 setae. Sternite VII with 22 setae, VIII with 26 setae.

Genitalia (Figs 2B, C). Gonocoxite 60 µm long, with 4 setae. Tergite IX with about 70 setae. Segment X with 10-11 setae on each side. Postgenital plate large, triangular, pointed. Cercus broadly triangular, 161 µm long. Seminal capsule oval, 98 µm long, 84 µm wide, with well developed wall, spermathecal duct bent. Notum 130 µm long. Gonapophysis VIII with large dorsomesal lobe separated from well developed micritrichiose ventrolateral lobe. Apodeme lobe (Fig. 2C) well developed.

Systematics

Collartomyia has been shown to be closely related to *Polypedilum* by Amakye & Sæther (1992). The female of *C. discaudata*, spec. nov. has a well developed ventrolateral lobe and a distinct apodeme lobe

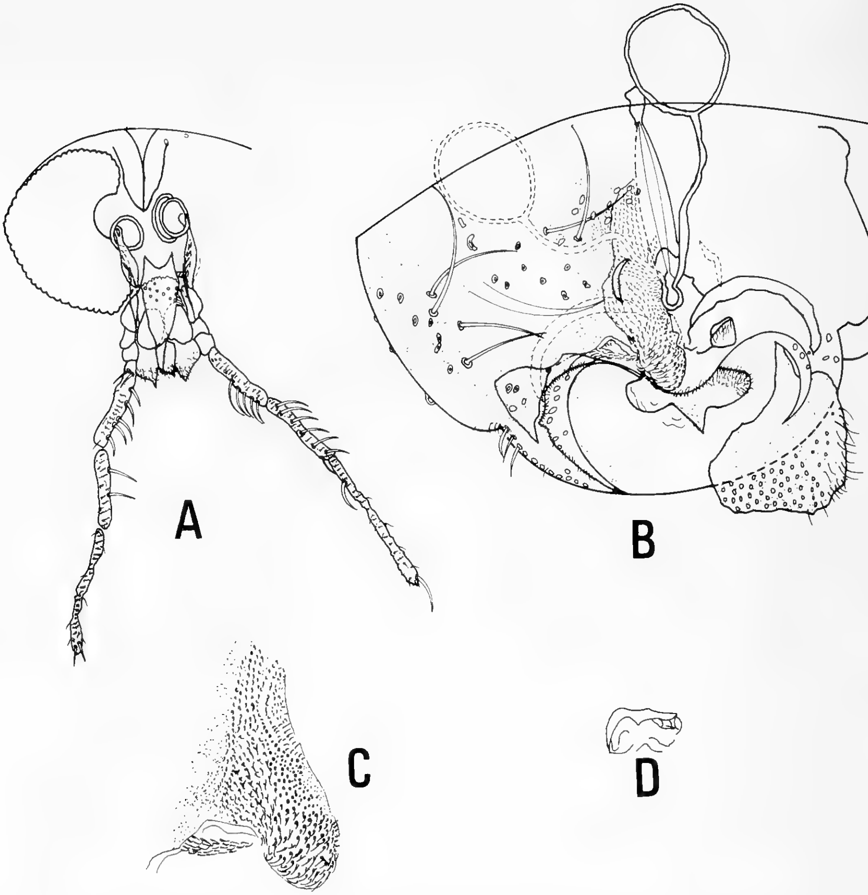


Fig. 2. *Collartomyia discaudata*, spec. nov., female imago. A. Head. B. Genitalia, ventral view. C. Lobes of gonapophyses VIII. D. Apodeme lobe.

similar to that described for *Polypedilum* by Saether (1977). *C. discaudata* thus reinforces the nearness of *Collartomyia* to *Polypedilum.*

The peculiar thorax with a strongly projecting scutum with an apical notch combined with an unreduced antepronotum appear to be a unique synapomorphy for *C. hirsuta* and *C. discaudata*. The anterior tapering of tergite VIII, a synapomorphy for *Polypedilum* and *Collartomyia*, is distinct also in *C. discaudata*. There are, however, several significant differences between the two species. Some of these can be ascribed to reductions and are clear autapomorphies such as the reduced palp of *C. hirsuta*; others, such as the differences of the male hypopygia and the tibial combs, are likely to be of generic value. However, until the *Polypedilum* complex is revised and/or the immature stages of *C. discaudata* found and described, it is more prudent to keep the two species together in the same genus.

Acknowledgements

I wish to thank Prof. Ole A. Sæther of the University of Bergen, Norway, for critically reading this paper and providing many useful suggestions. Financial support was received from the Norwegian Council for Science and Humanities (NAVF). Mr. Godwin Amegbe of the Institute of Aquatic Biology provided assistance in the collection of the material studied and did the drawings.

References

Amakye, J. S. & O. A. Sæther 1992. The immatures and imagines of the Afrotropical species *Microtendipes lentiginosus* Freeman and *Collartomyia hirsuta* Goetghebuer (Diptera: Chironomidae). - Ent. scand. **23**: 429-442

Goetghebuer, M. 1936. Chironomides du Congo Belge. - Rev. Zool. bot. Afr. **28**: 453-492

-- 1948. Note synonymique. - Bull. Annls. Soc. r. ent. Belg. **84**: 15

Sæther, O. A. 1969. Some Nearctic Podonominae, Diamesinae, and Orthocladiinae (Diptera: Chironomidae). - Bull. Fish. Res. Bd. Can. **170**: 1-54

-- 1977. Female genitalia in Chironomidae and other Nematocera: morphology, phylogenies, keys. - Bul. Fish. res. Bd. Can. **197**: 1-209

-- 1980. Glossary of chironomid morphology terminology (Diptera: Chironomidae). - Ent. scand. Suppl. **14**: 1-51

43. Falciai, L. & R. Minervini: Guida dei Crostacei Decapodi d'Europa. - Franco Muzzio & C. editore, Padua, 1992. 282 S., über 667 farb. u. s/w Abb. - ISBN 88-7021-557-1.

Mit dem vorliegenden Band liegt erstmals ein Bestimmungsbuch der dekapoden Krebse des gesamten europäischen Raumes und seiner Küsten vor. Den beiden Autoren ist für dieses sehr nützliche Werk zu danken. Einführende Kapitel beschäftigen sich kurz mit der Ökologie und dem Verhalten der Krebse, mit ihrer wirtschaftlichen Bedeutung und den Fangmethoden. Hieran schließt sich eine Einführung in die Morphologie und Systematik, bei der die äußere Anatomie der Krebse in klaren Zeichnungen dargestellt wird. Sie schafft auch die Voraussetzung, die Bestimmungsschlüssel ohne eingehende Kenntnisse der italienischen Sprache zu benützen. Die Schlüssel führen bis zur Gattung, von der mindestens ein typischer Vertreter in einer Strichzeichnung vorgestellt wird. Auf 18 Farbtafeln werden darüber hinaus 67 wichtige Vertreter in ihrer natürlichen Färbung vorgestellt. Es folgen detaillierte Angaben zum Vorkommen jeder Art, Angaben zur Identifikation, die auch meist die einzelnen Arten innerhalb der Gattung auftrennen lassen, zum Habitat und gegebenenfalls zur wirtschaftlichen Bedeutung. Über 20 Lesseps'sche Arten werden genannt, aber leider über das Buch verstreut.

Zwei nomenklatorische Fehler sind dem Rezensenten aufgefallen: *Parapandalus richardi* (Coutière, 1905) ist ein Synonym von *Stylopandalus richardi* (Coutière, 1905) (vgl. F. A. Chace 1985) und *Sergestes robustus* Smith, 1882 ist ein Synonym von *Sergia robustus* (Smith, 1882) (vgl. Omori 1974). Kaum verständlich ist die Anmerkung auf Seite 4: "Tutte le illustrazioni del volume sono opera di Paolo Bernucci", der für sich auch noch das Copyright in Anspruch nimmt. Eine ganze Reihe von Abbildungen konnten dank der Exaktheit der Kopien ohne Mühe sofort nach ihrer Herkunft aus Holthuis (1955) und Zariquiey Alvarez (1968), die z.T. frühere Autoren zitieren, identifiziert werden. Der Rezensent hat nach über 30 zweifelsfreien Identifikationen weitere unterlassen. Hätte es geschadet anzugeben, wer die ausgezeichneten Vorlagen geschaffen hat? Letzteres hat jedoch keinen Einfluß darauf, daß das Buch allen, die sich mit dekapoden Krebsen befassen, wirklich empfohlen werden darf. Für Studenten der Biologie dürfte es gerade bei Meeresexkursionen sehr gute Dienste leisten. L. Tiefenbacher

44. Holthuis, L. B.: The recent genera of the Caridean and Stenopodidean shrimps (Crustacea, Decapoda): with an appendix on the order Amphionidacea. [ed. C. H. J. M. Fransen & C. van Achterberg]. - Nationaal Natuurhistorisch Museum, Leiden, 1993. 328 S., 312 Abb. - ISBN 90-73239-21-4.

Das vorliegende Werk hat einen Vorgänger. 1955 veröffentlichte L. B. Holthuis in den Zoologische Verhandelingen No. 26 "The recent genera of the Caridean and Stenopodidean shrimps (class Crustacea, order Decapoda, supersection Natantia) with keys for their determination." Diese geschätzte Arbeit war wohl am Arbeitsplatz jedes Zoologen, der sich seit dem mit Natania befaßt hat, ein häufig benutztes, inzwischen schon fast zerlesenes Arbeitsbuch. Seit dieser Zeit ist die Forschung fortgeschritten, neue Genera und höhere Taxa sind beschrieben worden, manches wurde revidiert. Hierbei ist besonders zu erwähnen, daß der Autor in der nun völlig überarbeiteten und ergänzten Neuauflage sich der mühsamen und so verdienstvollen Arbeit unterzog, die Synonyme mit den zugehörigen Zitaten zusammenzutragen. Für alle Genera ist die Originalpublikation zitiert, sowie die Typusart. Als Hilfe zur Benützung der Schlüssel dienen die hervorragenden Strichzeichnungen vorzugsweise der Typusart aus den Originalarbeiten. Letztlich ist der Appendix, der der Ordnung der Amphionidacea gewidmet ist, zu erwähnen, die Holthuis 1955 noch unter "Genera dubia Carideorum" anführte. Das hervorragende Werk wird wieder für lange Zeit eine unentbehrliche Arbeitshilfe für alle sein, die sich mit den Caridea und Stenopodidea bzw. den Amphionidacea beschäftigen. Dank dem Autor und den Herausgebern. L. Tiefenbacher

45. Smaldon, G., L. B. Holthuis & C. H. J. M. Fransen: Coastal Shrimps and Prawns. - Synopses of the British Fauna (New Series) (eds. D. M. Kermack, R. S. K. Barnes and J. H. Crosthers), No.15 (2nd. ed.), publ. for Linnean Soc., London, and Estuarine and Coastal Sci. Ass. by Field Studies Council, Shrewsbury, 1993. pp. I-VIII, 1-142. - ISBN 1-85153-252-8.

Wie alle Bändchen dieser Reihe wendet sich dieser Führer an Amateure und Fachbiologen in gleicher Weise, die sicher die Garnelen im Küstenbereich der Britischen Inseln bestimmen wollen und sich über ihre systematische Zugehörigkeit, ihre charakteristischen Merkmale, ihre Färbung, ihre Fortpflanzung, ihren Lebensraum, ihre übrige Verbreitung u.a. fundiert informieren wollen. Die jeweiligen Bestimmungsschlüssel und die klaren Strichzeichnungen sind dabei sehr nützlich. Die zweite Auflage wurde durch Holthuis und Fransen gründlich revidiert und ergänzt. So sind drei Arten der Liste der britischen Garnelen zugefügt und in den Text und die Schlüssel eingearbeitet worden. Die Nomenklatur wurde auf den neuesten Stand gebracht und die weiterführende Literaturliste durch neuere Titel ergänzt. Das sehr empfehlenswerte Bändchen dürfte sicher ebenso schnell wie sein Vorgänger vergriffen sein. Interessenten sollten schnell zugreifen. L.Tiefenbacher

SPIXIANA	18	3	277–281	München, 01. November 1995	ISSN 0341–8391

A new species of *Cetema* Hendel with reference to the distribution of the genus

(Insecta, Diptera, Chloropidae)

By **E. P. Nartshuk**

Nartshuk, E. P. (1995): A new species of *Cetema* Hendel with reference to the distribution of the genus (Insecta, Diptera, Chloropidae). – Spixiana **18/3:** 277-281

Cetema maroccana, spec. nov. is described from North Africa. Three centres of biodiversity of the genus *Cetema* in the holarctic region are discussed.

E. P. Nartshuk, Zoological Institute Russian Academy of Sciences, 199034 S. Petersburg, Russia

Introduction

The genus *Cetema* Hendel belongs to the subfamily Chloropinae. *Cetema* is considered as a single genus within the genus group *Cetema* (Andersson 1972, Kanmiya 1984) or is included into the tribe Cetematini together with *Archecetema* Nartshuk and *Homaluroides* Sabrosky (Nartshuk 1983, 1987). In this paper *Archecetema* is considered only as a subgenus of *Cetema*. *Cetema* is a holarctic genus, 12 species being known from the Palaearctic and 2 species from the Nearctic region (Czerny & Strobl 1909, Becker 1910, Collin 1966, Duda 1933, Beschovski 1984, Ismay 1985). The genus *Cetema* deviates in the structure of the pregenital synsclerite and the male genitalia (epandrium) from all other genera of the subfamily Chloropinae. The pregenital synsclerite is enlarged in *Cetema* in contrast to the other Chloropinae with reduced synsclerite. The epandrium of most species of *Cetema*, except for species of the subgenus *Archecetema*, has additional long anterolateral processes under the surstyli. Origin and variation of these processes can be observed within the genus, because species from the Far East are more generalized and do not have these processes or have only small ones (Nartshuk 1976).

There are two centres of biodiversity within the genus *Cetema* in the Palaearctic region: Westpalaearctic and Eastpalaearctic (Fig. 1). The third centre is situated in the eastern part of the Nearctic region. These three centres correspond to three regions of nemoral biotas within the Holarctic region. Species of *Cetema* are not associated with trees. Larvae of *Cetema* are phytophagous, they live in shoots of grasses of the genera *Agrostis, Glyceria, Poa, Alopecurus* and some others. Most of the species are mesophilous, they occur on meadows, borders and clearings in forests. *C. bispinosa* Duda is the only hydrophilous species that occurs in wet places, their larvae live in shoots of *Glyceria triflora* (Korsh.).

Up to date the westpalaearctic species were known only from Europe. A new species which is described in this paper occurs in North Africa. The number of westpalaearctic species gradually decreases from west to east, and the number of eastern species increases again in the Eastpalaearctic region (Fig. 2). Eight species occur in the atlantic sector of the Palaearctic region: *C. paramyopina* Collin, *C. monticula* Becker, *C. maroccana*, spec. nov., *C. transversa* Collin, *C. neglecta* Tonnoir, *C. elongata* Meigen, *C. cereris* Fallén, *C. myopina* Loew. I consider *C. similis* Ismay, 1985 a synonym of *C. elongata* Meigen (Nartshuk 1991). *C. obliqua* Beschovski, 1984 is very likely also a synonym of *C. elongata*. Dr. M. v. Tschirnhaus (pers. comm.) considers this species a synonym of *C. elongata*. Distances of ranges of these species eastwards are very different. Two former species, *C. paramyopina* and *C. maroccana*, are not recorded eastward of the atlantic sector, two related species *C. transversa* and *C. monticola* – eastwards to central Europa, *C. neglecta* – eastwards of Moscow district, *C. elongata* – eastwards to Ural moun-

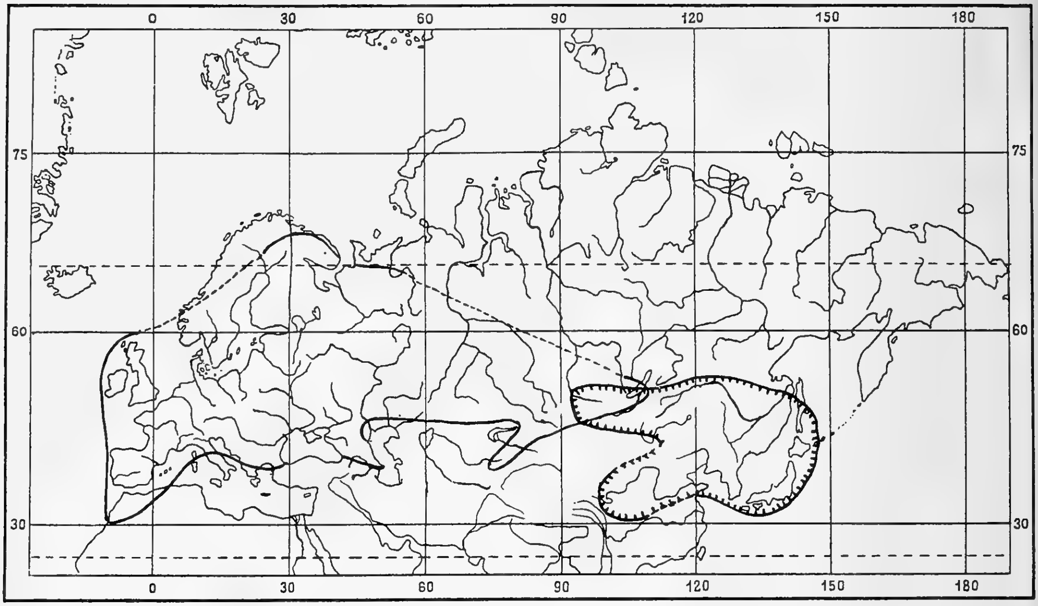


Fig. 1. Ranges of west- (simple line) and east- (line with strokes) palaearctic species groups of *Cetema*.

tains, *C. myopina* – eastwards to the Baikal lake. Only *C. cereris* is a transpalaearctic species. Similar patterns of distribution – but in the opposite direction – are known for the eastpalaearctic species. The number of species decreases westwards. *C. necopinata* is recorded from Japan, southern Kuril islands and Primorsky province of Russia, *C. sulcifrons* Duda is known westwards to Szechwan in China (as the subspecies *nigritarsis* Duda) and East Aimak in Mongolia, and *C. bispinosa* Duda is recorded westwards to the Yenisey river (Figs 1, 2). *C. cereris* has the widest range and occurs from Great Britain to Sakhalin and in Europe northwards to the Polar circle (Rovaniemi in Finland) by the nominate subspecies *C. c. cereris*. In the south of far east of Russia and Japan this subspecies is replaced by the subspecies *C. cereris orientalis* Nartshuk. Males of this subspecies lack the long hairs on the fore tibia. The most northern record of *Cetema* in Europe belongs to *C. elongata*: Murmansk, Kola peninsula.

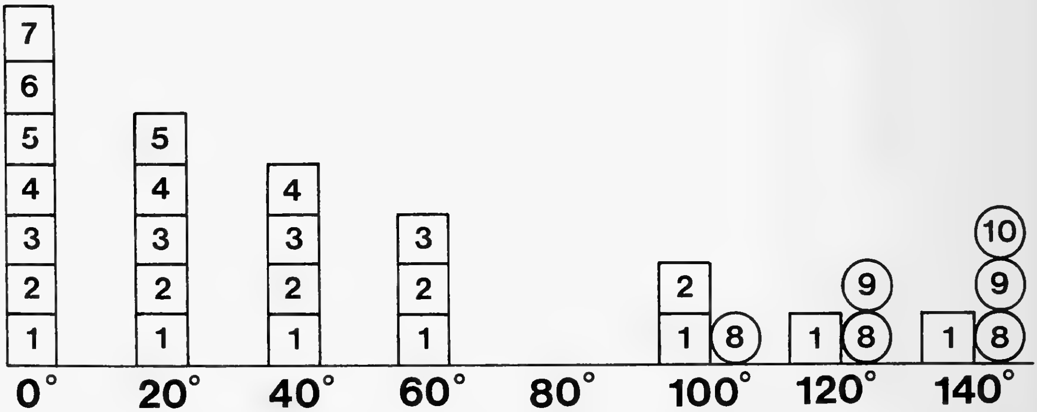


Fig. 2. Schema of the distribution of the west- (squares) and east- (circles) palaearctic species of *Cetema*. 1. *C. cereris* Fallén. 2. *C. myopina* Loew. 3. *C. elongata* Meigen. 4. *C. neglecta* Tonnoir. 5. *C. transversa* Collin. 6. *C. paramyopina* Collin. 7. *C. maroccana*, spec. nov. 8. *C. bispinosa* Duda. 9. *C. sulcifrons* Duda. 10. *C. necopinata* Nartshuk. On absciss axis grades of eastern longitude.

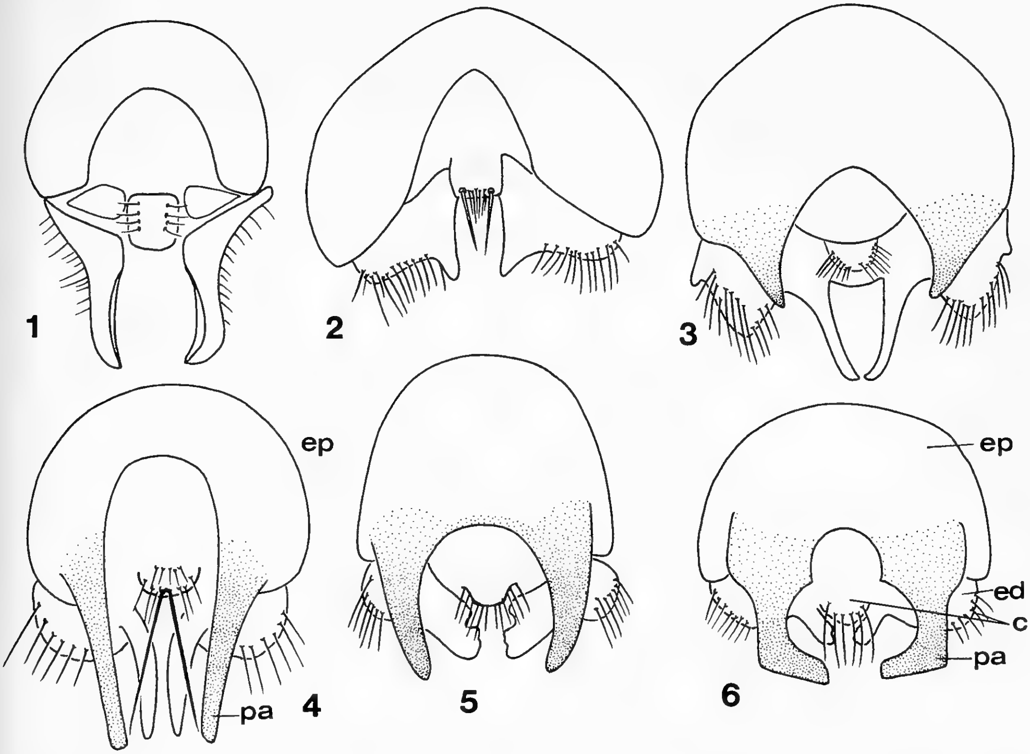


Fig. 3. Epandrium of *Cetema*. 1. *C. necopinata*. 2. *C. sulcifrons*. 3. *C. bispinosa*. 4. *C. maroccana*. 5. *C. elongata*. 6. *C. myopina*. c = mesolobus (fused cerci), ed = surstyli, ep = epandrium, pa = anterolateral processes

The structure of male genitalia of the new species is very characteristic. The epandrium has above rather long additional anterolateral processes under the surstyli, and also a long projection of the surstyli, similar to those of *C. bispinosa*. The new species is close to *C. bispinosa* in a comparative morphological row based on the structure of the male genitalia (Fig. 3). The most generalized species *C. necopinata* Nartshuk and *C. sulcifrons* Duda occur in the far east of Russia, in China and Japan.

Cetema maroccana, spec. nov.

Types. Holotype: ♂, Morocco, Haut Atlas, 2500 m, Oukaimeden, 27.-28.06.1987, leg. W. Schacht (ZSM). – aratypes: 1♀, same label as holotype (ZSM); 1♂, Atlas mal., Arround, 9.-12.06.1926, leg. Lindberg (ZMHU).

Description

Body length. 4.0-4.2 mm.

Head. Wider than long, frons in profile not strongly produced beyond anterior level of eye. Frons nearly square, yellow, covered by black hairs. Frontal triangle black except the yellow tip, shining smooth. Occiput black, pubescent and confluent with base of frontal triangle. Gena and face yellow with white hairs. Gena of moderate breadth, a little narrower than breadth of first flagellomer. First flagellomer slightly longer than broad, largely yellow with infuscate dorsal margin; arista all brownish. Palpi yellow in male, slightly darkened at tip in female.

Scutum. Relatively narrow, about 1.3 as long as wide, entirely black shining, except for yellow postpronotum which bears a small black spot. Scutellum yellow with blackish lateral side. Pleura yellow with usual large black spots. Bristles of scutum and scutellum black. Legs largely black, coxae

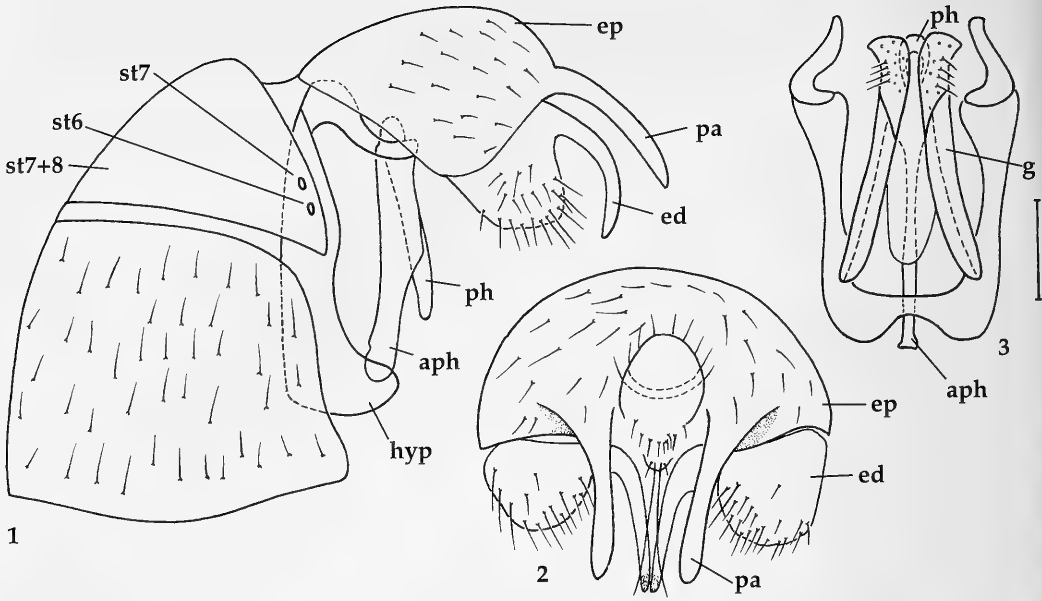


Fig. 4. Male genitalia of *C. maroccana*, spec. nov. 1. Tip of abdomen, lateral view. 2. Epandrium. 3. Hypandrium. aph = apodeme of phallus, g = gonite, hyp = hypandrium, ph = phallus, s 7+8 = synsclerite, st 6,7 = stigma, t = tergite. Other abbreviations see Fig. 3. Scale line: 0.1 mm.

and trochanters yellow; femora black except tip; tibia black except both ends, tarsi black except metatarsi of middle and hind legs, which are dark yellow. Middle tibia with usual black apical spur. Distal part of fore and middle tibia in male covered by long white hairs. Male femora more thickened than those in female. Wing of usual form, weakly tinged with grey; halter pale yellow.

Abdomen. Black, terminal segments in male weakly curving ventrally and somewhat clubbed in lateral view. Tergite 5 is a little longer than tergite 4 and tergite 4 is longer than tergite 3. Synsclerite 7+8 in male rather strong sclerotized, about ½ as long as tergite 5.

Male genitalia (Fig. 4). Epandrium large black, except brownish base and tip of anterolateral processes. These processes long and tapering, curved in lateral view. Posterodistal notch of epandrium broadly and deeply emarginate in reversed U-shape. Surstyli located under anteroventral part of epandrium with long narrow projections, which are as long as processes of epandrium. Hypandrium much higher than wide. Gonites well differentiated, located in line, pregonites being much longer than postgonites. Postgonites with 4 setae and some pores. Basiphallus short, distiphallus membranous.

Comparison. From the palaearctic species of the genus three species and subspecies have dark coloured legs. *C. sulcifrons nigritarsis* Duda, described from Szechwan, China, is distinguished by the structure of the frontal triangle with central groove and absence of additional anterolateral processes of the epandrium in male genitalia (Fig. 3, 2). *C. cereris nigrifemur* Czerny, described from Spain, has a white arista in contrast of the dark arista in the new species. *C. monticola* Becker, described from the Pyrenees (Aix-les-Bains and Le Vernet according to Becker 1910), is distinguished by the presence of a long black bristle at the top of metatarsus of the middle legs. The new species is distinguished from *C. monticola* also by the dark tarsi of all legs and the long projection of the surstyli in the male genitalia. I have seen 1♂ (syntype ?) from Aix-les-Bains (France, Dept. Savoie) received from Naturhistorisches Museum Vienna/Austria and have not observed this long projection of surstyli. Some specimens of *C. cereris* and *C. myopina* from the Caucasus mountains collected by me in the Teberda nature reserve and in Daghestan above 1500 m, have also dark coloured legs, especially the females. The main distinguishing characters of the new species are in the structure of the male genitalia.

Acknowledgements

I am much indebted to Mr. W. Schacht (Zoologische Staatssammlung München, Germany – ZSM) and Dr. P. Vilkamaa (Zoological Museum of the Helsinki University, Finland – ZMHU) for the loan of this material for investigation. The paper was supported by grant Nr. 2.1.92 6p of the Russian Academy of Sciences, grant N JJJ 100 of International Sciences Foundation and Government of Russian Federation, and the Deutsche Forschungsgemeinschaft. I wish to express my deepest thanks to Dr. H. Ulrich for his kind help during my work in German museums.

References

Andersson, H. 1977. Taxonomic and phylogenetic studies on Chloropidae (Diptera) with special reference to the Old World genera. - Ent. Scand. Suppl. **8**: 1-200

Becker, Th. 1910. Chloropidae. Eine monographische Studie. - Archivum zoologicum, Budapest **1** (10): 33-174

Beschovski, V. 1984. *Cetema obliqua* sp. n., a new species of Chloropidae from southeast Europe (Diptera). - Reichenbachia **22** (30): 213-214

Collin, J. E. 1966. A new revision of the British species of *Cetema* Hendel (Diptera, Chloropidae) with two species new to science. - Entomoligst **99**: 116-2120

Czerny, L. & G. Strobl 1909. Spanische Dipteren III. Beitrag.-Verh. zool.-bot. Ges. Wien **59** (6): 121-301

Duda, O. 1933. Chloropidae - In: E. Lindner. Die Fliegen der palaearktischen Region. Bd. **4** (1): 48-248

Ismay, I. W. 1985. The identity of *Cetema elongata* (Meigen) (Diptera, Chloropideae). - Ent. month. Mag. **121**: 35-38

Kanmiya, K. 1983. A systematic study of the Japanese Chloropidae (Diptera). - Mem. Ent. Soc. Wash. **11**: 1-370

Nartshuk, E. P. 1976. Far-eastern species of the genus *Cetema* Hendel (Diptera, Chloropidae). - Trudy Zool. Inst. AN SSSR **62**: 117-126 (In Russian)

-- 1983. A system of the superfamily Chloropoidea (Diptera, Cyclorrhapha). - Entomol. obozr. **62** (3): 638-648 (in Russian) English translation: Entomol. Review, Washington. 1983. **62**(3): 180-193

-- 1987. Grassflies (Diptera: Chloropoidea) their system, evolution and associations with plants. - Trudy Zool. Inst. AN SSR **136**: 1-280 (in Russian)

-- 1991. Grassflies (Diptera, Chloropidae) of the Moscow province. - Biol. nauki **7** (331): 22-43 (in Russian)

46. Wells, S. (ed.): UNEP/IUCN. Coral Reefs of the World. Vol 1: Atlantic and Eastern Pacific. - UNEP Regional Seas Directories and Bibliographies. IUCN, Gland, Switzerland and Cambridge U.K./UNEP, Nairobi, Kenya, 1988 (Reprinted 1991). XLVII + 373 S. - ISBN 2-88032-943-4.

Nach Nutzung, Ausbeutung und teilweiser Zerstörung von Korallenriffen ist in den letzten 10-15 Jahren das Interesse an ihrer Zukunft weltweit deutlich gestiegen. So wurde für den 4. und 5. International Coral Reef Congress (1981 und 1985) als Thema "Das Riff und der Mensch" gewählt. Hier wurden zahlreiche Arbeiten, die die fortschreitende Zerstörung der Riffe weltweit darstellten, vorgetragen. Auf dieser Grundlage erreichte es die Coral Reef Working Group der IUCN Commission on Ecology, zwei Projekte zu starten, einerseits um die Bedrohung der Riffe weltweit zu dokumentieren und andrerseits um eine Bestandsaufnahme von Schutzgebieten, die auch Korallenriffe einschließen, durchzuführen. Der Nachdruck des 1. Bandes von 1988 zeigt, wie groß die Nachfrage ist. Er beschreibt die Riffe des Atlantik und des östlichen Pazifik in 37 alphabetisch aufgeführten Einzelgebieten und gründet auf den oben genannten Arbeiten. Karten, die die Lage genau angeben, detaillierte Beschreibungen der Korallenriffe, ihres Zustandes, ihrer teilweise Zerstörung, des fehlenden oder unzureichenden Schutzes durch die Regierungen der jeweiligen Länder u.s.w., sowie reiche Angaben, die zur Originalliteratur führen, machen diese wichtige Dokumentation, die laufend zu ergänzen ist, zur unverzichtbaren Voraussetzung, um einen weltweiten Schutz dieser phantastischen, in ihrer Bedeutung für den Menschen noch kaum erkannten Lebensräume durchzusetzen.

L. Tiefenbacher

47. Kerry, K. R. & G. Hempel (eds.): Antarctic Ecosystems. Ecological Change and Conservation. - Springer Verlag, Berlin, Heidelberg, 1990. XII + 427 S. - ISBN 3-540-52101-1 und ISBN O-387-52101-1.

Vom 29. August bis 3. September 1988 wurde unter der Schirmherrschaft des Scientific Committee on Antarctic Research (SCAR) am University Centre der Universität von Tasmanien in Hobart, Australien, ein Symposium unter dem Thema "Ecological Change and the Conservation of Antarctic Ecosystems" veranstaltet, das 5. Symposium in einer Reihe. Im Vordergrund standen hier die kurz- und langzeitlichen Veränderungen im Ökosystem, die durch die Natur und den Menschen verursacht werden. Die Kenntnis dieser Veränderungen trägt zum Verständnis der ökologischen Prozesse bei, die sich in einer sich verändernden Umwelt und bei der Variabilität der ökologischen Faktoren ereignen, und sie ist wichtig für eine Entwicklung realistischer Überwachungsstrategien und beim Erkunden von Schutzpraktiken. Von den 80 Vorträgen und 93 Posterdemonstrationen dieses Symposiums sind im vorliegenden Band 45 abgedruckt. Alle übrigen wurden in wissenschaftlichen Zeitschriften wir POLAR BIOLOGY und ANTARCTIC SCIENCE veröffentlicht. Die Beiträge sind im vorliegenden Band unter den Hauptkapiteln eingeordnet: "Lang- und mittelfristige Änderungen der antarktischen Umwelt", "Jahreszeitliche Wechsel in den Meereiszonen und vor South Georgia", "Ökologische Veränderungen und Veränderungen der Population bei Seevögeln und Meeressäugern", "Gegenwärtige und mögliche Fischerei", "Einwirkung des Menschen auf die terrestrischen und marinen Systeme". Der Band ist für alle, die sich mit der Antarktis beschäftigen, unverzichtbar. Ökologen werden ihn als eine Fundgrube schätzen.

L. Tiefenbacher

48. Kaas, P. & R. A. Van Belle: Monograph of Living Chitons. Vol. 5. Additions to Vol. 1-4. - Brill, Leiden, New York, Köln, 1994. 402 S.

Der ganze Band besteht aus Ergänzungen zu den Bänden 1-4, die als Monographie über Chitonen von 1985 an erschienen sind. Die einzelnen Arten werden nach dem bewährten Schema abgehandelt: Ort, an dem der Typus aufbewahrt wird, Typus-Lokalität, Synonymie, Beschreibung und Verbreitung. Außerdem sind die Arten unter den jeweiligen Faunenregionen, in denen sie vorkommen, zusammengefaßt. Am Schluß ist ein Verzeichnis der Abkürzungen der Aufbewahrungsorte des Typenmaterials angeführt. Es folgen ein ausführliches Literaturverzeichnis und Verbreitungskarten einiger Arten. Wer die ersten vier Bände besitzt, wird sich wohl auch diesen Ergänzungsband anschaffen müssen.

R. Fechter

SPIXIANA	18	3	283–319	München, 01. November 1995	ISSN 0341–8391

The pipunculid flies of Israel and the Sinai

(Insecta, Diptera, Pipunculidae)

By **Marc De Meyer**

De Meyer, M. (1995): The pipunculid flies of Israel and the Sinai (Insecta, Diptera, Pipunculidae). – Spixiana **18/3:** 283-319

The pipunculid fauna of Israel and the Sinai is revised. In total, 45 species are recorded from this area and 18 species are described as new to science: *Eudorylas ascitus, E. flavicrus, E. imitator, E. sinaiensis, Tomosvaryella argyrata, T. argyratoides, T. inermis, T. israelensis, T. debruyni, T. docta, T. freidbergi, T. inopinata, T. jubata, T. nodosa, T. parakuthyi, T. pusilla, T. sedomensis,* and *T. trichotibialis. Eudorylas lini* (Hardy) is considered a junior synonym of *Eudorylas confusoides* (Lamb). The female of *Cephalops conjunctivus* is recorded for the first time. Lectotypes and paralectotypes are designated for *T. helwanensis* (Collin) and *T. dentiterebra* (Collin). Identification keys for the males of the genera *Eudorylas* and *Tomosvaryella* are provided. The zoogeographical relationship of the pipunculid fauna is briefly discussed.

Marc De Meyer, National Museums of Kenya, Dept. Invertebrate Zoology, P.O. Box 40658, Nairobi, Kenya.

Introduction

Pipunculidae are small inconspicuous flies, closely related to hoverflies (Syrphidae). They can be differentiated from the latter by the wing venation (no vena spuria) and the large compound eyes occupying most of the hemispherical head. During their larval stage they are parasitoids of Auchenorrhyncha (Homoptera).

European Pipunculidae have been the topic of recent revisions (Albrecht 1990, De Meyer 1989a, Jervis 1992). Nevertheless, the Mediterranean fauna is still poorly studied (De Meyer 1992b). Around the beginning of this century, Becker described several species from the Mediterranean area (Becker 1903, 1910, 1921). Later, only a few fragmentary works were published on limited collections of this region (Coe 1969, Collin 1948, 1958, Janssens 1955). No comprehensive study of the Israel fauna has been undertaken before. The only records are in Bodenheimer (1937) where four pipunculid species are reported: *Eudorylas trochanteratus* (Becker), *Tomosvaryella frontata* (Becker), *T. subvirescens* (Loew), under the junior synonym of *T. pilosiventris* (Becker), and *T. vicina* (Becker).

Material and methods

The present study is based on a collection from the Tel Aviv University and kindly put at my disposal by Dr. Amnon Freidberg. It comprises about 800 specimens, collected over the last 50 years (with emphasis on the last two decennia). Most material was collected in Israel, including the occupied territories of Golan Heights and West Bank, as well as from the Sinai Desert (now Egypt). Material from the former places is listed under Israel with mention of the occupied zone, while material from the Sinai is listed under Egypt.

In addition type material and other specimens for comparison were kindly put at my disposal by the following institutions: Zoologisches Museum der Humboldt Universität, Berlin, Germany (MNHU);

Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussel, Belgium (KBIN); Museum of Comparative Zoology, Cambridge, USA (MCZ); Natal Museum, Pietermaritzburg, South Africa (NMP); Bishop Museum, Honolulu, Hawaii (BPBM); Natural History Museum, London, Great Britain (NHM); Slovak National Museum Bratislava, Slovakia (SNMB); and Zoologisch Museum, Amsterdam, the Netherlands (ZMA).

Only new species are described in detail. For others, a short diagnosis is given. In case a recent revision is available, reference is made to this work: Jervis (1992) for European *Chalarus*; De Meyer (1993) for Afrotropical *Tomosvaryella* (including several species also found in Israel and the Sinai); and De Meyer (1989a) and Ackland (1993) for West Palaearctic *Cephalops*. For the identification of *Eudorylas* spp., use was made of an unpublished manuscript by Mr. M. Ackland (Oxon) which provides a key and detailed illustrations of the British species of this genus. The manuscript was kindly put at my disposal by the author and will hereafter be referred to as Ackland (MS).

List of species

The species are listed alphabetically within each genus. For the arrangement of supraspecific taxa, Rafael & De Meyer (1992) is followed.

Chalarinae

Chalarus fimbriatus Coe, 1966

Diagnosis. Frons without fronto-orbital setae. Eyes moderately convergent. Hind femora without long and curved apical seta of posterodorsal/dorsal row. Abdomen narrow; lateral fan with long bristles. All ♀ pulvilli of same length.

Material. Israel: 27 specimens from the following localities: Ani'am (occ. Golan Heights); Panyas (occ. Golan Heights); Bar'am; Dan; Har Dov; Mahanayim; Monfort; Har Hermon (occ. Golan Heights); Park HaYarden; Tarqumiya; Up. W. Faria (occ. West Bank); W. Kelt (occ. West Bank) (all TAU).

Discussion. Jervis (1992) gives a detailed redescription of this species in his revision of European *Chalarus*, with illustrations for the major characters. The species is mainly reported from West and Central Europe.

Chalarus juliae Jervis, 1992

Diagnosis. Frons without fronto-orbital setae. Eyes moderately convergent. Hind femora with long and curved apical seta of posterodorsal/dorsal row present. Abdomen narrow; lateral fan with long bristles. ♀ pulvilli on four anterior legs longer than those on hind legs. Front ommatidial facets greatly enlarged.

Material. Israel: Panyas (occ. Golan Heights), 3♀♀, 10.VII.1975; 1♂, 9.VI.1976; 1♀, 13.VI.1982; 2♂♂, Mt Hermon (occ. Golan Heights), 31.VIII.1984; 1♀, Neve Ativ, 28-29.VIII.1981, all A. Freidberg (TAU).

Discussion. This species was recently described from France (Jervis 1992). It is clearly differentiated from other *Chalarus* species by the long and curved apical seta of the posterodorsal/dorsal row on hind femora. Diagnostic characters are illustrated in Jervis (1992). The species is further reported from England, Finland, Russia and Sweden.

Chalarus spurius (Fallén, 1816)

Diagnosis. Frons without fronto-orbital setae. Eyes strongly convergent. Hind femora without long and curved apical seta of posterodorsal/dorsal row. Abdomen broad; lateral fan with shorter bristles. ♀ eyes weakly convergent. All pulvilli of same length.

Material. Israel: Panyas (occ. Golan Heights), 2♀♀, 10.VII.1975; 1♀, 28.VI.197, A. Freidberg; 1♀, Bar'am, 3 km SE, 20.VIII.1990, A. Freidberg; 1♀, Dan, 21.VII.1983, I. Nussbaum; 1♀, Tel Dan, 18.VI.1971, Kugler; 1♀, Up. W. Faria (occ. West Bank), 28.IV.1976, M. Kaplan. – Lebanon: 1♀, Mt Baruh, 9.IX.1984, I. Nussbaum (all TAU).

Discussion. Probably one of the most widespread *Chalarus* species with perhaps a cosmopolitan distribution. Jervis (1992) however points out that several of the records from regions outside Europe are questionable.

General remark. Jervis (1992) made a revision of this genus, with emphasis on the European fauna. Still, several taxonomic and identification problems are unresolved (like number of forms only partly related to described species, inadequate association of males with females). Therefore, the identifications are somewhat tentative. Further in depth study of the genus on a wider basis could cause changes. In addition 9 *Chalarus* specimens could not be identified to species level.

Verrallia aucta Fallén, 1817

Diagnosis. Vein M1+2 with appendix. One pair of ocellar bristles present. Second antennal segment with numerous dark bristly hairs below and above. All femora without warts beneath. Thorax and abdomen dark; scutellum with long dark bristles along apical margin.

Material. Israel: 1♂, Panyas, 16.IV.1992, A. Freidberg (TAU).

Discussion. *Verrallia aucta* is the only species of this genus occurring in the West Palaearctic region. It can be readily differentiated from members of the closely related genus *Jassidophaga* by the presence of an appendix in vein M1+2 in *Verrallia* (sometimes both taxa are considered as one genus, but see Rafael & De Meyer 1992). *V. aucta* is widely distributed over Europe and one of the more common pipunculid species. Genitalia of both sexes are illustrated in Coe (1966).

Pipunculinae

Cephalopsini

Cephalops conjunctivus Collin, 1958

Diagnosis. Frons completely silver-grey; third antennal segment acute, black-brown. Humerus dark; scutellum with long pale hairs. Legs mainly dark, knees yellow; hind tibiae with 3 erected anterior bristles in median part. Cross-vein r-m placed at basal third till fourth of discal cell. Abdomen shining black, elongated, with long pale hairs. Membraneous area not reaching epandrium.

The ♀ resembles the ♂ in most respects except for the following characters. Third antennal segment somewhat longer acuminate. Frons silver-grey pubescent except in upper part shining black in front of ocellar triangle. Tibiae more yellowish. Ovipositor with base broad and long, piercer shorter than base, straight (Fig. 7a).

Material. Croatia: 1♂, Dalmatia, Korcula (east end), 22-27.V.1955, R. Coe (holotype) (NHM). – Israel: 2♂♂, Hefa, 18.IV.1992, A. Freidberg; 1♂, Majdel Chams (occ. Golan Heights), 14.X.1982, F. Kaplan; Mt Meiron, 1♀, 18.IX.1976; 1♂ 1♀, 30.IX.1976; 1♀, 10.IX.1981 (all A. Freidberg); 1♀, Mt Hermon (occ. Golan Heights), 2000 m, 8.IX.1971, Kugler (all TAU).

Discussion. A detailed redescription of the ♂ holotype is given in De Meyer (1989a). The ♀ was unknown up till now. *C. conjunctivus* is clearly a mediterranean species, known from the former Yugoslavia (now Croatia), and Spain (De Meyer 1992b). It is closely related to some Afrotropical representatives of the *aeneus* group within *Cephalops* (see De Meyer 1992a).

Cephalops perspicuus (de Meijere, 1905)

Diagnosis. ♂, frons silver-grey pubescent with small shining median patch; third antennal segment short acute, yellow. Humerus dark; scutellum with short pale hairs along apical margin. Legs mainly yellow; hind tibia with few weakly suberected anterior hairs in median part. Cross-vein r-m placed

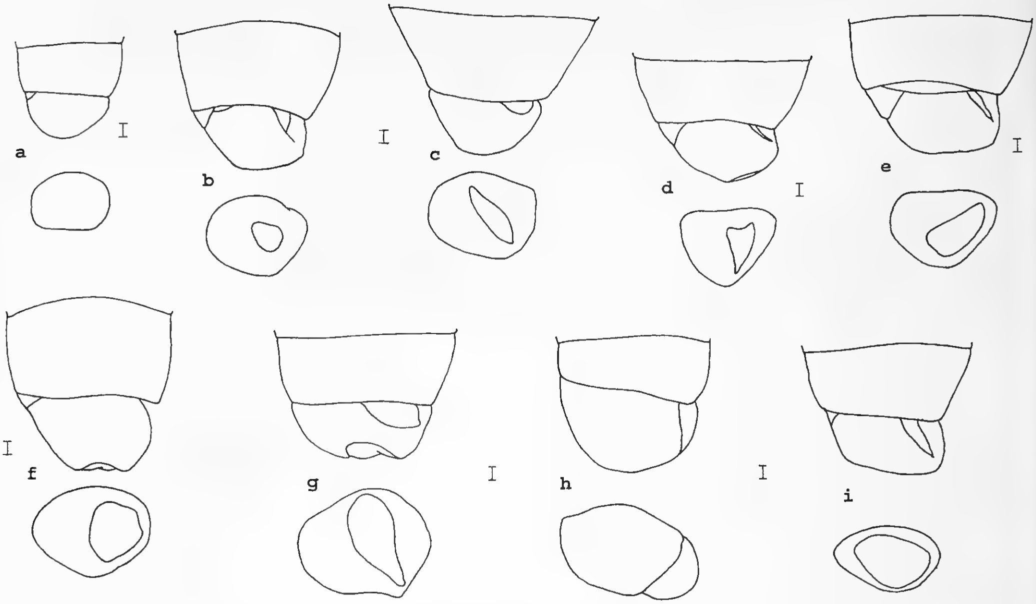


Fig. 1. ♂ tergum 5 and sternum 8 in dorsal view (above) and distal view (below). a. *Eudorylas confusoides*. b. *E. fluviatilis*. c. *E. halteratus*. d. *E. obliquus*. e. *E. longifrons*. f. *E. pannonicus*. g. *E. setosus*. h. *E. trochanteratus*. i. *E. zermattensis*. Scale 0.1 mm.

near middle of discal cell. Abdomen short, subshining black-brown, terga 2-4 with not clearly defined yellow markings along lateral margins, markings can be variable. Membraneous area reaching epandrium. ♀, frons silver-grey pubescent except for shining part in front of ocellar triangle.

Material. The Netherlands: Bussum, 1♂, 1.VIII.1902, de Meijere (holotype) (ZMA). – Israel: Herzliyya, 1♀, 10.IV.1982; 1♀, 26.V.1982, A. Freidberg (TAU).

Discussion. A detailed redescription of both sexes is given in De Meyer (1989a), with illustrations of ♂ and ♀ terminalia. Ackland (1993) gives additional and excellent diagnostic figures. *C. perspicuus* is a West-Palaearctic species, occurring all over Europe except the northern part. No records are known from the Mediterranean area. The specimens from Israel (two females) seem to correspond to this species albeit the yellow markings on the abdominal segments are quite obscure. The shape of the ovipositor however, with the long thin piercer curved upwards, is conspecific.

Eudorylini

Key to ♂♂ of *Eudorylas*

1. Abdominal sternum 8 without membraneous area (sometimes slight depression present distally but no true membraneous area) (Figs 1a, 1h, 4-6) .... 2.
– Abdominal sternum 8 with membraneous area (Figs 1b-g, 1i, 2, 3) .... 6.

2. Smaller species (<2.5 mm). Eyes not touching. Abdominal sternum 8 small, in dorsal view at most as long as tergum 5 (Fig. 1a). Pterostigma very obscure, seemingly missing .... *E. confusoides*
– Larger species (>2.8 mm). Eyes touching. Abdominal sternum 8 very large, about twice as long as tergum 5 (Figs 1h, 4-6). Pterostigma always distinct .... 3.

3. Epandrium in dorsal view clearly visible, occupying right side of sternum 8 (giving the impression of a dorsal suture on the right side of sternum, fig. 1h). Hind trochanter with dark spiny bristles .... *E. trochanteratus*

– Epandrium not visible in dorsal view; sternum 8 without suture (Figs 4-6). Hind trochanter without spiny bristles .... 4.

4. In dorsal view, sternum 8 truncated to right side. Inner surstylus ankyroid in lateral view (Fig. 5) .... *E. ruralis*

– In dorsal view, sternum 8 evenly rounded distally. Inner surstylus without hook distally (Figs 4, 6) .... 5.

5. Apical part aedeagus in ventral view slender, with subparallel lateral margins. Surstyli asymmetrical, inner surstylus basally broadened (Fig. 6) .... *E. sinaiensis*

– Apical part aedeagus in ventral view broad, broadening basally. Surstyli subsymmetrical, inner surstylus without broadened base (Fig. 4) .... *E. imitator*

6. Apical margin of scutellum with conspicuous long dark bristles .... *E. setosus*

– Apical margin of scutellum without long bristles, at most short dark or palish hairs .... 7.

7. Posteroventral spurs on four anterior tibiae absent. Legs mainly dark with only knees narrowly brownish yellow. Membraneous area running obliquely along sternum 8 (Fig. 1c) .... *E. halteratus*

– Posteroventral spurs present. Legs with at least tibiae partly yellow (except for *E. zermattensis*). Membraneous area different .... 8.

8. Legs completely yellow .... *E. flavicrus*

– Tibiae and/or femora at least partly darkened .... 9.

9. Membraneous area small and elongated (Fig. 2). Base of hind femur dark .... *E. ascitus*

– Membraneous area much larger. Base of hind femur dark or yellow .... 10.

10. Membraneous area of roundish shape (Figs 1b,f) .... 11.

– Membraneous area of different shape (Figs 1d,e,i) .... 12.

11. Membraneous area larger, occupying almost half of sternum 8 in distal view (Fig. 1f). Base of hind femur dark .... *E. pannonicus*

– Membraneous area smaller, occupying at most one fourth of width (Fig. 1b). Base of hind femur usually yellow (sometimes obscurely so) .... *E. fluviatilis*

12. Membraneous area roughly triangular, much higher than wide (Fig. 1d). Base of hind femur yellow .... *E. obliquus*

– Membraneous area wider, not triangular shaped. Base of hind femur dark (Figs 1e,i) .... 13.

13. Tibiae mostly dark; hind tibia without suberected anterior bristle in median part. Membraneous area directed subventrally (Fig. 1i) .... *E. zermattensis*

– Tibiae only darkened medially, margins yellow; hind tibia with suberected anterior bristle in median part. Membraneous area directed to right side of sternum 8 (Fig. 1e) .... *E. longifrons*

Eudorylas ascitus, spec. nov.

Fig. 2

Types. Holotype: ♂, Israel, Haifa, 1.X.1978, A. Freidberg (TAU). – Paratype: 1♂, Israel, Nahal, Deragot, 25.III.1987, F. Kaplan (TAU).

Description

♂. Body length: 2.99-3.20 mm. Wing length: 3.06-3.13 mm.

Head. Third antennal segment acuminate, yellow-brown. Eyes. touching for distance equal to twice ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput greyish pubescent, upper part greyish-brown.

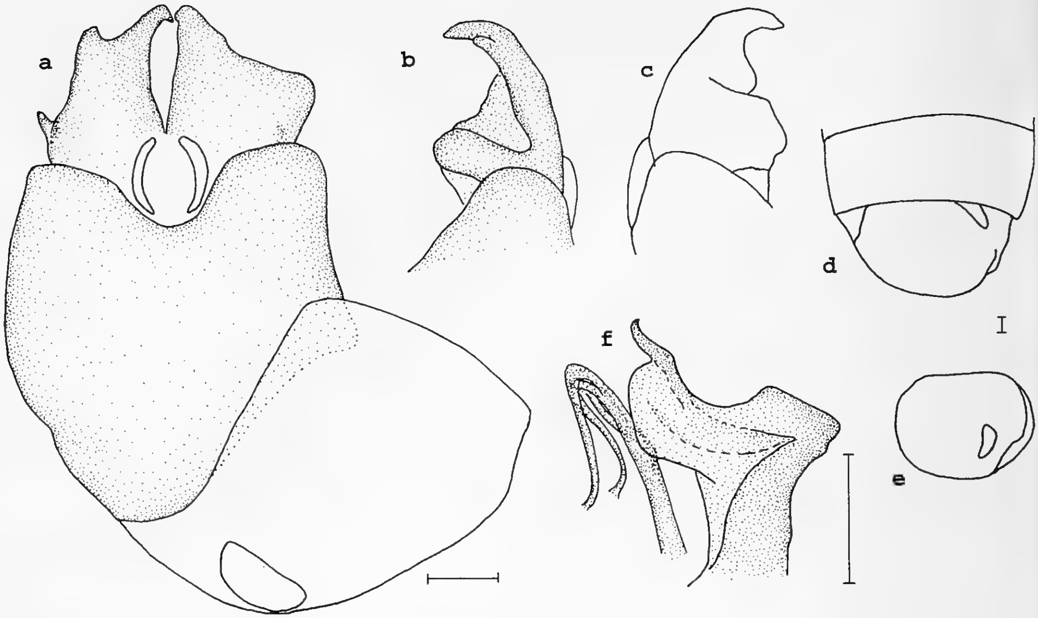


Fig. 2. *Eudorylas acitus*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus and ejaculatory duct, lateral. Scale 0.1 mm.

Thorax. Humerus yellowish. Mesonotum subshining black-brown; brownish dusted, anterior part greyish dusting. Scutellum subshining black, greyish dusted; on disc brownish. Halter yellow-brown. Wing: Fourth costal section about as long as third costal section. Cross-vein r-m at basal third of discal cell. Legs: Femora dark, apical margin narrowly yellow. Tibiae yellow, at least on dorsal part; more or less darkened in median part, especially in hind leg. Tarsal segments yellow to yellowish brown, last tarsal segment darker. Anterior four tibiae with apical spur present.

Abdomen. Lateral fan with 1-2 dark bristly hairs. Abdominal terga subshining black-brown, brownish dusted, tergum 1 greyish dusted. Lateral margins also greyish dusted, extending towards middle posteriorly. Sternum 8 subshining black-brown, greyish brown dusted. In dorsal view, sternum 8 slightly longer than tergum 5. Membraneous area small. Terminalia fig. 2.

♀ unknown.

Etymology. From the Latin 'ascitus' meaning alien or foreign and referring to the unknown relationship with other European *Eudorylas* species.

Discussion. This species has yellow humeri and the base of the femora dark. It does not seem to show a close relationship with any of the other *Eudorylas* species found in Israel or Europe. Especially the enlarged and twisted ejaculatory duct is unlike any of those found in European representatives of the genus.

Eudorylas confusoides (Lamb, 1922)

Eudorylas lini (Hardy, 1971) (**syn.nov.**).

Diagnosis. ♂ eyes not touching. Humerus dark, above slightly paler than centre mesonotum. Pterostigma barely coloured except extreme tip; cross-vein r-m at basal fifth to sixth of discal cell. Femora dark at base. Membraneous area absent. ♀ frons broad and shining black, except above antennae silver-grey pubescent. Pulvilli about as long as last tarsal segment. ♂ terminalia Fig. 1a.

Material. Seychelles: 1♂, Mahe, near Morne Blanc (syntype *E. confusoides*) (NHM). – Philippines: 2♂♂ 1♀, Palawan, 13 km N of Puerto Princesa (♂ holotype, ♀ allotype and ♂ paratype *E. lini*) (BPBM). – Taiwan: 2♂♂, N. Taiwan, Taipei (paratypes) (BPBM). – La Reunion: 5 specimens from Ligne Paradis, St. Pierre, reared from *Cicadulina mbila*, B. Reynaud (KBIN). – Israel: 19 specimens from the following localities: Elot; Hadera; Herzliyya; Jeruzalem, Mt Scopus; Kfar Rugin; Kiryat Gat; Yasur (TAU).

Discussion. Lamb originally placed this species in *Dorylomorpha* because of the obscure pterostigma and the position of the cross-vein r-m. Albrecht (1990) in his revision placed the species in *Eudorylas* and suggested it is related to *E. fusculus*. Both are indeed small pipunculids without a membraneous area on the abdominal 8th sternum. The surstyli are somewhat similar except that the outer surstylus in *confusoides* is much more elongated. The ejaculatory duct structure is however distinctly different.

Albrecht (1990) also placed the Oriental *E. lini* (Hardy, 1971) under the genus *Eudorylas*. Study of type material of both species has shown them to be synonymous.

I am not sure of the generic position of this species. The shape of the discal cell could suggest a relation with the genus *Microcephalops* De Meyer (1989b) but other characteristics for this genus (like the swollen frons and narrowed face) are missing. Since *E. confusoides* and *E. lini* have shown to be identical, the distribution makes more sense. It seems to be a mainly Oriental species, also occurring on islands in the Indian Ocean and now reported from Israel. So far, it has not been found on the African mainland.

The author recently received material from la Reunion where the species was found in rearing cages of *Cicadulina mbila* (Cicadellidae). This cicadellid, the transmitter of Maize Streak Virus, is also known from mainland Africa (Reynaud 1988). In addition the species is reported from paddy fields in the Oriental region (Hardy 1971, Yano et al. 1984) and seems to be associated with the rice leafhopper (*Nephotettix*).

Eudorylas flavicrus, spec. nov.

Fig. 3

Types. Holotype: ♂, Israel, Elat, 4.V.1986, F. Kaplan (TAU).

Description

♂. Body length: 3.5 mm. Wing length: 4.0 mm.

Head. Third antennal segment long acute, yellow. Eyes touching for distance equal to three times ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput greyish pubescent, upper part greyish-brown.

Thorax. Humerus yellow. Mesonotum mainly brownish dusted, anterior part narrowly greyish dusted. Scutellum with greyish brown dusting. Halter yellow. Wing: Fourth costal section about 1.5 times as long as third costal section. Cross-vein r-m at basal two-fifths of discal cell. Legs: mainly yellow; femora darkened in median part, especially dorsally; last tarsal segment dark. Anterior four tibiae with apical spur present.

Abdomen. Lateral fan with 2-3 dark bristles. Abdominal terga weakly subshining black-brown; brownish dusted, tergum 1 wholly and lateral margins of other terga greyish dusted, posteriorly extending towards middle. In dorsal view, sternum 8 about as long as tergum 5. In distal view, membraneous area very small, elongated. Terminalia Fig. 3.

♀ unknown.

Etymology. Refers to the almost completely yellow legs.

Discussion. *E. flavicrus*, spec. nov. clearly belongs to the *Eudorylas* species group with humeri and base of the femora yellow. The small size of the membraneous area, and the shape of the surstyli are somewhat similar to those found in the European *E. subterminalis* Collin, but the apical part of the aedeagus is clearly differently formed.

Eudorylas fluviatilis (Becker, 1900)

Diagnosis. Humerus yellow. Base of hind femur yellow, sometimes not distinctly so. Tibiae mainly yellow. Abdominal sternum 8 about as long as tergum 5; membraneous area small and roundish. ♀ anterior tarsi with pulvilli very long (three times as long as last tarsal segment). Frons completely

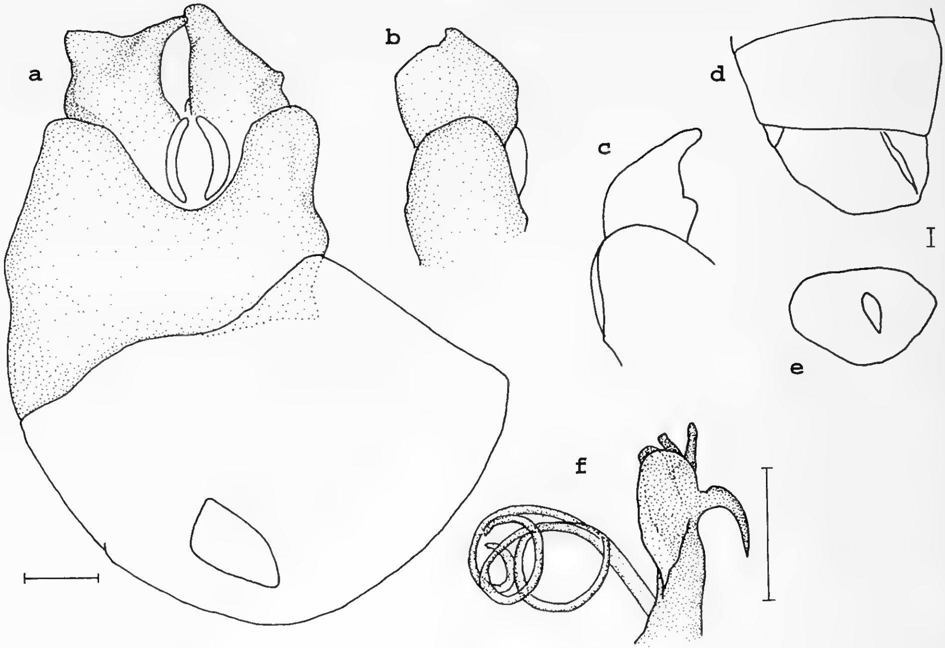


Fig. 3. *Eudorylas flavicrus*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus and ejaculatory duct, lateral. Scale 0.1 mm.

greyish pubescent, although thinly so in front of ocellar triangle. ♂ terminalia Fig. 1b.

Material. Israel: 149 specimens from the following localities: Ashdod; Panyas (occ. Golan Heights); Bet Dagan; Har Karmel; Jisr Damiya; Dor; Ga'ash; Haifa; Mt Hermon (occ. Golan Heights); Hefa; Herzliyya; Kalia; Kerem Shalom; Ma'agam Michael; Oamiya; Pal machim; Tel Aviv; Wadi Kabala, Judean Hills.

Discussion. Clearly a species with Mediterranean and western Asian distribution. It is reported from the Canary Islands, Egypt, and the South European Territory of the former USSR (Tanasijtshuk 1988). It is unknown from any other region in the West-Palaearctic and does not seem to be related to any of the other European *Eudorylas* species.

Eudorylas halteratus (Meigen, 1838)

Diagnosis. Humerus black. Third antennal segment short acute, black. Legs mainly black, with knees narrowly brownish yellow. Four anterior tibiae without posteroventral spur apically. Abdomen dark, lateral margins greyish dusted. Membraneous area narrow and elongated. Terminalia Fig 1c.

Material. Israel: 1♂, Mt Hermon (occ. Golan Heights), 1700 m, 7.VII.1987, A. Freidberg (TAU).

Discussion. *Eudorylas halteratus* is one of the two European *Eudorylas* species without posteroventral spurs. It seems to be uncommon but widespread in West and Central Europe (maybe also found in Sweden).

Eudorylas imitator, spec. nov.
Figs 4, 7b

Types. Holotype: ♂, Israel, Tirat Zvi, 11.V.1984, A. Freidberg (TAU). – Allotype: ♀, same locality and date as holotype (TAU). – Paratypes: Israel: 1♂, same locality and date as holotype; Mt Hermon (occ. Golan Heights): 1♂, 2.VIII.1982, F. Kaplan; 1♂, 18.VII.1972, M. Kaplan; 1♀, 7.VII.1987, F. Kaplan; 1♀, 13.VIII.1973, A. Freidberg; 1♀, 28.VI.1971, Kugler; 1♂ 2♀♀, Panyas (occ. Golan Heights), 13.VI.19 82, A. Freidberg; 1♂, Nahal Tut, 18.V.1982,

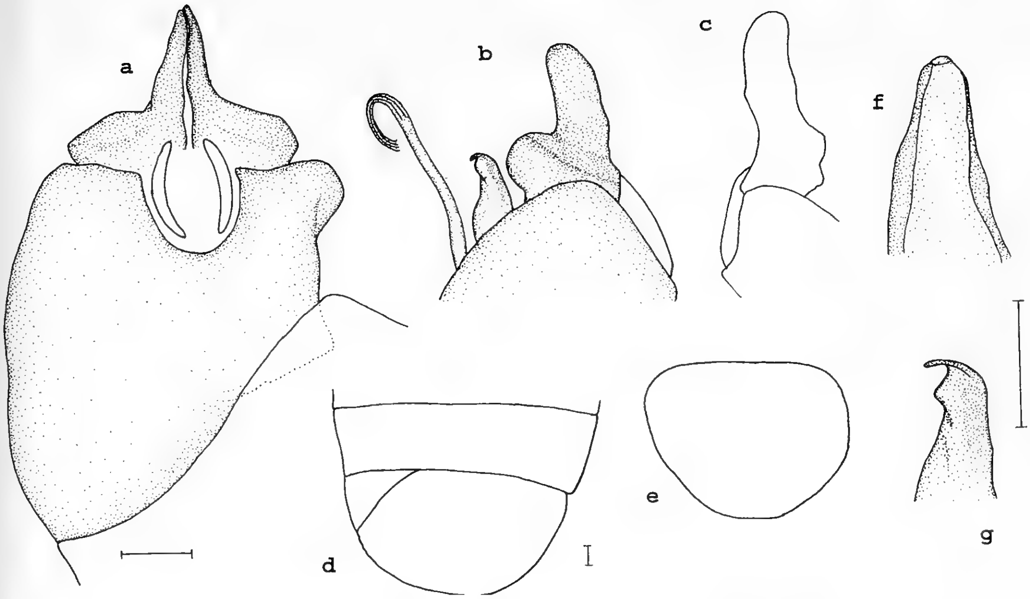


Fig. 4. *Eudorylas imitator*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus with aedeagus and ejaculatory duct, lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus ventral; g. aedeagus, lateral. Scale 0.1 mm.

A. Freidberg; 1♂, Hazeva, 21.IV.1981, F. Kaplan; 1♂, Jeruzalem, Mt Scopus, 1.IX.1930, O. Theodor; 1♂, Hamat Gader, 1.VI.1986, A. Freidberg; 1♂, Sderot, 27.II.1974, A. Freidberg; 1♂, Qusbiye, 14.III.1975, A. Freidberg; 1♂, Yizre'el, 7.VII.1973, M. Kaplan (all TAU).

Additional Material. One ♂ specimen of unknown locality also belongs here. It is not included in the type series. Type material returned to TAU, except 6 paratypes deposited in collection KBIN.

Description

Body length: 3.06-3.88 mm. Wing length: 3.26-4.08 mm.

♂. Head. Third antennal segment acuminate; brownish, with apical tip whitish. Eyes touching for distance equal to twice ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput greyish pubescent, upper part less densely greyish-brown.

Thorax. Humerus pale yellowish. Mesonotum weakly subshining black-brown; mainly brownish dusted, anterior part more greyish dusting. Scutellum subshining black, greyish brown dusted; along apical margin with short dark hairs. Halter yellow-brown. Wing: Fourth costal section about as long as third costal section. Cross-vein r-m at basal third of discal cell. Legs: Dark, with knees and basal third of tibiae yellow. Anterior four tibiae with apical spur present. Sometimes legs more yellowish brown in general colour.

Abdomen. Lateral fan with 2-3 dark bristles. Abdominal terga subshining black-brown; brownish dusted, tergum 1 wholly and lateral margins of other terga extensively greyish dusted especially tergum 5. Sternum 8 mainly subshining black-brown, weakly greyish brown dusted. In dorsal view, about twice as long as tergum 5; evenly rounded apically. Membraneous area absent. Terminalia Fig. 4.

♀♀ do not seem to be different from those of *E. ruralis*. Only ♀ specimens that were associated with ♂♂, are included in the type series. Others are listed separately under *E. ruralis* (see below). As ♂ except for following characters. Third antennal segment longer acuminate, more palish white along apical margin. Frons silver-grey dusted above antennae, gradually becoming more shining black upwards. Pulvilli slightly longer than last tarsal segment. Terminalia Fig. 7b.

Etymology. Refers to the similarity with *E. ruralis*.

Discussion. This new species belongs to a complex of three species: *E. ruralis*, *E. sinaiensis*, spec. nov., and *E. imitator*, spec. nov. It shows the rounded apical margin of eight sternum like in

E. sinaiensis but the apical part of the aedeagus is broader in ventral view and the shape of the surstyli is slightly different. As indicated above, the ♀♀ cannot be distinguished from those of *E. ruralis*.

Eudorylas longifrons Coe, 1966

Diagnosis. Third antennal segment brownish. Humerus yellow. Base of hind femur dark. Tibiae mainly yellow, with median bristle. Membraneous area large, narrowing towards right margin. ♂ terminalia Fig. 1e.

Material. Israel: 1♂, Har Karmel, 27.V.1974, A. Freidberg; 3♂♂, W. Nemrod, 10.VI.1976, A. Freidberg (TAU).

Discussion. This is an uncommon species of which the distribution is not well known. So far, it is only reported from Belgium, the former Czechoslovakia, and Great Britain. Possibly it is much more widespread. The aedeagus in the Israel specimens is slightly different from the one illustrated by Ackland (MS, based on British material) by being much longer. Otherwise no differences could be detected.

Eudorylas obliquus Coe, 1966

Diagnosis. Humerus yellow. Base of hind femur yellow. Tibiae mainly yellow. Membraneous area roughly triangular, higher than wide and confined to right side of abdominal sternum 8. ♀ ovipositor base with unequal lobes, right one being larger than the left. ♂ terminalia Fig. 1d.

Material. Israel: 58 specimens from the following localities: Panyas (occ. Golan Heights); Bar'am; Har Karmel; Daliyya; En Te'o; Givat Brenner; Herzliyya; Kiryat Gat; Lahav; Mahamayim; K. Meiron; Nahal Qumeran; K. Nahum; Nashonim; Park HaYarden; Ramat Chen; Lower Nahal Amud, Zomet Koah; Up. N. Amud.

Discussion. This species is mainly reported from western Europe. In addition, records are known from the former Czechoslovakia, and Italy (De Meyer 1992b). The species is very similar to *E. jenkinsoni* Coe but can be differentiated by small differences in the ♂ genitalia (Ackland, MS).

Eudorylas pannonicus (Becker, 1898)

Diagnosis. Humerus yellow. Base of hind femur dark. Tibiae mainly dark, at least in median part. Membraneous area medium size, roundish. ♀ body mainly greyish dusted. Tarsal segments with long conspicuous black bristles. ♂ terminalia Fig. 1f.

Material. Israel: 1♂, Nahal Qetura, 2.V.1986, A. Freidberg; 1♂, Ein Mur, 30.X.1984, A. Freidberg; 1♂, Palestine, Gwulot, 21.X.1954, O. Theodor; 1♀, Ein Gedi, 20.I.1976, Kugler; 1♀, Ein Feshkha, 22.XI.1976, A. Freidberg; 1♀, Neot Hakikaz, 20.V.1974, A. Freidberg; 1♀, West Negev, En HaMe'ara [small spring near Har Loz, Central Negev, according to A. Freidberg pers. comm.], 24.X.1984, A. Freidberg. – Egypt: 1♂ 1♀, Sinai, Qzaima, 1.VII.1972, A. Freidberg (all TAU).

Discussion. This species is mainly recorded from the Mediterranean region and Central Europe (De Meyer 1992b). The females can be readily recognized from any other *Eudorylas* by the long conspicuous bristles on the tarsal segments. The males have a simple, subsymmetrical pair of surstyli, unlike any of the other *Eudorylas*.

Eudorylas ruralis (Meigen, 1824)

Diagnosis. Head: third antennal segment brown, acuminate. Legs dark with basal third of tibiae yellow. Scutellum greyish brown dusted; along apical margin with short pale hairs. Sternum 8 without membraneous area, not evenly rounded, directed to right side. ♀ third antennal segment longer acuminate, with apical margin whitish. Frons silver-grey above antennae till small supraantennal protuberance; upper part gradually more shining black. ♂ terminalia Fig. 5.

Material. 32 specimens from the following localities: Israel: Bar'am; Haifa; Har Meron; Herzliyya; Mt Meiron; Tel Aviv. – Egypt: Sinai, Qzaima (all TAU).

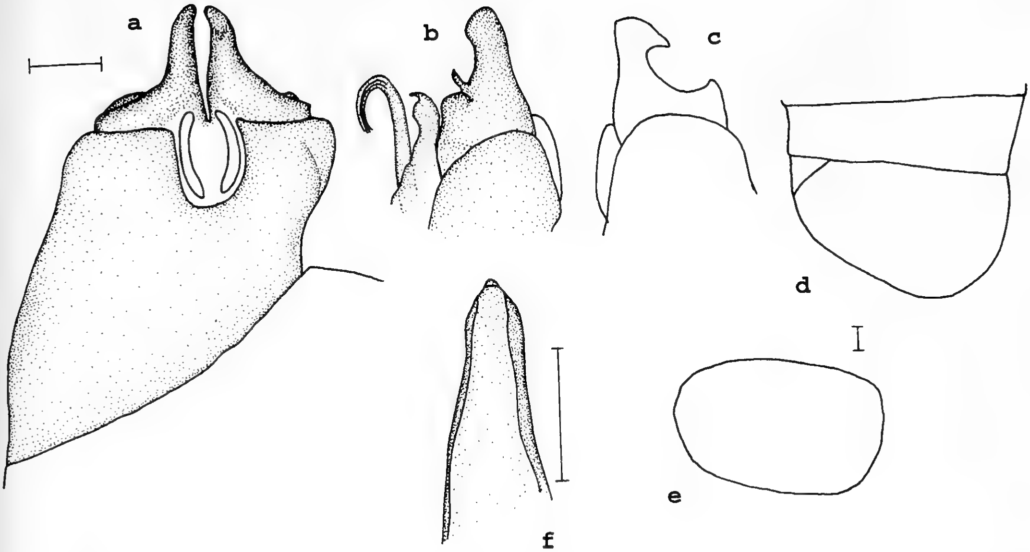


Fig. 5. *Eudorylas ruralis*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus with aedeagus and ejaculatory duct, lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus, ventral. Scale 0.1 mm.

In addition, the following 11♀♀ were not associated with any males. Since the females of *E. ruralis* and *E. imitator*, spec. nov., cannot be differentiated, they are listed here provisionally as *E. ruralis* s.l.: Israel: Park HaYarden, 1♀, 16.XI.1982, I. Yarom; 1♀, 20.VI.1982, A. Freidberg; 1♀, Hefa, 18.IV.1992, A. Freidberg; 1♀, Mt Meron, 10.VI.1987, Yarom & Zvik; 1♀, Nov (occ. Golan Heights), 13.V.1981, A. Freidberg; Ein Gedi, 1♀, 5.III.1981, A. Freidberg; 3♀♀, 13.VII.1987, Yoram & Zvik; 1♀, Ze'elim, 16.VI.1986, F. Kaplan; 1♀, Zelat, 18.VII.1970, Kugler (all TAU).

Discussion. *E. ruralis* can be differentiated from other *Eudorylas* species by the enlarged eight sternum without membraneous area. However, Israeli material comprised two other, closely related species with the same characteristic: *E. sinaiensis*, spec. nov. and *E. imitator*, spec. nov. *E. ruralis* can be differentiated by the hooks on the male surstyli and the shape of the eight sternum. It is a fairly common species, widespread throughout Europe except northern Europe (absent in Fennoscandia and Denmark).

Eudorylas setosus (Becker, 1908)

Diagnosis. Humerus yellow. Scutellum with long black bristles along apical margin. Base of hind femur black. Tibiae mainly darkish. Abdomen black dusted with silvery bands posteriorly. ♀ third antennal segment long filiform. Frons with long median shining black line extending from ocellar triangle till supraantennal tubercle. Tibia less dark. Abdomen greyish brown dusted with lateral margin extensively greyish. ♂ terminalia Fig. 1g.

Material. Israel: Herzliyya, 1♂, 27.VI.1982; 1♀, 10.VII.1982; 1♀, 11.VII.1982; 1♀, 14.VII.1982; 1♀, 18.VII.1982, all A. Freidberg (TAU).

Discussion. *Eudorylas setosus* can be differentiated from any other European *Eudorylas* spp. by the long black bristles along the apical margin of the scutellum. The species was described originally from the Canary Islands and also seems to occur in Spain (Ackland pers. comm.). The drawings of ♂ terminalia, sent to me by Michael Ackland, and based on his specimen from Spain, show however a slightly different shape of surstyli from the specimens of Israel.

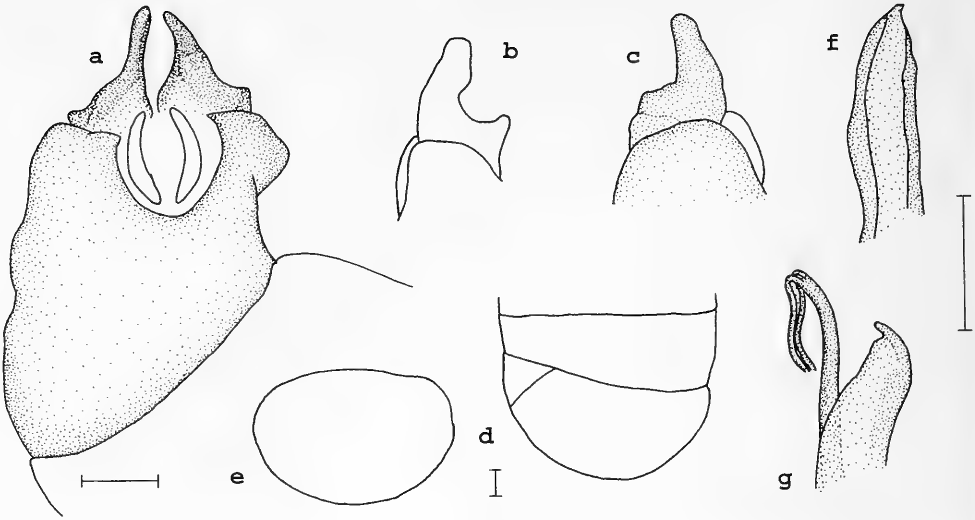


Fig. 6. *Eudorylas sinaiensis*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus, lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus, ventral; g. aedeagus and ejaculatory duct, lateral. Scale 0.1 mm.

***Eudorylas sinaiensis*, spec. nov.**
Figs 6, 7c

Types. Holotype: ♂, Egypt, Sinai, Ofira, 22.III.1981, A. Freidberg (TAU). – Allotype: ♀, same locality and date as holotype. – Paratypes: 8♂♂, 3♀♀, same locality and date as holotype; 1♂, Sinai, Wadi Kid, 13.III.1982, A. Freidberg; 1♂, Sinai, Ein Qsaib, 15.III.1982, A. Freidberg; 2♀♀, Sinai, 20 km N Dahab, 12.III.1982, A. Freidberg (TAU). Type material returned to TAU, except 4 paratypes deposited in collection KBIN.

Description

Body length: 2.86-3.19 mm. Wing length: 3.26-3.74 mm.

♂. Head. Third antennal segment long acuminate, yellow-brown. Eyes touching for distance equal to twice ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput greyish pubescent, upper part greyish-brown.

Thorax. Humerus pale yellowish. Mesonotum weakly subshining black-brown; mainly brownish dusted, anterior part more greyish dusting. Scutellum subshining black, greyish brown dusted; along apical margin with short pale hairs. Halter yellow-brown. Wing: Fourth costal section about as long as third costal section. Cross-vein r-m at basal third of discal cell. Legs: Femora dark, apical margin narrowly yellow. Tibiae yellow, slightly darkened in median part, especially hind tibia. Tarsal segments yellow to yellowish brown. Anterior four tibiae with apical spur present.

Abdomen. Lateral fan with 2-5 dark bristles. Abdominal terga subshining black- brown, brownish dusted, tergum 1 wholly and lateral margins of other terga extensively greyish dusted. Sternum 8 mainly subshining black-brown; weakly greyish brown dusted. In dorsal view, about twice as long as tergum 5; evenly rounded apically. Membraneous area absent. Terminalia Fig. 6.

♀. As ♂ except for following characters. Third antennal segment longer acuminate to filiform, pale yellow. Frons completely silver-grey dusted, except in front of ocellar triangle shining black. Sometimes legs more yellowish and abdomen more extensively greyish dusted. Pulvilli longer than last tarsal segment. Terminalia Fig. 7c.

Etymology. Referring to the type locality, the Sinai desert.

Discussion. As mentioned above, this new species belongs to a complex, together with *E. ruralis* and *E. imitator*. Like *E. imitator*, the apical margin of the eight sternum is rounded. Is can be differentiated from *E. imitator* by the shape of the apical part of aedeagus (slender in ventral view) and the more

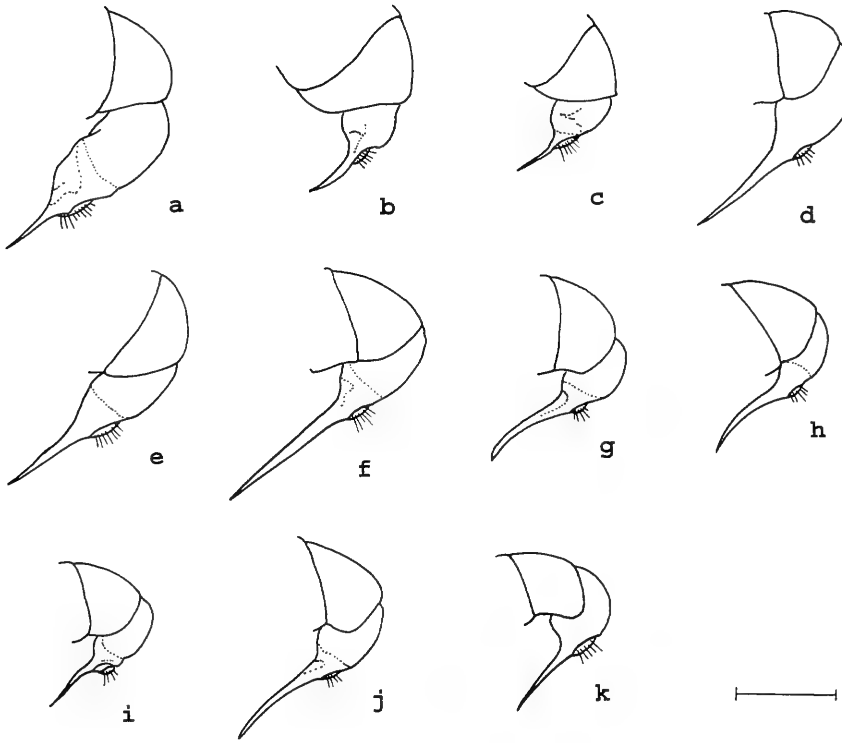


Fig. 7. ♂ terminalia, lateral view. a. *Cephalops conjunctivus*. b. *Eudorylas imitator*. c. *E. sinaiensis*. d. *Tomosvaryella argyratoides*. e. *T. debruyni*. f. *T. docta*. g. *T. freidbergi*. h. *T. israelensis*. i. *T. nodosa*. j. *T. parakuthyi*. k. *T. pusilla*. Scale 0.5 mm.

yellow tibiae. The ♀ can be differentiated from the other two, by the more yellow tibiae and the frons more extensively greyish dusted.

Eudorylas trochanteratus (Becker, 1900)

Diagnosis. Third antennal segment yellow. Humerus yellow. Base of hind femur black. Tibiae yellow with median part darkish. Hind trochanter covered with short black spiny bristles. Abdominal sternum 8 large, swollen, without membraneous area. In dorsal view, epandrium occupying right side of sternum 8. ♀ frons shining black except above antenna. Hind trochanter without spiny bristles. ♂ terminalia Fig. 1h.

Material. Israel: 12 specimens from the following localities: Sedom; Bet She'an Valley; Be'er Sheva; Shivta; N. Bsor; Ze'elim (all TAU).

Discussion. *Eudorylas trochanteratus* resembles *E. ruralis* somewhat, but can be differentiated by the epandrium occupying the right side of the sternum 8 in dorsal view and by the spiny bristles on the hind trochanter. Also, the ♂ terminalia are strongly different. Two ♀ specimens apparently belong to this species (one specimen associated with ♂♂) They are very similar to ♀♀ of the *E. ruralis* complex except for some minor differences in the shape of the ovipositor. The species was described originally from Egypt. Bodenheimer (1937) reported it from Palestina. Albrecht in Hackmann (1980) mentions it from Finland but this seems questionable.

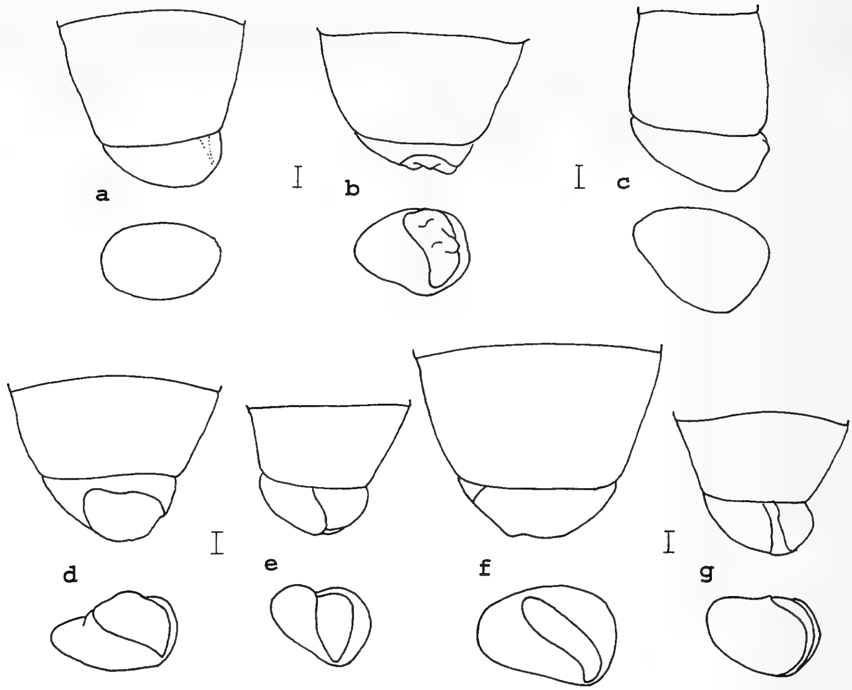


Fig. 8. ♂ tergum 5 and sternum 8 in dorsal view (above) and distal view (below). a. *Tomosvaryella frontata*. b. *T. geniculata*. c. *T. helwanensis*. d. *T. kuthyi*. e. *T. minima*. f. *T. mutata*. g. *T. sylvatica*. Scale 0.1 mm.

Eudorylas zermattensis (Becker, 1898)

Diagnosis. Third antennal segment brown acuminate. Humerus yellow. Legs black, only knees yellow, tarsal segments yellow-brown below. Abdomen subshining black-brown; weakly brownish dusted, lateral margins more greyish dusted, 2nd tergum more densely so. ♂ terminalia Fig. 1i.

Material. Israel: 11 specimens from the following localities: 'Ajav'; Ein Gedi; Herzliyya; Jeruzalem, Mt Scopus; Kalia; Ma'ale Adumim; Majdel Chams (occ. Golan Heights); N. Poleg; Nu'eima; Ze'elim.

Discussion. *Eudorylas zermattensis* is widespread over Europe (De Meyer 1992b) and also reported from Uzbekistan (Kozánek 1988). The apical tip of the aedeagus differs slightly from that in West European material from France (KBIN) and Great Britain (Ackland, MS). I consider the material however conspecific.

Tomosvaryellini

Key to ♂♂ of *Tomosvaryella*

1. Hind trochanter with protuberance .... 2.
– Hind trochanter smooth .... 6.

2. Abdominal terga with conspicuous bristly pilosity. Protuberance of hind trochanter apically covered with short hairs .... 3.
– Abdominal terga without conspicuous bristly pilosity, at most with scatered hairs. Protuberance without hairs apically .... 5.

3. Protuberance of hind trochanter keel like, with scattered hairs. Membraneous area on sternum 8 directed distally .... *T. vicina*

– Protuberance of different shape, only with short but dense pilosity apically. Membraneous area directed to right side of sternum 8 .... 4.

4. Hind protuberance of trapezoid shape .... *T. subvirescens*

– Hind protuberance of triangular shape .... *T. tecta*

5. Abdominal sterna with pairs of knobby protuberances. Sternum 8 without dorsal suture (Fig. 18) .... *T. nodosa*

– Abdominal sterna without knobby protuberances. Sternum 8 with dorsal suture (Fig. 17) .... *T. jubata*

6. Hind tibia dorsally with conspicuous comb of long dark bristles at apical end (Fig. 22) .... *T. trichotibialis*

– Hind tibia without such comb, at most dispersed bristly hairs apically .... 7.

7. Abdominal sterna covered with velvet like pile. Sternum 8 very short (Fig. 8b) .... *T. geniculata*

– Abdominal sterna without such pile .... 8.

8. Halter black .... *T. nigronitida*

– Halter yellowish, at most yellowish-brown but never black .... 9.

9. Frons with conspicuous hornlike processus in the middle (Fig. 11) .... *T. debruyni*

– Frons normal, without processus .... 10.

10. Occiput with anterior margin broadly and conspicuously silvery (above sometimes not so clear). First two abdominal terga with conspicuous dense silver dusting dorsally .... 11.

– Occiput silver-grey or greyish brown, never with distinct silvery collar along anterior margin. First two abdominal terga at most with greyish patches, never conspicuous silvery (except for *T. docta* when viewed obliquely from front) .... 12.

11. Hind femur ventrally with long pale hairs, longest hairs at least as long as width of femur .... *T. argyrata*

– Hind femur without long hairs .... *T. argyratoides*

12. Abdominal sternum 8 without membraneous area (Figs 8a,c) .... 13.

– Abdominal sternum 8 with membraneous area (although sometimes small and slitlike) (Figs 8f,g) .... 14.

13. Eyes not touching, narrowly separated .... *T. frontata*

(*Eudorylas confusoides* might also key out here because the pterostigma is not distinctly coloured. It can be differentiated by the position of the cross-vein being at the basal fifth or sixth of discal cell and the absence of conspicuous pilosity on the abdominal terga).

– Eyes touching .... *T. helwanensis*

14. Abdominal terga with conspicuous pilosity .... *T. inermis*

– Abdominal terga without conspicuous pilosity .... 15.

15. Eyes not touching .... *T. sedomensis*

– Eyes touching .... 16.

16. Membraneous area slit like and at right side of sternum 8 (Fig. 8g) .... *T. sylvatica*

– Membraneous area not slit like (although sometimes narrow but elongated, like in *mutata* Fig. 8f) .... 17.

17. Hind femur with posteroventral row of longer hairs .... 18.

– Hind femur without posteroventral row of longer hairs .... 21.

18. Mesonotum completely greyish dusted .... *T. parakuthyi*
– Mesonotum mainly brownish dusted, only anteriorly more or less broadly greyish dusting ... 19.

19. Larger species. Membraneous area occupying at least half of sternum 8 and directed more postero-dorsally (Fig. 8d) .... *T. kuthyi*
– Smaller species. Membraneous area occupying less than half of sternum 8 and directed more distally (Figs 13, 16) .... 20.

20. Sternum 8 without dorsal suture (Fig. 13). Surstyli very slender and elongated .... *T. freidbergi*
– Sternum 8 with dorsal suture (Fig. 16). Surstyli more robust, distinctly hooked apically .... *T. israelensis*

21. Sternum 8 with dorsal suture (Figs 8e, 20) .... 22.
– Sternum 8 without dorsal suture (Figs 8f, 12, 15) .... 23.

22. Mesonotum entirely greyish-brown dusted, only between humeri more greyish. Fourth costal section about as long as third costal section (never more than twice as long) .... *T. pusilla*
– Mesonotum with anterior third greyish dusted, in contrast with remainder which is brownish dusted. Fourth costal section more than twice as long as third costal section .... *T. minima*

23. Membraneous area elongated and narrow, running obliquely along sternum 8 in distal view (Fig. 8f) .... *T. ?mutata*
– Membraneous area large and more oval shaped (Figs 12, 15) .... 24.

24. Membraneous area occupying half of sternum 8 (Fig. 12). Mesonotum mainly shining black except anterior and posterior margins silver-grey dusted .... *T. docta*
– Membraneous area occupying less than half of sternum 8 (Fig. 15). Mesonotum mainly greyish brown dusted .... *T. inopinata*

Tomosvaryella argyrata, spec. nov.

Fig. 9

Types. Holotype: ♂, Israel, Shivta, 18.III.1977, A. Freidberg (TAU). – Paratype: 1♂, Israel, Mt Hermon (occ. Golan Heights), 800 m, 23.IV.1973, D. Furth (TAU).

Description

♂. Body length: 3.26-3.54 mm. Wing length: 3.06-3.20 mm.

Head. Third antennal segment acuminate, brownish. Eyes touching for distance equal to ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput conspicuously silvery, upper part posteriorly more subshining black.

Thorax. Humerus pale yellowish. Mesonotum shining black; anterior ⅓ and posterior margin in front of scutellum with dense silvery dusting. Scutellum silvery dusting on anterior part of disc, otherwise shining black. Halter pale brownish. Wing: Fourth costal section about two to three times as long as third costal section. Cross-vein r-m near middle of discal cell. Legs: Dark, with knees and basal fourth of tibiae yellow; apical end of tibiae and tarsal segments yellowish brown. Trochanters smooth. Hind femur ventrally with long pale hairs, especially apically; the longest hairs at least as long as width of femur. Front four femora posteriorly with large silvery patch at apical half; no basal spines, at most few hairs.

Abdomen. Lateral fan with few palish hairs. Abdominal terga shining black except first tergum with dense silver dusting, anterior half of second tergum and anterior fourth of third tergum with dense silvery dusting. All terga along lateral margins silver-grey dusted, on tergum 5 extending towards middle. In dorsal view, sternum 8 about half as long as tergum 5. In distal view, membraneous area occupying about half of sternum 8. Terminalia Fig. 9.

♀ unknown.

Etymology. After the silvery appearance of this species.

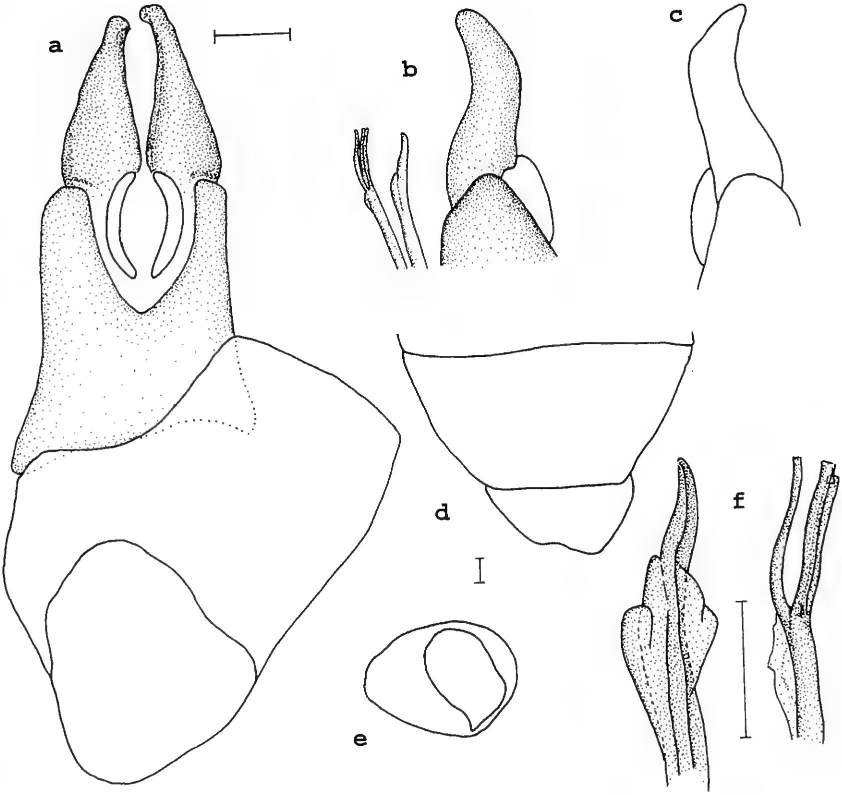


Fig. 9. *Tomosvaryella argyrata*, spec. nov., ♂ terminalia. a. dorsal view, b. outer surstylus with aedeagus and ejaculatory duct, lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus, ventro-lateral; ejaculatory duct, lateral. Scale 0.1 mm.

Discussion. *T. argyrata*, spec. nov. belongs to a group of closely related species sharing all or most of the following characteristics: occiput with conspicuous silver collar; silvery patches on the posterior side of the front four femora; hind femur with very long hairs ventrally; silvery stripes and/or patches on the body. The group seems to include the following species *T. argyrata*, spec. nov., *T. argyratoides*, spec. nov., *T. debruyni*, spec. nov., *T. docta*, spec. nov. (all newly described from Israel), *T. nigronitida*, *T. nigrifemorata*, and *T. argentea* (Sack, 1935) described from Askhabad.

Tomosvaryella argyratoides, spec. nov.

Figs 7d, 10

Types. Holotype: ♂, Israel, Avdat, 25.III.1987, A. Freidberg (TAU). – Allotype: ♀, Avdat, 25.III.1987, A. Freidberg (TAU). – Paratypes: Israel: 3♂♂, same locality as holotype, 31.III.1981, F. Kaplan; 1♂, Beer-Mashash, 18.III.1971, Kugler; 1♂, Mashabke Sade, 19.IV.1967, Kugler; 1♂, Ein Gidron, 21.iv.1981, A. Freidberg; 1♂, Har Zavoa' nr. Yeruham, 11.IV.1990, A. Freidberg (all TAU). Type material returned to TAU, except two paratypes deposited in collection KBIN.

Description

Body length: 3.26-3.54 mm. Wing length: 3.54-3.67 mm.

♂. Head. Third antennal segment acuminate, brownish. Eyes touching for distance equal to ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput with anterior margin broad and conspicuously silvery, posteriorly more subshining black.

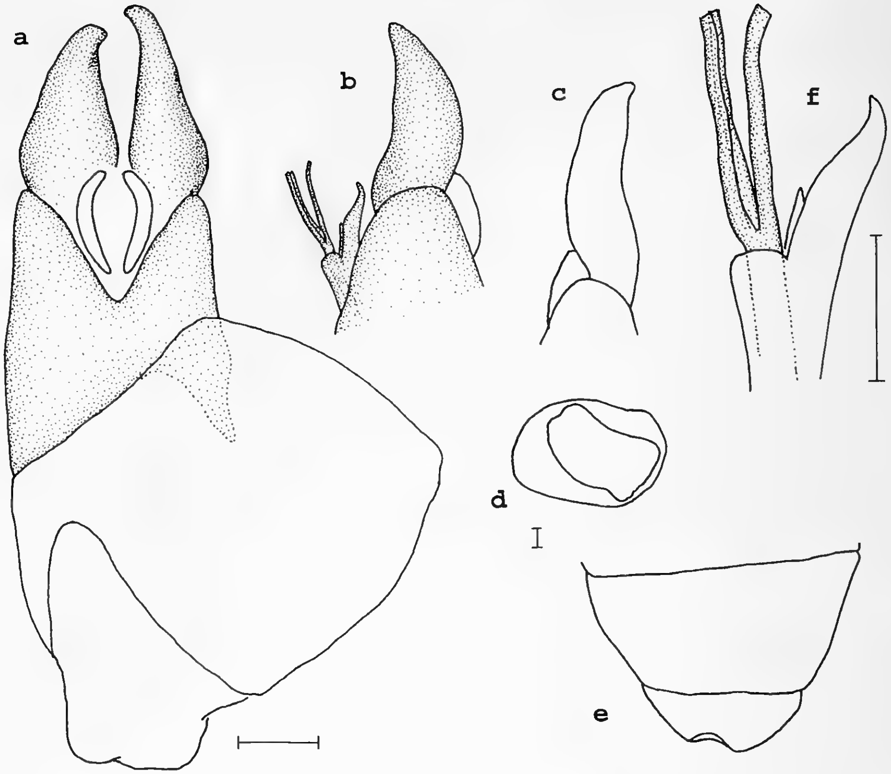


Fig. 10. *Tomosvaryella argyratoides*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus with aedeagus and ejaculatory duct, lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus and ejaculatory duct, lateral. Scale 0.1 mm.

Thorax. Humerus pale yellowish. Mesonotum subshining black; anterior margin with dense silvery dusting. Scutellum silvery dusting along anterior margin, on centre less so. Halter yellowish. Wing: Fourth costal section about three to four times as long as third costal section. Cross-vein r-m near middle of discal cell. Legs: Dark, with knees and basal fifth to sixth of tibiae yellow. Trochanters smooth. Front four femora with large silvery patches posteriorly (not as conspicuous as in *T. argyrata*, spec. nov.). No basal spines on femora.

Abdomen. Lateral fan with few short black hairs. Abdominal terga subshining black except first tergum with dense silvery dusting, anterior ⅔ of second tergum and anterior margin of third tergum with dense silvery dusting. All terga along lateral margins silver-grey dusted, tergum 5 with large silvery spots extending towards middle. In dorsal view, sternum 8 less than half as long as tergum 5; greyish brown dusted. In distal view, membraneous area occupying more than half of sternum 8. Terminalia Fig. 10.

♀. As ♂ except for the following characters. Third antennal segment longer acuminate, with whitish tip. Frons shining black at upper half. Occiput with upper part subshining black. Front four femora ventrally with 1-2 basal spines. Pulvilli about as long as last tarsal segment, front pulvilli longer. Terminalia Fig. 7d.

Etymology. Referring to the close relationship with the above described species, *T. argyrata*, spec. nov.

Discussion. *T. argyratoides*, spec. nov. also belongs to the group with silver bands and spots on abdomen (see above). It seems to be closely related to *T. argyrata* but differs in genital structure.

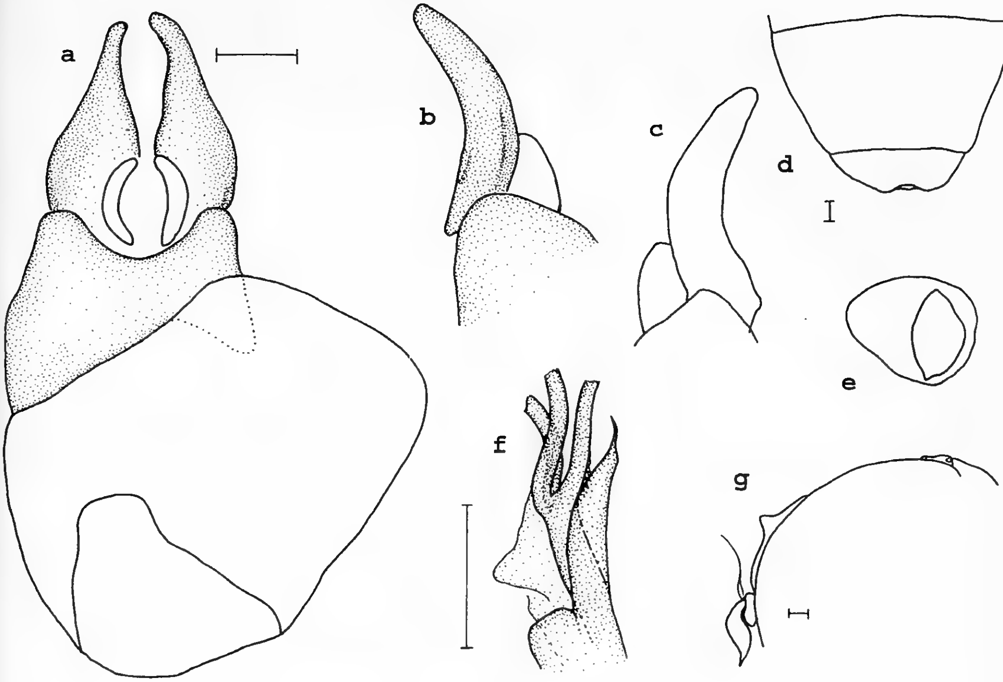


Fig. 11. *Tomosvaryella debruyni*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus and ejaculatory duct, lateral; g. upper part head, lateral. Scale 0.1 mm.

Tomosvaryella debruyni, spec. nov.

Figs 7e, 11

Types. Holotype: ♂, Israel, Ein-Gedi, 29.III.1976, A. Freidberg (TAU). – Allotype: ♀, same data as holotype (TAU). – Paratypes. Israel: 1♂, Bor Mashash, 8.IV.1975, M. Kaplan; 1♂, N. Ze'elim, 24.III.1975, M. Kaplan (all TAU). TADZHIKISTAN: 1♂, Karamazor, 41.30N/69.49E, alpine meadow, 800 m, 18.v.1989, Bartak (SNMB). Holotype, allotype and one paratype returned to TAU, one paratype returned to SNMB, one paratype deposited in KBIN.

Description

Body length: 3.33-3.60 mm. Wing length: 3.38-3.54 mm.

♂. Head. Third antennal segment acuminate, brownish. Eyes touching for distance at most equal to ocellar triangle; lower part silver-grey pubescent, with conspicuous hornlike processus (Fig. 11g); upper part shining black. Occiput with anterior margin broad and conspicuously silvery, posteriorly more subshining black.

Thorax. Humerus pale yellowish. Mesonotum subshining black; anterior ⅖ with dense silvery dusting, posteriorly less densely brownish grey dusted. Scutellum silvery dusting on disc, otherwise shining black. Halter yellow. Wing: Fourth costal section about twice as long as third costal section. Cross-vein r-m near middle of discal cell. Legs: Dark, with knees and basal fourth of tibiae yellow; tarsi yellowish brown. Trochanters smooth. Front four femora silvery posteriorly; no basal spines. Hind femur with longer pale pilosity ventrally.

Abdomen. Lateral fan with few palish hairs. Abdominal terga shining black except first tergum with dense silver dusting, second tergum dense silvery dusted except posterior margin. All terga along lateral margins silver-grey dusted, on third tergum extending towards middle. In dorsal view, sternum 8 very small, less than ¼ of tergum 5. In distal view, membraneous area occupying about half of sternum 8. Terminalia Fig. 11.

♀. As ♂ except for following characters. Frons shining black in upper part from hornlike processus onwards. Third costal section slightly shorter. Abdominal terga with lateral margins more extensive silver-grey dusted. Terminalia Fig. 7e.

Etymology. Named after my friend and fellow dipterist, Luc De Bruyn. Both he and this new species have a knob on their head in common.

Discussion. *T. debruyni*, spec. nov. belongs to the group with silver bands and spots on abdomen, and anterior margin of the occiput silver. Considerable variation was noticed in the few specimens, regarding the extensivity of the silver coloured patches, and the distance for which the eyes touch in the males. However, the genital structure shows consistency. In one ♂ specimen (Palestina, Beth Hakerem, Jerusalem, 22.V.1950, O. Theodor (TAU) however, the surstyli were slighlty shorter. It is not included in the type series.

Tomosvaryella dentiterebra (Collin, 1949)

Diagnosis. Third antennal segment acuminate, brown. Occiput with silvery margin anteriorly. Legs dark with knees and basal third of tibiae yellow; tarsal segments yellow except last segment; hind trochanter smooth; front four femora with conspicuous silvery patches posteriorly. Abdomen mainly subshining black, weakly brownish grey dusted. Abdominal sternum 8 very short, less than one fourth of tergum 5 in dorsal view. Membraneous area occupying less than half of sternum 8. ♀ frons silver-grey pubescent except in front of ocellar triangle for length equal to triangle. Body more greyish dusted.

Material. Egypt: series of three syntypes. ♂, Edku Salt Lakes, 2.VII.1944, R. Coe (hereby designated as lectotype); 1♀, same locality and date as lectotype; 1♀, Lake Karoun, IX.1945, R. Coe (both designated as paralectotypes) (all NHM).

Discussion. Although not found among the material of Israel, this species is mentioned here because of its close relationship with some of the Israeli material. It belongs to the *argyrata* group with silvery margin of the occiput and conspicuous silvery patches on front four femora. It can be differentiated by the absence of any conspicuous silvery patches on thorax and by the shape of the terminalia.

Tomosvaryella docta, spec. nov.
Figs 7f, 12

Types. Holotype: ♂, Egypt, Sinai Mts, St. Katharina, 18.VII.1974, F. Kaplan (TAU). – Allotype: ♀, same date and locality as holotype (TAU). – Paratypes: Egypt: 1♂, 1♀, same date and locality as holotype; 2♀♀, same locality as holotype, 12.VII.1969, Kugler; 1♀, Sinai Mts, El-Arbain, 14.VII.1974, F. Kaplan. – Israel: 1♂, 1♀, Maoz Hayyim, 23.X.1978, A. Freidberg; 1♀, Ein-Gidron, 21.IV.1981, F. Kaplan; 1♀, N. Amud, 6.X.1974, A. Freidberg (all TAU). Type material returned to TAU, except two paratypes deposited in KBIN.

Description

Body length: 3.20-3.40 mm. Wing length: 2.65-2.92 mm.

♂. Head. Third antennal segment acuminate; yellow-brown. Eyes touching for distance equal to 1.5 times length of ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput silver-grey dusted, upper third more subshining black-brown.

Thorax. Humerus yellow-white. Mesonotum mainly shining black-brown, weakly and narrowly greyish dusted along margins. Scutellum shining black, except anterior margin greyish dusted. Halter yellow. Wing: Fourth costal section two to three times as long as third costal section. Cross-vein r-m near middle of discal cell. Legs: Dark, with knees and basal third of tibiae yellow. Tarsal segments yellow-brown, last tarsal segment brown. Front four femora posteriorly with large silvery patch at apical part; no basal spines. Trochanters smooth.

Abdomen. Lateral fan with dark bristly hairs. Abdominal terga shining black-brown; tergum 1 greyish dusted, viewed obliquely from front terga 2-3 with silvery shine. Sternum 8 subshining brown, greyish-brown dusted; in dorsal view, more than half as long as tergum 5. In distal view, membraneous area irregulary oval to roundish shaped, occupying about half of sternum 8. Terminalia Fig. 12.

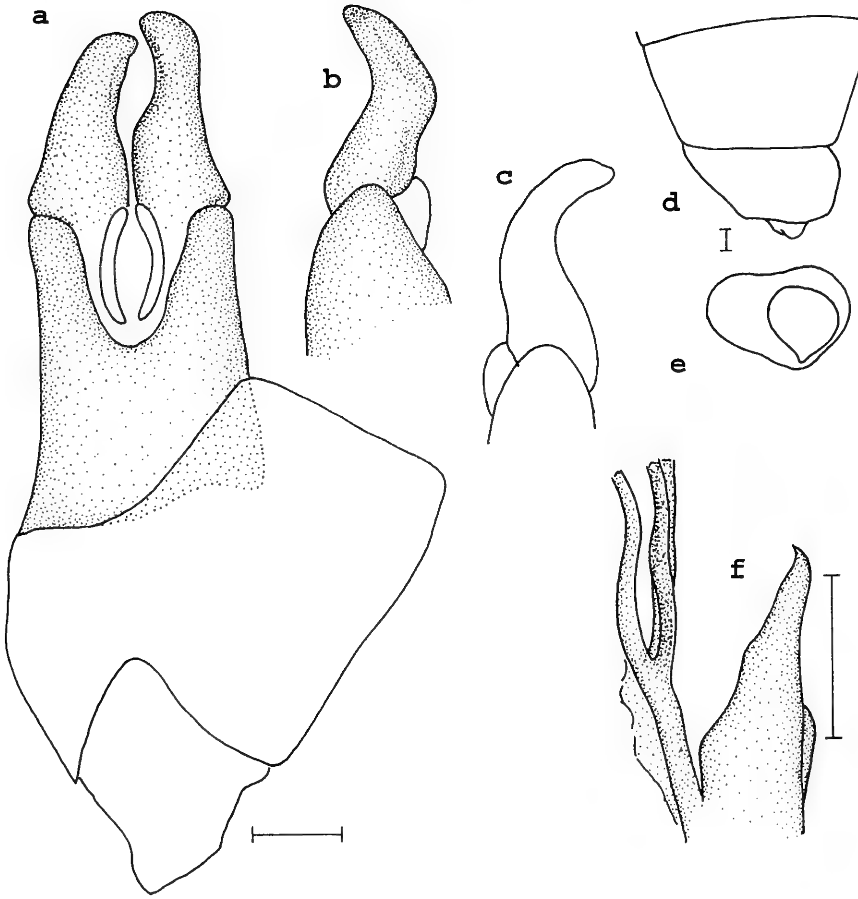


Fig. 12. *Tomosvaryella docta*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus and ejaculatory duct, lateral. Scale 0.1 mm.

♀. As ♂ except for the following characters. Third antennal segment paler. Frons shining in upper part for distance equal to twice ocellar triangle. Front four femora with well developed basal spines. Tibiae more yellowish. Front four pulvilli well developed, longer than last tarsal segment; hind pulvilli about as long as segment. Terminalia Fig. 7f.

Etymology. After the Latin 'doctus' meaning wise or learned. This is a reference to St. Catherina after whom the type locality is named. She is considered a saint who presumably lived in the 4th Century and who was martyred in Alexandria. She is celebrated for her learning and philosophical culture. A monastry occupied by Orthodox Christian monks and founded by the Emperor Justinian in 530 AD is situated here.

Discussion. Based on the general shape of the surstyli and ejaculatory duct, *T. docta* seems to be related to the *argyrata* group as described above. The silvery appearance is however not so distinct.

Tomosvaryella freidbergi, spec. nov.

Figs 7g, 13

Types. Holotype: ♂, Israel, Mt Hermon (occ. Golan Heights), 2000 m, 1.VII.1986, A. Freidberg (TAU). – Allotype: ♀, same locality and data as holotype (TAU). – ParaTypes. Israel: 3♂♂, same date and locality as holotype; 1♂, same locality as holotype, 16.VIII.1976, A. Freidberg; 1♂, 28.VI.1977, A. Freidberg; 1♂, 9.VII.1975,

A. Freidberg; 1♀, 30.V.1978, D. Furth; 2♂♂, 5.IX.1981, A. Freidberg; 1♀, 21.VI.1982, A. Freidberg; 1♂, 2♀♀, 2.VIII.1982, A. Freidberg; 1♀, 7.VII.1987, A. Freidberg; 1♂, 1♀, 1300 m, 22.V.1973, A. Freidberg; 3♂♂, 1♀, Meron, 11.VI.1974, F. Nachbar.

Additional material (not included in type series). Israel: 1♂, Latrum, 4.VII.1985, A. Freidberg; 1♂, Tirat Zvi, 11.V.1984, A. Freidberg; 1♀, Herzliyya, 24.V.1981, A. Freidberg; 1♀, En Boqeq, 1.vii.1970, Kugler; 1♀, W. Kelt, 30.IV.1973, D. Furth. – Egypt: 2♂♂, Sinai Mts St Katharina, 18.VII.1974, F. Kaplan (all TAU). All material returned to TAU except 4 paratypes deposited in KBIN.

Description

Body length: 2.52-3.06 mm. Wing length: 2.38-2.72 mm.

♂. Head. Third antennal segment acuminate, dark brown. Eyes touching for distance equal to 1.5 times ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput silver-grey dusted, upper part brownish.

Thorax. Humerus yellow. Mesonotum densely brownish dusted, anterior margin more greyish dusted, posterior part and scutellum more subshining black. Dorsocentral row with dark hairs, well developed anteriorly. Halter yellow. Wing: Fourth costal section two to three times as long as third costal section. Cross-vein r-m just beyond middle of discal cell. Legs: Dark, knees narrowly yellow. Hind femur with posteroventral row of longer hairs. Trochanters smooth. Front four femora with 1-2 basal spines.

Abdomen. Lateral fan with few dark hairs. Abdominal terga subshining black-brown, brownish dusted, lateral margins greyish. In dorsal view, sternum 8 half as long as tergum 5. In distal view, membraneous area occupying less than half of sternum 8. Terminalia Fig. 13.

♀. As ♂ except for the following characters. Frons completely greyish dusted. Dorsocentral rows more developed. Pulvilli longer than last tarsal segment. Abdomen more extensively greyish dusted along lateral margins. Terminalia Fig. 7g.

Etymology. This species is named in honour of Dr. Amnon Freidberg, who collected the type material of this species, as well as most of the material studied here.

Discussion. This species is closely related to *T. kuthyi*. Both species can be differentiated by the smaller size, smaller membraneous area (less than half of sternum 8) in the ♂ and the shorter piercer in the ♀ of *T. freidbergi*, spec. nov.

Tomosvaryella frontata (Becker, 1898)

Diagnosis. Third antennal segment acuminate, yellow. ♂ eyes not touching, separated for approximately the width of one ommatidium. Legs dark with tarsal segments wholly and margins of tibiae broadly yellow; hind trochanter smooth. Abdomen shining black, only weakly brownish dusted; with dispersed but conspicuous, short darkish hairs. Abdominal sternum 8 without membraneous area (Fig. 8a). Abdominal sternum 6 with three distinct tubercles on appendage. ♀ frons shining black for upper two-thirds. Pulvilli about as long as last tarsal segment.

Material. Israel: 13 specimens from the following localities: Akko; N. Bsor, nr Ze'elim; Yeroham; Enot Zukim; Nizzanim; Michmoret (all TAU).

Discussion. This species was redescribed in detail by Hardy (1966), based on material reared from the Tamarix leafhopper *Opsius stactogalus* Fieber. It is a southern species, recorded from France, Italy and Rumania. Bodenheimer (1937) mentions this species from Palestina.

Tomosvaryella geniculata (Meigen, 1824)

Diagnosis. Third antennal segment long acute; brownish with apical margin paler. Legs dark with knees narowly yellow. Mesonotum greyish brown dusted. Abdomen subshining black-brown, brownish dusted, lateral margins more greyish. Abdominal sternum 8 very short (Fig. 8b); other abdominal sterna covered with dense velvet like, brownish pile.

Material. Israel: 1♂, Gesher, 27.x.1974, D. Furth; 1♂, Mash'abbe Sade, 19.III.1978, A. Freidberg (TAU).

Discussion. A widespread species, found all over Europe. It can be differentiated from any other European or Afrotropical *Tomosvaryella* by the presence of dense velvet-like pile on the abdominal sterna.

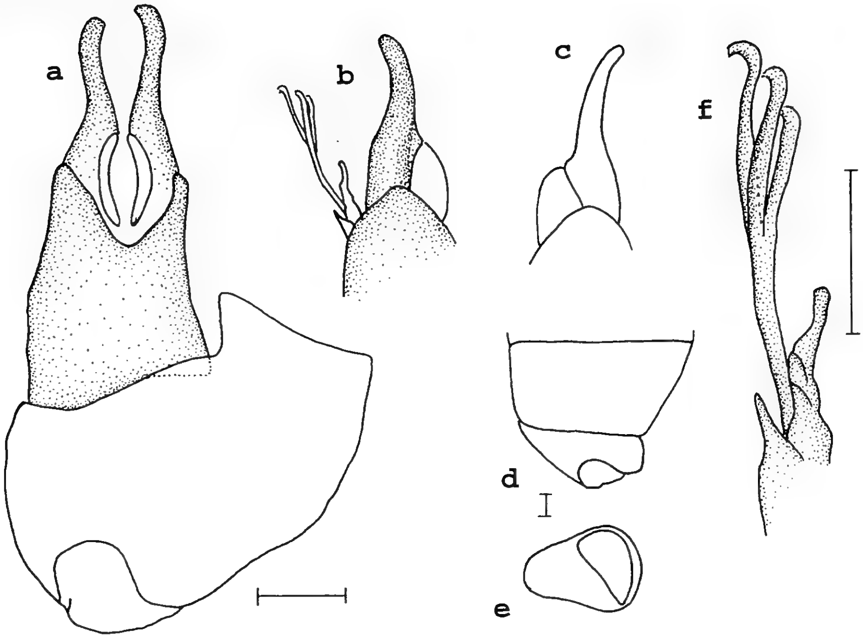


Fig. 13. *Tomosvaryella freidbergi*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus with aedeagus and ejaculatory duct, lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus and ejaculatory duct, lateral. Scale 0.1 mm.

Tomosvaryella helwanensis (Collin, 1949)

Diagnosis. Third antennal segment long acuminate; yellow. Legs mainly yellow, femora largely dark with margin narowly yellow, tibiae with dark median patch. Abdomen shining black-brown, weakly brownish dusted, lateral margins more densely greyish; with dispersed but conspicuous pilosity. ♂ abdominal sternum 8 without membraneous area (Fig. 8c). ♀ frons shining black in upper half. Pulvilli at most as long as last tarsal segment.

Material. Egypt: series of 20 syntypes (11♂♂, 9♀♀), Helwan, IX.1944, R.L. Coe (NHM), ♂ lectotype and 10♂ and 9♀ paralectotypes hereby designated and accordingly labeled; 1♀, Sinai, Azaima, 1.VII.1972, A. Freidberg. – Israel: 1♂, Tel Aviv, Savion, 15.IX.1982, Y. Zvik; 1♀, Ze'elim, 16.VI.1986, A. Freidberg (all TAU).

Discussion. This species was originally described from Egypt. It was not included in the Catalog of Palaearctic Region (Tanasijtshuk 1988), and its distribution is poorly known. The ♀ specimens have a slightly more elongated tip at the piercer than the ♀ syntypes. The ♂ specimen seems to be conspecific with the syntype material.

Tomosvaryella inermis, spec. nov.

Fig. 14

Types. Holotype: ♂, Israel, Maoz Hayyim, 23.X.1978, A. Freidberg (TAU). – Paratypes: Israel: 2♂♂, same date and locality as holotype; 1♂, Btecha [= Biq'at Beit Zeida], 12.VI.1974, A. Freidberg; 1♂, Rafid (occ. Golan Heights), 8.VIII.1973, A. Freidberg; 1♂, Mas'ada (occ. Golan Heights), 3.X.1970, Kugler (all TAU). All type material returned to TAU except one paratype deposited in KBIN.

Description

♂. Body length: 2.92-3.20 mm. Wing length: 2.92-3.10 mm.

Head. Third antennal segment acuminate; brownish, apical margin pale. Frons, eyes touching for

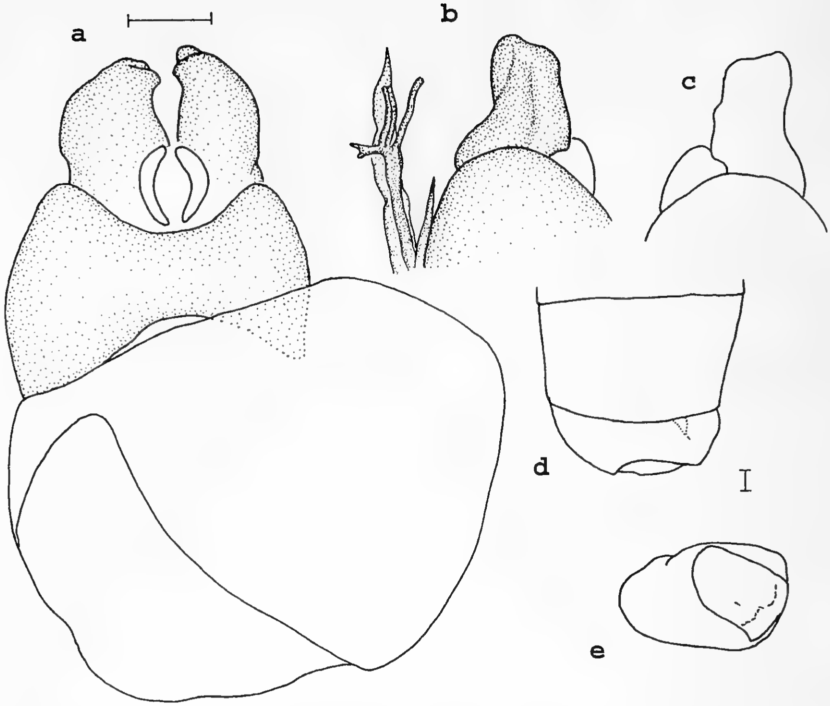


Fig. 14. *Tomosvaryella inermis*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus with aedeagus and ejaculatory duct, lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal. Scale 0.1 mm.

distance equal to 1.5 times the ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput silver-grey dusted, upper third greyish brown.

Thorax. Humerus pale yellowish. Mesonotum mainly brown dusted, anteriorly greyish. Scutellum brownish dusted, posteriorly more greyish. Halter yellow. Wing: Fourth costal section twice as long as third costal section. Cross-vein r-m beyond middle of discal cell. Legs: Dark, with knees, basal fourth and apical margin of tibiae narrowly yellow. Tarsal segments yellow, last tarsal segment dark. Trochanters smooth, hind trochanter with several short dark bristles. Front four femora with 1-2 basal spines.

Abdomen. Lateral fan with bristly dark hairs. Abdominal terga subshining black-brown; greyish brown dusted, lateral margins more greyish. All terga with conspicuous bristly dark pilosity. In dorsal view, sternum 8 less than half as long as tergum 5. In distal view, membraneous area occupying about half of sternum 8. Terminalia Fig. 14.

♀ unknown.

Etymology. Referring to the smooth trochanters in the ♂, which is in contrast to the other species belonging to this group.

Discussion. This species clearly belongs to the *subvirescens* group (see De Meyer 1993) because of the narrowed epandrium, and the conspicuous pilosity on abdominal terga. It is however the only species with smooth hind trochanters, in contrast to the other representatives who all have a distinct processus.

Tomosvaryella inopinata, spec. nov.

Fig. 15

Types. Holotype: ♂, Israel, Giv'at Koah, 1.VII.1987, Yarom & Zvik (TAU). – Paratypes: Israel: 1♂, 'En Mor, 19.IV.1975, A. Freidberg; 1♂, Neot Hakikas, 20.V.1974, A. Freidberg; 1♂, Sedom, 20.IX.1971, Kugler. Egypt: 1♂, Sinai Mts, St Katharina, 18.VII.1974, F. Kaplan (all TAU). Type material returned to TAU, 1 paratype deposited in KBIN.

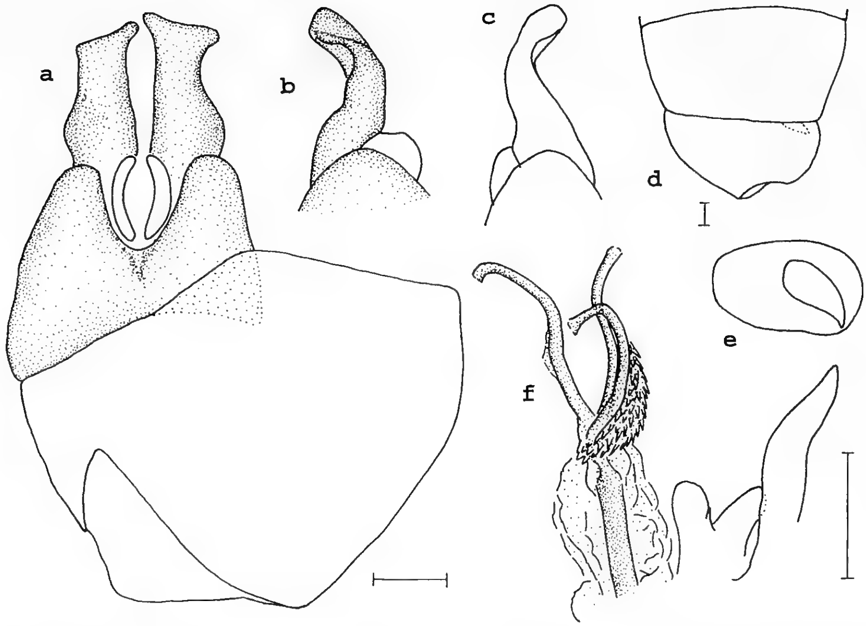


Fig. 15. *Tomosvaryella inopinata*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus and ejaculatory duct, lateral. Scale 0.1 mm.

Description

♂. Body length: 3.26-3.40 mm. Wing length: 2.86-3.33 mm.

Head. Third antennal segment acuminate; brown. Eyes touching for distance equal to twice length of ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput silver-grey dusted, upper third more subshining black-brown.

Thorax. Humerus yellow-white. Mesonotum subshining black-brown, greyish dusted, centre more brownish grey dusted. Halter yellow. Wing: Fourth costal section three times as long as third costal section. Cross-vein r-m just beyond middle of discal cell. Legs: Dark, with knees and basal fourth till third of tibiae yellow. Tarsal segments yellow-brown, last tarsal segment brown. Trochanters smooth.

Abdomen. Lateral fan with short pale hairs. Abdominal terga subshining black-brown; tergum 1 greyish dusted, other terga brownish dusted, lateral margins greyish dusted; tergum 5 with large silvery spots extending towards middle, tergum 4 with smaller silvery spots. In dorsal view, sternum 8 more than half as long as tergum 5. In distal view, membraneous area irregulary oval shaped, occupying less than half of sternum 8. Terminalia Fig. 15.

♀ unknown.

Etymology. From the Latin 'inopinatus' meaning unexpected, or unlooked for and referring to its close relationship with a southern African species.

Discussion. *T. inopinata*, spec. nov. is closely related to *T. oligoseta* De Meyer from southern Africa. It shows the same kind of subsymmetrical surstyli with broadened distal ends; and the long tubiform ejaculatory ductuli, one having a row of small teeth. There are some small differences in the shape of the surstyli and also the apical part of the aedeagus is differently formed. In *T. oligoseta*, the dorsocentral hairs and abdominal lateral fan are completely reduced, while in *T. inopinata* they are still present albeit very short.

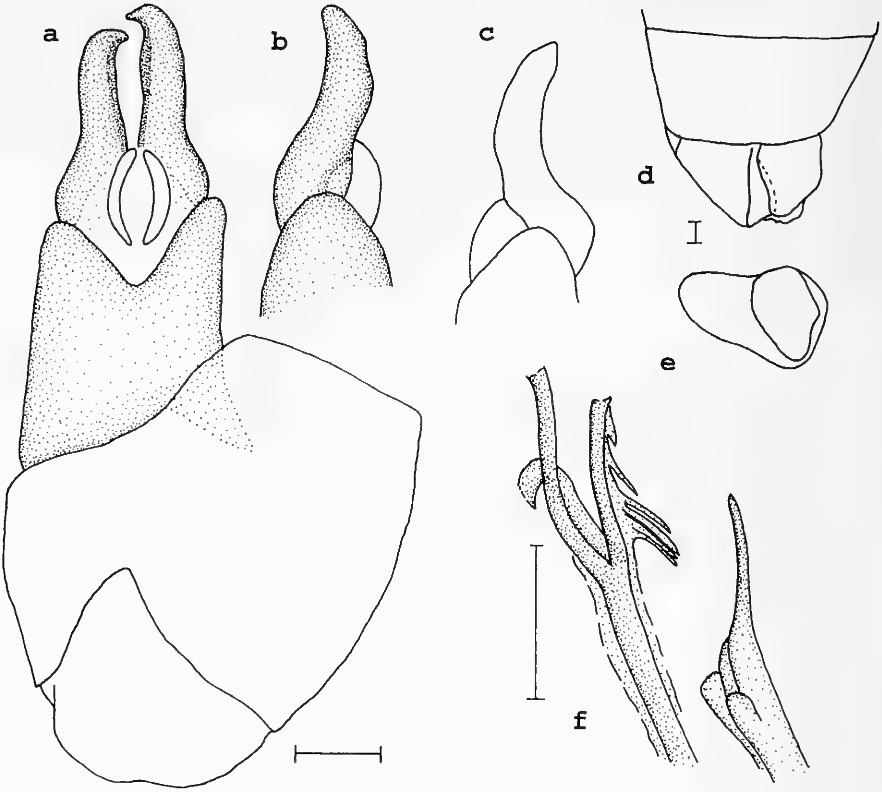


Fig. 16. *Tomosvaryella israelensis*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus and ejaculatory duct, lateral. Scale 0.1 mm.

Tomosvaryella israelensis, spec. nov.

Figs 7h, 16

Types. Holotype: ♂, Israel, Kfar Shamai, 30.IX.1975, A. Freidberg (TAU). – Allotype: ♀,same date and locality as holotype (TAU). – Paratypes: Israel: 1♂, Maoz Hayyim, 23.X.1978 A. Freidberg; 1♂, Meron, 11.VI.1974, F. Nachbar; 1♂, Mash'abbe Sade, 6.IX.1974, M. Kaplan; 1♂, N. Amud, 6.X.1974, A. Freidberg; 1♂, Ze'elim, 6.XII.1976, A. Freidberg; 1♂, Mt Hermon (occ Golan Heights), 22.V.1973, A. Freidberg (all TAU). Type material returned to TAU, except two paratypes deposited in KBIN.

Description

Body length: 2.52-2.79 mm. Wing length: 2.38-2.62 mm.

♂, Head. Third antennal segment acuminate; yellow-brown, apical margin whitish. Eyes touching for distance equal to ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput silver-grey dusted, upper third less densely greyish brown.

Thorax. Humerus yellow. Mesonotum subshining black, brownish dusted; anterior margin broadly greyish dusted. Scutellum greyish dusted except anteriorly more brownish. Halter yellow. Wing: Fourth costal section about twice to three times as long as third costal section. Cross-vein r-m at middle of discal cell. Legs: Dark, with knees and basal fourth of tibiae yellow. Tarsal segments yellow, last tarsal segment slightly darker. Hind femur with posteroventral row of longer pale hairs. Trochanters smooth.

Abdomen. Lateral fan with palish hairs. Abdominal terga subshining black, brownish dusted; first tergum greyish dusted. Terga 4-5 with large silver-grey spots laterally. In dorsal view, sternum 8

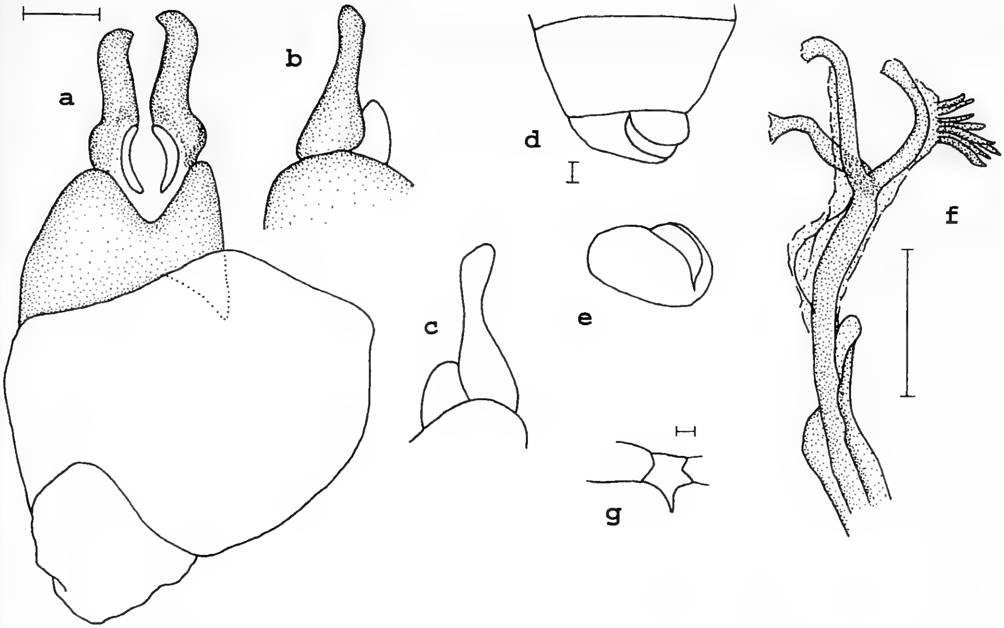


Fig. 17. *Tomosvaryella jubata*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus and ejaculatory duct, lateral; g. hind trochanter, anterior. Scale 0.1 mm.

almost as long as tergum 5; with dorsal suture. In distal view, membraneous area occupying half of sternum 8. Terminalia Fig. 16.

♀. As ♂ except for the following characters. Frons completely greyish pubescent. Front four femora with 2 basal spines ventrally. Terminalia Fig. 7h.

Etymology. Referring to the type locality Israel.

Discussion. *T. israelensis*, spec. nov. belongs to the *kuthyi* species complex (see above) and resembles most the newly described *T. parakuthyi*. The lateral shape of the surstyli is however distinctly different.

Tomosvaryella jubata, spec. nov.
Fig. 17

Types. Holotype: ♂, Israel, Sedom, 20.IX.1971, Kugler (TAU). – Paratypes: Israel: 4♂♂, same locality and data as holotype; same locality as holotype: 2♂♂, 26.VI.1976; 1♂, 21.IV.1981, F. Kaplan; 2♂♂, 25.III.1987, Yoram & Zvik; Ein Akev, 2♂♂, 8.VIII.1977, A. Freidberg; Ein-Gidron, 1♂, 21.IV.1981, F. Kaplan (all TAU). Type material returned to TAU, except three paratypes deposited in KBIN.

Description

♂. Body length: 2.31-2.65 mm. Wing length: 2.20-2.58 mm.

Head. Third antennal segment acuminate; palish. Eyes touching for distance slightly less than ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput silver-grey dusted, upper third less densely so.

Thorax. Humerus whitish yellow. Mesonotum greyish dusted, centre brownish dusted. Scutellum greyish dusted. Halter whitish yellow. Wing: Fourth costal section about 1.5 times as long as third costal section. Cross-vein r-m at middle of discal cell. Legs: Dark, with knees and basal third of tibiae yellow. Apical margin of tibiae yellowish brown. Tarsal segments yellow. Hind trochanter with pointed processus (fig. 17g). Femora without basal spines.

Abdomen. Lateral fan with several pale hairs. Abdominal terga subshining black-brown, weakly greyish dusted; first tergum and lateral margins of other terga more densely so, especially terga 4-5. In dorsal view, sternum 8 slightly less than half as long as tergum 5; with dorsal suture. Terminalia Fig. 17.

♀ unknown.

Etymology. From the Latin adjective jubatus, meaning 'having a mane' or 'crested' and referring to the crest like structure on the ejaculatory ductulus.

Discussion. This new species belongs to the Afrotropical *africana* group of *Tomosvaryella* (cfr De Meyer 1993), recognized by the dorsal suture on abdominal sternum 8 and the appendages on one of the ejaculatory ductuli.

Tomosvaryella kuthyi Aczél, 1944

Diagnosis. Third antennal segment acuminate; dark brown. Legs dark with knees only narrowly yellow, hind femur with posteroventral row of long hairs. Abdomen subshining black, brownish dusted, lateral margins more densely greyish especially terga 4-5. ♂ abdominal sternum 8 with large membraneous area (Fig. 8d). ♀ with piercer reaching till first tergum.

Material. Israel: 110 specimens from the following localities: Panyas (occ. Golan Heights); Bet Guvrin; Bet Dagan; Bet Hillel; Bet Nehemya; Har Karmel; Eshta'ol; Hefa; Hamat Gader; Herzliyya; Jericho (occ. West Bank); Kfar Adumim; Lattun; Ma'ale Gamla; Har Meron; Mt Meron; Monfort; Negba; Nemrod; Nin David; N. Dan; Park HaYarden; Savion; Tel Aviv; Tirat Zvi; Up. N. Amud (all TAU).

Discussion. This is a fairly common species throughout Europe except for the northern part (De Meyer 1992b). Together with *T. freidbergi* and *T. parakuthyi* it forms a closely related group, differentiated by the presence of a row of longer hairs over the entire ventral side of the hind femora.

Tomosvaryella minima (Becker, 1898)

Diagnosis. Third antennal segment acuminate; brown, apical margin whitish. Mesonotum mainly dusted brown, anterior fourth greyish dusted, behind humeri more extensively so. Fourth costal section three times as long as third costal section. Legs dark, with knees narrowly yellow. Trochanters smooth. Abdominal terga weakly subshining black-brown; tergum 1 greyish dusted, other terga brownish dusted, lateral margins broadly greyish dusted. Sternum 8 with dorsal suture (Fig. 8e).

Material. Israel: 1♂, Arad Junc., 5 km S Devira, 21.III.1985, A. Freidberg; 1♂, 'En Mor, 29.IV.1987, A. Freidberg (TAU).

Discussion. This specimen is conspecific with material studied from West Europe and identified as *T. minima*. *T. minima* is a widespread European species, mainly recorded from western and Central Europe.

Tomosvaryella ?mutata (Becker, 1898)

Diagnosis. Third antennal segment acuminate; brownish yellow. Legs dark with knees yellow, and tarsi brownish yellow; trochanters smooth. Abdomen weakly shining black-brown, greyish brown dusted, tergum 5 with two large silvery spots laterally. Membraneous area long and slender (Fig. 8f). ♀ with third antennal segment longer and lateral margins of abdomen more greyish.

Material. Egypt: 1♂, 1♀, Assiut XII 44395 Becker coll. (MNHU). 38 specimens from the following localities: Israel: Bet Dagan; Har Karmel; Ein Yahar; N. Zavitan, nr Qatzzin (occ. Golan Heights); Qziat; Ramat Magshimium (occ. Golan Heights); Herzliya; Ma'de adamim; Maoz Hayyim; Meron; N. Amud; Neot Hakikas; Sedom; Ze'elim. – Egypt: Sinai Mts, St Katarina (all TAU).

Discussion. This species was described from Egypt and furthermore reported from Spain and Hungary. Aczél (1944) mentions that more than one species could be involved. The Israeli material does indeed show considerable variation in the shape of surstyli, albeit the ejaculatory duct, membraneous area, and apical part of aedeagus are similar. The holotype from the Schnabl collection was not studied. Two specimens (1♂, 1♀) from Assiut, det. and coll Becker were seen and they seem to be two different species. The ♂ corresponds with what is considered here as *T. mutata*, while the ♀ does

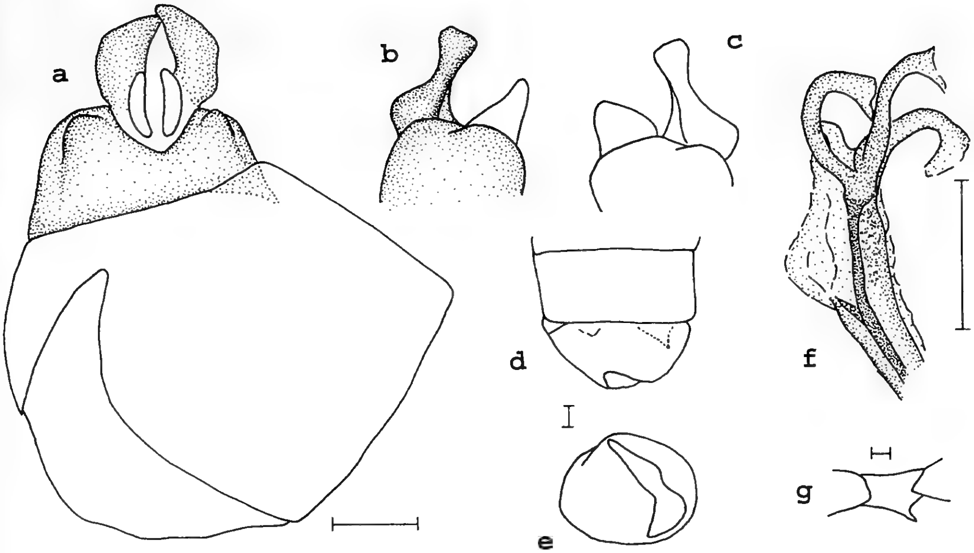


Fig. 18. *Tomosvaryella nodosa*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. aedeagus and ejaculatory duct, lateral; g. hind trochanter, anterior. Scale 0.1 mm.

not correspond to any of the species we have seen. It is considered preferable to wait until all related type material can be studied, and the specimens are placed tentatively under *T. mutata*. Five ♀ specimens (from Kfar-Shamai; Majdel Chams (occ. Golan Heights); and Ze'elim) seem to be related to this species. They resemble the ♀ *mutata* completely except that the piercer is much longer (reaching till first sternum).

Tomosvaryella nigronitida (Collin, 1958)

Diagnosis. ♀ third antennal segment long acuminate; brownish yellow with apical margin palish. Legs shining black except knees yellow and tarsal segments brownish yellow; four anterior femora with large silvery patch posteriorly; ventrally with 2 basal spines. Halter black. Abdomen shining black-brown, lateral margins narrowly greyish dusted.

Material. 1♀, Croatia, Dalmatia, Korcula (east end), 22-27.V.1955, R. Coe (holotype) (NHM); 1♀, Israel, Meiron, 5.V.1975, F. Kaplan (TAU).

Discussion. *T. nigronitida* is one of the two Palaearctic *Tomosvaryella* spp. species with black halteres. The other, *T. cilifemorata* (Becker) is known from Tunis and Egypt. It is very similar but can be differentiated by the different shape of ovipositor: in *T. nigronitida*, the piercer is much longer in comparison to the base and reaches up till first sternum. No ♂ specimens were seen.

Tomosvaryella nodosa, spec. nov.
Figs 7i, 18

Types. Holotype: ♂, Israel, Elat, 6.IV.1973, A. Freidberg (TAU). – Allotype: ♀, same date and locality as holotype (TAU). – Paratypes: Israel: 2♀♀, same date and locality as holotype; 1♂, Moon Valley, 16.V.1981, T. Furman; 1♂, Neot-Hakikar, 8.IX.1974, A. Freidberg. – Egypt: 1♂, Taba, 29.IV.1974, A. Freidberg (all TAU). Type material returned to TAU, two paratypes deposited in KBIN.

Description

Body length: 2.24-2.58 mm. Wing length: 2.11-2.24 mm.

♂. Head. Third antennal segment long acuminate; yellow-brown. Eyes not touching, narrowly separated for width slightly less than one ommatidium; lower part silver-grey pubescent, upper part shining black. Occiput silver-grey dusted, upper third less densely so.

Thorax. Humerus whitish yellow. Mesonotum greyish dusted, centre brownish grey dusted. Halter whitish yellow. Wing: Fourth costal section about twice as long as third costal section. Cross-vein r-m beyond middle of discal cell. Legs: Dark, with knees and basal third of tibiae yellow. Apical margin of tibiae yellowish brown. Tarsal segments yellow. Front four femora with basal spines poorly developed. Hind trochanter with pointed processus (Fig. 18g).

Abdomen. Lateral fan with several pale hairs. Abdominal terga subshining black-brown, weakly greyish dusted; first tergum and lateral margins of other terga more densely so, on tergum 5 extending towards middle. Sterna 3-4 with two knoblike protuberances along posterior margin, sternum 5 with larger protuberances. In dorsal view, sternum 8 about as long as tergum 5. In distal view, membraneous area narrow, elongated, sinoid. Terminalia Fig. 18.

♀. As ♂ except for the following characters. Frons silver-grey pubescent, shining in upper part for length equal to ocellar triangle, at lateral margins further so. Fourth costal sections 2-3 times as long as third costal section. Cross-vein near middle of discal cell. Tibiae darker; basal spines on front femora well developed; Pulvilli at most as long as last tarsal segment. Terminalia Fig. 7i.

Etymology. Referring to the knobby structures on the abdominal sterna.

Discussion. *T. nodosa*, spec. nov. belongs to the group with coiled ejaculatory ductuli and armed hind trochanters in the ♂. It mostly resembles *T. singuloides* De Meyer from Ethiopia in the symmetrical surstyli and shape of membraneous area. However, the paired protuberances on the abdominal sterna and the epandrium are unique in this group.

Tomosvaryella parakuthyi, spec. nov.

Figs 7j, 19

Types. Holotype: ♂, Egypt, Sinai, Ofira, 22.III.1981, A. Freidberg (TAU). – Allotype: ♀, same date and locality as holotype (TAU). – Paratypes: Egypt: 2♂♂, 2♀♀, same date and locality as holotype; 2♂♂, 2♀♀, Sinai, 20 km N Dahab, 12.III.1982; 1♂, 3♀♀, Dahab Junction, 14.III.1982; Dahab: 1♂, 7.IV.1973; 1♀, 23.V.1981 (all A. Freidberg); 1♂, Sinai, Wadi Kid, 14.III.1982, I. Yarom; 1♂, Sinai Mts, St Katharina, 13.VII.1974, F. Kaplan. – Israel: 4♂♂, Moon Valley, 16.V.1981, T. Furman; 1♂, Bor Mashash, 16.VI.1988, A. Freidberg. S. Palestine: 2♂♂, Ein Rhadian, dunes, 1.V.1954, O. Theodor (all TAU). Type material returned to TAU except 6 paratypes deposited in KBIN.

Description

Body length: 2.38-2.79 mm. Wing length: 2.18-2.52 mm.

♂. Head. Third antennal segment acuminate; pale brown, with whitish pilosity. Eyes touching for distance equal to ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput silver-grey dusted.

Thorax. Humerus pale yellow. Mesonotum and scutellum subshining black-brown; completely greyish dusted. Dorsocentral hairs palish. Halter pale yellow. Wing: Fourth costal section two till three times as long as third costal section. Cross-vein r-m at or just beyond middle of discal cell. Legs: Dark, knees narrowly yellow. Tarsal segments yellow, last tarsal segment dark. Hind femur with posteroventral row of longer hairs. Front four femora with 1-2 basal spines ventrally, usually poorly developed and almost absent. Trochanters smooth.

Abdomen. Lateral fan with few pale hairs. Abdominal terga mainly subshining black-brown, weakly greyish dusted, first tergum, anterior part of second tergum and lateral margins of terga 4-5 more extensively greyish. In dorsal view, sternum 8 more than half as long as tergum 5. In distal view, membraneous area occupying less than half of sternum 8. Terminalia Fig. 19.

♀. As ♂ except for the following characters. Frons completely greyish dusted. Dorsocentral rows more developed. Pulvilli longer than last tarsal segment. Fourth costal section shorter. Abdomen more extensively greyish dusted along lateral margins. Terminalia Fig. 7j.

Etymology. Referring to the close relationship with *T. kuthyi*.

Discussion. As mentioned above, this species is closely related to *T. kuthyi* and *T. freidbergi*, spec. nov. It can be differentiated from the former by smaller size, and smaller membraneous area. From the

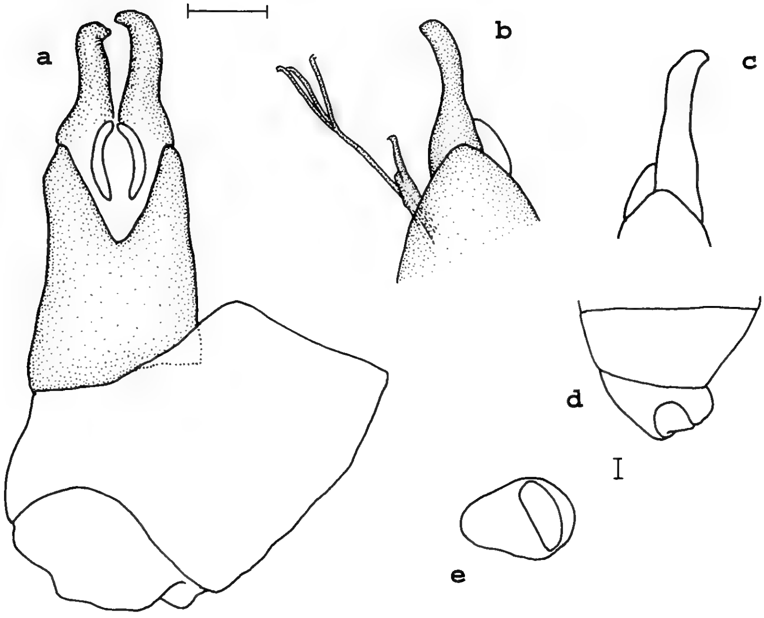


Fig. 19. *Tomosvaryella parakuthyi*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus with aedeagus and ejaculatory duct, lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal. Scale 0.1 mm.

latter by the completely greyish appearance, and the longer piercer of the ♀. Also, some slight differences can be distinguished in the ♂ terminalia. In addition 5♂♂ from Elat (6.IV.1973, leg. A. Freidberg) were found, who resemble *T. parakuthyi* in most respect except for small differences in the surstyli. They are not included in the type series.

Tomosvaryella pusilla, spec. nov.

Figs 7k, 20

Types. Holotype: ♂, Israel, Herzliyya, 19.VIII.1981, A. Freidberg (TAU). – Allotype: ♀, Israel, Kfar Ruppin, 28.X.1978, A. Freidberg (TAU). – Paratypes: same locality as allotype: 1♂, 1♀, 25.X.1978, 1♀, 10.X.1978, A. Freidberg; 1♂, Bor Mashash, 21.VII.1986, A. Freidberg; 1♀, Akko Swamp, 23.X.1986, I. Yarom. Egypt: 1♂, St. Katharina, 18.VII.1974, F. Kaplan; 1♀, Sinai, Ofira Sewage, 2.V.1981, A. Freidberg (all TAU). Type material returned to TAU except 2 paratypes deposited in KBIN.

Description

Body length: 1.56-2.31 mm. Wing length: 1.63-2.18 mm.

♂. Head. Third antennal segment long acuminate; brown. Eyes touching for distance equal to half of ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput silver-grey dusted, upper third less densely greyish-brown.

Thorax. Humerus whitish. Mesonotum subshining black-brown, weakly brownish dusted, anterior margin narrowly greyish dusted. Scutellum as centre of mesonotum. Dorsocentral hairs well developed, especially anteriorly. Halter yellow. Wing: Fourth costal section about as long as third costal section. Cross-vein r-m near middle of discal cell. Legs: Dark, with knees and basal fourth till fifth of tibiae yellow. Front four femora at most with 1-2 poorly developed bristles basally. Trochanters smooth.

Abdomen. Lateral fan with few hairs. Abdominal terga subshining black-brown, brownish dusted; lateral margins greyish dusted, on terga 4 and 5 extending towards middle. In dorsal view, sternum

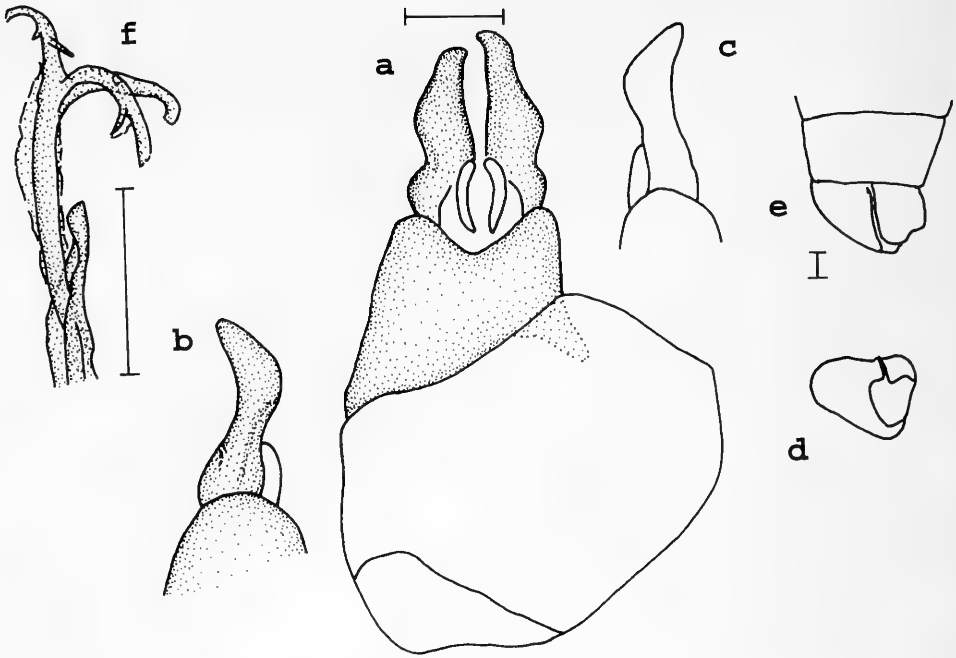


Fig. 20. *Tomosvaryella pusilla*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. ejaculatory duct, lateral. Scale 0.1 mm.

8 about as long as tergum 5, with dorsal suture. In distal view, membraneous area directed to right side, occupying less than half of sternum 8. Terminalia Fig. 20.

♀. As ♂ except for the following characters. Frons completely greyish pubescent. Front femora with basal spines. Pulvilli as long as last tarsal segment. Terminalia Fig. 7k.

Etymology. Referring to the small size of this species.

Discussion. This small species seems to belong to the *africana* group (see De Meyer 1993) because of the dorsal suture on the eight abdominal sternum and the teeth on the ejaculatory ductuli. The shape of the surstyli is however somewhat different from other representatives of this group. Also the hind trochanters in the ♂ are without protuberances.

Tomosvaryella sedomensis, spec. nov.

Fig. 21

Types. Holotype: ♂, Israel, Sedom, 20.IX.1971, Kugler (TAU). – Paratypes: 4♂♂, same locality and data as holotype (TAU). Holotype and 3 paratypes returned to TAU, one paratype deposited in KBIN.

Description

♂. Body length: 2.38-2.79 mm. Wing length: 2.38-2.52 mm.

Head. Third antennal segment long acuminate, pale yellow. Eyes not touching, separated for distance equal to one ommatidium; lower part silver-grey pubescent, upper part subshining black. Occiput silver-grey dusted, upper part more greyish brown.

Thorax. Humerus pale yellowish. Mesonotum and scutellum mainly greyish brown dusted. Halter yellow. Wing: Fourth costal section two to three times as long as third costal section. Cross-vein r-m near middle of discal cell. Legs: Dark, with knees, basal third and apical margin of tibiae, and tarsal segments yellow. Trochanters smooth. Front four femora with 1-2 basal spines.

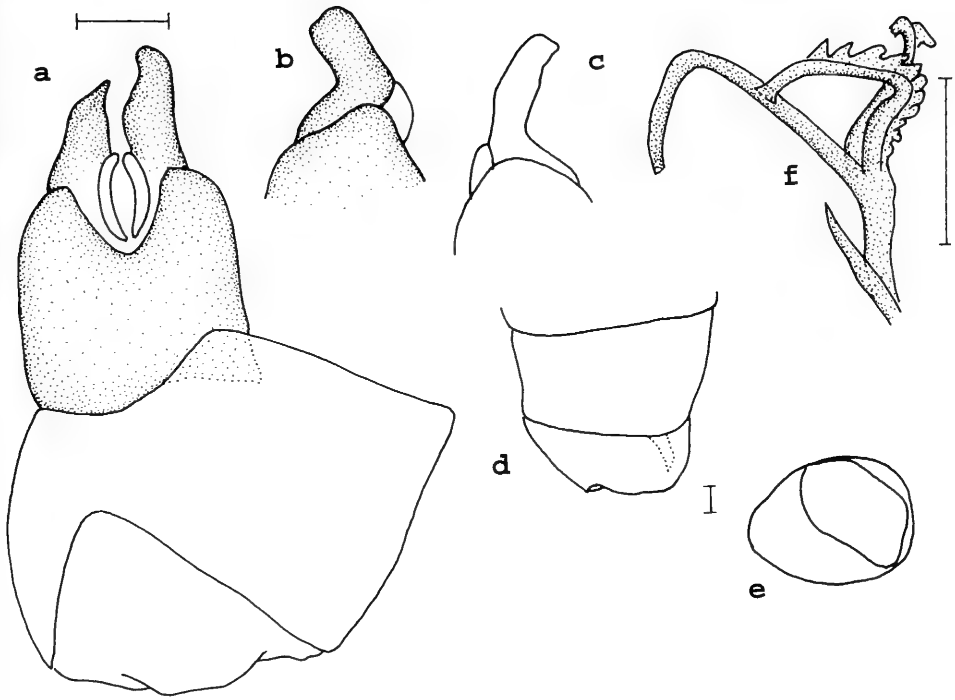


Fig. 21. *Tomosvaryella sedomensis*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. ejaculatory duct, lateral. Scale 0.1 mm.

Abdomen. Lateral fan with few palish bristly hairs. Abdominal terga greyish brown; tergum 1 greyish dusted; lateral margins of other terga greyish. In dorsal view, sternum 8 half as long as tergum 5. In distal view, membraneous area occupying about half of sternum 8. Terminalia Fig. 21.

♀ unknown.

Etymology. After the type locality, Sedom.

Discussion. The shape of the surstyli resembles most those of the Afrotropical *T. gibbosa* (from South Africa and Zaire). Their subsymmetrical and strongly curved form seems to refer to the *ancylostyla* group (see De Meyer 1993) and possibly both species are related to this group.

Tomosvaryella subvirescens (Loew, 1872)

Diagnosis. Third antennal segment long acuminate, brown with apical margin pale. Mesonotum subshining black-brown with dorsocentral rows of short dark hairs. Legs mainly dark with knees yellow, tarsal segments darkish; ♂ hind trochanter with trapezoid protuberance. Abdominal terga shining black-brown with lateral margins greyish; with short but conspicuous pilosity.

Material. 1♂, USA, Texas, Belfrage, (holotype) (MCZ). – Egypt, Sinai, Ofira Sewage: 1♂, 2.V.1981; 1♂, 21.V.1981, A. Freidberg. – Israel: 1♂, Elat, 4.V.1986, F. Kaplan (all TAU).

Discussion. ♂ and ♀ diagnostic characters are illustrated in De Meyer (1993). It seems to be a cosmopolitan species, recorded from most zoogeographical regions. It was recorded by Bodenheimer (1937) from Palestina, under the name of *P. pilosiventris* (junior synonym).

Tomosvaryella sylvatica (Meigen, 1824)

Diagnosis. Third antennal segment acuminate; brownish with apical margin paler. Legs dark with knees and tarsi yellow. Mesonotum greyish brown dusted. Abdomen subshining black-brown, weakly brownish dusted, lateral margins more greyish. Abdominal sternum 8 with slit like membraneous area (Fig. 8g).

Material. Israel: 1♂, Mt Hermon (occ. Golan Heights), 2000m, 12.VII.1984, Y. Zvik (TAU).

Discussion. This is the most widespread species in Europe, found in all subregions. Also reported from Tunis. A detailed redescription is given by Aczél (1944).

Tomosvaryella tecta De Meyer, 1993

Diagnosis. Third antennal segment long acuminate, brown with apical margin pale. Mesonotum subshining black-brown with dorsocentral rows of short dark hairs. Legs mainly dark with knees yellow; ♂ hind trochanter with triangular protuberance. Abdominal terga shining black-brown with lateral margins greyish; with short dark pilosity.

Material. South Africa: 1♂, Natal, Ndumu Game Reserve, 4-9.X.1982, J. Londt (holotype) (NMP); 1♀, Natal, Rietspruit farm, 13 km NE Pietermaritzburg, 13.III.1990, A. Whittington (allotype) (NMP). – Israel: 33 specimens from the following localities: 'Ammi'ad; Ashdod; Bet Shemesh; Bet Dagan; Elot; Hermon (occ. Golan Heights); Herzliyya; Jeruzalem, Mt Scopus; Kare-Deshe; Kfar Rugin; Ma'agan Michael; N. Bsor, near Ze'elim; Ra'anana; Ramat Hadar; Rishon te Zion; Tel Antipatris; Tel Aviv; W. Faria (occ. West Bank), Ein-Shibli (Wadi FAria, occ. West Bank); Yavne; Zetat. – Egypt: 1♀, Silvah, 22.XI.1943 (all TAU).

Discussion. ♂ and ♀ diagnostic characters are illustrated in De Meyer (1993). *T. tecta* is closely related to *T. subvirescens* and was previously confused with the latter. So far, it is only recorded from the Afrotropical region (South Africa and Kenya), although it might be much more widespread like *T. subvirescens.*

Tomosvaryella trichotibialis, spec. nov.

Fig. 22

Types. Holotype: ♂, Israel, Senir, 8.VII.1987, I. Nussbaum (TAU).

Description

♂. Body length: 3.4 mm. Wing length: 3.2 mm.

Head. Third antennal segment long acuminate; yellow-brown. Eyes touching for distance equal to 1.5 times of ocellar triangle; lower part silver-grey pubescent, upper part shining black. Occiput silver-grey dusted, upper part greyish-brown.

Thorax. Humerus pale yellow. Mesonotum weakly subshining black-brown, mainly brownish dusted, anterior margin greyish dusted. Scutellum as centre of mesonotum. Dorsocentral hairs indistinct. Halter yellow-brown. Wing: Fourth costal section about four times as long as third costal section. Cross-vein r-m well beyond middle of discal cell. Legs: Dark, with knees narrowly yellow. Hind tibia dorsally with conspicuous comb of long dark bristles at apical end (Fig. 22f). Femora and trochanters smooth. Tarsal segments dark. Pulvilli at most as long as last tarsal segment.

Abdomen. Lateral fan well developed with dark bristles. Abdominal terga weakly subshining black-brown, brownish dusted; anterior margin of second tergum and lateral margins of other terga greyish dusted, on tergum 5 extending towards middle. In dorsal view, sternum 8 about as long as tergum 5. In distal view, membraneous area directed to right side, occupying less than half of sternum 8. Terminalia Fig. 22.

♀ unknown.

Etymology. Referring to the long bristles on the hind tibia.

Discussion. This species can be readily differentiated from any other *Tomosvaryella* by the long conspicuous bristles on the hind tibia. The bold shape of the surstyli and the very fine ejaculatory ductuli are unlike any of the other *Tomosvaryella* species and its relationship is unclear.

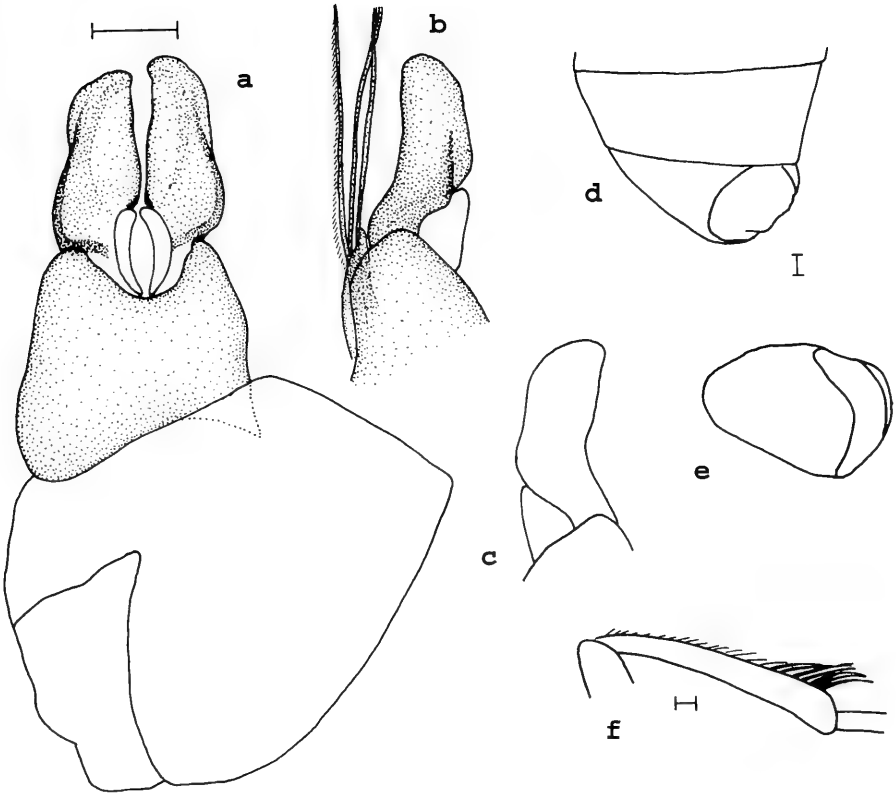


Fig. 22. *Tomosvaryella trichotibialis*, spec. nov., ♂ terminalia. a. dorsal view; b. outer surstylus with aedeagus and ejaculatory duct, lateral; c. inner surstylus lateral; d. tergum 5 and sternum 8 dorsal; e. sternum 8 distal; f. hind tibia, anterior. Scale 0.1 mm.

Tomosvaryella vicina (Becker, 1900)

Diagnosis. Third antennal segment acuminate, pale brown. Mesonotum weakly subshining black-brown. Legs mainly dark with knees yellow; ♂ hind trochanter with keel like protuberance, with short hairs. Abdominal terga subshining black-brown with lateral margins narrowly greyish; with short dark pilosity.

Material. Syntype ♂, Egypt, Luxor, '44629 II' (MNHU); 2♂♂, Israel, EIn Ghadian [=Hazeva], 1.V.1954, J. Wahrman (TAU).

Discussion. Illustration of ♂ genital structures and hind trochanter is given in De Meyer (1993). The species was originally described from Egypt by Becker, and additionally reported from Palestina by Bodenheimer (1937). A recent revision of the Afrotropical *Tomosvaryella* did not reveal any specimens, though Hardy (1961) mentions it from Zaire.

Discussion

With 45 species, the fauna of Israel is not very rich compared with other countries in the Palaearctic region. Countries like Belgium, the former Czechoslovakia, or Great Britain all have more than 70 species. The species composition is however quite special because of its geographical position. Freidberg (1988) has pointed out the unique position of Israel as belonging to the Palaearctic region but bordering Asia and Africa, as well as the diverse physiography of the country itself. He indicates that the dipteran fauna of the area is predominantly Palaearctic in origin (the Palaearctic element occupying 20 % in Chironomidae up till 100 % in several other families). The Afrotropical element is considered second in importance, and Oriental and other elements can be noticed to a lesser extent. For Pipunculidae, the zoogeographical affinities seem to vary according to the genus studied. For the genera *Verrallia* and *Cephalops* the relationship is truely Palaearctic. The genus *Verrallia* knows an Holarctic distribution and *V. aucta* is a Palaearctic species, found throughout Europe. The representatives of *Cephalops* are also Palaearctic. *C. conjunctivus* is a mediterranean species with close relationship to Afrotropical species. The *Chalarus* species also seem to be of Palaearctic origin although the picture is incomplete here because of the poor knowledge of this group. The genus *Chalarus* has a mainly Holarctic distribution with a fair amount of representatives in the Neotropical region. This might however may be a bias because of insufficient study for the other regions. The genus does occur in the Afrotropical region (the author has seen *Chalarus* specimens from Kenya, Madagascar and South Africa) but their identification is unknown. Further study of this genus on a worldwide scale is necessary before any definite conclusions can be made.

The representatives of the genus *Eudorylas* also seem to be of Palaearctic origin. Species like *E. halteratus, E. longifrons, E. obliquus,* and *E. zermattensis* are widespread over Europe. The species complex of *E. ruralis, E. imitator,* and *E. sinaiensis* might also of Palaearctic origin. Some species seem to have a mainly Mediterranean distribution like *E. fluviatilis, E. setosus, E. pannonicus,* and *E. trochanteratus* (sometimes with occurrence in Central Europe and/or Central Asia). The Mediterranean fauna is however scarcely known as indicated in the introduction. *E. confusoides* is the only species with a clearly Oriental affinity, being mostly known from Asia (under the junior synonym of *E. lini*) and some of the islands in the Indian Ocean. No Afrotropical affinities could be detected for this genus. However, again this could be because of the fact that no recent revisions exist of this genus for that region.

The only genus with clearly Afrotropical links is *Tomosvaryella. T. jubata, T. inopinata, T. sedomensis,* and *T. nodosa* all have a close relationship with species from mainland Africa. The Palaearctic element is however still predominant with *T. sylvatica, T. geniculata,* and *T. minima* being widespread species in Europe and *T. frontata, T. mutata, T. helwanensis,* and *T. nigronitida* having a Mediterranean distribution (again sometimes with occurrence in Central Europe). The *T. argyrata* species group and the *T. kuthyi* complex also seem to be related to the Palaearctic fauna and/or the Irano-Turanian fauna.

The only cosmopolitan species found among the Pipunculidae of Israel and the Sinai is *T. subvirescens* which is mentioned from almost all zoogeographical regions. The same is also true for *Chalarus spurius* but some of these identifications seem to be doubtful and should be checked first, as mentioned by Jervis (1992).

Some common genera from the Palaearctic region seem to be absent in Israel, like *Dorylomorpha* and *Pipunculus*. This can be explained by the different habitat preference. Representatives of the genus *Dorylomorpha* for example seem to prefer more forested and humid or relatively cooler habitats like meadows, birch or oak forests, swamps, etc. (cfr Albrecht 1990). This also applies for most of the *Cephalops* species in Europe. The predominance of *Tomosvaryella* species can be explained because of their preference for more xerophyllic conditions.

Most species seem to occur in the summer months. Species like *T. kuthyi, T. freidbergi, E. ruralis, E. fluviatilis,* and *E. imitator* seem to have a single peak period between the months of May and August. *E. obliquus* occurs somewhat earlier (March till June). Grootaert (1993) noticed a pronounced shift of occurrence for *Platypalpus* spp. (Hybotidae) to the cooler winter months in the Mediterranean region, compared to abundance of related species during the summer months in western Europe. Such a drastic seasonal shift could however not be detected for the pipunculid species here, although species found in both areas do not necessarily seem to co-occur or show the same modality. *T. kuthyi* for example is a bivoltine species in Belgium with peaks in June and August (De Meyer & De Bruyn 1989). Here, only one peak was detected around June. The same more or less applies to *E. obliquus* which occurs earlier in Israel. Some species, like *T. tecta* and *E. confusoides* seem to occur generally in the cooler months of late autumn or winter. For these however, no related species occur in Europe as mentioned above. The phenological data are in general too preliminary to make any definite conclusions.

Acknowledgments

The author would like to thank the various curators who kindly put material at his disposal. Many thanks to Mr. M. Ackland for providing me with his unpublished manuscripts on British Pipunculidae. This study was partly financed by a grant (ref. V 3/5 DE.D 9 259 – 1991) from the N.F.W.O. (Brussels, Belgium).

References

Ackland, D. M. 1993. Notes on British *Cephalops* Fallén, 1810 with description of a new species, and *Microcephalops* De Meyer, 1989, a genus new to Britain (Dipt., Pipunculidae). - Entomologist's mon. Mag. **129**: 95-105

Aczél, M. 1944. Die Gattung *Tomosvaryella* Acz. (Dipt.). (Dorylaiden-Studien 8). - Ann. hist.-nat. Mus. nat. hung., Zool. **37**: 75-129

Albrecht, A. 1990. Revision, phylogeny and classification of the genus *Dorylomorpha* (Diptera, Pipunculidae). - Acta zool. fenn. **188**: 240 pp.

Becker, T. 1903. Aegyptische Dipteren. - Mitt. zool. Mus. Berl. **2**: 1-195

-- 1910. Dipterologische Sammelreise nach Korsika (Dipt.). - Dt. ent. Z. 1910: 635-665

-- 1921. Neue Dipteren meiner Sammlung. Pipunculidae. - Wiener Ent. Z. **38**: 123-132

Bodenheimer, F. S. 1937. Prodromus Faunae Palestinae. - Mém. Inst. Egypt **33**: p 188

Coe, R. L. 1966. Diptera, Pipunculidae. - Handb. Ident. Br. Ins. **X**, 2c: 83 pp.

-- 1969. Some Pipunculidae (Diptera) from Southern Spain, with description of a new species. - Ent. Meddr. **37**: 3-8

Collin, J. E. 1948. Results of the Armstrong College Expedition to Siwa Oasis (Libyan desert) 1935, under the leadership of Prof. J. Omer-Cooper. Diptera Empididae, Dolichopodidae, Aschiza and Acalypterae. - Bull. Soc. Fouad 1 Ent. **33**: 175-225

-- 1958. Pipunculidae collected by Mr Ralph L. Coe in Yugoslavia in 1955, with description of two new species. - Entomologist **91**: 96-99

De Meyer, M. 1989a. The West-Palaearctic species of the pipunculid genera *Cephalops* and *Beckerias* (Diptera): classification, phylogeny and geographical distribution. - J. nat. Hist. **23**: 725-765

-- 1989b. Systematics of the Nearctic species of the genus *Cephalops* Fallén (Diptera, Pipunculidae). - Bull. Inst. r. Sci. nat. Belg. Ent. **59**: 99-130

-- 1992a. Revision of the Afrotropical species of *Cephalops* Fallén (Diptera, Pipunculidae). - J. afr. Zool. **106**: 81-111

-- 1992b. Preliminary database on the distribution of Pipunculidae (Diptera) in Europe. - Proc. 8th int. Coll. EIS, Brussels 1991: 91-100

-- 1993. A revision of the Afrotropical species of *Tomosvaryella* Aczél, 1939 (Diptera: Pipunculidae). - Ann. Natal Mus. **34**: 43-101

-- & L. De Bruyn 1989. Seasonal occurrence and voltinism of Pipunculidae (Diptera) in Belgium. - Bull. Inst. r. Sci. nat. Belg. Ent. **58**: 71-81

Freidberg, A. 1988. 10. Zoogeography of the Diptera of Israel. In: Yom-Tov & Tchernov (Eds.): The zoogeography of Israel, pp. 277-308. - Dordrecht

Grootaert, P. 1993. Faunistics and phenology of *Platypalpus* species in central Mediterranean Spain - reversal phenology. - Bull. Ann. Soc. r. Belg. Ent. **129**: 20-25

Hackman, W. 1980. A Checklist of the Finish Diptera II. Syrphoidea. - Notul. ent. **60**: 117-162

Hardy, D. E. 1961. Bibionidae (Diptera, Nematocera) and Dorilaidae (Pipunculidae: Diptera-Cyclorrhapha). - Parc nat. Garamba, Miss. H. De Saeger **24**: 111-180

-- 1966. Redescription of *Tomosvaryella frontata* (Diptera: Pipunculidae). - Ann. ent. Soc. Amer. **60**: 116-118

-- 1971. Pipunculidae (Diptera) Parasitic on Rice Leafhoppers in the Oriental Region. - Proc. Hawaii. ent. Soc. **21**: 79-91

Janssens, E. 1955. Mission E. Janssens & R. Tollet en Grece. 13e note Diptera Pipunculidae. - Bull. Inst. r. Sci. nat. Belg. **31**: 1-6

Jervis, M. A. 1992. A taxonomic revision of the pipunculid fly genus *Chalarus* Walker, with particular reference to the European fauna. - Zool. J. Linn. Soc. **105**: 243-352

Kozánek, M. 1988. Description of two new species of the genus *Eudorylas* (Diptera, Pipunculidae) from Soviet Middle Asia. - Faun. Sprav. **43**: 945-948

Rafael, J. A. & M. De Meyer 1992. Generic classification of the family Pipunculide (Diptera): a cladistic analysis. - J. nat. Hist. **26**: 637-658

Sack, P. 1935. Dorylaidae (Pipunculidae). In: Lindner, E. (Ed.) Die Fliegen der palaearktischen Region 4(4), **32**: 1-57. - Stuttgart

Tanasijtshuk, V. S. 1988. Family Pipunculidae. In: Soos & Papp (Eds): Catalogue of the Palaearctic Diptera **8**: 230-245. - Budapest & Amsterdam

Yano, K., Ishitani, M., Asai, I. & M. Satoh 1984. Faunal and biological studies on the insects of Paddy Fields in Asia. XII. Pipunculidae from Japan (Diptera). - Trans. Shikoku ent. Soc. **16**: 53-74

49. Torp, E.: Danmarks Svirrefluer. Danmarks Dyreliv Bd. 6. - Apollo Books, Kirkeby Sand 19, DK-5771 Stenstrup, 1994. 490 S., 482 Abb., 21 Farbtaf., 270 Verbreitungskarten.

Dieses solide Buch informiert ausführlich über alle 270 aus Dänemark nachgewiesenen Schwebfliegenarten. Leider ist der zweispaltige Text in dänischer Sprache verfaßt. Dem Inhaltsverzeichnis und dem Vorwort folgt eine Einleitung, in der berühmte dänische Dipterologen und die Kartierung auf UTM-Gitter vorgestellt werden. Die notwendigen Erklärungen zum Bau der Imagines fehlen nicht. Der 52-seitige, sehr ausführliche Bestimmungsschlüssel wird von ca. 250 Strichzeichnungen begleitet. Es folgen 12 Farbtafeln, auf denen ca. 230 Arten farbig und etwas vergrößert dargestellt werden, viele davon in beiden Geschlechtern. Auf weiteren 25 Farbfotos werden Lebendaufnahmen gezeigt, darunter auch Larven. Auf 265 Seiten, dem systematischen Teil, werden alle Arten im einzelnen behandelt. Die Beschreibungen enthalten in der Regel die Merkmale, Verbreitung, Habitat, Flugzeit, Blütenbesuch und Larvenbiologie sowie eine englische Zusammenfassung. Die Verbreitung in Dänemark wird zusätzlich als Rasterkartierung (UTM-Gitter) bildlich dargestellt. Der Teil wird von weiteren Abbildungen von Imagines und auch einiger Larven begleitet. Wie nicht anders zu erwarten, gibt es gerade in dieser Familie auch einen volktümlichen dänischen Namen für jede Art. Weitere Kapitel behandeln Biologisches, wie Paarung, Eiablage, Larvenentwicklung, Verpuppung, Überwinterung, Biotopbindung mit Fotos typischer Landschaften, Populationsentwicklung, Zoogeographie, Feinde, Parasitismus und Mimikri. Ein Kapitel zur Roten Liste, eine Sammelanleitung, die systematische Liste mit dem lateinischen und dem volkstümlichen dänischen Namen, ein umfangreiches Literaturverzeichnis und der Index beschließen das Werk. Insgesamt ein Buch, das die mitteleuropäische Syrphiden-Literatur erheblich bereichert und für jeden Insektenfreund, schon wegen der Farbabbildungen, von Nutzen sein wird. W. Schacht

50. Ebert, G. (Hrsg.): Die Schmetterlinge Baden-Württembergs. Band 3 und 4: Nachtfalter I und II. - Verlag Eugen Ulmer, Stuttgart, 1994. 518 S. und 535 S.

Mit der Untersuchung der Nachtfalterarten, von denen es zehnmal mehr gibt als Tagfalter, wird die enzyklopädische Bearbeitung der Schmetterlinge Baden-Württembergs fortgesetzt. Band 1 beinhaltet einen Allgemeinen Teil, in dem Benutzerhinweise gegeben, Beobachtungsmethoden bei Nachtfaltern vorgestellt werden und die allgemeine Ökologie und Biologie (inkl. Gefährdung und Schutz) behandelt wird. Der Spezielle Teil stellt die einzelnen Arten der Hepialidae, Cossidae, Zygaenidae, Limacodidae, Psychidae und Thyrididae vor, wobei ausführlich folgende Punkte erörtert werden: Synonyme, Gesamtverbreitung, subspezifischer Kontext, regionale und vertikale Verbreitung, Phänologie der Imagines und Präimaginalstadien, Lebensraum, Nahrung der Raupe, Habitat, Nahrung des Falters, Verhalten, Parasitoide sowie Gefahrdung und Schutz. Band 2 beinhaltet die Familien der Bombycidae, Lasiocampidae, Lemoniidae, Saturniidae, Sphingidae, Drepanidae, Notodontidae, Dilobidae, Lymantriidae, Ctenuchidae und Nolidae. Die Artbeschreibungen sind luxuriös mit brillianten Farbfotos von Imagines, Präimaginalstadien, Futterpflanzen und Habitaten ausgestattet, ergänzt durch Säulendiagramme der Naturraum-Phänologien. Weitere Nachtfalterbände sind in Vorbereitung. Eine ebenso fantastische wie überaus preiswerte Buchreihe, die in keiner entomologischen und ökologisch-naturschutz-orientierten Bibliothek fehlen sollte. R. Gerstmeier

51. Fossa, S. A. & A. J. Nilsen: Korallenriff-Aquarium. Band 4: Nesseltiere im Korallenriff und für das Korallenriff-Aquarium. - Birgit Schmettkamp Verlag, Bornheim, 1995. 447 S.

Dieses Sachbuch ist ein herrliches Nachschlagewerk für Korallen, aber auch für andere Nesseltiere wie Hydroide, Quallen, Würfelquallen, Anemonen, Scheiben- und Krustenanemonen. Illustriert mit unzähligen brillianten Farbfotos werden Vorkommen, Größe, Futter und Habitus der einzelnen Arten beschrieben und die entsprechenden Aquarienbedingungen aufgelistet (generelle Pflege, Beleuchtung, Wasserbewegung und Vermehrungsmöglichkeiten). Sehr ausführliche, allgemeine Beschreibungen finden sich in der Einleitung zu den jeweiligen Gruppen, ergänzt durch anschauliche Grafiken, Fotos von Querschnittpräparaten oder z.B. Fotos von der Ansiedelung einer Planula-Larve im Aquarium mit Heranwachsen einer neuen Kolonie. Hielt man die Haltung von Steinkorallen im Aquarium noch vor einigen Jahren für nahezu unmöglich, so zeigen Aquarianer heute, daß sogar deren Lebenszyklus im Aquarium realisiert werden kann - durchaus auch für die Wissenschaft ein interessantes Ergebnis. Ein uneingeschränkt empfehlenswertes Standardwerk für Aquarianer, Taucher, UW-Fotografen und Korallenliebhaber.

R. Gerstmeier

SPIXIANA – Zeitschrift für Zoologie	SPIXIANA – Journal of Zoology
herausgegeben von der	published by
Zoologischen Staatssammlung München	The Zoological State Collection Munich

SPIXIANA bringt Originalarbeiten aus dem Gesamtgebiet der Zoologischen Systematik mit Schwerpunkten in Morphologie, Phylogenie, Tiergeographie und Ökologie. Manuskripte werden in Deutsch, Englisch oder Französisch angenommen. Pro Jahr erscheint ein Band zu drei Heften. Umfangreiche Beiträge können in Supplementbänden herausgegeben werden.

Ein Jahresabonnement kostet 120,- DM oder 60 US-$. Supplementbände werden gesondert nach Umfang berechnet. Mitglieder der "Freunde der Zoologischen Staatssammlung München" können die Zeitschrift zum ermäßigten Preis von 50,- DM beziehen.

SPIXIANA publishes original papers on Zoological Systematics, with emphasis on Morphology, Phylogeny, Zoogeography and Ecology. Manuscripts will be accepted in German, English or French. A volume of three issues will be published annually. Extensive contributions may be edited in supplement volumes.

Annual subscription rate is 60 US-$ or any internationally convertible currency in the value of 120,- DM. Supplements are charged at special rates depending on the number of printed pages. Members of the "Freunde der Zoologischen Staatssammlung München" may order the journal at the reduced rate of 50,- DM.

Bestellungen sind zu richten an die

Orders should be addressed to the library of the

Zoologische Staatssammlung München
Münchhausenstraße 21
D-81247 München

Hinweise für Autoren

Die Manuskripte sollen in zweifacher Ausfertigung eingereicht werden. Sie sollen einseitig und weitzeilig mit mindestens vier cm breitem Rand geschrieben sein. Sie müssen den allgemeinen Bedingungen für die Abfassung wissenschaftlicher Manuskripte entsprechen. Für die Form der Manuskripte ist die jeweils letzte Ausgabe der SPIXIANA maßgebend und genau zu beachten. Eine englische Zusammenfassung ist der Arbeit voranzustellen. Tabellen und Abbildungsvorlagen sind gesondert beizufügen. Der Gesamtumfang eines Beitrages sollte nicht mehr als 2 Druckbogen (32 Druckseiten) umfassen.

Manuskripte auf Computerdisketten werden bevorzugt. In diesem Falle müssen die Diskette und zwei gedruckte Exemplare eingereicht werden. Der Text sollte keine Absatzformatierungen enthalten, die Tabellen sollten aber mit Tabulatoren formatiert sein. Gattungs- und Artnamen können kursiv gesetzt werden. Von der Verwendung anderer Zeichenformatierungen ist abzusehen. Anstelle von ♀ und ♂ sollte eine Zeichenkombination, welche im Text sonst nicht vorkommt, z. B. '#w' und '#m', verwendet werden. Es sollten 3,5" und 5,25" Disketten, lesbar auf IBM-kompatiblen Computern mit MS-DOS, eingereicht werden.

Die Herausgabe dieser Zeitschrift erfolgt ohne gewerblichen Gewinn. Mitarbeiter und Herausgeber erhalten kein Honorar. Die Autoren erhalten 1 Heft mit ihrer Arbeit. Sonderdrucke werden nach Wunsch gegen Rechnung angefertigt. Die Bestellung sollte bei Rückgabe der Fahnenkorrektur erfolgen.

Notice to Contributors:

The manuscript should be presented in two complete copies. It must be typed on one side of the paper only and double spaced with a margin of at least four centimetres. It should correspond to the universal composition of scientific manuscripts. The form should observe the SPIXIANA standard outlay set up in the previous issue. An English abstract should precede the paper. Tables, graphs and illustrations must be enclosed separately. The total text of a contribution should not exceed two galley proofs (32 printed pages).

Manuscripts on word processor discs are preferred. The floppy disc with text (and graphic-files, if present) and two hard copies shoud be send to the Editor. Do not format the text, except for italics (for names of genera and species) and tabs (only for tables !). Instead of ♀ and ♂ use '#f' and '#m' or any other combinations of signs which do not occur elsewhere in the text. The text should be on 3.5" or 5.25" discs, readable on IBM-compatibles with MS-DOS.

The publication of this journal ensues without material profit. Co-workers and publishers receive no payment. The authors will receive 1 copy of the part of the volume in which their paper appears. Reprints can be ordered when the proofs are returned.

33. DM 138.-; **34.** DM 65.-; **35.** DM 39.80; **36.** DM 38.-; **37.** USD 78.-; **38.** USD 75.-; **39.** GBP 85.-; **40.** GBP 85.-; **41.** AUD 125.- pro Band; **42.** AUD 29.95; **43.** ?; **44.** DFL 170.-; **45.** GBP 16.50; **46.** GBP 25.-, USD 45.-; **47.** DM 148.-; **48.** DFL 250.-; **49.** DKK 300.-; **50.** je DM 79.-; **51.** DM 96.-.

SPIXIANA	18	3	201–320	München, 01. November 1995	ISSN 0341–8391

INHALT - CONTENTS