Taxonomy, phylogeny, and zoogeography of the weevil genus *Euops* (Insecta: Coleoptera: Curculionoidea) in the Papuan Region

Dissertation
zur Erlangung des Doktorgrades
der Fakultät für Biologie
der Ludwig-Maximilians-Universität München

vorgelegt von
Alexander Riedel
München, Januar 2002

Erstgutachter: Prof. Dr. Gerhard Haszprunar
Zweitgutachter: Prof. Dr. Horst Bohn

Tag der Abgabe: 13. März 2002

Tag der mündlichen Prüfung: 17. Mai 2002

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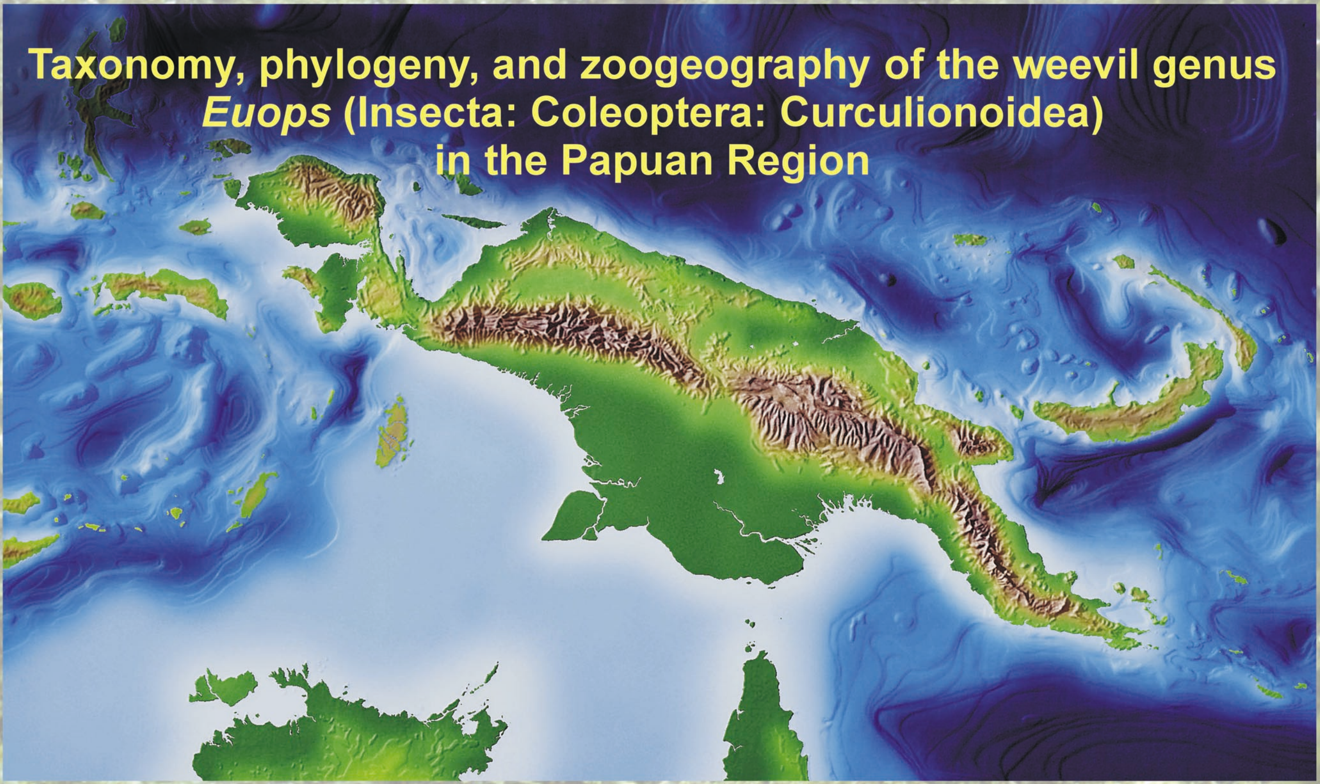
For my parents,
who gave me the opportunity to carry out these studies:

For my mother,
who helped me with her tolerance and patience.

For my late father,
with whom I spent so many happy days collecting beetles.

Taxonomy, phylogeny, and zoogeography of the weevil genus *Euops* (Insecta: Coleoptera: Curculionoidea) in the Papuan Region



Summary

The attelabid genus *Euops* SCHOENHERR is demonstrated to constitute a monophyletic group based on the following synapomorphies: 1) mycetangia of the female for storage of fungus spores consisting of three different reservoirs and associated setose structures, 2) a patch of modified setae of the female venter, usually associated with exocrinous glands, 3) enlarged eyes. Systematics, evolutionary history and biology of Curculionoidea and Attelabidae are summarized.

The "Papuan region" is treated herein as comprising the provinces of Maluku and Irian Jaya of Indonesia, Papua New Guinea, and the Solomon Islands. A summary of the natural history of this region is given. Approximately two years were spent in the field to supplement the sparse material available from museum collections for this study.

Selected, monophyletic species groups of *Euops* are treated in a monographic way: the *spinosus*-group (ten species described as new), the *pygmaeus*-group (one species redescribed, 13 species described as new), the *quadrifasciculatus*-group (four species redescribed, six species described as new), the *simulans*-group (three species redescribed, 19 species described as new), and the subgenus *Neosynaptops* (two species redescribed, seven species described as new). These monographs are attached to the present summary as appendices.

New standards are proposed for taxonomic descriptions of *Euops* species: the transfer apparatus of the male genitalia proved to be of critical importance for the diagnosis of species. Other characters of male and female genitalia, of the mouthparts, the metanotum, and the proventriculus are useful in phylogenetic reconstruction and in the diagnosis of species groups. These and other characters are described for the first time. Methods for their appropriate preparation and examination by SEM and light microscopy are proposed.

The literature published on *Euops* is reviewed and a bibliography is given. At the commencement of this study (1998), 134 species and 10 subspecies of *Euops* were recognized as valid worldwide. A synopsis of Papuan *Euops* is given. Before the commencement of this study 24 valid species of Papuan *Euops*, based on inadequate descriptions, were known to science. These are redescribed to meet the new standards. Where necessary, lectotypes are designated. One species (*E. picipes* VOSS) is placed into synonymy. One subspecific name (*Euops femoralis* f. *ruficornis* Voss) is elevated to species level. 52 species are added by formal descriptions. At present (2002), 76 described species are reported for the Papuan region, constituting 40 % of the world fauna (189 described species). Another 108 undescribed species from the Papuan region are listed. These could not be described herein but they will be so in later publications. Thus, at present 184 *Euops* species are known from the Papuan region constituting 58 % of the world fauna (320 ascertained species).

Cladistic analyses are performed for each of the monographed species groups. An overall analysis is done using selected species. Five other genera of Attelabidae were included as outgroup representatives. The monophyly of the recognized species groups of *Euops* was confirmed except for the *simulans*-group which is difficult to define at its base. A clade comprising *Apoderus*, *Lamprolabus* and *Euscelophilus* is supported mainly by derived characters of the prementum, plesiomorphic in *Attelabus* and in *Euops*. It is predicted that the rank of the "Apoderinae" will have to be downgraded after a phylogenetic analysis of the Attelabidae.

The worldwide distribution of *Euops* is a paleotropical one. This could reflect an ancient Gondwanic pattern or a more recent one through rapid dispersal. Evidence for and against each hypothesis is discussed. Within the Papuan region most species groups of *Euops* are strictly confined to the area of the Sahul shelf. Off-shore islands, such as Maluku or the Solomons, have a depauperate fauna. The areas of endemism observed are usually not compatible with geological terrains. Rapid dispersal overland is postulated. The Philippines and Sulawesi adjoining to the West have a speciose but uniform fauna, belonging exclusively to the subgenus *Suniops*. The fauna of Maluku consists of equal parts of *Suniops* species arrived from the west and of other species of Papuan *Euops* groups from the east. There is little overlap between the Papuan fauna of *Euops* and a moderately rich Australian one. The origins of the highly secluded Papuan fauna of *Euops* remain obscure.

Although *Euops* occupies an altitudinal range from sea level to 3535 m, there is a maximum of diversity between 700 m and 800 m altitude. Diversity remains at a high level to an altitude of 1600 m or further, with an increase in the endemism of species. This pattern is different from groups such as birds and ants, whose diversity decreases evenly along an altitudinal gradient. It is suggested that this fact should be considered in priority assessments for conservation measures.

A table of the association with host plants is given. Species of the *pygmaeus*-group are reported to feed exclusively on the fresh leaf flush of *Nothofagus*. Species of its presumed adelphotaxon, the *quadrifasciculatus*-group, are recorded from Myrtaceae. Such a pattern is unusual among phytophagous insects and different scenarios for a host switch are discussed.

Preliminary data on the association with fungi are provided. Fungi isolated from the mycetangia of different *Euops* species exhibit different mycological characters (*e.g.* coloration) and presumably belong to different species. They all belong to the genus *Penicillium*. It was found that spores obtained from the mycetangia can be stored for extended periods in sterilized water. Future studies should make use of this fact to export fungus samples and to cultivate them under more favourable laboratory conditions than usually available in tropical countries.

A trend curve of the discovery of *Euops* species in the Papuan region is discussed. It reveals that the saturation phase is not yet reached. It is estimated that the area studied harbours at least 300 species of *Euops*, making it the most diverse region for this genus in the world.

Disclaimer

I herewith declare that the nomenclaturally relevant acts in this thesis have to be regarded as unpublished according to Article 8 of the International Code of Zoological Nomenclature, and will only become available by the referring publications.

Zusammenfassung

Die Attelabiden-Gattung *Euops* stellt eine monophyletische Gruppe dar, welche durch folgende Synapomorphien begründet ist: 1) Mycetangien des Weibchens. Diese bestehen aus drei verschiedenen Kammern zum Speichern von Pilzsporen, und daran anschließende, durch Borsten gebildete Strukturen. 2) Ein Fleck modifizierter Borsten auf der Bauchseite des weiblichen Abdomens. Meist sind diese Borsten von exocrinen Drüsen begleitet. 3) Vergrößerte Augen. Systematik, Stammesgeschichte und Biologie der Curculionoidea und der Attelabidae werden umrissen.

Die "papuanische Region" wird hier als das Gebiet behandelt, welches die Molukken, Irian Jaya (beides Provinzen von Indonesien), Papua Neu Guinea und die Salomonen umfaßt. Die Naturgeschichte dieser Region wird zusammengefaßt. Um das spärliche zur Verfügung stehende Museumsmaterial zu ergänzen, wurden ungefähr zwei Jahre im Freiland zugebracht.

Ausgewählte, monophyletische Artengruppen von *Euops* werden monographisch bearbeitet: die *spinosus*-Gruppe (zehn neue Arten), die *pygmaeus*-Gruppe (eine beschriebene Art, 13 neue Arten), die *quadrifasciculatus*-Gruppe (vier beschriebene Arten, sechs neue Arten), die *simulans*-Gruppe (drei beschriebene Arten, 19 neue Arten), und die Untergattung *Neosynaptops* (zwei beschriebene Arten, sieben neue Arten). Diese Monographien sind der vorliegenden Arbeit als Appendices beigefügt.

Für taxonomische Beschreibungen von *Euops*-Arten werden neue Normen vorgeschlagen: Der Transfer-Apparat des männlichen Genitals hat sich für die Diagnose der Arten als extrem wichtig herausgestellt. Weitere Merkmale des männlichen und weiblichen Genitals, der Mundwerkzeuge, des Metanotum und des Proventrikulus sind sowohl für die phylogenetische Rekonstruktion nützlich, als auch für die Diagnose der Artengruppen. Diese und weitere Merkmale werden erstmals beschrieben. Es werden Methoden für ihre geeignete Präparation und Untersuchung durch Licht- und Raster-Elektronen-Mikroskopie dargestellt.

Die gesamte, über *Euops* publizierte Literatur wurde überprüft, eine Bibliographie wird vorgelegt. Zu Beginn dieser Arbeit (1998) waren weltweit 134 Arten und 10 Unterarten von *Euops* als gültig anerkannt. Eine Übersicht der papuanischen *Euops* wird vorgelegt. Zu Beginn dieser Arbeit waren 24 gültige Arten papuanischer *Euops* der Wissenschaft anhand von ungenügenden Beschreibungen bekannt. Diese wurden erneut beschrieben, um dem neuen, vorgegebenen Standard zu entsprechen. Wo nötig, werden Lectotypen designiert. Eine Art (*E. picipes* VOSS) wird synonymisiert. Ein subspezifischer Name (*Euops femoralis* f. *ruficornis* Voss) wird zu vollem Art-Status erhoben. 52 Arten werden durch Neubeschreibungen hinzugefügt. Gegenwärtig (2002) sind 76 beschriebene Arten für die papuanische Region nachgewiesen, was 40 % der Welt-Fauna (189 beschriebene Arten)

ausmacht. Weitere 108 unbeschriebene Arten der papuanischen Region werden aufgelistet. Diese konnten nicht an dieser Stelle beschrieben werden, ihre Beschreibungen werden aber in zukünftigen Publikationen folgen. So sind gegenwärtig 184 *Euops* Arten aus der papuanischen Region bekannt, was 58 % der Welt-Fauna (320 erkannte Arten) ausmacht.

Kladistische Analysen werden für jede der behandelten Arten-Gruppen durchgeführt. Eine Gesamtanalyse wird mit ausgewählten Arten vorgenommen. Fünf andere Attelabiden-Gattungen werden als Außengruppen-Vertreter in die Analyse eingeschlossen. Die Monophylie der erkannten Artengruppen wurde bestätigt, ausgenommen die *simulans*-Gruppe, die an ihrer Basis schwer zu definieren ist. Der Zweig, der *Apoderus*, *Lamprolabus* und *Euscelophilus* umfaßt, ist hauptsächlich durch abgeleitete Merkmale des Prämentums begründet, die bei *Attelabus* und *Euops* im plesiomorphen Zustand vorliegen. Es wird vorausgesagt, daß nach einer phylogenetischen Analyse der Attelabidae der Rang der "Apoderinae" herabgestuft werden muß.

Die weltweite Verbreitung von *Euops* ist eine paläotropische. Diese könnte ein altes, gondwanisches Muster widerspiegeln, oder ein jüngeres, hervorgerufen durch rasche Ausbreitung. Hinweise für und gegen jede dieser Hypothesen werden diskutiert. Innerhalb der papuanischen Region sind die meisten Artengruppen auf das Gebiet des Sahul Schelfs beschränkt. Nicht auf dem Schelf gelegene Inseln, wie die Molukken oder die Salomonen, haben eine verarmte Fauna. Die beobachteten Endemismus-Gebiete sind meist nicht mit geologischen Terrains kompatibel. Eine schnelle Verbreitung auf dem Landweg wird angenommen. Die Philippinen und Sulawesi, welche sich im Westen anschließen, haben eine artenreiche, aber relativ gleichförmige Fauna, die ausschließlich zu der Untergattung *Suniops* gehört. Die Fauna der Molukken setzt sich zu gleichen Teilen aus *Suniops*-Arten zusammen, die von Westen her kamen, und von Arten die zu papuanischen Artengruppen im Osten gehören. Es gibt nur eine geringe Überlappung zwischen der papuanischen *Euops* Fauna und einer mäßig reichhaltigen australischen Fauna. Die Ursprünge der stark abgeschlossenen papuanischen *Euops* Fauna liegen im Dunkeln.

Obwohl *Euops* eine Höhenverbreitung von Meereshöhe bis zu 3535 m einnimmt, liegt die maximale Diversität zwischen 700 m und 800 m. Die Diversität bleibt bis 1600 m oder noch darüber hinaus auf einem hohen Niveau, mit einer Zunahme im Endemismus der Arten. Dieses Muster ist anders als bei Gruppen wie Vögeln oder Ameisen, deren Diversität gleichmäßig entlang eines Höhengradienten abnimmt. Es wird angeregt, diese Tatsache bei der Prioritäts-Bestimmung von Naturschutz-Maßnahmen zu berücksichtigen.

Die bekannten Wirtspflanzen-Bindungen werden tabellarisch aufgeführt. Arten der *pygmaeus*-Gruppe fressen ausschließlich an frischen Blattauschüttungen von *Nothofagus*. Arten des vermutlichen Adelphotaxons, der *quadrifasciculatus*-Gruppe werden von

Myrtaceae angegeben. Ein solches Muster ist innerhalb der phytophagen Insekten ungewöhnlich. Verschiedene Szenarien für einen Wirtswechsel werden skizziert.

Zu einer Bindung mit Pilzen werden vorläufige Angaben gemacht. Pilze, die aus Mycetangien verschiedener *Euops*-Arten isoliert wurden, zeigen unterschiedliche mykologische Merkmale (z.B. Färbung) und gehören vermutlich zu verschiedenen Arten. Sie gehören alle zu der Gattung *Penicillium*. Es wurde festgestellt, daß aus Mycetangien isolierte Sporen über längere Zeit in sterilem Wasser aufbewahrt werden können. Zukünftige Projekte sollten von diesem Umstand Gebrauch machen, um Pilzproben zu exportieren und sie unter günstigeren Laborbedingungen anzuziehen, als in tropischen Ländern meist zur Verfügung stehen.

Eine Trendkurve der Entdeckung von *Euops*-Arten der papuanischen Region wird diskutiert. Sie zeigt, daß eine Sättigungsphase noch nicht erreicht ist. Es wird geschätzt, daß das untersuchte Gebiet mindestens 300 *Euops*-Arten beherbergt, was es weltweit zur diversesten Region für diese Gattung macht.

Hinweis

Hiermit erkläre ich, daß die nomenklatorisch relevanten Handlungen in dieser Arbeit als unpubliziert zu gelten haben (im Sinne von Artikel 8 des Internationalen Kodes für Zoologische Nomenklatur). Sie werden ausschließlich durch die betreffenden Publikationen verfügbar gemacht.

1. Introduction

Now the LORD God had formed out of the ground all the beasts of the field and all the birds of the air. He brought them to the man to see what he would name them; and whatever the man called each living creature, that was its name. (19)
So the man gave names to all the livestock, the birds of the air and all the beasts of the field. (20)
(The Bible, New International Version: Genesis 2)

1.1. General remarks

Religions develop to a great part from genetically derived moral feelings and from various basic needs of man (WILSON, 1998). In this sense the foregoing citation shows that man has always been striving to identify and name the species of organisms he shares his environment with. The current system of the binary nomenclature dates back to LINNAEUS (1758). So far, there are about 1.750.000 animal species that have been described within this system (GLEICH et al., 2000; GROOMBRIDGE & JENKINS, 2000). Research of ERWIN (1982), STORK (1988), and others anticipates that this number might be no more than two to twenty percent of the number of species actually existing. The rather cautious estimate of ØDEGAARD (2000) suggested five to ten million species of arthropods could be found on earth.

Systematics, especially its field of taxonomy, provides the base for all further studies on our living environment. It sets a reference frame, similar to the periodic system of elements in chemistry. As long as one is satisfied studying the biology of a few selected model organisms of whose identity there is no doubt, the omnipresence and necessity of taxonomy in all fields of biology can easily be overlooked. Working with unnamed "morphospecies" is a poor - though sometimes inevitable - makeshift: valuable data can be compared and used within one study, interlinking them with other studies is difficult or impossible. In the long run, science looses substance of research.

It does not help much getting lost in a discussion whether there are ten or a hundred million species of organisms on earth. There is even less point in surrendering to the sheer numbers, giving up the idea of a complete survey of biological species. If this idea was pursued with a zeal similar to the (surely sensible) human genome project and if similar amounts of money were invested as in the possible discovery of organisms on Mars, the aim of discovering and registering biodiversity of our own planet would have come within reach.

The present thesis should be seen as a small contribution to this task. The idea is less to simply add a number of species, something that could be done with minimal descriptions, taking the risk that following students may recognize the species only by examining the type specimens. The purpose was rather to identify characters which are suitable for diagnosing and grouping species; to examine these characters with appropriate methods; and to describe them in words and illustrations comprehensible to others. Thus, it is hoped that the standard of taxonomic work on the genus studied herein is permanently elevated to a level necessary for future studies.

1.2. Systematic position of the group studied

1.2.1. The superfamily Curculionoidea

The weevils or snout-beetles (Curculionoidea) represent with about 57.000 described species (THOMPSON, 1992) one of the most diverse groups of insects. Two of every five species of named insects are beetles and one of every five beetle species is a weevil. They exceed the number of all vertebrates which comprise at present approximately 52.000 species (GROOMBRIDGE & JENKINS, 2000). Yet, many more species of weevils await discovery. O´BRIEN & WIBMER (1979), taking a conservative approach, estimated a minimum number of 85.000 existing species. Studies following ERWIN (1982) calculating numbers from quantitative samples obtained by canopy fogging in tropical rainforests would anticipate much larger numbers. As it seems, these superlatives rather deterred than attracted researchers: the state of knowledge on taxonomy, phylogeny and ecology of weevils falls far behind the standards of other families of beetles such as the Carabidae.

The Curculionoidea constitute a monophyletic group, supported by both morphological and molecular data. The most important and conspicuous apomorphy is the rostrum (CROWSON, 1955; FARRELL, 1998; MARVALDI & MORRONE, 2000).

A prerequisite for the evolutionary success of weevils was their use of the rostrum in oviposition. The key adaption of Curculionidae *s.s.*, which represent most of all weevil species, was probably their use of living plant tissues which allowed them to exploit the Angiosperms at the time they appeared and radiate together with this group of plants (ANDERSON, 1995). Similarly, FARRELL (1998) explains the diversity of the entire Phytophaga by an early coevolution of the most species-rich clades of Curculionoidea and Chrysomeloidea with Angiosperm plants.

The **fossil record of Curculionoidea** begins with the family Obrieniidae which existed about 230 million years ago in the Triassic (ZHERIKHIN & GRATSHEV, 1993). The Jurassic Karatau beds in Kazakhstan contain a rich record of Nemonychidae which is usually regarded as the most primitive family of extant weevils (ARNOL'DI, 1977; KUSCHEL, 1983). Recent Nemonychids are almost exclusively associated with three families of Coniferales. So, it is most likely that "Gymnosperm" plants, a variety of which is preserved in the Karatau beds, were used as hosts by those early weevils. Three other Curculionoid species described by ZHERIKHIN (1977) from the Lower Cretaceous Trans-Baikal site are originally assigned by him to the Attelabidae and the Curculionidae. Subsequently, KUSCHEL (1983) transferred one to Nemonychidae, the other two to Caridae. The first record for a more advanced weevil group is *Orapaeus cretaceus* KUSCHEL & OBERPRIELER from the Mid Cretaceous of the Orapa mine in Botswana (KUSCHEL et al., 1994). It belongs to the tribe Eurhynchini of the Brentidae. This marks indirectly the existence of the more basal clades (Fig. 1) including the Attelabidae. The first Curculionidae *sensu strictu* are known from Upper Cretaceous deposits, namely *Curculionites* from South Dakota, USA (NORTHROP, 1928), and an adelognathous weevil, *Dorotheus*, from Chile (KUSCHEL, 1959).

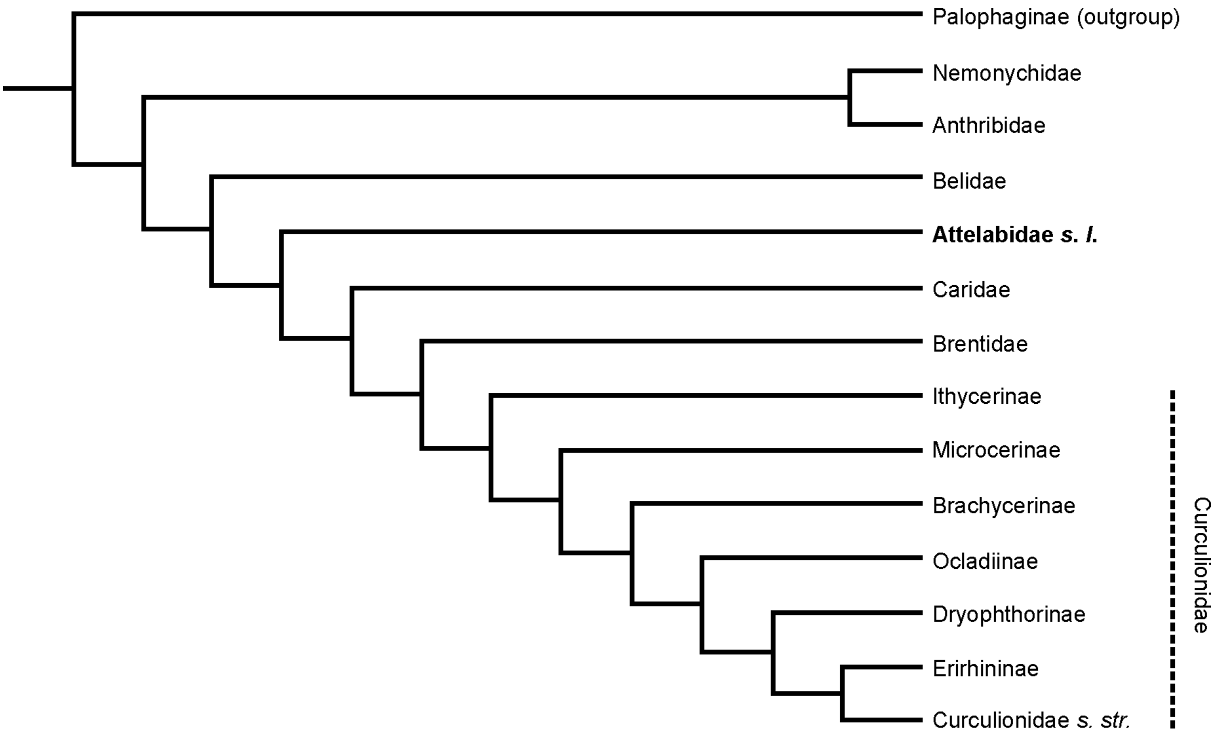


Fig. 1. Cladogram of Curculionoidea. Redrawn from MARVALDI & MORRONE (2000).

1.2.2. The family Attelabidae

The Attelabidae comprise approximately 2000 described species (1908 species listed in O'BRIEN & WIBMER, 1978). Female oviposition is diverse and in many cases highly developed in this group. It caught the interest of many entomologists: DEBEY (1846) was the first to study the leaf-cut of *Deporaus betulae* L. which seems to be based on a complicated mathematical formula. Examples of kleptoparasitism, such as exhibited by *Lasiorhynchites sericeus* HERBST (PRELL, 1926) or by the species of the Pterocolinae (VOGT, 1992) are other highlights of attelabid biology.

KÔNO (1930), LENGERKEN (1954) and PRELL (1924) compared the **oviposition behaviour** throughout the Attelabidae. They distinguish two biological groups, the "stingers" and the "rollers". The former, which are represented by the Auletini and the Rhynchitini, pursue a primitive mode of oviposition: larvae develop within buds, shots, or fruits, and the female prepares the oviposition hole with its rostrum. In many cases a second hole ("sting") is made some distance basal of the oviposition site to interrupt the sap flow; this leads the apical plant part to wilt or to rot and sometimes to fall off the plant. The Bytiscini represent the most primitive group of the "rollers". They sting the petiole of a chosen leaf. After the leaf starts wilting the female rolls it into a cigar-like object which is used for oviposition. VOGT (1992) coined the term ***nidus*** (Latin = nest) for such attelabid leaf-rolls. Finally, the Deporaini plus the Attelabinae make a more or less sophisticated cut across the leaf surface which allows it to prepare cone- or can-shaped nidi. Even within the Attelabinae there is a considerable variety in the way nidi are prepared. In American Attelabinae, VOGT (1992) distinguishes eight distinct nidus-types, mainly based on differences in the leaf-cut. A curious, highly derived state is the ball-like nidus of *Pilolabus* described by HOWDEN & GILL (1992). Using the key of SAWADA (1986) to the nidi of Japanese Attelabidae it is even possible to identify genera and some species based on nidus characters alone.

SOUTHWOOD (1973) points out that strict phytophagy is an evolutionary hurdle that few insect lineages have overcame. One of the problems inherent for beetles is the vulnerability of the preimaginal stages by desiccation and attacks of predators if exposed on the plant. The vast majority of Curculionoidea at the larval stage are either ground-ectophagous on roots, or they are endophagous in stems, buds or fruits of their host plants. To attack thin Angiosperm leaves various groups of weevils became leaf-miners which, however, puts restraints on their body size. The leaf-rolling Attelabidae managed to use the vast resource of Angiosperm leaves by preparing nidi for oviposition, thus, creating a suitable environment for their endophagous larvae.

KUSCHEL (1995) divides the family Attelabidae into two subfamilies, the supposed adelphotaxa Rhynchitinae and Attelabinae. ZIMMERMAN (1994) and, more recently, ALONSO-ZARAZAGA & LYAL (1999) concede family level to both of these but without providing conclusive reasons. Unless otherwise stated I am using Attelabidae in the broad sense, *i. e.* Attelabidae (*s. l.*) including both Rhynchitinae and Attelabinae.

The **apomorphies** of the Attelabidae as given by KUSCHEL (1995) and MARVALDI & MORRONE (2000) are: 1) Sternite VIII of male tightly fused or articulated with sternite IX on each side beyond the arms. 2) Epicranium of larva with hyaline posterior extension. 3) Nervous system with all ganglia fused into one conglomerate. These are not many characters, nevertheless, they are quite convincing and there are no competing hypothesis challenging the monophyly of Attelabidae.

The Rhynchitinae are defined by three apomorphies, 1) thin and 2) exodontous mandibles, 3) appendiculate (free) claws.

The Attelabinae have a larger number of apomorphies: 1) prementum broad and heavily sclerotized, 2) with apical dentiform projections. 3) Tibiae without spurs, but with large uncus. 4) Tarsal claws connate. 5) Thoracic spiracle of larva situated on mesothorax or the intersegmental fold in front.

- Family Rhynchitidae GISTEL
  - Subfamily Rhynchitinae GISTEL
    - Tribe Rhynchitini GISTEL
      - Subtribe Rhynchitina GISTEL
      - Subtribe Eugnamptina VOSS
    - Tribe Auletini DESBROCHERS
      - Subtribe Auletina DESBROCHERS
      - Subtribe Pseudauletina VOSS
    - Tribe Bytiscini VOSS
    - Tribe Deporaini VOSS
      - Subtribe Deporaina VOSS
      - Subtribe Chonostropheina MORIMOTO
    - Tribe Rhinocartini VOSS
  - Subfamily Isotheinae SCUDDER (†)
    - Tribe Isotheini SCUDDER (†)
    - Tribe Toxorhynchini SCUDDER (†)
  - Subfamily Pterocolinae LACORDAIRE
- Family Attelabidae BILLBERG
  - Subfamily Attelabinae BILLBERG
    - Tribe Attelabini BILLBERG
      - Subtribe Attelabina BILLBERG
      - Subtribe Euscelina Voss
      - Subtribe Euscelophilina Voss
      - Subtribe Hybolabina Voss
      - Subtribe Lagenoderina Voss
      - Subtribe Lamprolabina Voss
      - Subtribe Phymatolabina Voss
    - → Tribe Euopini VOSS
    - Tribe Pilolabini VOSS
  - Subfamily Apoderinae JEKEL
    - Tribe Apderini JEKEL
    - Tribe Clitostylini VOSS
    - Tribe Hoplapoderini VOSS
    - Tribe Trachelophorini VOSS
  - Subfamily Archolabinae VOSS

Tab. 1. Current classification of Attelabidae *s. l.* as in ALONSO-ZARAZAGA & LYAL (1999). Herein, the "Attelabidae" and the "Rhynchitidae" are regarded as subfamilies of the family Attelabidae. The tribe Euopini VOSS (containing the nominate genus only) is marked by an arrow.

The most recent **classification** of Attelabidae (Tab. 1) given by ALONSO-ZARAZAGA & LYAL (1999) is mostly based on Voss (1925, 1933b) who believed in anagenetic rather than in phylogenetic classifications. To solve the inherent problems a comprehensive phylogenetic analysis of the higher taxa of Attelabidae would be necessary. Knowledge of the sister taxon of *Euops* would be of major importance in the present study. Some preliminary investigations on **attelabid phylogeny** were made and a few general points should be discussed in the following.

The Apoderinae should be perceived as a subordinate taxon of Attelabinae. They are characterized by an apomorphic constriction of the base of the head (Fig. 51). This character achieves an increased mobility comparable to a ball-and-socket joint. Earlier authors were prompted by this conspicuous character to grant subfamily status to the Apoderini (Apoderinae of Tab. 1). According to KUSCHEL (1995) the Archolabinae should also be downgraded under the Attelabinae. The Euopini and the Pilolabini each contain one single monophyletic genus (See below for *Euops*). The Attelabini, on the contrary, are most likely paraphyletic. Genera such as *Paramecolabus* JEKEL and *Euscelophilus* VOSS are candidates for sister taxa for the Apoderini since they have both a shallow constriction of the base of the head and a similar prementum (See also chapter 3.2.). Morphology of the prementum, especially of the labial palpi, is of great value for attelabid classification. *Attelabus* SCOPOLI retained labial palpi with two distinct articles. The same is true for *Homoeolabus* JEKEL, but not for *Xestolabus* JEKEL. Presently, the latter two genera are included in the subtribe Attelabina. Obviously, all genera of Attelabini, and especially of the Attelabina, must be checked for characters such as of the prementum before a serious discussion on attelabid phylogeny is possible. After excluding more advanced elements such as *Xestolabus* JEKEL, the Attelabini are likely to be the most basal branch of the attelabine tree. Unfortunately, it is unclear where the genus *Euops* SCHOENHERR will be placed: its labial palpi are completely reduced which is the most advanced state of this character. Yet, the ground-pattern of three apical processes of the prementum agrees with *Attelabus* SCOPOLI and this could also mean that it is a rather basal branch.

As outlined above there is no obvious necessity to grant family level to the basal adelphotaxa of Attelabidae, the Rhynchitinae and the Attelabinae. Besides this superficial problem of ranking there are considerations that question the monophyly of Rhynchitinae. WHITEHEAD (cited in VOGT, 1992) points out that the evolutionary stage was set much earlier for Rhynchitinae than for Attelabinae: "It is unlikely that Attelabinae and Rhynchitinae are cladistic equivalents, of equal age; the Attelabids ought to be sought more recent, specialised derivative. Rhynchitids evidently are so old that they are likely to have ancestrally associated with fruit cones or buds, pre-dating origin of leaves suitable for nidification." It is true that Rhynchitinae could have evolved at earlier times than Attelabinae. Some of the former are associated with Gymnosperms such as *Araucaria*, whereas the latter depend on tender Angiosperm leaves suitable for nidification. This just opens the possibility of a paraphyly of the Rhynchitinae, but it is no reason for a paraphyly of the Rhynchitinae *per se*. In fact, such reasons can be found both in the biology and the morphology. As described above, leaf-rolling behaviour starts with the Bytiscini; cutting the leaf for nidification begins with the Deporaini. The present classification deems these ethological characters to have evolved at least twice independently. ZHERIKHIN & GRATSHEV (1995) see characters in the wing venation which they consider apomorphic between Deporaini, Bytiscini and Attelabinae. In their study they stated that the "Rhynchitinae lack synapomorphies and are almost certainly paraphyletic even if the Deporaini and Bytiscini are excluded". Based on their illustrations I am unable to recognise these characters, so the specimens should be studied again. Presently, it can be said that the characters that define the Rhynchitinae, namely the thin exodontous mandibles and the appendiculate claws, could be true apomorphies of the monophyletic Rhynchitinae. Almost as likely is the possibility that they are apomorphies of the entire Attelabidae and that these characters were reduced in the derived branch of the Attelabinae leaving a paraphyletic assemblage of "Rhynchitinae".

The **fossil record of Attelabidae** is scarce. KUSCHEL (1995) mentions what could be the earliest record of an attelabine from the Middle or Upper Cretaceous of the Orapa mine in Botswana. The statement was based entirely on an examination of a photographic print and no detailed description is given, so it remains somewhat doubtful. However, as mentioned above, *Orapaeus cretaceus* KUSCHEL & OBERPRIELER, a member of the Brentidae from the same formation, gives indirect evidence for the existence of the Attelabidae. SCUDDER (1893) describes numerous species of the rhynchitine Isotheinae from the Oligocene. *Megarhynchaenus schalowae* described by KOHRING (1989) from the Upper Miocene of Rumania was placed by ALONSO-ZARAZAGA & LYAL (1999) in the Attelabinae, presumably on account of the exposed pygidium. The genus *Eneuops* of ZHANG et al. (1994) from the Chinese Miocene could be a member of Attelabinae, but there is no indication of a close relationship with *Euops* as the name might anticipate. ALONSO-ZARAZAGA & LYAL (1999) list *Archiorhynchus angusticollis* HEER (1874) under Attelabinae. This species was described from the Lower Cretaceous of Greenland.

As is often the case in insect paleontology the critical apomorphic characters are usually not preserved unless fossilised in amber. Therefore, we might rather try to fix the date of the earliest possible existence of Attelabinae indirectly. As indicated above in the discussion of the possible paraphyly of the Rhynchitinae, the Attelabinae are dependent on tender Angiosperm leaves suitable for nidification. With tough Gymnosperm leaves such as exhibited by the Cycadeae, a leaf-rolling weevil could not have existed. Thus, we can not expect to find the first leaf-rolling Attelabinae before the **appearance of Angiosperm plants**:

by the Middle Cretaceous only the supposedly most archaic order, the Magnoliales, may have begun to differentiate into its basic families such as the Winteraceae (CRONQUIST, 1988). By the Cenomanian (earliest Late Cretaceous, 97 million years before present), at least four of the eleven extant angiosperm subclasses (Magnoliidae, Hamamelidae, Rosidae, one subclass of Liliopsida) had already differentiated (CRANE & LIDGARD, 1989). Thus, leaf-rolling Attelabinae should not be expected before the Middle Cretaceous.

1.2.3. The genus *Euops*

SCHOENHERR (1839) erected the genus *Euops* based on the type species *Euops falcatus* (GUÉRIN-MÉNEVILLE, 1833). He stated that the name is derived from the Greek words "Eυ" (= good) and "ωψ" (eye), referring to the species´ extraordinary **large eyes** (Figs. 100-129). Indeed, the character of the large eyes is present in all the major groups of *Euops* and it is likely to be an apomorphy of the entire genus. There are only few *Euops* species with eyes that are medially distinctly separate and not much larger than of some other genera of Attelabinae. Once the most basal branches on the phylogenetic tree of *Euops* are identified, it can be decided if the character of the large eyes is an apomorphy of the entire genus, or just of a crown group comprising the majority of species.

Another character which is most suitable both to diagnose *Euops* and to define it as a monophyletic group was first described by SHARP (1889). It is a **patch of modified setae** on the abdominal venter of the females (Figs. 82-86). These setae are arranged in strictly transverse parallel rows and project at almost right angle ventrad. They are more or less cylindrical at the base, but in their apical part they are distinctly flattened and often markedly undulated. Two such transverse rows of setae each occupy the middle of one sternite, being separated from each other by less than a single seta´s length. There are never more than two such parallel rows of modified setae on one sternite. Sternites III to V (the first to third externally visible sternite) bear such double rows. Depending on the species of *Euops* sternite VI may possess a double row of modified setae, one single row of modified or unmodified setae, or no setose row at all. Within the species this character is constant.

Examining Japanese species of *Euops* [*i. e.*: *E. konoi* SAWADA & MORIMOTO, *E. lespedezae* SHARP, *E. politus* (ROELOFS), *E. punctatostriatus* (MOTSCHULSKY), *E. pustulosus* SHARP, *E. splendidus* DALLA TORRE & VOSS] SAWADA & MORIMOTO (1986) described a "porose band", a stripe of cuticle with a high density of pores visible in SEM photographs behind the front row of modified setae of each segment (Figs. 84, 86). In sections, the same authors found large exocrinous glands which are connected to these pores. The glands can also be examined by opening the abdomen of fresh specimens from dorsally; when the intestines are removed the gland tissue can be seen covering the ventral cuticular surface. Nothing is known of the substances which are discharged.

The ground-pattern of the double-row of modified setae and the porose band is fairly constant in most species of *Euops*, but there are some exceptions. In the *simulans*-group (Figs. 75-76 of appendix 5), in *E. papua* HELLER, and in new species 1 it is identical with the Japanese species. It is quite similar in the *pygmaeus*-group (Fig. 51 of appendix 3) and the *quadrifasciculatus*-group (Figs. 40-42 of appendix 4) except for a different shape of the modified setae which are rather spatulate. In *E. tibialis* VOSS the pores are also present, but here the two rows have fused to a single one (Figs. 83, 85). In the *spinosus*-group glands and pores are missing (Figs. 23-24 of appendix 2), but the modified setae are still present. In *E. falcatus* (GUÉRIN-MÉNEVILLE) the porose band is missing; instead, between the rows of a double-row there is a pair of openings visible with a dissection microscope. These openings continue as tube-like structures internally. Each of the tubes is densely clothed with filaments after maceration. ZIMMERMAN (1994) described them correctly, but was probably mistaken in believing that they represent mycetomes, an assumption for which there is no evidence. It is more likely that gland tissue is concentrated on these tubes. Fresh material of female *E. falcatus* (GUÉRIN-MÉNEVILLE) should be examined to check this interpretation.

One function of the rows of modified setae seems to be the distribution of the gland products. This view is supported by setae of a similar structure in tergal glands of Blattoidea (BOHN, 1999). However, there must be a second function, otherwise, the situation in the *spinosus*-group, where modified setae are present without the respective glands, would be hard to explain. This second function could be one of a mechanical brush. SAKURAI (1985) described the setose patch being used by the female to spread fungus spores on the nidus and to sow them into pits that she had nibbled into the leaf surface before. The spores are squeezed out of **mycetangia** present in between thorax and abdomen. The leaf-segment prepared for nidification is thoroughly brushed by the female *Euops* to inoculate the nibbled scars with spores which later start to germinate on these spots, but not on the adjoining intact leaf surface (SAKURAI, 1985). Presumably, the fungus growing on the nidus has positive effects on the development of the weevil larva, but so far there are no studies available to substantiate this interpretation.

The morphological structures of the mycetangia have been studied by SAKURAI (1985), SAWADA & MORIMOTO (1986), and by myself. Their morphology is identical in all *Euops* species so far examined. Although external structures, they are deeply invaginated inside the body. There are three distinct but interconnected areas used to store fungus material in the female weevil. For practical reasons, I will follow the terminology of SAKURAI (1985) who distinguishes a "spore reservoir", a "spore incubator", and a "spore bed". It must be kept in mind that these terms implicate hypotheses on functions which need more evidence to be accepted without reservation. The cavities of the metacoxae, which are formed by the anteroventral end of the abdomen, differ markedly between male and female

Euops. They are larger and deeper in females and submedially possess a pair of subtriangular pits (Fig. 57) which are usually filled with spores. These pits, which are absent in the males, are called the "spore reservoir". The wall of the spore reservoir is provided with pores and microchaetae not present in the remainder of the coxal cavity. It is likely that a substance to supply the stored fungus material is secreted through these pores. The metacoxae and the metendosternite face the spore reservoirs (Fig. 56). The mesal edge of each metacoxa hangs over a large elongate cavity which it delimits together with the metendosternite. These paired cavities behind their slit-like entrances are called the "spore incubator". The distal opening of each spore incubator leads to another chamber, the "spore bed". The proximal opening is located at the thoracic-abdominal joint next to the metendosternite in the middle of the body.

SAKURAI (1985) observed spores of two sizes. The spore bed contains, besides some hyphae, spores of a small size. The spores in the spore incubator gradually increase in size from the terminal end to the bottom, the spore reservoir contains spores of the large size. SAKURAI presumed that the fungus initially reaches the spore bed to multiply there, the spores undergo a ripening process under the influence of substances secreted by the beetle. The "mature spores" finally reach the spore reservoir to be deposited by the female weevil onto the leaf segment which is going to be processed into a nidus. The "growth" of the spores needs to be confirmed. However, it is likely that the fungus indeed grows and multiplies within the female *Euops*. Dissected freshly hatched teneral specimens never contained visible fungus material, whereas older specimens with a thoroughly hardened cuticle did. How the fungus enters the mycetangia of the female beetle is completely unknown. How the spores are transported to the exit can be deduced from morphological structures: the mesal margin of the metacoxae bears rows of bifurcate setae (Figs. 58, 60-61) on the posterior surface. They could act as a sorting mechanism between the spore reservoir and the spore incubator, or simply keep the spores inside the spore incubator. Ventrally, near the entrance, these bifurcate setae are replaced by a patch of dense, simple setae (Figs. 58-59). By an appropriate movement of the coxae, the spores in the crevice between coxa and abdomen will have a stronger tendency to be pushed towards the tips of these setae than to their base, which means they are pushed outside. The mesal end of each coxa bears a comb of longer, stouter setae (Fig. 58) which overlaps the intercoxal process of the abdomen. These combs are seen easily in intact specimens. They will sweep spores that were pushed out of the mycetangia posteriad, so the spores can be caught by the setose patch.

The technique of **nidification** in *Euops* is quite peculiar. Usually, leaf-rolling attelabids take an entire leaf per nidus. They cut transversely across it to use the apical part for nidification. In *Euops*, the cut is made parallel to the margin of the leaf (See fig. 2k of

SAWADA, 1986). This narrow stripe is used for the nidus which is always cut from the plant when completed. The leaf-cut is similar to the type VI of VOGT (1992) which is found in some *Euscelus* and avoids cutting the leaf´s midrib. However, the excised segment is much narrower in *Euops*. Observing the behaviour of *Attelabus nitens* and *Apoderus coryli*, DAANJE (1957) found that either of these two species may cut the nidus off or leave it hanging on the plant. The decision which technique is followed depends on the condition of the leaf and the climate, since it is important that the leaf-roll neither dries out nor gets mouldy too fast. Therefore, the nidification technique *Euops* pursues is not absolutely unique among leaf-rolling attelabids, but in its consistency it is nevertheless remarkable. This may be an ethological apomorphy of the genus but this can not be demonstrated without deeper knowledge on phylogeny and ethology of the Attelabidae in general.

To sum up the paragraphs above: *Euops* SCHOENHERR is a monophyletic group justified by the following **apomorphies**: 1) the patch of modified setae of the female venter associated with exocrinous glands (the latter are absent in one taxon, presumably due to secondary reduction). 2) The mycetangia of the female consisting of spore bed, spore incubator and spore reservoir. 3) The female metacoxa bearing a row of bifurcate setae on the posteromesal edge, a patch of simple setae on its inner end, and a comb of setae overlapping the intercoxal process of the abdomen. Probably, these characters are all linked to a fungus-symbiosis. Generally, there is a diversity of mutualistic relationships with fungi in beetles (CROWSON, 1981, p.519 ff.), but these are most frequent in wood-dwelling beetles. FRANCKE-GROSMANN (1967) described similar, but less sophisticated mycetangia in Scolytidae and Platypodidae. In Attelabidae, no other symbiotic relationship with fungi could so far be demonstrated.

Other characters of *Euops* could also be apomorphies, but there is some homoplasy, and for this reason their status needs to be examined more thoroughly: 4) the large, sometimes medially contiguous eyes. 5) The labial palpi of the prementum vestigial. 6) Nidification of a leaf-segment which is cut parallel to the lateral leaf margin, and the nidus is cut off the host plant.

RIEDEL (1998; see appendix 1) reviews the literature published on *Euops*. The distribution of the genus shows a largely paleotropical pattern (Fig. 2). The absence of *Euops* in the new world is confirmed by screening material of American Attelabidae in various museum collections. Remarkable is the presence of one species on the Seychelle Islands which will be discussed below. At the commencement of the present study in 1998, 134 species and 10 subspecies of *Euops* were recognized as valid. Additionally, a high number of undescribed species exist. With these numbers, a world revision of *Euops* is out of the scope of the given time frame. Therefore, the present contribution is limited to a study of the *Euops* species occurring within the Papuan Region.

1.2.4. Diagnosis of the genus *Euops*

Beetle with anterior part of head produced into rostrum. Maxillary palpi short and rigid. → Curculionoidea except Nemonychidae.

Antenna straight, not geniculate. Body compact. Abdominal sternites III to VII subequal in length, fused. Tibial apex of female usually with uncus and premucro (in some species with uncus only); male with uncus only → Attelabinae.

Eyes large, dorsomedially contiguous or subcontiguous. Dorsal integument subglabrous. Female abdominal venter with patch of erect, modified setae arranged in segmental, transverse double-rows (Figs. 82, 83). Female metacoxae with mycetangia. → *Euops*

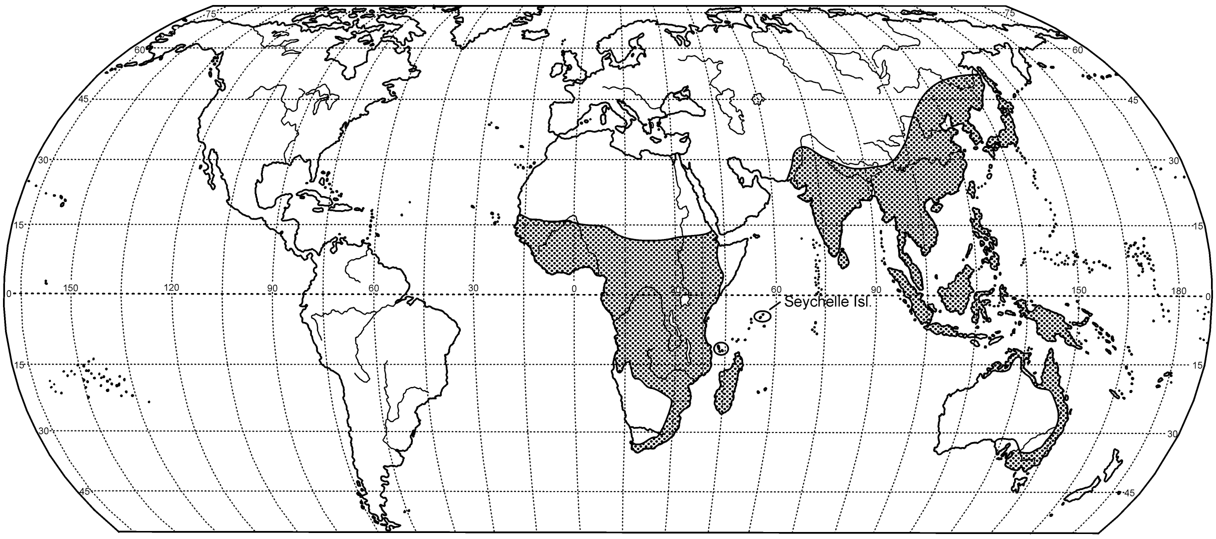


Fig. 2. Distribution pattern of *Euops* (stippled). (Original drawing).

1.3. The geographical area studied

New Guinea is a fantastic island, unique and fascinating. (...) Diversity is its prime characteristic, whatever the subject of interest. (...) To an ecologist, and to all biologists, it is a happy hunting ground of endless surprises and unanswered questions.

(J.L. GRESSITT, 1982a)

1.3.1. Definition of the geographical area

The term "Papuan Region" (or in the strict zoogeographic sense the "Papuan Subregion" of the Australian Region) is often found in zoogeographic literature. Sometimes "New Guinea" is incorrectly used as a synonym for this term (*e. g.* DARLINGTON, 1962, 1971), in other instances it is mentioned explicitly without further explanation (*e. g.* MAYR, 1944). Relatively few authors clearly define it (BEEHLER et al., 1986; GRESSITT, 1982a).

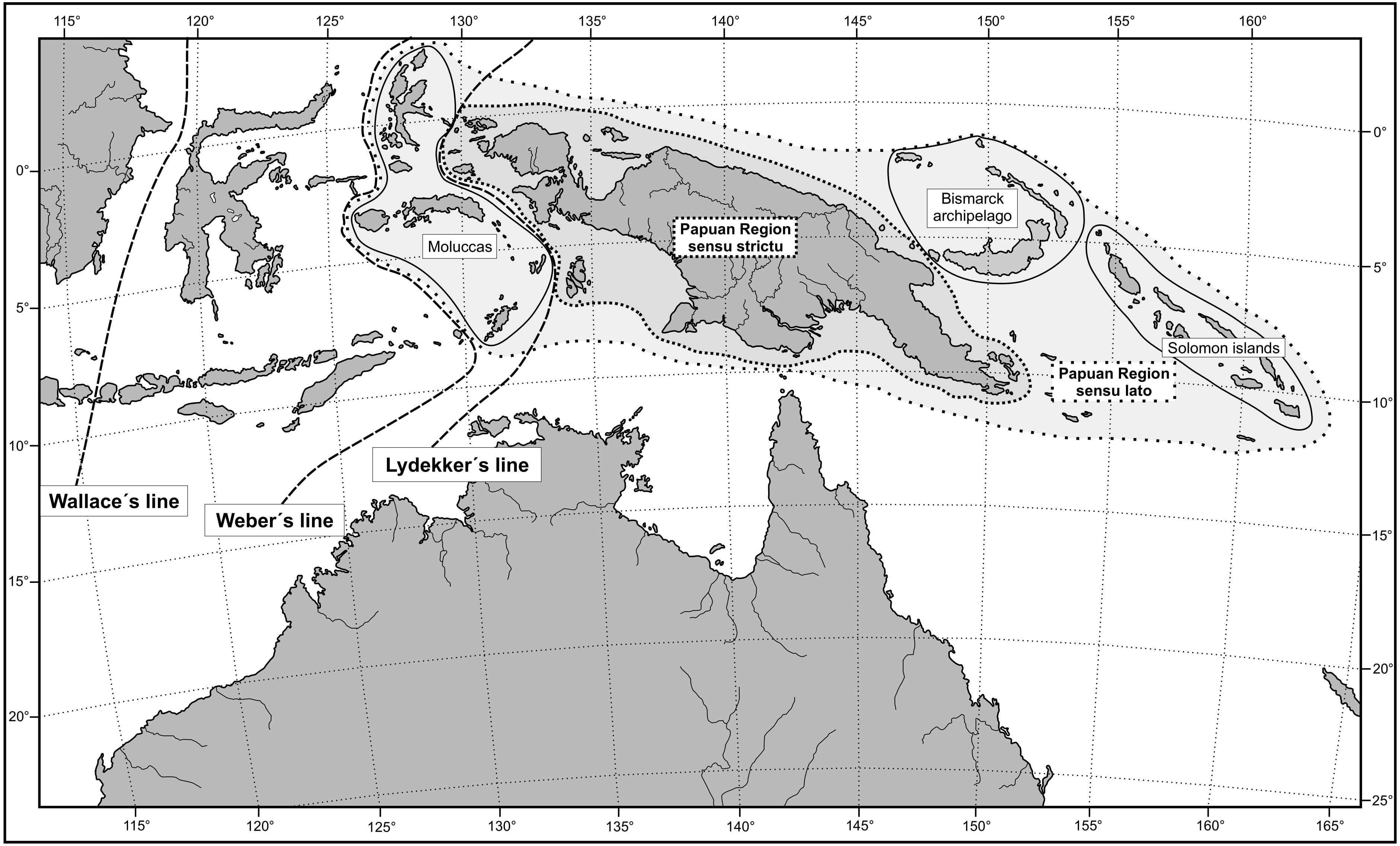


Fig. 3. Map of New Guinea and the surrounding region defining the area studied herein and showing important zoogeographic lines . Land areas are shaded in dark grey. The "Papuan Region sensu strictu" is shaded in medium grey. The "Papuan Region sensu lato" is shaded in pale grey; besides New Guinea, it comprises also the island groups of the Moluccas, the Solomons and the Bismarck Archipelago. Redrawn from The Times Atlas of the World (1994).

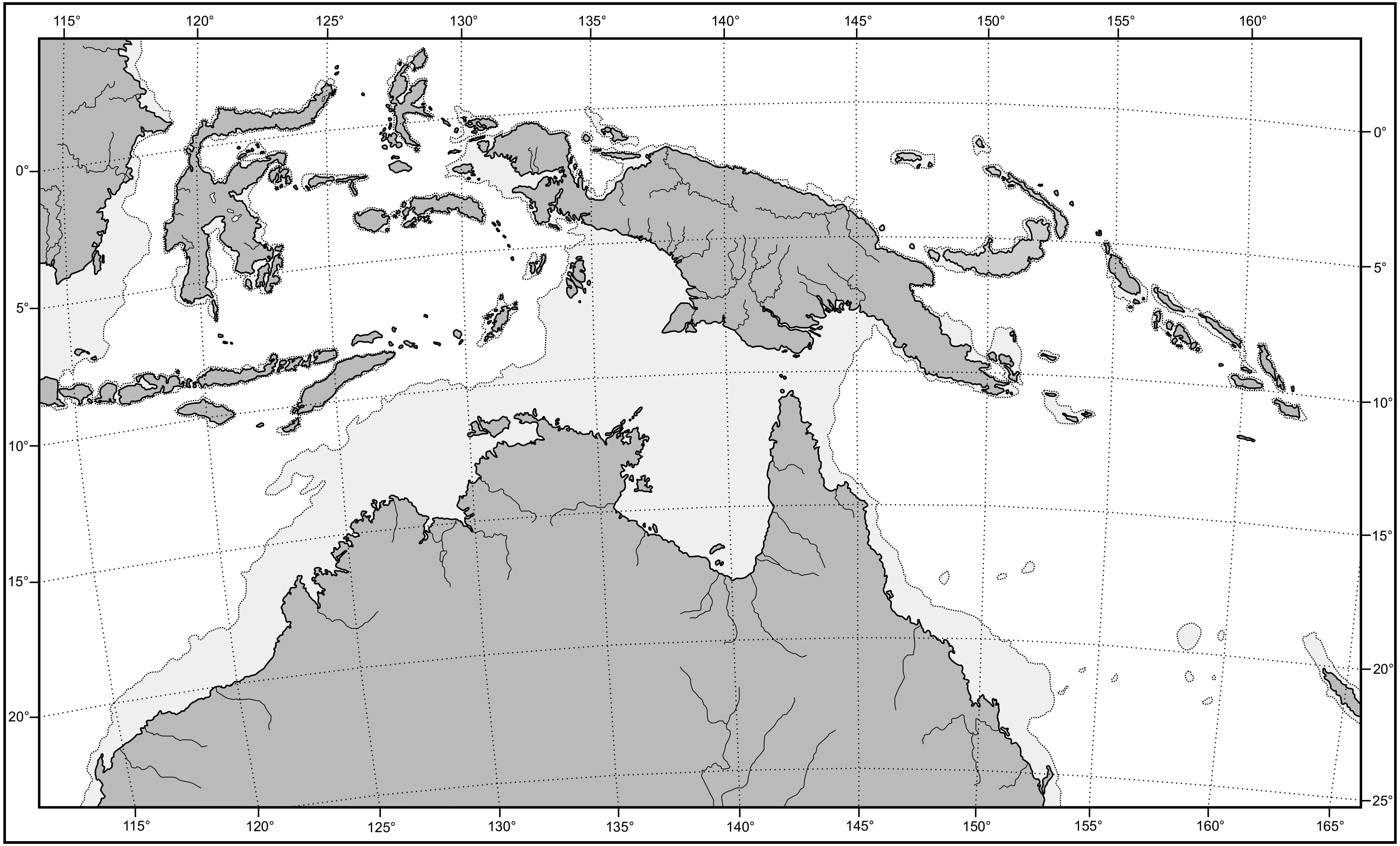


Fig. 4. Map of New Guinea and the surrounding region. Land areas are shaded in dark grey. Areas above the 130 m depth contour are shaded in pale grey. These areas were exposed during times of the pleistocene. Redrawn from The Times Atlas of the World (1994), combined with information of VORIS (2000).

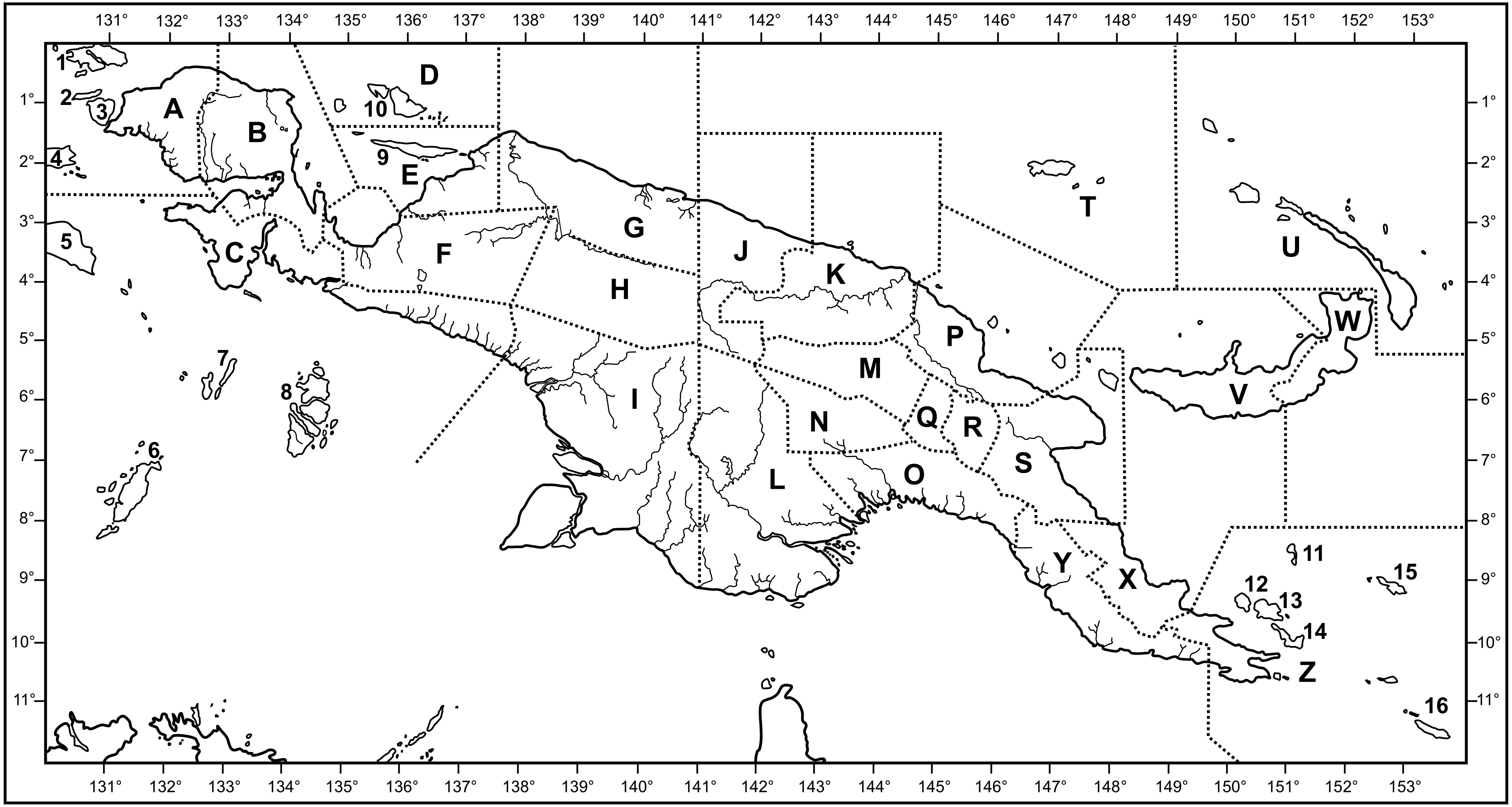


Fig. 5: Map of administrative districts / provinces in New Guinea: A = Sorong; B = Manokwari; C = Fakfak; D = Biak-Numfor; E = Japen-Waropen; F = Paniai; G = Jayapura; H = Jayawijaya; I = Merauke; J = Sandaun; K = East Sepik; L = Western Province; M = Enga / Western Highlands; N = Southern Highlands; O = Gulf; P = Madang; Q = Simbu; R = Eastern Highlands; S = Morobe; T = Manus; U = New Ireland; V = West New Britain; W = East New Britain; X = Oro; Y = Central Province; Z = Milne Bay. Minor Islands: 1 = Waigeo; 2 = Batanta; 3 = Salawatti; 4 = Mysol; 5 = Ceram; 6 = Tanimbar / Larat; 7 = Kai; 8 = Aru; 9 = Japen; 10 = Biak; 11 = Trobriand; 12 = Goodenough; 13 = Fergusson; 14 = Normanby; 15 = Woodlark; 16 = Louisiade Archipelago.

Its heart is New Guinea. This island is separated in the south from Australia by the Torres Strait. Though this is only a stretch of shallow sea (depth 10-20 m), which did not exist during the Pleistocene, it is acceptable as a southern border for a zoogeographic area for reasons outlined below. However, some smaller neighbouring islands have a fauna so similar to the one of New Guinea that they must be treated along with the latter. These islands are either part of the Sahul continental shelf (Aru, Batanta, Japen, Mysol, Salawatti), or narrowly separated from it (Ferguson, Goodenough, Koffiau, Normanby, Waigeo). With the Pacific Ocean north and east of New Guinea it is relatively easy to define the Papuan region there. The situation is different in the west where chains of islands extend to the Sunda-shelf of the Oriental Region.

Attempts to draw one definite line between the Oriental and the Australian regions have produced a number of different lines (SIMPSON, 1977); some of them make more sense than others: "Huxley´s line" coincides with the edge of the Sunda shelf, all islands to the west of this line definitely belong to the Oriental Region. "Lydekker´s Line" coincides with the Sahul shelf, all islands to the east definitely belong to the Australian Region, *i. e.* the Papuan Subregion. Between these lines lies a transition zone of thousands of islands called **Wallacea** (DICKERSON, 1928). Islands lying on the shelves were connected to the mainlands at times of low sea level during the Pleistocene. Wallacea, on the contrary, remained insular.

MAYR (1944), in his attempt to settle the issue where to draw the line between Oriental and Australian Region sees "Weber´s line" as a line of faunal balance, east of which the Papuan elements have a numerical superiority over Oriental elements. Roughly speaking "Weber´s line" runs between Sulawesi and the Moluccas.

WHITMORE (1981) uses the term "Papuasia" for New Guinea, the Bismarck archipelago, and the Moluccas. Thus, he uses "Weber´s line" to delimit this region in the west, but he does not include the Solomon Islands in the east, which have a similar percentage of typical Papuan elements as the Moluccas. More consistent appear the concepts of BEEHLER et al. (1986) and of GRESSITT (1982a). The former uses "Papuan Region" in a strict sense which includes the satellite islands of New Guinea from Kofiau in the west, to the D´Entrecasteaux-archipelago in the east. GRESSITT (1982a) uses "Papuan Region" in a wider sense, he includes both the Moluccas in the west, the Bismarck archipelago in the north, and the Solomons in the east.

The area discussed herein resorts to GRESSITT´s **Papuan Region *sensu lato*** (Fig. 3). All the *Euops* species described from this area are included. Species of neighbouring regions are included only as far as necessary for an understanding of the Papuan fauna, *e. g.* in respect of zoogeography. Of course, a more holistic approach (namely a world monograph of *Euops* plus a generic revision of Attelabidae) would be necessary to discover all details of *Euops* zoogeography. However, this task would require decades and is therefore not realistic under present circumstances. A revision of the Papuan fauna is a good compromise as the *Euops* fauna of this region is shown to be highly secluded.

1.3.2. Geographical and political facts

New Guinea is the world´s second largest island: with an area of 824 200 km^2 it is exceeded only by Greenland. Roughly, it extends between the Equator and latitude 11°S, and it is centred between longitudes 130°E to 152°E. Its maximal width is 720 km, its length is 2400 km. Being the home of the "birds-of-paradise", New Guinea made people´s fancy recognize the bird-like shape of the island: The westernmost peninsula is called the "Birdshead" or in Dutch the "Vogelkop", the area south of the isthmus is called "Birdsneck"; the "Tail" in the east is more often called the "Papuan Peninsula". A 2000 km long cordillera of craggy mountains running the length of New Guinea is the most distinctive topological feature. The crests of the main divide exceeds 3000 m in many places, and a handful of rocky peaks soar above 4500 m (MULLER, 1994; PARSONS, 1999; PIETERS, 1982). The highest peak is Puncak Jaya (formerly Carstensz Top) reaching 4884 m, although sometimes incorrectly marked 5029 m on maps. Together with two other peaks it is capped by snow and ice (HOPE et al., 1976).

The rugged terrain of the central range is at places interrupted by large, elongate intermontane valleys: the most important are the region of the Paniai lakes, the Baliem valley, and the Wahgi valley. In the middle part of the island the mountain range falls steeply into the southern lowlands which form a large alluvial plain. To the north the mountains give way to wide river basins of the Ramu, the Sepik, and the Mamberamo and its tributaries. These swampy plains are flanked to the north by a discontinuous coastal range (MULLER, 1994; PARSONS, 1999; PIETERS, 1982).

Many aspects of New Guinea´s geography indicate **low geological age**: high mountains ridges with sharp narrow crests, deeply incised V-shaped valleys, and frequent land-slides. The latter are often triggered by earthquakes. There is high seismic activity, Papua New Guinea alone experiences between 5% and 10% of the world´s seismicity (RIPPER, 1970). Orogenesis takes place at unusually high rates, regions of the north coast are elevated at up to 3-4 meters per 1000 years (ESAT et al., 1999; LÖFFLER, 1982b). Presently, there is only one active volcano on the mainland (Mt. Lamington), but the Moluccan Islands to the west, the Bismarck Archipelago to the north, and the Solomons to the east posses a larger number of active volcanoes.

Politically, New Guinea is divided between **two nations** along longitude 141°E: the western half used to be a Dutch colony and was handed over to Indonesia in 1963. Until now it is Indonesia´s easternmost province named Irian Jaya. The word "Irian" stems from the Biak-language and means "the big mainland", while "Jaya" is Indonesian and means "victorious". The latter epithet alludes to the mainly political victory over the Dutch in 1963 (MULLER, 1994). However, since the indigenous population of Irian Jaya has ethnically and culturally nothing in common with their current rulers in Jakarta there is a traditionally strong rebel movement. Recently, in negotiations over partial autonomy, the Papuans of West New Guinea were conceded to rename their land "Papua Barat" (West Papua). However, to avoid confusion, herein the name "Irian Jaya" is used consistently for the western half of New Guinea.

The eastern half of New Guinea is the sovereign nation of "Papua New Guinea" (PNG). This reflects colonial history, too: the southeastern part of the island was the British colony of "Papua". The northeastern part was the German colony "Kaiser Wilhelms-Land" which came under control of the "League of Nations" after the first World War. With a minor Japanese interlude during the second world war, both territories were administered by Australia, at first separately, after 1948 jointly as the "Territory of Papua and New Guinea". In 1975 it gained independence as Papua New Guinea (GRESSITT, 1982a; SOUTER, 1964).

The islands of the Papuan region to the west of New Guinea are either part of Irian Jaya (*i. e.* Batanta, Kofiau, Mysol, Salawatti, Waigeo), or they belong to the Moluccan or Spice Islands: Batchian, Halmahera, Obi, and Morotai belong to the Indonesian province of Maluku Utara (North Maluku). Ambon, Buru, Ceram, Kei, Tanimbar, and Aru (the latter in fact part of the Sahul shelf !) belong to the province of Maluku Selatan (South Maluku). The islands of the Papuan region to the east of New Guinea either belong to PNG, or to the independent nation of the Solomon Islands.

Names of administrative districts and island groups are explained in fig. 5.

1.3.3. Geological history

New Guinea as we know it today is a complex conglomerate of various geological units. The processes that led to its present geography took place on the leading edge of the northward moving Australian plate after the breakup of the Southern Continent Gondwana. Therefore, we may start at this point. Excellent summaries of the topic are given by BOER (1995), HALL (1998), and PIGRAM & DAVIES (1987). The geological processes of oceanic island arcs and their biological consequences are explained by POLHEMUS (1996).

Presumably 95 mya (mya = million years ago) Australia and Antarctica separated (AUDLEY-CHARLES, 1987) and Australia moved mainly eastward. At this time areas of New Guinea were largely submerged. The Australian continent changed its course from eastward to northward (ca. 50 mya) which forced the older and heavier Tethys Sea floor to the north of Australia to subduct at the western and southern margins of the Philippine and Pacific plates. The accompanying volcanism of this subduction gave rise to an extensive oceanic island arc, the Indo-Melanesian part of this arc system generally known as Outer Melanesian Arc (OMA) in biogeography (DUFFELS, 1986; HOLLOWAY, 1979). The movement of the Pacific plate carried the OMA westward and between 40 and 30 mya its most western part collided with the Asian continent enabling Asiatic biota to enter and migrate eastward along the arc. As a result of the collision and the continued movement of the Pacific plate, the island arc started breaking up: western parts became incorporated in the Philippines and in Sulawesi, the more eastern parts of the OMA continued their westward course.

Even before the break-up of Gondwana, fragments of the Australian plate continuously detached, rifting ahead of Australia. These terranes of continental origin are termed microcontinents. Some of these microcontinents preceded Australia in reaching the subduction zone and they became incorporated in the OMA. The terranes of the island arc were thus of composite geological origin. By 25 mya Australia entered the subduction zone at the southern margin of the Pacific and Philippine plates. The northern Australian craton collided in the first of a series of collisions with a part of the composite OMA that is known as the Sepik arc. This collision had various consequences: DALY et. al. (1991) believed that it led to the origin of many Moluccan islands which are continental slivers. The obliquely colliding Sepik Arc chiselled off these tectonic flakes from the northern craton of Australia and pushed them westward. Second, the collision led to a reversal of the subduction: the

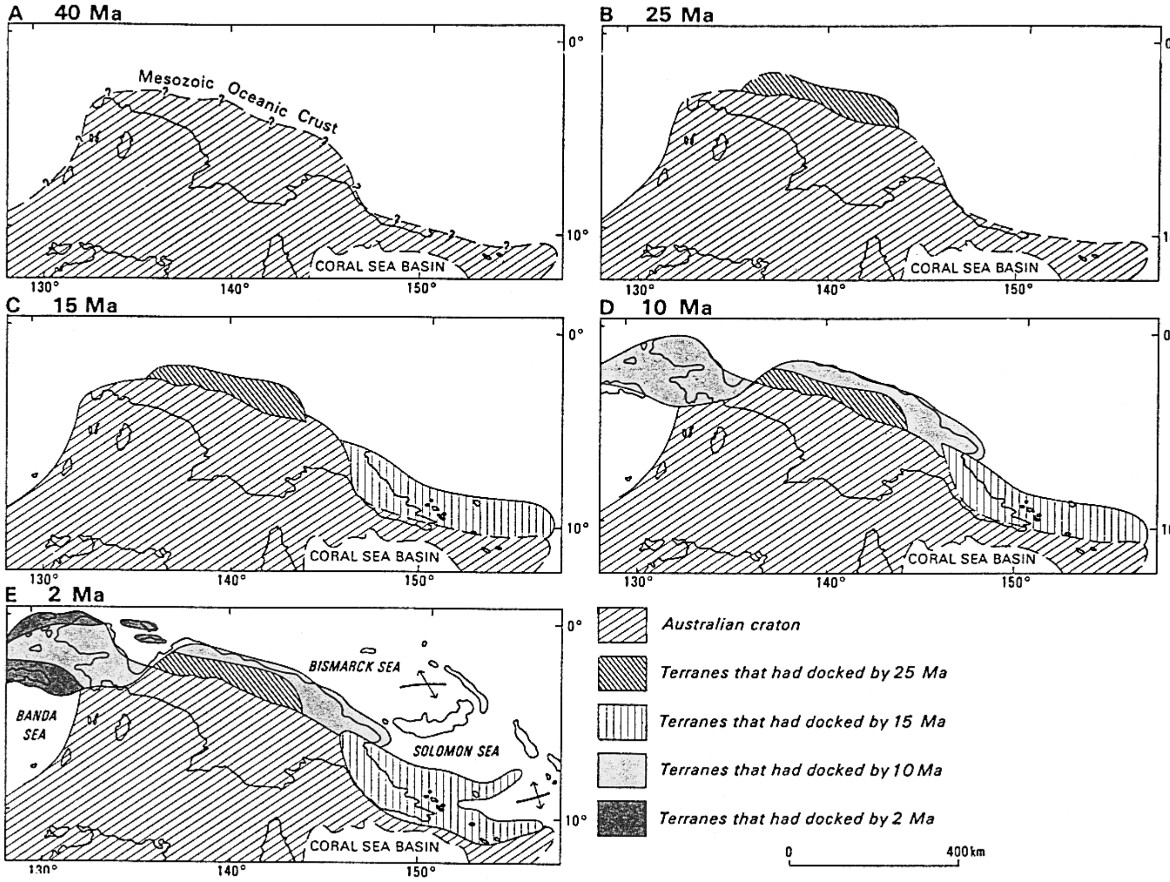


Fig. 6. Schematic accretion history of New Guinea. From PIGRAM & DAVIES (1987).

Thetys Sea had been completely consumed by subduction; now a part of the Pacific plate was forced to subduct southward under the Sepik Arc terranes which had been newly accreted to the Australian plate. Third, the collision resulted in the formation of the central mountain ranges. According to PIGRAM & DAVIES (1987) the orogenesis started in the middle or late Oligocene. Fourth, the weight of the accreted Sepik Arc terrane pushed down the northern part of the Australian continent causing its submergence. Only a small area of microcontinental origin was not pushed under water, the Kubor Range, which are presumably the only part of continental New Guinea that was continuously above sea level (DOW, 1977). The foreland basin stretched for about 18 million years as a shallow epicontinental sea over Southern New Guinea until the developing mountain ranges had filled it with erosion products since about 10 mya.

Another large composite block of the OMA was formed to the east of the Sepik Arc. The amalgamation of this block may have started as early as 52 mya and was completed by the end of the Oligocene (26 mya). In middle or late Miocene (ca. 15 mya) it collided with a salient of the Australian continent to form the Papuan peninsula. However, it remained long separated from the central mountain ranges of New Guinea by the north-south tending Aure Trough which may have been filled just 2 mya. Next, the terranes that now form the northern mountain ranges (*e. g.* the Gautier terrane of Irian Jaya, the Torricelli terrane of PNG) accreted to New Guinea about 10 mya. The original position of these terranes in the OMA is unknown. At about the same time the Birdshead collided with West New Guinea. The greater part of the Birdshead consists of two microcontinents, the Kemum- and the Misool terrane (PIGRAM & PANGGABEAN, 1984), which had joined by the end of the Oligocene (26 mya). They are of uncertain origins; one hypothesis is that they arrived far from the east of the Australian craton (BOER, 1995). Smaller parts of the Birdshead are of oceanic origin, namely the Waigeo-, the Tamrau, and the Arfak-terrane, the latter accreted quite recently, ca. 2 mya, to New Guinea. The last of the larger blocks that joined New Guinea was the Finisterre terrane: Accretion started about 10 mya in the west, propagated eastward, and was completed by 2 mya. The Finisterre terrane might earlier have formed a linear arc segment with New Britain, New Ireland, Manus Island, and the Solomon Islands (PIGRAM & DAVIES, 1987).

For geologists it is extremely difficult to date the emergence of small terranes above sea level or to detect short-time submergence of others. Yet, both processes are critical for the evolution of the terrestrial biota. There is not much point for biologists in knowing that a given terrane was at a certain time at a certain place unless we know if it was above sea level and could therefore carry land organisms or not. There are considerable differences in the dating and the size of land areas geologists postulate for the early days of New Guinea. DOW (1977) sees quite extensive insular land areas north of the Australian craton since the

Eocene. However, the more recent reconstructions of HALL (1998) show the first emergence of lasting land areas of minor size not before the Miocene (20 mya), larger areas appearing at the Early Pliocene (5 mya).

1.3.4. History of climatic changes and sea-level oscillations during the pleistocene

The glaciations during the pleistocene had profound effects on New Guinea: they were strongly influencing the formation of landscapes in the mountains, the distribution of vegetation types (see 1.3.5. for details), and the extent of shallow sea and dry land on the Sahul shelf.

The most recent maximum cold phase in New Guinea was the "Würm-glaciation", 20 000 - 17 000 years ago. The total area covered by glaciers during this period was about 2000 km^2. The snowline was lowered from its present 4600 m to about 3500 m. The glaciers retreated from their maximum extent from about 15 000 years ago onwards until they had entirely disappeared at about 7000 years ago. Glacial ice formed again on the high peaks at about 5000 years ago (LÖFFLER, 1982a).

Direct evidence for glaciations (*e. g.* moraines) pre-dating the Würm-glaciation is difficult to find. There are volcanic rocks on Mt. Giluwe which were formed under an ice cover which date back to 290 000 years ago, possibly also to 700 000 years ago (LÖFFLER, 1982a).

One important aspect of climatic change is a correlated change of sea-level. During cooler periods more water is bound as ice, mainly in the polar regions. Thus, during relatively warm interglacials the sea-level was higher than it was during cold phases of the pleistocene. Dating uplifted coral terraces on the north coast of the Huon peninsula allows reconstruction of past sea-level changes (ESAT et al., 1999). In the last 2 million years sea levels have fluctuated by up to 140 m on a time scale of about 100 000 years. The time spent at the lowest sea levels is similar to that spent at their highest, each not more than 10-15 000 years (CHAPPELL, 1987). Thus, the maximum lows existed for relatively short periods, whereas a sea level 30 to 40 m below the present one existed for more than half of the time during the past 250 000 years (VORIS, 2000).

These sea-level oscillations are of major importance to biogeography because lower sea levels connect areas allowing the terrestrial fauna to exchange easily. Fig. 4 shows the area of the Papuan region at a sea level of 130 m below present. The fact that New Guinea is connected to Australia is not an unusual situation. On the contrary, it existed as an island only during relatively short interglacials in the Quaternary past. As shown by the maps of VORIS (2000), Torres Strait, which separates New Guinea from Australia today, becomes already dry land at a sea level 10 m below present. Japen and Salawatti are connected to this main land as well. A sea level of 30 m below present connects Mysol to this land mass;

at 40 m below present, the Aru islands join. As mentioned above, such a situation prevailed during most of the Quaternary.

1.3.5. Vegetation patterns and their history

At the time Australia separated from Antarctica (95 mya) it was mostly covered by a temperate evergreen forest. This forest contained ancient taxa (*e. g.* Araucariaceae, Cycadaceae, *Nothofagus*, Podocarpaceae, Winteraceae) which had a wider distribution across fragments of former Gondwanaland. This vegetation was carried northward with the Australian plate into tropical latitudes, occupying its east coast (AXELROD & RAVEN, 1982). It may have entered New Guinea rifting on microcontinents such as the Kubor terrain. Fossil evidence shows that some of these Gondwanic plants (*e. g. Nothofagus, Podocarpus*) have been in New Guinea at least since the mid-Miocene (KHAN, 1974). When the collision with the OMA occurred in the Oligocene, the arc fragments must have had biota of tropical Asian origin. Today, the flora of New Guinea is still dominated by these tropical **Indomalaysian plants** (BALGOOY, 1976). Most of the **Gondwanic elements** retreated into montane habitats. This history made New Guinea the only place on earth where Laurasian Fagaceae (*Castanopsis*, *Lithocarpus*) naturally occur side by side with Gondwanic *Nothofagus*.

The divisions of New Guinea **natural vegetation** as given in JOHNS (1982) are found useful herein and should be summarized briefly. Three zones based on elevation are distinguished: first, the lowland zone; second, the montane zone; third, the subalpine zone. The various vegetation types of the **lowland zone** are controlled mainly by drainage conditions and water regime. Of no further significance herein are the types "coastal vegetation", "mangrove forest" and "swamp forest", the terms being more or less self-explanatory. In areas with more or less seasonal climate "monsoon forest" which contains a number of trees which are deciduous occurs. If rainfall further decreases an open "Savannah vegetation" results. This is dominated by *Eucalyptus* spp., *Melaleuca* spp., or *Albizia*. Today, four minor areas of such savannah vegetation exist in New Guinea, *i. e.* the Upper Markham River, the north coast of the tip of the Papuan peninsula, the Port Moresby region, and finally the largest of them, the Trans-Fly region opposing the Australian Cape York. The remainder of the New Guinea lowland is naturally covered by "mixed lowland rainforest", one of the most diverse habitats on earth.

The **montane zone** is subdivided into the lower-, the mid-, and upper montane forest types. Naturally, there are transitions between these forest types, but nevertheless they are sharp enough to pin them down to an altitudinal range of no more than 100 m. The appearance of these types differs according to local climatic and topographic conditions. Usually, the upper boundary of the lowland tropical rainforest is at 700 m, but can locally occur between 300 m and 1000 m. Common species of the lower montane forest are oaks

(*Castanopsis*, *Lithocarpus*), hoop / klinki pines (*Araucaria*) and a ground cover of *Hymenophyllum*. The lower montane zone is distinctly drier than the mid montane which becomes apparent in a relative scarcity of ferns and mosses. The upper boundary of the lower montane forest is usually around 1700 m, but can be found between 1500 m to 2000 m. The mid montane forest is dominated by Podocarpaceae (*Podocarpus* spp., *Dacrycarpus* spp) and by *Nothofagus*. Terrestrial and epiphytic ferns, mosses and lichens abound. The upper boundary of the mid montane forest coincides with the upper altitudinal limit of *Euops* in New Guinea at 2700 m - 3000 m. Higher, the upper montane forest (up to 3400 m) and finally the **subalpine forest** continues to the forest line which is today at about 3900 m. Alpine grasslands, bogs, and alpine scree communities reach an altitude of approximately 4500 m, where they give way to rocks. (Johns, 1982; Mangen, 1993)

A drop of temperature during the Pleistocene had two major effects for vegetation: first, a change of the vertical plant zonation; second, a change of the areal proportions between closed forest and savannah.

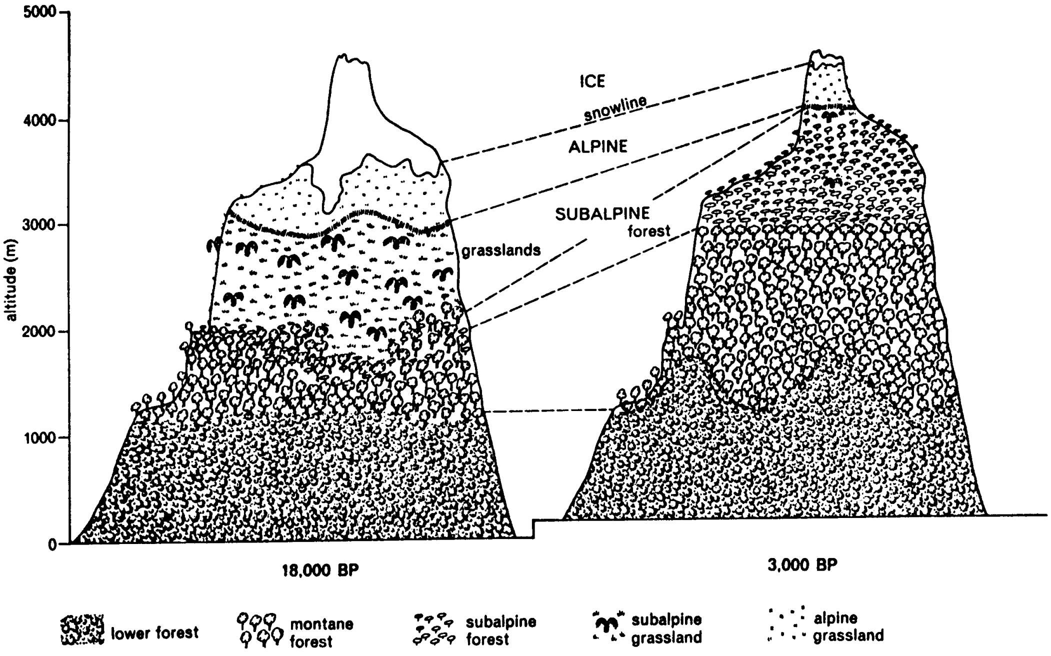


Fig. 7. Generalized changes in vegetation zones between ice maxima and mid-Holocene in New Guinea. From Hope (1986).

Hope (1980, 1986) describes the changes in vertical vegetational zonation during the maximum of the Würm glaciation as reconstructed using geological and palynological data (Fig. 7): the forest line was at an altitude of ca. 2000 m, which is 1500 m lower than today. The upper montane and the subalpine forests were very compressed. Subalpine grasslands were much more extensive, occupying an altitudinal belt about 1000 m deep.

Furthermore, the lower temperatures during Pleistocene cold phases caused changes in the atmospheric water cycle and in the location of major wind systems.

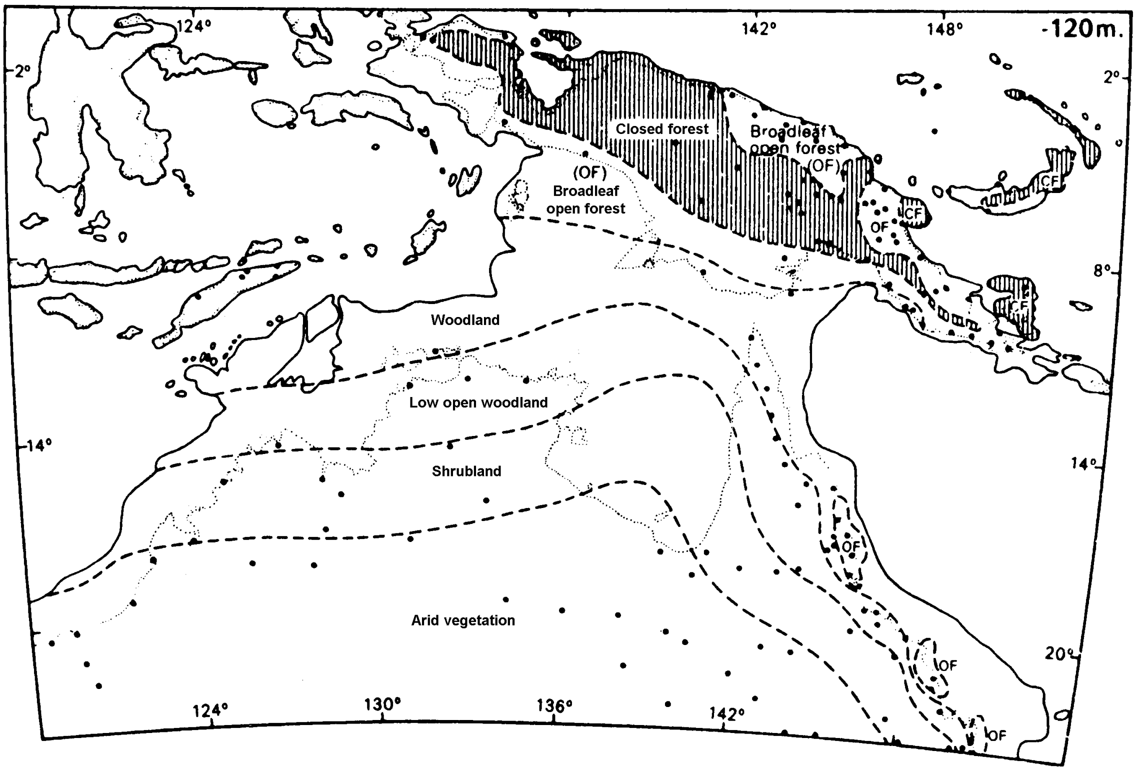


Fig. 8. Main vegetation types that might have occupied northern Australia, New Guinea, and intervening land about 17 000 to 14 000 years before present under the postulated climate of precipitation 0.5 that of present, evaporation 1.25 that of present, air temperature 1°C below present. From NIX & KALMA (1972).

These changes were magnified by the exposure of most of the continental shelf in what is now the Arafura Sea and the Gulf of Carpentaria. These present-day, warm, shallow seas are the sources of most of the tropical cyclones which make a major contribution to today´s rainfall budget. Evidence of a more continental, arid climate in areas of Sahul- and Sundaland is summarized by MORLEY & FLENLEY (1987). Based on available climatic data NIX & KALMA (1972) modelled plant response and sketched a scenario for the distribution of vegetation during cold phases illustrated in fig. 8. It becomes obvious that in some areas of New Guinea open savannah vegetation was more extensive than it is today. Nevertheless, a large block of closed forest remains. In Australia on the contrary, closed forest was almost absent.

1.3.6. History of the entomological exploration

The historical data of the following chapter are drawn from the excellent summaries of FRODIN & GRESSITT (1982), MULLER (1994) and PARSONS (1999).

The first written record of a European setting foot on New Guinea goes back to 1526. The Portuguese governor of the Moluccas, Jorge de Menezes had been driven out of his way and reached the Birdshead of New Guinea by accident. Cloves and nutmeg of the

Moluccas, the famous "spice islands", and tales of gold in New Guinea later led Dutch and Spaniard sailors to the Papuan region. Their interest was of a pure economic nature which was never fulfilled in New Guinea. Later, colonial interests emerged, but not before the 19th century any European nation made claims on the relatively unattractive territories of New Guinea. During this period zoological discoveries centered around "curiosa", such as the birds of paradise.

Between 1826 and 1829 J. S. Dumont d´Urville was the chief naturalist aboard the French ship Astrolabe that spent a few weeks in the Papuan region. He visited New Ireland, New Britain, Dorey Bay (= Manokwari) and Waigeo. Time was limited, but Dumont d´Urville achieved the first notable collection of insects ever taken in this region which included some weevils, but no *Euops*. The first sizeable zoological collection was accumulated by the private naturalist Alfred Russel Wallace between 1854 and 1862 (WALLACE, 1869). He stayed only in one place of the main island (Dorey Bay), where he suffered from illness. Nevertheless, he managed to collect the type specimen of *Euops wallacei* SHARP which is still the only specimen known of this species. Moreover, he accumulated excellent collections on the Aru islands, on Waigeo, Mysol, Salawatti and Ceram. All the Papuan *Euops* species described by PASCOE and two described by VOSS are based on Wallace´s material. Other collectors followed, but they usually concentrated on attractive insect groups such as butterflies and the relatively inconspicuous beetles were largely ignored. Second, they had the same problems as Wallace: they suffered from various diseases (mainly malaria, dysentery, dengue fever, and tropical ulcers) and they were restricted to coastal areas, finding it impossible to penetrate into the mountainous interior. This latter draw-back was only overcome by large-scale government expeditions such as the German "Kaiserin-Augustafluss-Expedition" of 1912-1913 which reached the headwaters of the Sepik. The accompanying entomologist Joseph Bürgers collected four of the *Euops* species described by VOSS (1924). The interior of West New Guinea was in parts explored on a series of Dutch military expeditions between 1907 and 1915. The success of reaching the high mountains of the interior by a few experts was bought at enormous financial costs and human sacrifices of hundreds of porters. This era began to change with the Third Archbold Expedition of 1938-39 (ARCHBOLD et al., 1942), which made use of an amphibious airplane.

After World War II small aircrafts were heavily used to access remote areas of the interior. The work of building air strips was mainly done by missionaries, who at the same time helped to pacify notoriously aggressive tribes such as the Kukukuku or the Goilala. Extensive areas of the New Guinea interior were open to scientists not before the 1950´s. J. L. Gressitt of the B. P. Bishop museum (Honolulu) started his entomological field work in New Guinea in 1955 and continued on a yearly base until his untimely death in 1982. Many other entomologists and students were sent by him to PNG, but also to other areas of the

Papuan region. Large volumes of undescribed insect species from PNG accumulated at B. P. Bishop museum. Selected groups were thoroughly studied by specialists but nobody touched the rich material of *Euops* until now. West New Guinea was practically closed to scientists since it was turned over from the Dutch to Indonesia. Gressitt visited the western half of the island only twice, once while it was still Dutch in 1955, and on another brief visit in 1979. From 1990 onward the present author collected insects in Irian Jaya reaching areas that had not been visited by entomologists before.

New Guinea, especially the western half, retains much of the mysteries it held for the last centuries. The discovery of a very distinctive new species of tree-kangaroo by FLANNERY et al. (1995) illustrates the poor state of our knowledge on the fauna of this island. Even animals with a body weight of up to ten kilogram eluded scientific discovery until recently. It is still a major challenge to rescue samples of unknown insect species before their habitats may be destroyed. The proportion of this unknown fauna should not be underestimated.

2. Materials and Methods

2.1. Material examined

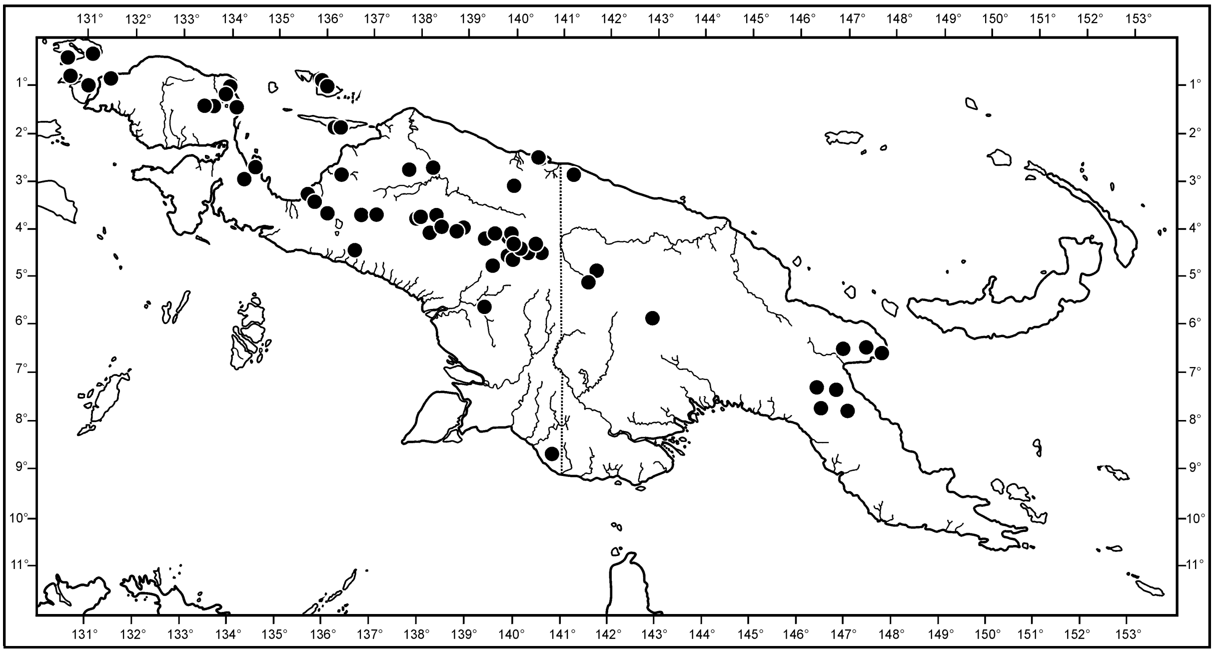


Fig. 9. Map of New Guinea; localities marked where author searched for *Euops* personally. (Original drawing).

Most of the material studied herein was collected personally between 1990 and 2001 on thirteen expeditions to Maluku, Irian Jaya and Papua New Guinea with an overall duration of more than two years (Fig. 9). Additionally, rich material could be borrowed from the B. P. Bishop Museum (Honolulu). Despite my attempts to borrow material from other collectors or institutions, none could provide significant numbers of specimens. Most of the specimens stored in museums date back to historic expeditions. They are of crucial importance as type material of the described species. Altogether, about 4032 *Euops* specimens from the Papuan region could be studied.

Type depositories are cited using the following codens:

AMS	Australian Museum, Sydney, Australia
ANIC	Australian National Insect Collection, Canberra, Australia.
ARC	Alexander Riedel collection, stored in ZSM, Germany.
BMNH	The Natural History Museum, London, U.K..
BPBM	Bernice P. Bishop Museum, Honolulu, HI, USA.
CMNC	Canadian Museum of Nature, Ottawa, Canada.
CWOB	Charles W. O'Brien collection, Tallahassee, FL, USA.
DEI	Deutsches Entomologisches Institut, Eberswalde, Germany
DPIM	Department of Primary Industries, Mareeba, Australia.
HAHC	Henry and Anne Howden Collection, Ottawa, Canada.
HNHM	Hungarian Natural History Museum, Budapest, Hungary.
KFC	Klaus Fabian collection, Essen, Germany.
MNHB	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany.
NFIL	National Forest Insect Collection, Lae, Papua New Guinea.
NNML	Nationaal Natuurhistorisch Museum, Leiden, The Netherlands.
PSC	Peter Stüben collection, Mönchengladbach, Germany.
SAMA	South Australian Museum, Adelaide, Australia.
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany.
SMTD	Staatliches Museum für Tierkunde, Dresden, Germany.
ZMH	Zoologisches Museum, Hamburg, Germany.
ZMUA	Zoölogisch Museum, Universiteit van Amsterdam, Netherlands.
ZSM	Zoologische Staatssammlung, München, Germany.

2.2. Methods

2.2.1. Collecting material of *Euops*

Euops are collected most effectively by traditional methods using a beating sheet and a butterfly net. Collectors using modern techniques of canopy fogging with knock-down insecticides could not provide *Euops* in significant numbers. If plants for collecting are selected statistically, *Euops* will be exceedingly scarce and possibly not be found at all. The successful collector of *Euops* knows that these beetles aggregate on certain shoots or leaves which are suitable for food / nidification. Often, such plant parts are still young and tender and have a coloration lighter than the average, sometimes yellowish or reddish. When following a jungle trail such plants should be sought for. They can be checked using a beating sheet. If a first glance reveals that many *Euops* specimens have aggregated, it is often useful to quickly cover the whole branch with a butterfly net so that the specimens can not escape taking flight. Also, such branches should be checked hours or days later, as specimens that escaped at first often return later. The typical scars on the margin of older leaves that had been used for nidification can serve as a hint on the presence of *Euops* in an area, or suggest a host plant of a *Euops* species. Populations of *Euops* species perform distinct temporal fluctuations and a species not found in a locality may be present a few weeks later.

2.2.2. Mycological techniques

The studies concerning the symbiotic fungi of female *Euops* were in part of methodological character. It was necessary to find out which techniques are best to obtain cultures of these fungi. Therefore, some techniques are part of the results and will be outlined in chapter 3.3.

As a cultivating substrate MMM was used according to the following recipe:

NaCl: 1.25 ml of 1% aqueous solution
KH_2PO_4: 2.50 ml of 10 % aqueous solution
$(NH_4)_2HPO_4$: 1.25 ml of 10 % aqueous solution
$FeCl_3$: 1 ml of 1 % aqueous solution
$CaCl_2$: 2.5 ml of 1% aqueous solution
$MgSO_4$: 0.75 ml of 10% aqueous solution
thiamin: 0.5 ml of 0.01 % aqueous solution
glucose: 5 g
malt extract: 2.5 g

The mixture was brought to 500 ml with water or to 1l (50 % MMM); 8g Agar Agar were added per 500 ml of liquid. Laboratory jars were filled with the mixture and tyndalized in a pressure cooker for each one hour on consecutive days. Both disposable petri dishes and tubes with screw caps were filled with the warm medium. After cooling they were sealed in parafilm and stored at room temperature for a few days to make sure they were sterile.

Female specimens of *Euops* chosen for dissection were narcotized using ethylacetate and instantly killed by decapitation. They were placed with their dorsum on a disinfected plate of a dissection microscope. Sterile (flamed) forceps were used for the dissection. The elytra were spread and then the apex of the abdomen pushed dorsad against the anterior body parts. Then, with sufficient care, the abdomen was removed without contaminating the mycetangia with body lymph or gut-contents. Spore material of the "spore reservoir" and the "spore incubator" was taken with freshly sterilized forceps or a flamed wire loop. The material was used to inoculate only two, previously marked spots on a petri dish. The preparation was usually done under a tent-like construction made of plastic foil which was placed on a pane of glass. The interior was sprayed with 70% alcohol one hour before use.

2.2.3. Preparation of the genitalia

The preparation of the genitalia was most easily done using fresh specimens: the pygidium was pushed open, the intersegmental membrane between segments VII and VIII slit and the entire genitalia were pulled out. Dry collection specimens which had been relaxed for preparation are more difficult to handle. In male specimens it was usually possible to apply the same procedure as described above, but more caution was required. In relaxed females, however, the spermatheca usually sticked to the abdominal notum and the spermathecal duct tore off when segment VIII was pulled out. To avoid this the entire female abdomen had to be removed. The abdominal notum was detached and raised on one side while the spermatheca was removed carefully.

The genitalia were macerated with 10% KOH at about 80°C until the tissue had sufficiently dissolved. They were rinsed in water, stained with an alcoholic Chlorazolblack solution and transferred to water once more. The spermathecae were drawn at this stage, as they tend to collapse in other media. Then the genitalia were transferred to glycerol, where they were dissected. Sternite VIII was detached from tergite VIII in both sexes to allow appropriate examination. To bring parts such as the aedeagus or the tegmen into a suitable position for drawing they were fixed on one end with vaseline. Parts stored in glycerol were finally attached to the pin of the specimen in microvials. However, the structures of the transfer apparatus (TA) of the aedeagus could not be observed properly when in glycerol. To achieve better transparency and resolution, the aedeagus had to be transferred once more to water and via absolute isopropene alcohol and xylene to canada balsam. For routine identification in most cases it was sufficient to view the TA when in glycerol. However, for drawing it was found essential to examine it in canada balsam or a similar medium. Any aedeagus used for drawing the TA was placed into a drop of canada balsam on a piece of cellophane which was attached to the pin of the specimen.

2.2.4. Preparation of the proventriculus

The preparation of the proventriculus is difficult due to its internal position, relatively small size, and fragile membrane. When filled, the foregut of *Euops* is a voluminous sack extending posteriad to the border between the metathorax and the abdomen. However, the taxonomically interesting characters, the gnathal ridges and the pulvilli of the proventriculus proper, occupy a small portion on its posterior end, ill-defined against the anterior voluminous crop of simple setose membrane. The best method to extract the proventriculus was to remove the entire abdomen. If the foregut was full, it could be seen easily from behind in the center of the metathorax. Inserting a pair of fine forceps as deeply into the thorax as possible, the posterior half of the foregut containing the proventriculus could be pulled out. The proventriculus was then macerated with 10 % KOH and rinsed in water. For further treatment detergent was added to the distilled water. The proventriculus was slit with a fine pin, unfolded, and the contents carefully brushed away. It was then stained with chlorazol black, rinsed in water, and transferred via absolute isopropyl alcohol and xylene to canada balsam. It was necessary to make microscopic mounts with slides and cover-glasses for a complete examination of structural details.

The mounted proventriculus was examined with a Leitz DM photo-microscope. At the beginning of the study (Appendix 2-3) the image was exposed onto photographic film (APX 25), which was further processed by standard photographic techniques. Later (Appendix 3-6, herein), a Kappa ImageBase DX30 (CCD with 1300 x 1030 pixel) was used to take digital photographs. A sandwich technique was used to obtain near-confocal images: each proventriculus was photographed up to 15 times at different focal levels. The layers were carefully placed over one another, the best parts of each were used and combined by image processing (Corel Photo-Paint 8). Care was taken that no incorrect information was induced. In some cases the picture of the entire proventriculus was combined by 4-8 frames to increase resolution.

2.2.5. Scanning electron microscopy (SEM)

Specimens for SEM examination, after cleaning and air drying were mounted on carbon stickers and coated with gold in a Bio-Rad SC 510 for 135 to 180 seconds. Those specimens were examined with a Philips XL 20 operated between 10 and 20 kV. If primary types were examined, they are left uncoated. In this case the SEM was operated at about 1 kV. In the beginning of the study (Appendix 2-3) the images were exposed onto photographic film (APX 100), which was further processed by standard photographic techniques. Later (Appendix 4-6, herein), the images were saved as TIF-files (712 x 484 pixel). The digital photographs were improved by image processing.

2.2.6. Habitus illustrations

Specimens selected for habitus illustrations were mounted on pieces of white cardboard. For illumination a Leitz-ringlight was used. To obtain a more diffuse light the specimen was placed within a cylinder of grease-proof paper. Pictures for appendix 2 were taken by standard photographic techniques using a Wild Photomacroscope M 400. Later, digital photographs were taken with a Kappa ImageBase DX30 (CCD with 1300 x 1030 pixel) adapted to a Leica MZ12. A sandwich technique was used to obtain near-confocal images:

each specimen was photographed 10 to 20 times at different focal levels and values of exposure. Legs and antennae had to be exposed shorter than dark parts of the body. The layers were carefully placed over one another, the best parts of each were used and combined by image processing (Corel Photo-Paint 8).

2.2.7. Line drawings

Drawings were done with the help of a camera lucida attached to a compound microscope (either a Zeiss Standard 18 or a Leitz Diaplan). On a light table the original pencil drawing was traced onto cardboard with technical ink pens. During the process the specimen was checked repeatedly to ensure that the correct visual impression was achieved. The original drawings were scanned and digitally processed.

To draw the head it was removed from the specimen and fixed with plasticine. The dorsal aspect shows the head in a position where both the ventral margin of the head capsule and the apex of the rostrum rest on one level. The sculpture of the head was omitted except in appendix 6. In drawings of the tegmen the apodeme was omitted since it continues to grow during the life time of the imago and only useful characters are restricted to the apex of the tegminal dorsal plate. Drawings of genital structures were oriented with the apex upward.

2.2.8. Measurements

Measurements were taken with the ocular grid of a Zeiss dissection microscope unless otherwise stated. As a measurement of body length, the length from the anterior margin of the pronotum to the apex of the elytron was taken in dorsal view; the head was excluded because its dorso-ventral position could not be standardized. Measurements of the head were taken from the original drawings. The length of the gena was measured in lateral view from the posterior margin of the eye in a horizontal line to the hind margin of the head capsule at the point of its greatest extent. The length of the rostrum was measured in lateral view from the anterior margin of the eye to the apex of the clypeus. To provide a ratio of the length of the rostrum, the length of the mouthparts was used as the denominator, since it changes little among specimens of the same body size, whereas the length of the gena is often correlated with the length of the rostrum. The length of the mouthparts was measured in lateral view between the posterior margin of the maxillary cavities and the apex of the clypeus. Unless otherwise stated, the width of the prothorax was measured at its widest extent *in front of* the basal constriction (Fig. 10); at the base it is wider but in dorsal view poorly delimited against the pterothorax. The width of the elytron was measured between the humerus and the middle of the scutellum (Fig. 10). If a humeral spine was present its length was not included, but the width was measured slightly anterior of the spine. The length of the elytron was measured in dorsal aspect parallel to the elytral suture from the anterior margin of the scutellum to the apex of the elytron. The height of the pterothorax was measured in lateral aspect from the dorsal contour of the elytron to the ventral contour of the metathorax at the point of its greatest extent (Fig. 11). The length of the pygidium (tergite VII) was measured medially, and its width at the base. The length of the apical scoop of the pedon was measured along its middle, and its width at the widest point.

Values given under "intraspecific variation" were measured for males and females separately. If it was subsequently found that mean values did not differ significantly between the sexes, the samples were pooled. In this case no separate values for males and females are given. If possible at least 20 specimens per sex were measured. The data are presented in the following sequence: Minimum value - maximum value (n= number of specimens measured, $\bar{x}$= arithmetical mean value ± standard deviation). These statistical values were not calculated in the beginning of the study (Appendix 2).

2.2.9. Terminology

There is some uncertainty about the homology of the sclerite basad of the prementum in weevils and other Coleoptera. I am following LYAL (1995), referring to it as the submentum. The area of the head visible in ventral aspect between the posterior tentorial pit and the neck membrane is referred to as the "gular region", although morphologically speaking, it only consists of the postgenae and a single gular suture. In front of the eyes the postgena reaches between submentum and gena (in the morphological sense) as a more or less extended wedge. The term "gena", unless otherwise stated, is not used in the morphological sense, but denotes the lateral surface of the head behind the eyes (Fig. 10). The term "vertex" is used for the dorsal surface of the head behind the eyes, and the "frons" for the area between the eyes.

I am following THOMPSON (1996) using "prepectus" (Fig. 11) and "postpectus" for the parts of the prosternum before and behind the procoxa respectively. Legs are described in an idealized, laterad extended position: there are a dorsal / ventral and an anterior / posterior surface. The "height" of a tibia is its dorsoventral extent. In describing the armature of the male profemur, protuberances in a submedian position are assigned to the anterior, or posterior half of the femur according to their position relative to the bent protibia. The position of characters on the extremities is described as follows: the distance of the position from the apical end is put into relation with the overall length of the respective part of the body. *e. g.*, "spine at 0.15 of profemur" means that the spine is located 15% of the length of the profemur from its apex. The terms "spine", "tooth" and "denticle" are used, as defined by SCHUH (1989), for acute cuticular processes of decreasing size.

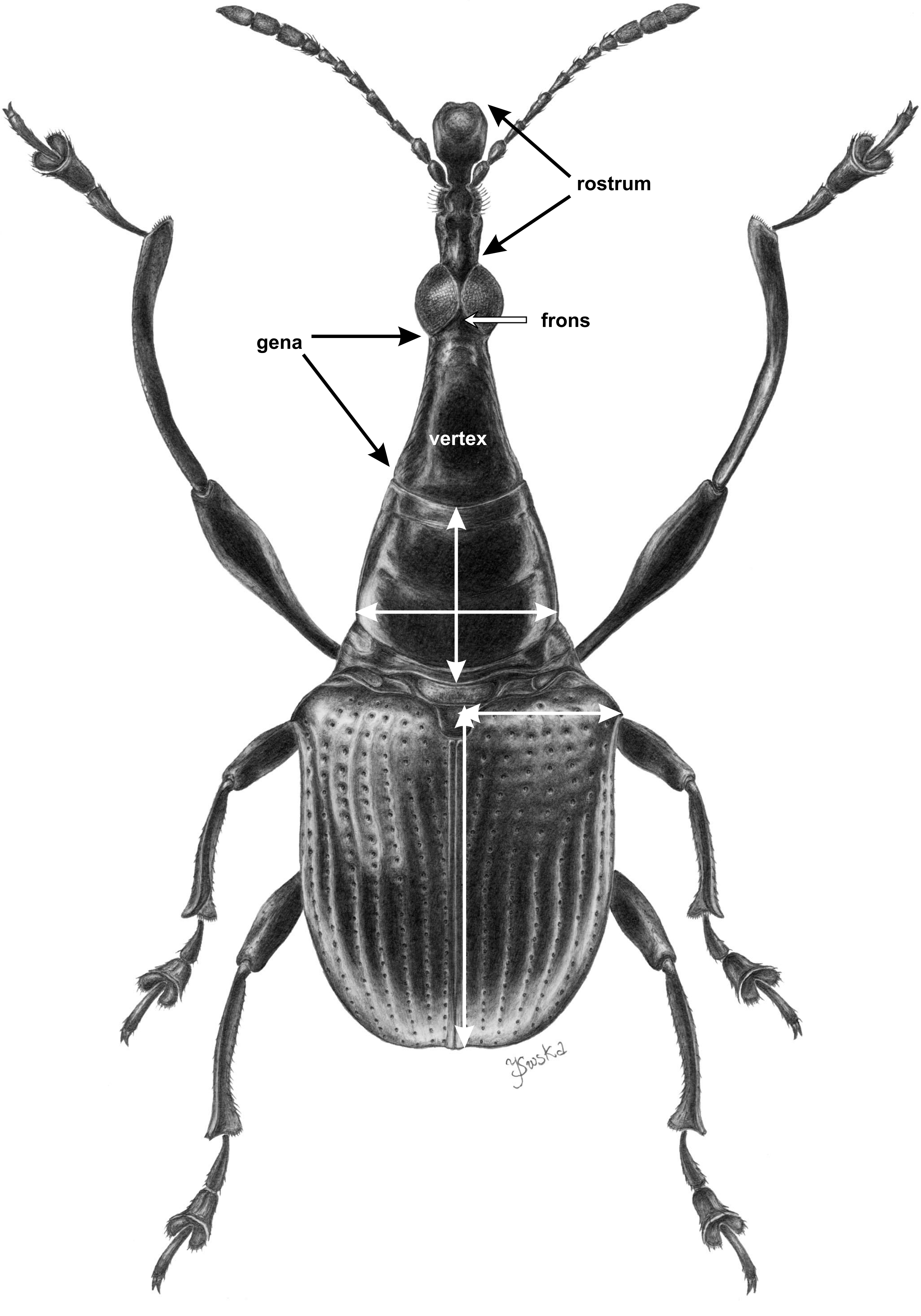


Fig. 10. Habitus of *Euops* sp. (*papua*-group, new species 23) in dorsal aspect. Explanation of terminology of head; length / width measurements of prothorax and of elytron. Drawing by Jolanta Swietojanska.

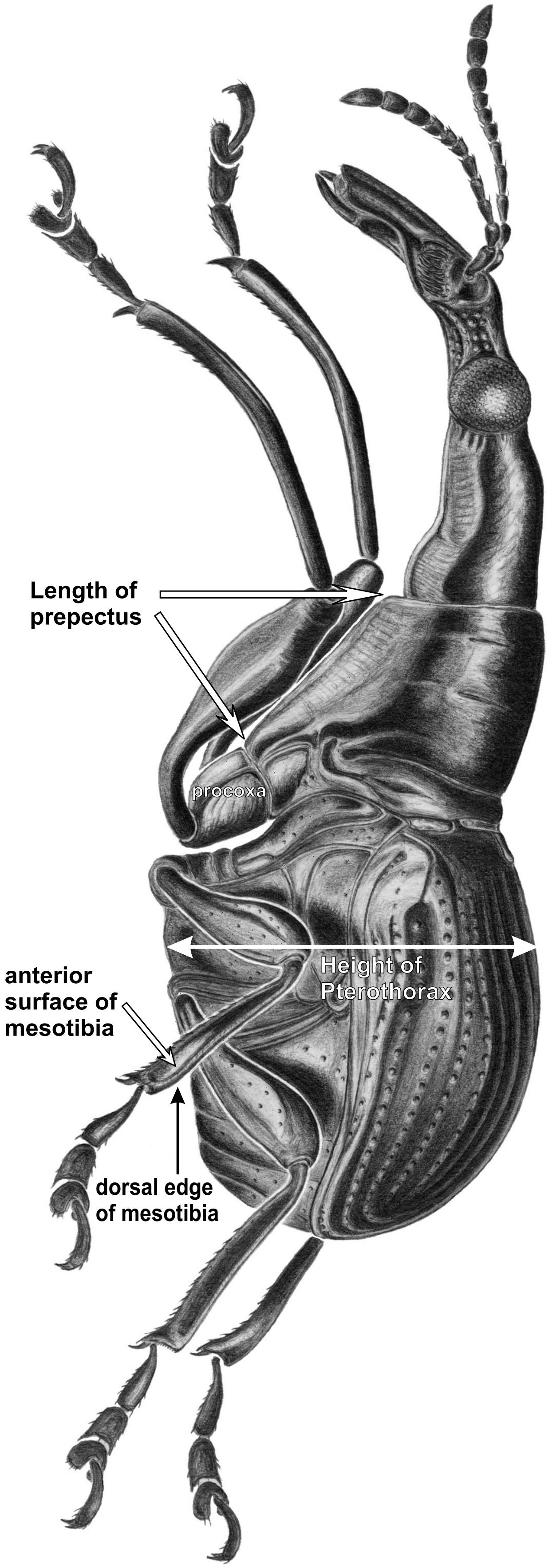


Fig. 11. Habitus of *Euops* sp. (*papua*-group, new species 23) in lateral aspect. Explanation of terminology. Drawing by Jolanta Swietojanska.

The tibial apex of Attelabinae is developed into one (males) or two (females) teeth. Although tibial teeth are present in Curculionidae, they are neither found in the presumed sister-group of the subfamily, the Rhynchitinae, nor in the Brentidae (*sensu* KUSCHEL), the family intermediate cladistically between Attelabidae and Curculionidae. In these groups the tibial apex is subtruncate and surrounded by a complete ring of thickened setae, the plesiomorphic form for the superfamily. The attelabine tibial teeth thus are unlikely to be homologous with those of the Curculionidae, and from a strictly morphological point of view different terms should be coined for them. However, in this study terms are used in a descriptive rather than morphological sense, and THOMPSON´s (1992) terminology will be employed. The tooth at the tibial apex of the male is thus termed the "uncus", while the second, more ventral tooth of the female I am terming the "premucro". The latter term is used instead of the more familiar "mucro" because of its position with respect to the protibial setose fringe, making it analogous to the premucro in, for example, Cossoninae.

The morphologically correct numbers for the abdominal segments are used. It should be recalled that the first externally visible sternite is sternite III. The body of the aedeagus consists of two sclerotized plates connected laterally by membrane. The dorsal plate is the tectum and the ventral plate is the pedon. The apical part of the pedon, delimited more or less from the remainder, is referred to as the apical scoop of the pedon. The "transfer apparatus" of the male aedeagus is abbreviated "TA". Figures 196-199 of appendix 5 outline the terminology of the male genitalia. For the terms used to describe the spermatheca see figure 131 of appendix 2.

Sculptural characters of the cuticle are categorized as macrosculptural and microsculptural. The macrosculpture is evident using a dissection microscope at low to medium magnification (ca. 5-50 X). The microsculpture can be seen superimposed on the macrosculpture either using a dissection microscope with good illumination at high magnification (ca. 50-100 X) or with an SEM. If a strong microsculpture is present, the cuticle usually appears dull at medium magnification. A cuticle described as "shining" with no further comments regarding microsculpture implies that a microsculpture can not be seen with a dissection microscope. In the definition of sculptural characters, I follow SCHUH (1989). If there are pairs of terms *e. g.*, "punctate" and "punctulate" or "rugose" and "rugulose" I am using the former term for macrosculpture, the latter for microsculpture. "Rugose" is used if there are wrinkles present that extend over some distance. "Scabrous" is used for a coarse surface with irregular short, sharp projections. The term "simple" is used to describe the absence of a conspicuous (usually rare) modification, *e. g.*, a "normal" elytral humerus instead of an elytral humerus bearing a denticle.

2.2.10. Descriptions

There is a difference between the theory of systematics and the practice of taxonomy. The former is biological, the latter has to be typological. This necessary distinction is overlooked or denied by many zoologists. Experience shows that type-series often consist of more than one species. With sufficient care such mistakes can be minimized but they can never be excluded. Therefore, I consider it essential to keep the data derived from the holotype separate from the peculiarities of other specimens. Thus, there remains a chance to pin down the species, if the type series turns out to consist of two or more sibling species and the holotype is not available. My species descriptions therefore consist of three integral parts: a description of the holotype; a description of a selected paratype of the opposite sex (which may be called "allotype" bearing in mind that it, and the other paratypes, have no nomenclatural significance); and a description of the intraspecific variation within the available sample of the species. Species descriptions without such a distinction constitute the equivalent to describing syntypes without fixing a holotype.

In the beginning of the study (Appendix 2) the computer program DELTA of DALLWITZ (1980) and PARTRIDGE et al. (1993) was used to generate uniform descriptions. However, numerous technical problems occurred: DELTA had to be used in MS-DOS modus and there were three separate data files that contributed to the description. If a change was made in the character list (*e. g.* by adding a character or character state), changes had to be made in the other two files as well. For this and other reasons I found the programme impractical for the purpose of creating descriptions. Later, a more pragmatic approach was taken retaining some of the ideas of DELTA: A list of the characters and character states in *Euops* was maintained. When a species group was revised, the characters constant within the group were extracted and given in the group-description. The list of the remaining characters was worked parallel for the treated species: *i. e.*, a given character was compared among all the species, decisions on the state in each case were made and, they were each added to the growing species description. The traditional approach was to make the complete description of species A before continuing with species B. The problem of this latter technique becomes obvious when species Z is reached and it is found difficult to recall where the lines had been drawn between "soft character states" in the beginning. Of course, this problem is not so problematic in numerical characters, but there are other characters to be considered as well. For example, the decision if the coloration of an insect would be called "metallic blue" or "shining black" is highly subjective and depends on the illumination (natural light, or artificial light), on the state of the specimen (is there grease on the surface ?), and on the constitution of the observer. Despite the inherent problems a statement on such character states should be made by the revisor. Making such decisions under the same circumstances and at the same time, the likelihood that identical states are described as something different and vice versa is reduced to a minimum.

2.2.11. Applied species concept

There exist a number of different ideas of how a species of organisms should be defined. A table of the most important species concepts is given by WÄGELE (2000: p. 57). In the practice of taxonomic work usually MAYR´s concept of a "biological species" is followed: "Species are groups of actually (or potentially) interbreeding natural populations which are reproductively isolated from other such groups" (MAYR, 1969). The advent of a precise methodology and theory of phylogenetics stimulated the formulation of other species concepts. HENNIG (1966) defines species as “Groups of individuals connected by tokogenetic [parental / genealogical] relationships”. HENNIG´s concept extends MAYR´s biological species into the fourth dimension by conceiving species as lineages with a distinct beginning (by speciation) and a distinct end (by speciation or by extinction). The concept of WILEY (*e. g.* 1981; as modified from SIMPSON, 1961) seems to go even further in being very generalized: "An evolutionary species is a single lineage of ancestor-descendant populations which maintains its identity from other such lineages and which has its own evolutionary tendencies and historical fate". The advantage of this universality is that it can be applied also in problematic cases as exemplified by asexual organisms or the so called "chronospecies". Unfortunately, the trade-off is the clarity of the definition.

So far there are no records of fossil *Euops* species, nor is there an indication of the existence of parthenogenetic populations in attelabids. Thus, it is possible to restrict the conceptual base of the taxonomic work herein to MAYR´s biological species.

Since it was not possible to experiment in crossbreeding different populations of the species studied, what criteria were used in sorting the specimens at hand? First of all, series of similar specimens exhibiting discrete morphological characters ("morphospecies") were identified. If two or more such "morphospecies" had been found sympatrically, this was regarded a strong indication for a lack of gene-flow; *i. e.*, reproductive isolation must be obtained and the specimens must belong to separate species. For example, three closely related species of *Neosynaptops* (*E. punctaticeps*, *E. similis*, *E. waigeoensis*) were collected near the village of Saporkren on Waigeo island. At least two species of the *spinosus*-group (*E. yali* and *E. armatus*) occur sympatrically near the village of Kosarek.

It is more problematical to deal with specimens from different localities; in such cases there is the possibility of allopatric distributions without a "natural crossbreeding experiment" which is provided in the case of the sympatric populations. It was necessary to make a somewhat arbitrary decision if the observed morphological differences are sufficient to justify the status of a separate species. Nevertheless, in most groups some sympatric species could provide a rough scale of the required morphological difference and the characters of importance. Concerning the examples above, it was found that male genital structures in the sympatric *E. yali* and *E. armatus* are very similar. However, the armature of the male profemur was completely different. As a consequence, this character was considered of major importance in the *spinosus*-group. When deciding about the status of other specimens of this group, differences of this character were first considered. In *Neosynaptops*, the situation is reversed. The three species occurring in Saporkren (Waigeo Island) are externally extraordinary similar, but the transfer apparatus of the male genitalia exhibits very distinct characters. Thus, comparable differences in genital characters were expected from other specimens of *Neosynaptops* to assign them specific status. In cases of doubt, the attitude of a "lumper" was preferred over the one of a "splitter". Local forms that may represent distinct species were described separately under "intraspecific variation". See for example the Biak-form of *E. viridiceps*, or the Mt.Kaindi-form of *E. zimmermani*. When additional material of these forms later suggests that they are indeed separate species, they can be named at that point. I have refrained categorically from naming subspecies. As outlined above, there is already some difficulty in defining species for which sound concepts exist. There is no reasonable concept for subspecies, an issue that was discussed in detail by WILSON & BROWN (1953).

Generally, characters that seem to evolve under sexual selection were of great importance for defining the species. Judging from the diversity of male sexual characters, ranging from sophisticated structures of the genital transfer apparatus to all kinds of protrusions on legs and rostrum, there appear to exist strong pressures of sexual selection in *Euops*. As outlined by STUBBLEFIELD & SEGER (1994) there is a positive correlation between the difference in parental investment and the amount of sexual selection. Attelabid females have to prepare the nidi, a laborious task which is not supported by the males in any way. Therefore, in theory, strong pressures of sexual selection should rest on male *Euops*; in reality this becomes obvious in the diversity of sexual male characters as cited above. Considering MAYR´s species concept, which rests on reproductive ties between the individuals of populations, it appears reasonable to rely largely on such sexual characters when defining the *Euops* species herein. Characters of the transfer apparatus are of crucial importance in this context. They remind us of the lock-and-key hypothesis of genital morphology. However, as in many other groups of arthropods only the keys exist in *Euops*; the soft-walled and uniformly poach-like bursa copulatrix of most females does not appear to represent a corresponding lock. This issue was discussed extensively by SHAPIRO & PORTER (1989). The "female choice hypothesis" of EBERHARD (1985) explains the present situation without requiring a mechanical female "lock". It assumes a runaway coevolution between male genital structures and female neuronal properties. Such a coevolution could take place if the female has some influence on the rate of fertilization after a copulation. This hypothesis explains equally well the rapid evolution of the male genital structures and their sophisticated specific structures.

All of the hypotheses regard these structures as critical for a successful insemination of the female and / or the fertilization of its egg-cells. Thus, the great practical value of male genital characters in sorting specimens and their importance in decision-making of which group of specimens to formally describe as a biological species is well-supported by evolutionary theory. Furthermore, it is well compatible with MAYR´s concept of a biological species.

For sorting the "morphospecies" (*Euops*, new species 1-108) male genital structures were also examined. The same rigorous criteria were applied as for the species which were formally described.

2.2.12. Supraspecific categories

If a classification is not to preclude the view to the natural relationships within a group, it has to be based on sound phylogenetic hypotheses. At the time the subgenera of *Euops* were introduced such hypotheses were still missing. Therefore, at least some of the subgenera are most likely artificial assemblages. This is especially true for the nominate subgenus *Euops* s. str. which is probably paraphyletic in relation to all the other subgenera. Therefore, it is used for practical reasons only, and emphasis is placed on the subordinate species groups instead. Before a robust hypothesis on the deep-level phylogenetic relationships between *Euops* species groups of all zoogeographic regions is proposed, it is best to refrain from establishing new subgeneric names and from changing existing concepts.

Generally, I prefer a cladistic classification to an "evolutionary" one (based on the subjective perception of anagenetic change). Therefore, adelphotaxa should be of equal rank; paraphyletic groupings should be avoided. This pertains to the status of the Rhynchitinae, the Attelabinae and the Apoderini. The former are possibly sister groups, and as long as no stronger evidence is presented to the contrary (see chapter 1.2.2 for a discussion of the possible paraphyly of the Rhynchitinae in relation to the Attelabinae), both taxa are given equal rank. The Apoderini (formerly Apoderinae) are most likely a subordinate taxon of the Attelabinae, and have therefore been downgraded despite their conspicuous apomorphic characters.

2.2.13. Phylogenetic reconstruction

The basic principles and methods of phylogenetic systematics have first been outlined by the German entomologist Willi Hennig (summarized in HENNIG, 1950, 1966). His ideas were readily picked up by anglosaxon zoologists who subsequently transformed them into a field of research called "pattern cladistics" (*e. g.*, NELSON & PLATNICK, 1981). The advent of powerful personal computers allowed them to analyze complex character matrices using newly developed computer programs. However, in Hennig´s homeland the recognition of the computer as a useful tool for phylogenetic analysis was delayed. The majority of German systematists adhered to Hennig´s methods of constructing cladograms "by hand"; largely, because of the suspicion that these programs represent yet another form of phenetics.

In the following both methods are briefly compared. A convenient summary of the current methods of pattern cladistics can be found in KITCHING et al. (1998). Below, some justification is given for the author´s preference for this latter approach. The specific settings for each analysis are outlined separately in the respective chapters as they vary somewhat among the different analyses.

If parsimony is accepted as the ultimate criterion for constructing phylogenies, the cladograms obtained by manual reconstruction and by the respective computer programs (*e. g.* Hennig86 or PAUP) are identical. A simple test of these programs can show that they are in fact cladistic and not phenetic. If characters are traced on a rooted cladogram their states are divided into plesiomorphic and apomorphic ones. However, the greatest difference between manual and computerized reconstruction concerns the method of how the characters are polarized. While traditional phylogenetists have to polarize the characters *a priori*, a computer program allows to take this step *a posteriori*. At first, only unpolarized networks are calculated treating the members of the ingroup and one or several outgroup representatives the same way. The resulting most parsimonious topology is then "rooted" by selecting one taxon as an outgroup. If more than one member of the outgroup was included in the analysis it serves as a convenient test of the monophyly of the ingroup. As another consequence of this procedure, characters of initially unknown polarity can be used in the analysis, too (MEIER, 1995).

A second important difference between manual and computerized reconstruction concerns the weighting of characters (HASZPRUNAR, 1998): while weighting is principally possible in a cladistic analysis, it is rarely done by pattern cladists. Their claim is to exclude the subjectivity involved in weighting. However, the decision if a character is included in an analysis, or excluded from it is just as subjective. Thus, character selection *per se* is a weighting processs. Traditional phylogenetists estimate the probability of homology of apomorphic states *a priori* using specific homology criteria. The tree is then constructed beginning with characters of the highest *a priori* probability of homology, subsequently adding those with lower probabilities. There are clear advantages of this method: the entire knowledge of the phylogenetist can be used when assigning probability values to potential apomorphies, including ecological data of the taxa involved. This helps to avoid being misled by so called concerted homoplasies. These are nonrandom homoplasies of independent characters that evolve under certain constraints, such as specific habitat conditions.

It must be emphasized that the result of a manual reconstruction based on maximum parsimony and the outcome of a computer analysis will be the same if characters are weighted equally. This fact is obvious if the data set contains no character conflict. The manual reconstruction of cladograms by successively joining sister taxa is relatively easy under such favourable conditions. This changes when character conflicts occur. It was noted by ARNOLD (1981) that parallelisms occur especially common in phylogenetic analyses of species groups - the prime purpose of this study. The enormous number of theoretically possible cladograms is often overlooked. While there are only 15 possible cladograms for four taxa, there are 8,2 x 10^{21} cladograms for the still moderate number of 20 taxa (FELSENSTEIN, 1978). If there is a number of homoplasies contained in the data set (which is usually the case) it is almost impossible to choose the most parsimonious solutions out if this huge number of possible cladograms without the aid of a computer.

A frequent argument of traditional phylogenetists against the use of computer programmes based on parsimony is that the course of evolution does not need to be parsimonious. However, this concern rests on a misunderstanding of the reasons why to follow parsimony. Parsimony is simply the most robust criterion for choosing between competing scientific hypotheses. It is not a statement about how evolution may or may not have taken place (FARRIS, 1983; RIEPPEL, 1999). In fact, most of the traditional phylogenetists make use of parsimony when it concerns selecting the most plausible of various cladograms that had been reconstructed manually: this is stated most explicitly by AX (1984: p.67); it is also implicit in the auxiliary principle of HENNIG (1966), which demands that homology should be presumed in the absence of evidence to the contrary.

It must be remembered that every cladogram - be it manually reconstructed, or by the help of a computer programme - is nothing more than a hypothesis. A good scientific hypothesis should be comprehensible to others. Pattern cladists usually provide matrices with their reconstructions, something that can rarely be found along manual reconstructions. Character list and matrix allow not only a thorough examination; they also guarantee that the data can be updated and improved easily. Because of this transparency a greater heuristic value can be attributed to cladistic reconstructions than to manual ones. However, the quality of a cladogram depends most importantly on the quality of the characters and on the correct identification of homologies. This should not be forgotten when performing a phylogenetic analysis, be it a traditional one, or a computerized one.

3. Results

3.1. Taxonomy

This chapter is intended as a synoptic treatment of the *Euops* species of the Papuan region. It covers the known species, *i. e.* those having been formally described in literature. The described species which have not yet been treated in my previous publications are herein redescribed in a way to conform with the new standards. The remaining undescribed species at hand are listed as "morphospecies". Under present constraints on both time and funding this was the only way to present an overall picture of the Papuan *Euops* fauna. I consider the use of "morphospecies" a provisionary arrangement which was unavoidable under present circumstances. See the "Introduction" for more comments on accurate taxonomy and on "morphospecies".

3.1.1. Key to the species groups of *Euops* in the Papuan region

Note: the following key is intended as a provisional aid for orientation over the major species groups of Papuan *Euops*. A large proportion of these groups has not yet been studied in detail. Therefore, the key may be erroneous in places. It should be used with appropriate caution.

1 Setose patch of female venter consisting of four double rows of modified setae. Body size relatively large, length of pronotum + elytron 3.20-6.10 mm. Elytron at humerus with denticle or spine 2

1' Setose patch of female venter consisting of less than four double rows; if sternite VI with modified setae, then with one single row only. Body size usually smaller, length of pronotum + elytron 1.88-5.10 mm. Elytron at humerus in some species with denticle or tooth, but usually evenly rounded . 3

2 (1) Elytron at humerus with large spine. Prothorax with pair of blunt protuberances anterior to subbasal constriction. Male profemur with two or more spines or denticles on ventral surface. Ovipositor without styli .... *spinosus*-group

2' Elytron at humerus with denticle or tooth. Prothorax anterior to subbasal constriction evenly rounded. Male profemur without protrusions on smooth ventral surface. Ovipositor with styli (Fig. 153) .... *papua*-group

3 (1') Head densely deeply punctate, at middle with marked constriction (Fig. 108, 109). Prothorax densely deeply punctate, anteriorly with marked preapical constriction and smooth collar-like extension (Fig. 38). Prementum with one single apical tooth .... *eucalypti*-group (*E. suturalis* Lea)

3' Head usually without constriction at middle (in *E. pygmaeus* with shallow constriction). Prothorax smooth, rugose, or punctate, but then punctures shallower and sparser; without marked preapical constriction. Prementum with two or three apical teeth 4

4 (2) Coloration either totally flavescent / ferruginous, or at least abdomen pale flavescent while the remainder is partly or completely black / bluish 5

4' Coloration mainly black with more or less marked metallic lustre; if parts of body of ferruginous coloration, abdomen never flavescent 9

5 (4) Prementum with two apical teeth (Appendix 3, Figs. 30-32) 6

5' Prementum with three apical teeth (Figs. 63, 69) 8

6 (5) Rostrum spatulate (Appendix 3, Fig. 14). Eyes dorsally distinctly separated at middle. Pronotum transversely rugose .... *pygmaeus*-group

6' Rostrum not spatulate, its profile in basal half parallel-sided. Eyes dorsally contiguous at middle. Pronotum smooth, without wrinkles 7

7 (6') Coloration completely flavescent / ferruginous .... new species group 2

7' Coloration partly flavescent / ferruginous (at least abdomen), other parts of body black .... new species group 6

8 (5') Terminal article of antenna densely clothed with erect setae (Figs. 70-71). Usually, male mesofemur in basal quarter ventrally with tooth (Figs. 78-79) (without tooth in *E. testaceus*). Coloration (Figs. 48-49) completely flavescent / ferruginous except for elytron partly or completely black in some species .... *testaceus*-group

8' Terminal article of antenna clothed with recumbent setae, such as other articles of antennal club. Male mesofemur ventrally without tooth. Abdomen always ferruginous or reddish, remainder more or less extensively black. If mainly ferruginous, at least head and pronotum dorsally darkened .... new species group 1

9 (4´) Prementum with two apical teeth 10

9´ Prementum with three apical teeth 12

10 (9) Maxilla with ventral suture fused between galea and palpifer (Appendix 3, Fig. 35) . ... *pygmaeus*-group

10´ Maxilla with ventral suture between galea and palpifer complete 11

11 (10´) Large body size, length of pronotum + elytron 4.80 mm. Rostrum elongate, not spatulate .... *simulans*-group (*E. wallacei* SHARP)

11´ Small body size, length of pronotum + elytron 2.20-2.31 mm. Rostrum short, markedly spatulate .... *quadrifasciculatus*-group

12 (9´) Gena of head heavily sculptured, punctate, interspaces between punctures with dorsoventral wrinkles (Appendix 6, Figs. 56-70). Head ventrally in front of gular region with transverse costae (Appendix 6, Figs. 11-13) .... subgenus *Neosynaptops*

12´ Gena of head weakly punctate or with shallow wrinkles, but not a combination of both. Head ventrally in front of gular region without transverse costae 13

13 (12´) Elytron with humeral spine (Fig. 33). Proventriculus behind gnathal ridges with large, somewhat digitiform pulvilli (Figs. 98-99) .... *armatipennis*-group

13´ Elytron evenly rounded, at most with minute denticle. Proventriculus different; if pulvillus present, much smaller 14

14 (13´) In many species ventral surface of pro-, meso-, and metafemur each with tooth (Fig. 65). Pronotum more or less rugose-punctate ..... subgenus *Suniops*

14´ Ventral surface of pro-, meso-, and metafemur never with tooth. Pronotum usually smooth 15

15 (14´) Spermatheca extended siphon-like towards ductus (Figs. 224-227). Funicle of antenna relatively slender, usually of ferruginous color (Figs.134-137). Proventriculus with densely setose primary folds, without sclerotized gnathal ridges (Figs. 90-91) .... *coelestinus*-group

15´ Spermatheca at insertion of ductus simple, without extension. Funicle of antenna usually distinctly stouter and black, but in some species also slender and ferruginous. Proventriculus where examined with sclerotized gnathal ridges 16

16 (15´) Funicle of antenna thick, in some species little narrower than club. Apical surface of male protibia on posterior side with angular extension; if this extension absent (new species 86), length of pronotum + elytron at least 3.10 mm .... new species group 4

16´ Funicle of antenna not exceptionally thick. Male protibia apically without angular extension 17

17 (16´) Apex of female protibia with premucro. Tegminal plate with apical edge wide, densely setose; medially with short setae, laterally with much longer ones (Appendix 5, Figs. 263-283). Usually TA with fold-out struts (Appendix 5, Figs. 196-199) .... *simulans*-group

17´ Apex of female protibia without premucro. Tegminal plate at apical edge narrow; medially with long setae, laterally with shorter ones. TA without fold-out struts 18

18 (17´) Apex of tegminal plate pointed, straight sides forming acute angle .... new species group 3

18´ Apex of tegminal plate rounded 19

19 (18´) Ovipositor with styli (Fig. 153) 20

19´ Ovipositor without styli 21

20 (19) Abdominal sternite III of male venter densely setose with short setae .... new species group 3

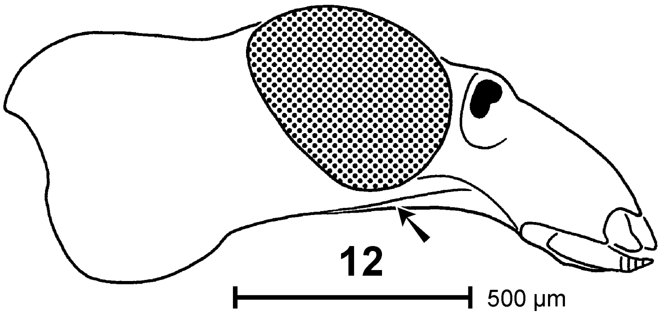
20´ Abdominal sternite III of male venter subglabrous .... *femoralis*-group

21 (19´) Setose patch of female venter with each double row of modified setae medially divided by glabrous area, thus, venter bearing six transverse clusters of modified setae. Male venter with sternites IV and V densely setose with long erect setae .... *trigemmatus*-group

21´ Setose patch of female venter with double rows of modified setae complete, medially undivided. Male venter with sternites IV and V glabrous or sparsely setose with short setae 22

22 (21´) Head at conjunction with rostrum ventrally with more or less conspicuously projecting carina (Fig. 12) .... new species group 5

22´ Head at conjunction with rostrum ventrally without projecting carina 23



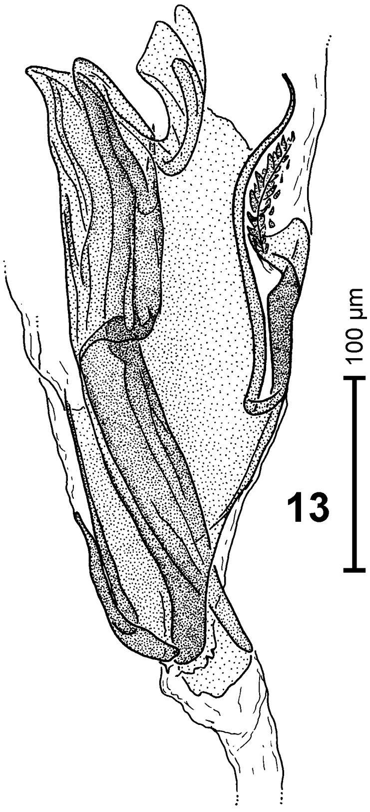


Fig. 12. Head of male specimen of *Euops*; new species group 5 (new species 91, Bilogay), in lateral aspect; carina extending backwards from base of rostrum marked by arrow.

Fig. 13. Transfer apparatus (TA) of aedeagus in lateral aspect (new species 18, Epomani); example of TA as typical of *maculatus*-group of *Euops*.

23 (22´) Elytron in some species with round yellowish spot. TA as in fig. 13, without basal sclerite .... *maculatus*-group

23´ Elytron never with round yellowish spot. TA with distinct basal sclerite, ca. 0.25-0.35 of total length of rather elongate TA .... new species group 7

3.1.2. The subgenus *Euops*

The nominate subgenus, as herein used, is an artificial assemblage. The fact that two valid taxa of subgeneric rank exist (*i. e. Neosynaptops*, *Suniops*) requires the placing of the remaining species groups into the subgenus *Euops*. However, this formal taxonomic requirement must not be confounded with phylogenetic reasoning. The species groups below are of the same importance as *Neosynaptops* or *Suniops.*

3.1.2.1. The *armatipennis*-group

Diagnosis. Gena without marked punctate-rugose sculpture, at most with shallow wrinkles. Elytron with humeral spine. Proventriculus behind gnathal ridges with large, somewhat digitiform pulvillus (Figs. 98-99). Prementum with three apical teeth. Sternite VI of female venter with simple row of modified setae.

Euops armatipennis VOSS, 1924

Euops armatipennis Voss, 1924: 51. Complete bibliography in appendix 1.

(Figs. 33, 98-99, 100-101, 133, 157, 166, 180, 194, 208, 223, 238)

Diagnosis. Elytron with humeral spine (Fig. 33). Male: Profemur ventrally with one short, truncate process. Broad apical edge of tegmen densely setose with flattened, lanceolate setae (Fig. 166). TA as in fig. 157. Female: Premucro of protibia small, hidden in tuft of setae behind ventral angle of ventroapicad produced tibial apex (as in figs. 76-77).

Range. Fig. 238. Japen-Waropen Prov. (Wapoga Riv.), Jayapura Prov. (Lereh, Waris), East Sepik Prov. (Ambunti, Angoram, Wewak), Madang Prov. (Adelbert-Mts.), Southern Highlands Prov. (Karimui, Lake Kutubu). Altitude: 20-1080 m.

Type material. Lectotype, male (by present designation): PAPUA NEW GUINEA, East Sepik Prov., Malu; labels: 1) [grey, rectangular] "D.N.Guinea 254, Hauptlg. b. Malu, 3.II.13, Kais.Augustafl.Exp., Bürgers S.G. [printed]" 2) [white, rectangular] "*Euops armatipennis* n. sp. [handwritten] Det. E.Voß [printed]" 3) [white, rectangular] "Zool. Mus. Berlin [printed]" 4) [red, rectangular] "LECTOTYPUS, *Euops armatipennis* Voss, det. A.Riedel 1995" [printed] (MNHB).

Other material examined: IRIAN JAYA, Japen-Waropen Prov.: 1 male, 1 female, Wapoga River, Kwadewa, logging road, Km 80, ca. 100 m, 1-2.III.1999, leg. A.Riedel (ARC); Jayapura Prov.: 2 males, 1 female, Lereh, 300-500 m, 26.I.1996, leg. A.Riedel (ARC); 1 male, Waris (S of Hollandia), 450-500 m, 16-23.VIII.1959, leg. T.C.Maa (BPBM); 1 female, Waris (S of Hollandia), 450-500 m, 1-7.VIII.1959, leg. T.C.Maa (BPBM). PAPUA NEW GUINEA: East Sepik Prov., 1 female, Angoram, 10-20 m, 14.VIII.1969, leg. J.L.Gressitt (BPBM); 1 female, Wewak, 2-20 m, 13.X.1957, leg. J.L.Gressitt (BPBM); Madang Prov.: 1 female, Adelbert-Mts., Wanuma, 800-1000 m, 25.X.1958, leg. J.L.Gressitt (BPBM); Southern Highlands Prov.: 1 male, Karimui, 1080 m, 8-10.VII.1963, leg. J.Sedlacek (BPBM); 1 male, Karimui, 1080 m, 13.VII.1963, leg. J.Sedlacek (BPBM); 1 female, Lake Kutubu, Tugiri, 1000 m, 7-9.II.1978, *Elaeocarpus*, leg. J.L.Gressitt (BPBM).

Redescription.

Lectotype, male. Length, pronotum + elytron: 3.70 mm. Coloration of elytron deep violet blue; head (except rostrum) and thorax shining black; rostrum, legs and abdomen ferruginous. Head. As in fig. 100. Gena 0.73 X as long as width of head immediately behind eyes. Vertex shining; dorsally smooth; laterally with shallow wrinkles curving from base towards eye. Eyes in dorsal view moderately prominent from lateral contour of head, medially contiguous for ca. 0.5 X their length. Profile of vertex immediately behind eye straight, towards base rounded. Ventral surface of head in front of gular region shining, with sparse shallow punctures, with median furrow. Rostrum 1.81 X as long as mouthparts; at widest point 1.52 X wider than at base; in cross section dorsally weakly rounded. Clypeus with median notch. Interantennal area with almost straight lateral margins converging. Profile of rostrum with dorsal contour at interantennal area forming blunt angle, rounded; anteriorly in straight line to apex; ventral contour weakly sinuate, at base weakly concave, towards apex weakly convex; dorsal and ventral contour of rostrum basally subparallel, in apical third converging. Venter of rostrum poorly delimited against venter of head, basally with indistinct submental median carina and with pair of shallow lateral impressions. Mouthparts. Prementum at base 1.6 X wider than long, ca. 1.9 X wider than at apex; with weakly sinuate, almost straight lateral margins converging apicad; with three short, blunt apical processes, subequal in length. Antenna as in fig. 133. Proventriculus [described from Angoram-specimen] (Figs. 98-99) with eight primary gnathal ridges; cutting edge of gnathal ridge in profile of subtriangular shape, rectangular; posteriad of each gnathal ridge with large pulvillus; pulvillus in shape and size similar to gnathal ridge, but less markedly sclerotized. Prothorax 0.94 X as long as wide; with deep subbasal constriction; sides rounded to apex; without preapical constriction; disc shining, smooth except for sparse minute punctures. Metanotum with pair of short sutural spines; with pair of lateral lobes. Elytron with humeral spine (Fig. 33); contour at very base of humerus weakly convex, then in straight line to apex of spine; 2.03 X longer than wide [measured excluding spine]; striae moderately impressed. Thoracic venter. Prepectus short, subequal to postpectus. Height of pterothorax 0.88 X length of elytron. Procoxa in anterior aspect 1.17 X as long as wide. Legs. Profemur strongly swollen; weakly asymmetrically clavate; ventral contour subangulate; dorsal contour weakly sinuate; ventral surface in apical half weakly rugose and with sparse small denticles, at middle with short apically truncate process. Protibia evenly curved ventrad; ventral surface densely denticulate, in basal half subglabrous, in apical half with sparse short suberect setae; uncus terminal; anterior distal comb complete; posterior distal comb bordering ventral tibial edge near tarsal articulation with sparse long setae. Mesotibia subapically with medium-sized, dorsoposteriad directed, rounded lobe. Abdomen. Pygidium 0.90 X as long as wide; shining, basally weakly microreticulate; densely, moderately deeply punctate; sparsely setose with inconspicuous, long, recumbent setae. Sternites III-V of venter each with transverse cluster of moderately dense, suberect setae. Genitalia. Sternite VIII as in fig. 194; apex with shallow constriction, broadly angulate, with dense short setae; base straight, lateral angles markedly extended basad. Tegminal plate (Fig. 166) broad, subapically weakly constricted, with sides diverging towards apex; apical edge broad, subangulate, densely setose with flattened lanceolate setae. Aedeagus. Apical scoop of pedon (Fig. 180) ca. 1.54 X as long as wide, with lateral margins subparallel, with apex rounded. Tectum with well-sclerotized lateral frame subparallel to rounded apex, medially hyaline. TA as in Fig. 157. Endophallus in apical portion without sclerite.

Selected female specimen (Angoram). Same as described male except: length, pronotum + elytron: 3.45 mm. Coloration of elytron deep violet blue; abdomen and funicle of antenna deep ferruginous; remainder shining black. Head. As in fig. 101. Gena 0.90 X as long as width of head immediately behind eyes. Rostrum 1.64 X as long as mouthparts; at widest point 1.58 X wider than at base. Prothorax 0.92 X as long as wide. Elytron 2.08 X longer than wide. Height of pterothorax 0.89 X length of elytron. Procoxa in anterior aspect 1.11 X as long as wide. Legs. Profemur moderately swollen; ventral and dorsal contours sinuate, convex towards apex; ventral surface smooth, without protrusion. Protibia with dorsal contour straight, weakly curved towards base and apex; ventral contour bisinuate, basally and apically concave, at middle convex; ventral surface weakly denticulate, subglabrous, apically sparsely setose with short suberect setae; tibial apex (as in figs. 76-77) with uncus and premucro; uncus in dorsal position; premucro small, in ventral third of tibial height, hidden in tuft of setae behind ventral angle of ventroapicad produced tibial apex; anterior distal comb complete, ventrally passing base of uncus. Mesotibia subapically simple, without extension. Abdomen. Pygidium 0.81 X as long as wide. Setose patch of venter 1.33 X as long as wide, consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row, plus one simple row of modified setae on sternite VI. Genitalia. Ovipositor without styli. Sternite VIII as in fig. 208; apex subtruncate, laterally rounded; base with short apodeme. Spermatheca as in fig. 223; with body moderately tapering apicad.

Intraspecific variation. Length, pronotum + elytron: 2.98-4.10 mm (n=14, $\bar{x}$=3.45 ± 0.28). Coloration. Specimens from Lereh and from Wapoga River with light ferruginous femora, darker ferruginous or black tibiae and ferruginous rostrum; in type and in specimens from Waris and Wewak rostrum ferruginous, femora and tibiae of same dark ferruginous color; specimens from Southern Highlands Province with legs and rostrum uniformly dark ferruginous to black. Prothorax 0.90-0.97 X as long as wide (n=14, $\bar{x}$=0.94 ± 0.02). Elytron 2.03-2.20 X longer than wide (n=14, $\bar{x}$=2.10 ± 0.04). Height of pterothorax 0.80-0.87 X length of elytron in males (n=7, $\bar{x}$=0.84 ± 0.02), 0.85-0.88 X length of elytron in females (n=7, $\bar{x}$=0.87 ± 0.01). Legs. Truncate process in males from Karimui more distinct than in holotype. Subapical lobe of mesotibia less distinct in males from Karimui. Abdomen. Pygidium 1.06-1.23 X wider than long in males (n=7, $\bar{x}$=1.14 ± 0.06), 1.19-1.41 X wider than long in females (n=7, $\bar{x}$=1.38 ± 0.08). Female patch of modified setae 1.15-1.55 X as long as wide (n=7, $\bar{x}$=1.31 ± 0.13).

Euops, new species 1

Range. Sandaun Prov. (Telefomin), Morobe Prov. (Wau). Altitude: 1100-1700 m.

Material examined: PAPUA NEW GUINEA, Morobe Prov.: 3 males, 1 female, Wau, 1450 m, 5.II.1963, leg. J.Sedlacek (BPBM); 1 male, Wau, 1050-1100 m, 15.XII.1961, leg. J., J.H.&M.Sedlacek, G.Monteith & Native Collectors (BPBM); 1 male, Wau, 1450 m, 1962, leg J.&M.Sedlacek (BPBM); 1 female, Wau, 1250 m, 3.V.1963, leg J.Sedlacek (BPBM); 1 female, Wau, 1450 m, 5.II.1963, leg J.Sedlacek (BPBM); 1 female, Wau, 1250 m, 15.II.1965, leg J.Sedlacek (BPBM); 1 female, Wau, 1200 m, 15-16.I.1963, Malaise Trap, leg J.Sedlacek (BPBM); 1 female, Wau, 1250 m, 5-6.XII.1961, leg J.&J.H.Sedlacek (BPBM); Sandaun Prov.: 1 male, 3 females, Telefomin, trail to Eliptamin, 1700-1900 m, 16-17.V.1998, leg. A.Riedel (ARC).

Euops, new species 2

Material examined: IRIAN JAYA, Japen-Waropen Prov.: 1 male, 1 female, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 23.XII.2000, leg. A.Riedel (ARC).

3.1.2.2. The *coelestinus*-group

Diagnosis. Head with large, contiguous eyes; behind eyes usually constricted. Funicle of antenna relatively slender, usually of ferruginous color. Male mesotibia usually with distinct subangulate lobe-like extension. Proventriculus with densely setose primary folds, without sclerotized gnathal ridges (Figs. 90, 91). Spermatheca extended siphon-like towards ductus.

Euops coelestinus PASCOE, 1874

Euops coelestina Pascoe, 1874: 27. Complete bibliography in appendix 1.

(Figs. 34, 102-103, 134, 158, 167, 181, 195, 209, 224, 239)

Diagnosis. Coloration (Fig. 34) bright metallic blue. Eyes large (Figs. 102-103). Male: Mesotibia subapically with subangulate lobe, its straight apical edge leading obliquely towards uncus. Apical scoop of pedon spoon-shaped. (Fig. 181). TA as in fig. 158. Female: Premucro of protibia vestigial. Spermatheca as in fig. 224, basally extended siphon-like towards ductus.

Range. Fig. 239. Manokwari Prov. (Manokwari, Ransiki, Wandammen Bay), Japen-Waropen Prov. (Serui), Paniai Prov. (Topo, Epomani). Altitude: 300-700 m.

Type material. Lectotype, female (by present designation): IRIAN JAYA: Manokwari Prov., Manokwari; labels: 1) [oval, blue] "Dorey [handwritten]" 2) [white, rectangular] "*Euops coelestis*, Type, Pascoe [handwritten]" 3) [white with red bordering, round] "Type [printed]" 4) [white with black bordering, rectangular] "*Euops coelestis* Pasc. [handwritten]" 5) [white, rectangular] "Pascoe Coll., 93-60. [printed]" 6) [white, rectangular] "internally damaged by mites [handwritten / label added by present author after dissecting the specimen]" 7) [red, rectangular] LECTOTYPE, *Euops coelestinus* Pascoe, det. A.Riedel 2000 [printed]" (BMNH).

Other material examined: IRIAN JAYA, Manokwari Prov.: 1 male, 1 female, Ransiki, Mayuby, ca. 300 m, 26-30.IX.1990, leg. A.Riedel (ARC); 1 female, Ransiki - Anggi, 250-750 m, 25.VIII.1991, leg. A.Riedel (ARC); 2 males, 3 females, Wandammen Bay, Wondiwoi Mts., Wasior, 250-600 m, 4.I.2001, leg. A.Riedel (ARC); 1 female, Wandammen Bay, Wondiwoi Mts., Wasior, 580-950 m, 3.I.2001, leg. A.Riedel (ARC); 1 male, Wandammen Bay, Wondiwoi Mts., Wasior, 300-850 m, 5.I.2001, leg. A.Riedel (ARC); 3 males, 2 females, Wandammen Bay, Wondiwoi Mts., Wasior, 300-700 m, 14.I.2001, leg. A.Riedel (ARC); 1 male, Wandammen Bay, Wondiwoi Mts., Wasior, 250-600 m, 15.I.2001, leg. A.Riedel (ARC); Japen-Waropen Prov.: 2 males, 1 female, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 23.XII.2000, leg. A.Riedel (ARC); 1 male, 2 females, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 25.XII.2000, leg. A.Riedel (ARC); Paniai Prov.: 1 male, 1 female, Nabire, Topo, Km 54, 31.VIII.1996, secondary vegetation, leg. Stüben/Schüle (PSC); 1 male, Epomani, Km 145, 550-750 m, 15-16.I.1996, leg. A.Riedel (ARC); 1 male, 1 female, Epomani, Km 165, 700-800 m, 17.I.1996, leg. A.Riedel (ARC).

Redescription.

Selected male specimen (Ransiki). Length, pronotum + elytron: 2.97 mm. Coloration (Fig. 34) bright metallic blue; head and prothorax greenish blue; legs and abdomen black with slight bluish lustre, anterior surface of meso- and metafemur with more distinct greenish lustre; antenna black. Head. As in fig. 102. Gena 0.98 X as long as width of head immediately behind eyes. Vertex shining; dorsally smooth; laterally with deep punctures in anterior half, with shallow transverse wrinkles posteriorly. Eyes in dorsal view moderately prominent from lateral contour of head, medially contiguous for ca. 0.4 X their length. Profile of vertex behind eye concave, towards base evenly convex. Ventral surface of head in front of gular region shining, with sparse punctures, with shallow median furrow. Rostrum 1.95 X as long as mouthparts; at widest point 1.45 X wider than at base; in cross section dorsally moderately rounded. Clypeus with median notch. Interantennal area with weakly sinuate lateral margins converging. Profile of rostrum with dorsal contour at interantennal area forming blunt angle, rounded; anteriorly in weakly sinuate line to apex; ventral contour sinuate, at base concave, towards apex convex; dorsal and ventral contour of rostrum basally subparallel, in apical third converging. Venter of rostrum poorly delimited against venter of head, basally with indistinct submental median carina and with pair of shallow lateral impressions. Mouthparts. Prementum at base 1.6 X wider than long, ca. 2.4 X wider than at apex; with almost straight lateral margins converging apicad, at base of lateral apical process with shallow constriction; with three moderately long, blunt apical processes, median process slightly shorter than lateral processes. Antenna as in fig. 134. Proventriculus with eight primary folds densely covered with hair-like setae; without sclerotized gnathal ridges, posteriad of primary fold without setose patch or pulvillus. Prothorax 0.94 X as long as wide; with shallow subbasal constriction; sides subparallel, in anterior quarter converging, with shallow preapical constriction; disc shining, smooth; in lateral aspect with center of side densely deeply punctate. Metanotum without sutural spines, but with pair of bluntly angular projections; with pair of lateral lobes. Elytron at humerus simple; 2.28 X longer than wide; striae moderately impressed. Thoracic venter. Prepectus shorter than postpectus; procoxae approaching anterior margin of prothorax. Height of pterothorax 0.77 X length of elytron. Procoxa in anterior aspect 1.32 X as long as wide. Legs. Profemur weakly swollen; weakly asymmetrically clavate; ventral contour in straight line to apical 0.37, continuing in straight line to apex; dorsal contour almost straight, basally weakly concave, in weakly convex line to apex; ventral surface smooth, without protrusion. Protibia in basal half straight, in apical half weakly curved ventrad; ventral surface moderately denticulate, moderately densely setose with suberect setae; uncus terminal; anterior distal comb ventrally shortened; posterior distal comb oblique, from behind tarsal articulation to ventral edge, in dorsal third shortened. Mesotibia subapically with dorsad directed subangulate lobe, its straight apical edge leading obliquely towards uncus. Abdomen. Pygidium 0.99 X as long as wide; shining; densely, shallowly punctate; sparsely setose with inconspicuous, recumbent setae. Sternites IV-VI of venter each with pair of clusters of sparse suberect setae, medially glabrous. Genitalia. Sternite VIII as in fig. 195; apex truncate, laterally with moderately long setae; base almost straight, weakly bisinuate; general shape trapezoid. Tegminal plate (Fig. 167) with sides weakly converging apicad; apical edge broad, subtruncate, densely setose with moderately long setae. Aedeagus. Apical scoop of pedon (Fig. 181) ca. 1.35 X as long as wide, evenly rounded to apex, spoon-shaped. Tectum with well-sclerotized lateral frame converging with straight sides to pointed apex, medially weakly sclerotized. TA as in Fig. 158. Endophallus with pair of subtriangular sclerites basad of body of aedeagus.

Lectotype, female. Same as described male except: length, pronotum + elytron: 3.18 mm. Head. As in fig. 105. Gena 0.84 X as long as width of head immediately behind eyes. Profile of vertex behind eye straight, towards base rounded. Rostrum 1.62 X as long as mouthparts; at widest point 1.43 X wider than at base. Profile of rostrum with dorsal and ventral contour basally subparallel, in apical half converging. Prothorax 0.88 X as long as wide. Elytron 2.31 X longer than wide. Height of pterothorax 0.82 X length of elytron. Procoxa in anterior aspect 1.09 X as long as wide. Legs. Profemur moderately swollen; dorsal contour sinuate, in basal third straight, continuing in markedly convex line to apex. Protibia with dorsal contour evenly weakly convex; ventral contour sinuate, basally convex, apically concave; ventral surface weakly denticulate, sparsely setose with subrecumbent to suberect setae; tibial apex [ventral angle of left tibia broken] with uncus and vestigial premucro; uncus in dorsal position; vestige of premucro in subventral position, more distinct in meso- and metatibia than in protibia; anterior distal comb ventrally shortened, not reaching ventral base of uncus. Mesotibia subapically simple, without extension. Abdomen. Pygidium 0.86 X as long as wide. Setose patch of venter as long as wide (1.00 X), consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row. Genitalia. Ovipositor without styli. Sternite VIII as in fig. 209; apex irregular, weakly sclerotized; base with short apodeme. Spermatheca as in fig. 224; slender; subisodiametric from insertion of duct to shortly before apex; basally extended siphon-like towards ductus; insertion of gland shifted apicad.

Intraspecific variation. Length, pronotum + elytron: 2.59-3.43 mm (n=26, $\bar{x}$=3.08 ± 0.18). Prothorax 0.92-1.00 X as long as wide in males (n=14, $\bar{x}$=0.96 ± 0.02), 0.86-0.94 X as long as wide in females (n=12, $\bar{x}$=0.91 ± 0.03). Elytron 2.31-2.50 X longer than wide in males (n=14, $\bar{x}$=2.39 ± 0.06), 2.30-2.39 X longer than wide in females (n=12, $\bar{x}$=2.34 ± 0.03). Thoracic venter. Height of pterothorax 0.73-0.78 X length of elytron in males (n=14, $\bar{x}$=0.75 ± 0.02), 0.78-0.83 X length of elytron in females (n=12, $\bar{x}$=0.81 ± 0.02). Abdomen. Pygidium 0.95-1.08 X wider than long in males (n=11, $\bar{x}$=1.00 ± 0.04), 1.03-1.19 X wider than long in females (n=10, $\bar{x}$=1.11 ± 0.05). Female patch of modified setae 0.85-1.28 X as long as wide (n=11, $\bar{x}$=1.11 ± 0.11). Male genitalia. In ventral aspect apical processes of TA differing: in specimens from Ransiki short, relatively broad but not markedly broadened at apex, weakly diverging; in specimens from Wandammen Bay short, apically markedly broadened, subtruncate, weakly diverging; in specimens from Japen long, constantly slender towards apex, distinctly diverging laterad; in specimens from Epomani moderately long, moderately slender, weakly broadened apically, weakly diverging laterad.

Euops ruficornis **Voss, 1956**

Euops femoralis f. *ruficornis* Voss, 1956: 124.

(Figs. 35, 104-105, 135, 159, 168, 182, 196, 210, 225, 239)

Diagnosis. Coloration (Fig. 35) deeply ferruginous to black with bluish to bronze lustre. Funicle of antenna slender, ferruginous. Eyes large (Figs. 104-105). Male: Mesotibia subapically with subangulate lobe, its weakly concave apical edge leading obliquely towards uncus. Subtruncate apical edge of tegmen (Fig. 168) densely setose with short setae. TA as in fig. 159. Female: Spermatheca as in fig. 225, basally extended siphon-like towards ductus.

Range. Fig. 239. East Sepik Prov. (Torricelli Mts.), Madang Prov. (Erima), Morobe Prov. (Salawaket Range, Wau), Central Prov. (Brown River, Goilala). Altitude: 500-1700 m.

Type material. Holotype, female (by monotypy): PAPUA NEW GUINEA, Madang Prov., Erima; labels: 1) [white, rectangular] "Erima, Astrolabe B. [printed]" 2) [white, rectangular] "N. Guinea, Biró 97. [printed]" 3) [white with red bordering, rectangular] "Holotypus [printed with red ink] 1955 [printed], *Euops femoralis* ab. *ruficornis* Voss" 4) [white, rectangular] "*Euops femoralis* m. f. n. *ruficornis* [handwritten] E. Voss det, 1955 [printed]" (HNHM).

Other material examined: PAPUA NEW GUINEA, East Sepik Prov.: 1 male, Torricelli Mts., Wantipi Vill., 30.XI.-8.XII.1958, leg. W.W.Brandt (BPBM); Morobe Prov.: 1 male, Salawaket Range, Lambaeb, 900 m, 18.IX.1956, leg. E.J.Ford jr. (BPBM); 1 female, Salawaket Range, Lambaeb, 900 m, 19.IX.1956, leg. E.J.Ford jr. (BPBM); 2 males, 1 female, Wau, 1300 m, 27.VII.1961, leg. J.Sedlacek (BPBM); 1 male, Wau, 1200 m, 30.VII.1961, leg. J.&M.Sedlacek (BPBM); 1 male, Wau, 1200 m, 31.VII.1961, leg. J.H.Sedlacek (BPBM); 1 male, Wau, 1250 m, 9.VIII.1961, "grasses", leg. J.Sedlacek (BPBM); 1 male, 1 female, Wau, 1250-1300 m, 20.VIII.1961, leg. J.Sedlacek (BPBM); 1 male, Wau, 1200 m, 7.IX.1961, leg. J.Sedlacek (BPBM); 3 males, Wau, 1200 m, 11.IX.1961, leg. J.Sedlacek (BPBM); 1 male, Wau, 1050 m, 19.IX.1961, leg. J.Sedlacek (BPBM); 1 female, Wau, 1500 m, 24.IX.1961, leg. J.Sedlacek (BPBM); 1 male, Wau, 1500 m, 24.IX.1961, leg. J. Sedlacek (BPBM); 1 male, Wau, 1150-1600 m, 9.II.1968, leg. J.Sedlacek (BPBM); 1 male, Wau, 1250 m, 24.III.1969, "*Macaranga 4-glandulosa*", leg. J.Sedlacek (BPBM); 1 male, Mt. Missim, 980 m, 20.VII.1969, Malaise trap, leg. L.Gressitt & Kirashima (BPBM); 1 male, 6 km W of Wau, Nami Creek, 1700 m, 15.VI.1962, leg. J.Sedlacek (BPBM); Central Prov.: 1 male, Owen Stanley range, Goilala, Tapini, 975 m, 16-25.XI.1957, leg. W.W.Brandt (BPBM); 3 males, 3 females, Owen Stanley range, Goilala, Loloipa, 25.XI-10.XII.1957, leg. W.W.Brandt (BPBM); 1 male, Daradae Pl´n, 80 km N of Pt. Moresby, 500 m, sweeping, 6.IX.1959, leg. T.C.Maa (BPBM); 1 male, Brown River, 5.XI.1960, "misc. palms", leg. J.L.Gressitt (BPBM).

Redescription.

Selected male specimen (Wau). Length, pronotum + elytron: 3.03 mm. Coloration black with bluish to bronze lustre; antennal club black, funicle deep ferruginous. Head. As in fig. 104. Gena 0.95 X as long as width of head immediately behind eyes. Vertex shining; dorsally smooth; laterally with deep punctures in anterior half, with shallow transverse wrinkles posteriorly. Eyes in dorsal view moderately prominent from lateral contour of head, medially contiguous for ca. 0.4 X their length. Profile of vertex immediately behind eye with depression, posteriorly convex towards base. Ventral surface of head in front of gular region shining, with sparse deep punctures becoming denser near eye, with deep median furrow. Rostrum 1.96 X as long as mouthparts; at widest point 1.50 X wider than at base; in cross section dorsally moderately rounded. Clypeus with median notch. Interantennal area with almost straight lateral margins converging. Profile of rostrum with dorsal contour at interantennal area forming blunt angle, rounded; anteriorly in weakly sinuate line to apex; ventral contour sinuate, at base concave, towards apex convex; dorsal and ventral contour of rostrum basally subparallel, in apical third converging. Venter of rostrum poorly delimited against venter of head, basally with indistinct submental median carina and with pair of shallow lateral impressions. Mouthparts. Prementum at base 1.9 X wider than long, ca. 2.7 X wider than at apex; with weakly bisinuate lateral margins converging apicad, at middle convex, before base and apex weakly concave; with three short, blunt apical processes, subequal in length; median apical process retracted into more dorsal position. Antenna as in fig. 135. Proventriculus with eight primary folds densely covered with hair-like setae; without sclerotized gnathal ridges, posteriad of primary fold without setose patch or pulvillus. Prothorax 1.01 X as long as wide; with shallow subbasal constriction; sides subparallel, in anterior quarter converging, with shallow preapical constriction; disc shining, smooth except for sparse minute punctures; in lateral aspect with center of side densely deeply punctate. Metanotum without sutural spines, but with pair of bluntly angular projections; laterally projecting angularly without forming distinct lateral lobe. Elytron at humerus simple; 2.27 X longer than wide; striae moderately impressed. Thoracic venter. Prepectus shorter than postpectus; procoxae approaching anterior margin of prothorax. Height of pterothorax 0.80 X length of elytron. Procoxa in anterior aspect 1.23 X as long as wide. Legs. Profemur weakly swollen; weakly asymmetrically clavate; with indistinct stalk in basal 0.25, its dorsal edge lined with denticles; ventral contour in straight line to apical 0.38, rounded, continuing in straight line to apex; anterior surface coriaceous; ventral surface smooth, without protrusion. Protibia evenly curved ventrad; ventral surface moderately denticulate, moderately densely setose with suberect setae; uncus terminal; anterior distal comb complete; posterior distal comb oblique, from behind tarsal articulation to ventral edge, in dorsal third shortened. Mesotibia subapically with dorsoposteriad directed subangulate lobe, its weakly concave apical edge leading obliquely towards uncus. Abdomen. Pygidium as long as wide (1.00 X); shining, in basal half densely deeply punctate, especially laterally; sparsely setose with inconspicuous, recumbent setae. Sternites IV-VI of venter each with pair of clusters of sparse recumbent setae, medially glabrous. Genitalia. Sternite VIII as in fig. 196; apex truncate, sparsely setose; base truncate; general shape trapezoid. Tegminal plate (Fig. 168) with sides moderately converging apicad; apical edge subtruncate, densely setose with short setae. Aedeagus. Apical scoop of pedon (Fig. 182) ca. 1.59 X as long as wide, with lateral margins converging in straight line, with apex subangulate. Tectum with well-sclerotized lateral frame converging with sinuate sides to pointed apex, medially weakly sclerotized. TA as in Fig. 159. Endophallus with pair of subtriangular sclerites basad of body of aedeagus.

Lectotype, female. Lectotype, female. Same as described male except: length, pronotum + elytron: 2.68 mm. Coloration (Fig. 35) ferruginous except base of head black with bluish lustre, scutellum metallic green; antennal club black, funicle light ferruginous. Head. As in fig. 105. Gena 0.74 X as long as width of head immediately behind eyes. Profile of vertex behind eye straight, towards base rounded. Rostrum 1.86 X as long as mouthparts; at widest point 1.40 X wider than at base. Profile of rostrum more slender, with dorsal and ventral contour basally subparallel, in apical half converging. Prothorax 0.97 X as long as wide. Elytron 2.28 X longer than wide. Procoxa in anterior aspect 1.06 X as long as wide. Legs. Profemur moderately swollen; dorsal contour sinuate, in basal third straight, continuing in markedly convex line to apex. Protibia with dorsal contour straight, weakly curved towards base and apex; ventral contour sinuate, basally convex, apically concave; ventral surface smooth except crenulate at middle, setose with subrecumbent to suberect setae; tibial apex with uncus and premucro; uncus in dorsal position; premucro in subventral position; anterior distal comb ventrally shortened, not reaching ventral base of uncus. Mesotibia subapically simple, without extension. Abdomen. Pygidium 0.91 X as long as wide. Setose patch of venter 1.28 X as long as wide, consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row. Genitalia. Ovipositor without styli. Sternite VIII as in fig. 210; apex medially subtruncate, laterally rounded; base with short apodeme. Spermatheca as in fig. 225; slender; subisodiametric from insertion of duct to shortly before apex; basally extended siphon-like towards ductus; insertion of gland shifted apicad.

Intraspecific variation. Length, pronotum + elytron: 2.25-3.09 mm (n=33, $\bar{x}$=2.72 ± 0.23). Coloration ranging from light ferruginous with bluish head to completely black with bluish lustre; in the majority of fully hardened specimens at hand at least elytra ferruginous. Prothorax 0.94-1.02 X as long as wide in males (n=22, $\bar{x}$=0.99 ± 0.02), 0.93-0.98 X as long as wide in females (n=7, $\bar{x}$=0.96 ± 0.02). Elytron 2.16-2.46 X longer than wide (n=31, $\bar{x}$=2.36 ± 0.06). Thoracic venter. Height of pterothorax 0.69-0.82 X length of elytron in males (n=24, $\bar{x}$=0.77 ± 0.03), 0.75-0.82 X length of elytron in females (n=8, $\bar{x}$=0.79 ± 0.03). Abdomen. Pygidium 0.88-1.03 X wider than long in males (n=19, $\bar{x}$=0.94 ± 0.04), 1.02-1.13 X wider than long in females (n=8, $\bar{x}$=1.07 ± 0.05). Female patch of modified setae 1.11-1.50 X as long as wide (n=9, $\bar{x}$=1.31 ± 0.14).

Euops tibialis **VOSS, 1929**

Euops tibialis Voss, 1929: 220. Complete bibliography in appendix 1.

(Figs. 36, 80-81, 83, 85, 87, 90-91, 106-107, 136, 150, 169, 183, 197, 212, 227, 240)

Diagnosis. Metatibia greatly enlarged (Fig. 81). Male: Trochanter of foreleg ventrally pointed, markedly projecting (Fig. 80). TA of flagellar structure, as in Fig. 150. Female: Setose patch of venter (Fig. 83) consisting of three simple (*not* double) rows of modified setae. Spermatheca as in fig. 227, basally greatly extended siphon-like towards ductus.

Range. Fig. 240. Sorong Prov. (Mysol), Manokwari Prov. (Arfak Mts., Wandammen Bay), Japen-Waropen Prov. (Serui, Wapoga Riv.), Paniai Prov. (Epomani) Jayawijaya Prov. (Karubaga, Angguruk, Emdoman, Borme), Jayapura Prov. (Lereh, Cyclops Mts.), Sandaun Prov. (Mianmin), Western Prov. (Olsobip), Western Highlands Prov. (Jimmi Vall.), Madang Prov. (Adelbert Mts.). Altitude: 200-1500 m.

Type material. Holotype, male, Mysol (BMNH): The specimen has been examined years ago, presently it is not at hand.

Other material examined: IRIAN JAYA, Manokwari Prov.: 1 male, 1 female, Ransiki - Anggi, 250-750 m, 25.VIII.1991, leg. A.Riedel (ARC); 1 male, Wandammen Bay, Wasior, DMP logging camp, Km 38, Sararti, S 03° 05´ E 134° 27´, 100-200 m, 7-9.I.2001, leg. A.Riedel (ARC); Japen-Waropen Prov.: 2 males, Japen Isl., Serui, Mantembu, 300-800 m, 6-9.XI.1991, leg. A.Riedel (ARC); 3 males, 1 female, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 23.XII.2000, leg. A.Riedel (ARC); 1 male, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 25.XII.2000, leg. A.Riedel (ARC); 2 males, 1 female, Wapoga Riv., Kwadewa, logging road, Km 80, ca. 100 m, 1-2.III.1999, leg. A.Riedel (ARC); Paniai Prov.: 3 males, 2 females, Epomani, Km 145, 550-750 m, 15-16.I.1996, leg. A.Riedel (ARC); 2 males, Epomani, Km 165, 700-800 m, 17.I.1996, leg. A.Riedel (ARC); 1 female, Ugida, Km 177, 29.VII.1996, leg. Stüben/Schüle (PSC); Jayawijaya Prov.: 3 males, 1 female, Emdoman, 800-1200 m, 14-15.IX.1992, leg. A.Riedel (ARC); 3 females, Emdoman, 900-1200 m, 29.IX.1993, leg. A.Riedel (ARC); 1 female, Swart Vall., Karubaga, 1300 m, "*Glochidion*" 7.XI.1958, leg. J.L.Gressitt (BPBM); 2 male, 2 female, Borme, 1000-1300 m, 13-18.VIII.1992, leg. A.Riedel (ARC); 1 male, Borme, 1000-1450 m, 12-15.VIII.1992, leg. A.Riedel (ARC); Jayapura Prov.: 3 males, Sentani, Cyclops Mts., 1100-1600 m, 5.X.1991, leg. A.Riedel (ARC); 2 males, 1 female, Sentani, Cyclops Mts., 950-1450 m, 3.X.1991, leg. A.Riedel (ARC); 1 male, Lereh, 300-550 m, 25.I.1996, leg. A.Riedel (ARC); PAPUA NEW GUINEA, Western Prov.: Fly Riv., Olsobip, 400-600 m, VIII.1969, leg. J.&M.Sedlacek (BPBM); Sandaun Prov.: 2 males, 1 female, N Mianmin, 700-1100 m, 20.V.1998, leg.

A.Riedel (ARC); 1 female, N Mianmin, 800-1200 m, 19.V.1998, leg. A.Riedel (ARC); Western Highlands Prov.: 1 male, Korop, Upper Jimmi V., 1300 m, 12.VII.1955, leg. J.L.Gressitt (BPBM); Madang Prov.: 1 male, Adelbert Mts., Wanuma, 800-1000 m, 25.X.1958, leg. J.L.Gressitt (BPBM); 1 female, Adelbert Mts., Wanuma, 800-1000 m, 26.X.1958, leg. J.L.Gressitt (BPBM).

Redescription.

Selected male specimen (Borme). Length, pronotum + elytron: 3.35 mm. Coloration (Fig. 36) largely black; rostrum, tibiae, tarsi and abdomen ferruginous; elytron at base black with bluish oily lustre, towards apex becoming deep ferruginous; antenna light ferruginous. Head. As in fig. 106. Gena 0.77 X as long as width of head immediately behind eyes. Vertex weakly microreticulate; smooth. Eyes in dorsal view almost continuous with lateral contour of head, medially contiguous for ca. 0.4 X their length. Profile of vertex immediately behind eye straight, towards base rounded. Ventral surface of head in front of gular region shining, smooth, without median furrow. Rostrum 1.92 X as long as mouthparts; at widest point 1.54 X wider than at base; in cross section dorsally moderately rounded. Clypeus with median notch. Interantennal area with almost straight lateral margins converging. Profile of rostrum with dorsal contour at interantennal area hardly projecting, rounded; anteriorly in weakly convex line to apex; ventral contour weakly sinuate, at base weakly concave, towards apex weakly convex; dorsal and ventral contour of rostrum basally subparallel, in apical third converging. Venter of rostrum poorly delimited against venter of head, basally with indistinct submental median carina and with pair of shallow lateral impressions. Mouthparts. Prementum at base 1.6 X wider than long, ca. 2.6 X wider than at apex; with straight lateral margins converging apicad; with three long, acute apical processes, subequal in length. Antenna as in fig. 136. Proventriculus with eight primary folds densely covered with hair-like setae; without sclerotized gnathal ridges, posteriad of primary fold without setose patch or pulvillus. Prothorax 0.86 X as long as wide; with shallow subbasal constriction; sides weakly rounded to apex, without preapical constriction; disc dull to weakly shining, microreticulate; in lateral aspect with center of side with shallow punctures. Metanotum without sutural spines, but with pair of bluntly angular projections; with pair of lateral lobes. Elytron at humerus with minute denticle; 2.25 X longer than wide; striae moderately impressed at base, towards apex becoming effaced. Thoracic venter. Prepectus shorter than postpectus; procoxae approaching anterior margin of prothorax. Height of pterothorax 0.79 X length of elytron. Procoxa in anterior aspect 1.07 X as long as wide; externally with spine projecting dorsad, supporting base of profemur when in obliquely dorsad position (Fig. 80). Trochanter of foreleg ventrally pointed, markedly projecting. Legs. Profemur strongly swollen; strongly asymmetrically clavate; with distinct stalk in basal 0.27, seemingly bent ventrad, apically of angulation dorsal edge lined with denticles; ventral contour in basal quarter concave, apically strongly convex; dorsal contour at very base angulate, continuing in weakly convex line towards apex; in apical quarter ventral surface with very low knob opposing tibia. Protibia evenly curved ventrad; ventral surface densely denticulate except before base and apex, with sparse short suberect setae; uncus terminal; anterior distal comb ventrally shortened; posterior distal comb strongly oblique, from behind tarsal articulation to ventral edge, in dorsal two thirds shortened. Mesotibia on posterior surface subapically with indistinct, posteriad directed carina. Metatibia (Fig. 81) with greatly enlarged lateral surface, of roughly triangular shape with supposed dorsal angle in apical quarter broadly rounded. Abdomen. Pygidium 0.87 X as long as wide; microreticulate; densely, moderately deeply punctate; sparsely setose with inconspicuous, recumbent setae. Venter glabrous. Genitalia. Sternite VIII as in fig. 197; apex truncate, with few scattered setae; laterally densely setose with short setae; base markedly sclerotized, broadly angulate, extended basad, lateral angles weakly extended basad. Tegminal plate (Fig. 169) broad, with sides subparallel towards apex; apical edge broadly rounded, glabrous; subapically on ventral surface with two densely setose patches of long setae. Aedeagus (Fig. 150). Apical scoop of pedon (Fig. 183) ca. 0.73 X as long as wide, with lateral margins converging in straight line, with apex truncate. Tectum with well-sclerotized lateral frame converging with straight sides to subangulate apex, medially weakly sclerotized. TA of flagellar structure, as in Figs. 87, 150. Endophallus (Fig. 150) in apical half with large subovate weakly sclerotized sclerite, in basal half with strongly sclerotized V-shaped sclerite.

Selected female specimen (Emdoman). Same as described male except: length, pronotum + elytron: 3.25 mm. Head. As in fig. 107. Gena 0.72 X as long as width of head immediately behind eyes. Profile of vertex from behind eye to base convex. Rostrum 1.71 X as long as mouthparts; at widest point 1.31 X wider than at base. Prothorax 0.88 X as long as wide. Elytron 2.20 X longer than wide. Height of pterothorax 0.81 X length of elytron. Height of pterothorax 0.83 X length of elytron. Procoxa in anterior aspect 0.91 X as long as wide. Legs. Profemur moderately swollen; weakly asymmetrically clavate; basal stalk indistinct, without angulation, its dorsal edge lined with weak denticles; dorsal contour straight at very base, continuing in evenly convex line to apex; ventral contour in straight line to angulation at apical 0.38, continuing weakly concave to apex; ventral surface smooth, without protrusion. Protibia with dorsal contour in apical half almost straight, in basal half weakly curved; ventral contour bisinuate, basally and apically concave, at middle convex; ventral surface at middle denticulate, setose with suberect setae; tibial apex with uncus and premucro; uncus in dorsal position; premucro in subventral position; anterior distal comb ventrally shortened, not reaching ventral base of uncus. Mesotibia subapically simple, without extension. Abdomen. Pygidium 0.90 X as long as wide. Setose patch of venter 0.89 X as long as wide, consisting of three simple rows of modified setae on sternite III-V with each sternite bearing one row (Fig. 83). Genitalia. Ovipositor without styli. Sternite VIII as in fig. 212; apex evenly rounded; base with short apodeme. Spermatheca as in fig. 227;

with body strongly tapering towards pointed apex; basally extended siphon-like towards ductus, this siphon internally annulate, as long as remainder of spermatheca; insertion of gland shifted apicad; spermathecal gland heavily sclerotized.

Intraspecific variation. Length, pronotum + elytron: 2.69-3.58 mm (n=47, $\bar{x}$=3.11 ± 0.23). Coloration. Rostrum light ferruginous or dark ferruginous with bluish lustre; fore leg ferruginous or black with bluish lustre. Prothorax 0.82-0.90 X as long as wide (n=45, $\bar{x}$=0.86 ± 0.02). Elytron 2.03-2.29 X longer than wide (n=44, $\bar{x}$=2.16 ± 0.07). Thoracic venter. Height of pterothorax 0.76-0.83 X length of elytron in males (n=26, $\bar{x}$=0.79 ± 0.02), 0.79-0.86 X length of elytron in females (n=17, $\bar{x}$=0.83 ± 0.02). Abdomen. Pygidium 0.99-1.14 X wider than long in males (n=22, $\bar{x}$=1.07 ± 0.04), 1.12-1.26 X wider than long in females (n=16, $\bar{x}$=1.17 ± 0.05). Female patch of modified setae 0.78-0.96 X as long as wide (n=16, $\bar{x}$=0.89 ± 0.06).

Euops violaceus **PASCOE, 1874**

Euops violacea Pascoe, 1874: 27. Complete bibliography in appendix 1.

(Figs. 37, 117, 137, 211, 226, 243)

Diagnosis. Female: Coloration (Fig. 37) bright metallic blue. Apex of protibia with uncus and premucro. Spermatheca as in fig. 226, basally extended siphon-like towards ductus.

Range. Fig. 243. Maluku Selatan Prov. (Ceram).

Type material. Lectotype, female (by present designation): Maluku Selatan Prov.: Ceram Isl.; labels: 1) [oval, blue] "Ceram [handwritten]" 2) [white, rectangular] "*Euops violacea*, Type, Pascoe [handwritten]" 3) [white, rectangular] "Pascoe Coll., 93-60. [printed]" 4) [white with red bordering, round] "Type [printed]" 5) [red, rectangular] LECTOTYPE, *Euops violaceus* Pascoe, det. A.Riedel 2000 [printed]" (BMNH). Paralectotype, female; labels: 1) [oval, blue] "Ceram [handwritten]" 2) [white, rectangular] "Pascoe Coll., 93-60. [printed]" 3) [white with yellow bordering, round] "Co-type [printed]" 4) [red, rectangular] PARALECTOTYPE, *Euops violaceus* Pascoe, det. A.Riedel 2000 [printed]" (BMNH).

Redescription.

Lectotype, female. Length, pronotum + elytron: 3.19 mm. Coloration (Fig. 37) bright metallic violet-blue; legs and abdomen deep ferruginous to black, with bluish lustre; pygidium deep ferruginous, at extreme base and apex metallic green. Head. As in fig. 117. Gena 0.89 X as long as width of head immediately behind eyes. Vertex shining; dorsally smooth; laterally with shallow punctures in anterior half, with shallow transverse wrinkles posteriorly. Eyes in dorsal view moderately prominent from lateral contour of head, medially contiguous for ca. 0.4 X their length. Profile of vertex from behind eye to base convex. Ventral surface of head in front of gular region shining, with shallow median furrow, sparsely punctate near eye, in basal half of eye´s length with regular transverse wrinkles between eyes. Rostrum 1.80 X as long as mouthparts; at widest point 1.46 X wider than at base; in cross section dorsally weakly rounded. Clypeus with median notch. Interantennal area with almost straight lateral margins converging. Profile of rostrum with dorsal contour of interantennal area weakly projecting, rounded; anteriorly in straight line to apex; ventral contour weakly sinuate, at base weakly concave, towards apex weakly convex; dorsal and ventral contour of rostrum basally subparallel, in apical third converging. Venter of rostrum poorly delimited against venter of head, basally with indistinct submental median carina and with pair of shallow lateral impressions. Mouthparts. Prementum at base 1.7 X wider than long, ca. 2.7 X wider than at apex; with weakly bisinuate lateral margins converging apicad, at anterior third convex, before base and apex weakly concave; with three moderately long, acute apical processes, subequal in length. Antenna as in fig. 137. Proventriculus with eight primary folds densely covered with hair-like setae; without sclerotized gnathal ridges, posteriad of primary fold without setose patch or pulvillus. Prothorax 0.87 X as long as wide; with shallow subbasal constriction; sides subparallel, in anterior quarter converging, with shallow preapical constriction; disc shining, smooth except for sparse minute punctures and very faint transverse microreticulation; in lateral aspect with center of side densely deeply punctate. Metanotum without sutural spines, but with pair of bluntly angular projections; with pair of lateral lobes. Elytron at humerus simple; 2.18 X longer than wide; striae moderately impressed. Thoracic venter. Prepectus shorter than postpectus; procoxae approaching anterior margin of prothorax. Height of pterothorax 0.84 X length of elytron. Procoxa in anterior aspect as long as wide (1.00 X). Legs. Profemur moderately swollen; weakly asymmetrically clavate; ventral contour in straight line to apical 0.32, continuing in straight line to apex; dorsal contour sinuate, in basal third straight, continuing in markedly convex line to apex; ventral surface smooth, without protrusion. Protibia with dorsal contour evenly weakly convex; ventral contour sinuate, basally convex, at middle concave and in straight line to apex; ventral surface smooth except weakly denticulate at middle, setose with subrecumbent to suberect setae; tibial apex with uncus and premucro; uncus in dorsal position; premucro in subventral position; anterior distal comb ventrally shortened, not reaching ventral base of uncus. Abdomen. Pygidium 0.94 X as long as wide; shining, at extreme base microreticulate; sparsely shallowly punctate, subglabrous. Setose patch of venter 1.40 X as long as wide, consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row. Genitalia. Ovipositor without styli. Sternite VIII as in fig. 211; apex subtruncate, weakly sclerotized; base with short apodeme. Spermatheca as in fig. 226; slender; subisodiametric from insertion of duct to shortly before apex; basally extended siphon-like towards ductus; insertion of gland shifted apicad.

Note: Dalla Torre & Voss (1930) list this species under *Suniops* Voss. However, the characters peculiar to the majority of species commonly included in this subgenus are absent in *E. violaceus*. In a future revision of *Suniops* Voss, which must include the designation of a type species, *E. violaceus* should be excluded.

Euops, new species 3

Range. Biak-Numfor Prov. (Biak Isl.: Mangrowawa, Korim). Altitude: ca. 50-150 m.

Material examined: IRIAN JAYA, Biak-Numfor Prov.: 1 male, Biak Isl., Mangrowawa, 50-100 m, 29.V.1959, sweeping, leg. T.C.Maa (BPBM); 1 female, Biak Isl., Mangrowawa, 50-100 m, 30.V.1959, leg. J.L.Gressitt (BPBM); 1 female, Biak Isl., Sepse, 3.X.1990, leg. A.Riedel (ARC); 1 male, Biak Isl., 3 Km S Korim, 100 m, 21-22.VI.1993, leg. A.Riedel (ARC); 53 males, 40 females, Biak Isl., Korim, Workar - Wari, 50-100 m, 41.XII.2000, leg. A.Riedel (ARC); 52 males, 41 females, Biak Isl., Korim, Nernu, 100-150 m, 12-14.XII.2000, leg. A.Riedel (ARC); 3 males, 4 females, Biak Isl., Korim, Nernu, 100-150 m, 1.II.2001, leg. A.Riedel (ARC); 15 males, 13 females, Biak Isl., Korim, Nernu, 100-150 m, 4.II.2001, leg. A.Riedel (ARC); 3 males, Biak Isl., Korim, Roidifu, ca. 100 m, 2.II.2001, leg. A.Riedel (ARC).

Euops, new species 4

Range. Manokwari Prov. (Arfak Mts.). Altitude: 700-800 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 1 male, Ransiki, Membey, 800-1200 m, 31.VIII.1991, leg. A.Riedel (ARC); 1 male, Manokwari, Warmare, 200-700 m, 22.VIII.1991, leg. A.Riedel (ARC).

Euops, new species 5

Range. Jayawijaya Prov. (Angguruk, Emdoman, Okloma, Galbok, Taramlu, Borme). Altitude: 1200-1700 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 3 males, 1 female, Angguruk, 1600-1700 m, 21/27/30.IX.1991, leg. A.Riedel (ARC); 4 males, 1 female, Angguruk - Tanggeam, 1500-1800 m, 28-29.IX.1991, leg. A.Riedel (ARC); 1 male, 1 female, Galbok (W Nalca), 1700-1800 m, 3.X.1993, leg. A.Riedel (ARC); 2 males, Okloma, 1650-1800 m, 30.IX.-1.X.1993, leg. A.Riedel (ARC); 4 males, Emdoman, 800-1200 m, 14-15.IX.1992, leg. A.Riedel (ARC); 2 males, 3 females, Emdoman, 900-1200 m, 29.IX.1993, leg. A.Riedel (ARC); 1 male, Bime, 1600-2000 m, 10.IX.1993, leg. A.Riedel (ARC); 4 males, 1 female, Taramlu, 1500-1700 m, 6.IX.1993, leg. A.Riedel (ARC); 3 males, Borme, 1000-1450 m, 12-15.VIII.1992, leg. A.Riedel (ARC); 6 males, 4 females, Borme, 1000-1300 m, 13-18.VIII.1992, leg. A.Riedel (ARC); 2 females, Borme, trail to Omban, 1000-1300 m, 3.IX.1993, leg. A.Riedel (ARC).

Euops, new species 6

Range. Japen-Waropen Prov. (Japen Isl.). Altitude: 500-800 m.

Material examined: IRIAN JAYA, Japen-Waropen Prov.: 1 male, Japen Isl., Ambaidiru, 800 m, 8.IX.1991, leg. A.Riedel (ARC); 1 male, Japen Isl., Serui, Mantembu, 300-800 m, 6-9.IX.1991, leg. A.Riedel (ARC); 3 males, 1 female, Japen Isl., Serui, Mantembu, 100-500 m, 16.XII.2000, leg. A.Riedel (ARC).

Euops, new species 7

Range. Jayapura Prov. (Cyclops Mts., Lereh), East Sepik Prov. (Torricelli Mts.). Altitude: 500-850 m.

Material examined: IRIAN JAYA, Jayapura Prov.: 4 males, 1 female, Sentani, Cyclops Mts., 270-500 m, 26.IX.1996, leg. A.Riedel (ARC); 2 males, Sentani, Cyclops Mts., 400-700 m, 16.X.1996, leg. A.Riedel (ARC); 1 male, Sentani, Cyclops Mts., 850-950 m, 16.X.1996, leg. A.Riedel (ARC); 1 male, Lereh, 500-1000 m, 26.I.1996, leg. A.Riedel (ARC); PAPUA NEW GUINEA, East Sepik Prov.: 1 male, Torricelli Mts., Wantipi Vill., 30.XI.-8.XII.1958, leg. W.W.Brandt (BPBM).

Note: the male from the Torricelli Mountains differs in genital characters slightly from the ones from the Cyclops Mountains. It may constitute a separate species.

Euops, new species 8

Range. Jayawijaya Prov. (Karubaga). Altitude: 1300-1500 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 1 male, 1 female, Swart Valley, Karubaka, 1450 m, 5.XI.1958, leg. J.L.Gressitt (BPBM); 1 female, Swart Valley, Karubaka, 1450 m, 17.XI.1958, leg. J.L.Gressitt (BPBM); 1 male, Swart Valley, Karubaka, 1500 m, 11.XI.1958, leg. J.L.Gressitt (BPBM); 1 female, Swart Valley, Karubaka, 1300 m, 7.XI.1958, leg. J.L.Gressitt (BPBM).

Euops, new species 9

Range. Sandaun Prov. (Mianmin). Altitude: 800-1100 m.

Material examined: PAPUA NEW GUINEA, Sandaun Prov.: 1 male, 2 females, S Mianmin, 800-1200 m, 19.V.1998, leg. A.Riedel (ARC); 3 males, 1 female, N Mianmin, 700-1100 m, 20.V.1998, leg. A.Riedel (ARC).

Euops, new species 10

Range. Morobe Prov. (Wau, Aseki). Altitude: 1500-1600 m.

Material examined: PAPUA NEW GUINEA, Morobe Prov.: 1 male, Aseki, Oiwa, Langama-road, 1600-1700 m, 13.III.1998, leg. A.Riedel (ARC); 2 females, Aseki, 1500-1650 m, 14.X.1992, leg. A.Riedel (ARC); 1 male, Wau, 1500 m, 27.VIII.1961, leg. J.Sedlacek (BPBM); 1 female, Wau, Mt. Kaindi, coffee-garden, 1550 m, 7.X.1992 (ARC).

Euops, new species 11

Range. Western Highlands Prov. (Baiyer Riv.); Morobe Prov. (Wau, Aseki, Pindiu, Mindik, Ulap). Altitude: 1100-1700 m.

Material examined: PAPUA NEW GUINEA, Western Highlands Prov.: 1 male, Baiyer Riv., 1150 m, 18.X.1958, leg. J.L.Gressitt (BPBM); 1 male, Baiyer Riv., 1150 m, 19.X.1958, "*Pandanus*", "*Freycinetia*", leg. J.L.Gressitt (BPBM); Morobe Prov.: 6 males, 2 females, W Pindiu, 1000-1400 m, 23.IV.1998, leg. A.Riedel (ARC); 1 male, Mindik, 1200-1500 m, 26.IV.1998, leg. A.Riedel (ARC); 1 female, E Pindiu, Kobau, 1250-1400 m, 24.IV.1998, leg. A.Riedel (ARC); 1 male, 2 females, Wau, Mt. Kaindi, coffee-garden, 1550 m, 7.X.1992 (ARC); 1 male, Wau, 1250 m, 4.II.1963, leg. J.Sedlacek (BPBM); 1 male, 6 km W of Wau, Nami Creek, 1700 m, 15.VI.1962, leg. J.Sedlacek (BPBM); 1 male, U Watut, SW, 1100-1600 m, 30.IV.1968, leg. J.L.Sedlacek (BPBM); 1 male, Ulap, 800-1100 m, IX.1968, leg. N.L.H.Krauss (BPBM).

Euops, new species 12

Range. Paniai Prov. (Nabire), Jayawijaya Prov. (Angguruk, Kosarek, Nalca, Bime), Western Prov. (Kiunga), Southern Highlands Prov. (Karimui); Morobe Prov. (Aseki). Altitude: 14-1700 m.

Material examined: IRIAN JAYA, Paniai Prov.: 3 males, 6 females, Nabire, Topo, Pusppensaat, Km 54, 750 m, 20-21.XII.1995, leg. A.Riedel (ARC); 1 male, Nabire, Topo, Pusppensaat, Km 54, 750 m, "*Mallotus* sp. (Euphorbiaceae), det. Veldkamp", 20-21.XII.1995, leg. A.Riedel (ARC); 1 male, Nabire, Topo, Km 54, secondary vegetation, 23.VII.1996, leg. Stüben/Schüle (PSC); Jayawijaya Prov.: 1 male, 4 females, Angguruk, 1600-1700 m, 21/27/30.IX.1991, leg. A.Riedel (ARC); 1 female, Angguruk - Tanggeam, 1500-1800 m, 28-29.IX.1991, leg. A.Riedel (ARC); 1 male, 1 female, Membaham (near Kosarek), 1500-1800 m, 23.IX.1991, leg. A.Riedel (ARC); 9 males, 6 females, Kosarek, 1650-1700 m, 25.IX.1991, leg. A.Riedel (ARC); 1 male, 2 females, Galbok (W Nalca), 1700-1800 m, 3.X.1993, leg. A.Riedel (ARC); 1 male, 1 female, Bime, 1600-2000 m, 10.IX.1993, leg. A.Riedel

(ARC). PAPUA NEW GUINEA, Western Prov.: 1 female, Kiunga, Fly Riv., [14 m], 15-21.VII.1957, leg. W.W.Brandt (BPBM); Southern Highlands Prov.: 1 female, Karimui, 1080 m, 8-10.VII.1963, leg. J.Sedlacek (BPBM); Morobe Prov.: 1 male, Aseki, 1200 m, 13.IV.1974, leg. Reni Sakomadoro (BPBM); 1 female, Aseki, 1200 m, 2-4.IV.1974, leg. Reni Sakomadoro (BPBM).

Euops, new species 13

Range. Central Prov. (Daradae Plain). Altitude: 300 m.

Material examined: PAPUA NEW GUINEA, Central Prov.: 1 male, Daradae, nr. Javarere, Musgrove R., 100 m ?, 3.X.1958, leg. J.L.Gressitt (BPBM); 1 male, Daradae, nr. Javarere, Musgrove R., 100 m ?, "*Alpinia*", 4.X.1958, leg. J.L.Gressitt (BPBM); 1 male, Daradae Plain, 80 km N to Pt. Moresby, 300 m, sweeping, 6.IX.1959, leg. T.C.Maa (BPBM).

Euops, new species 14

Range. Manokwari Prov. (Wandammen Bay), Jayawijaya Prov. (Holuwon, Samboka), Western Prov. (Kiunga). Altitude: 14-700 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 4 males, 2 females, Wandammen Bay, Wasior, DMP logging camp, Km 38, Sararti, S 03° 05´ E 134° 27´, 100-200 m, 7-9.I.2001, leg. A.Riedel (ARC). Jayawijaya Prov.: 1 male, Yeimu, near Holuwon [at least 700 m], 28.VI.1994, leg. A.Riedel (ARC); 1 male, 1 female, Samboka, Upper Kolff River, ca. 200 m, 10-14.X.1996, leg. A.Riedel (ARC). PAPUA NEW GUINEA, Western Prov.: 1 male, Kiunga, Fly Riv., [14 m], 8-10.VIII.1957, leg. W.W.Brandt (BPBM).

Note: This species is most likely the sister species of *Euops tibialis* VOSS. This assumption is supported by the unique structure of the TA of the male genitalia.

Euops coelestinus-group

Unidentified material at hand: 61 female specimens from New Guinea.

3.1.2.3. The *eucalypti*-group

Diagnosis. Prementum with single, apical process. Pronotum smooth or punctate, but never rugose. Proventriculus simply setose, without sclerotized gnathal ridges. Male TA of flagellar structure.

Euops suturalis LEA, 1898

Euops suturalis Lea, 1898: 617. Complete bibliography in appendix 1.

(Figs. 38, 108-109, 138, 151, 154, 171, 185, 198, 213, 228, 247)

Diagnosis. Head densely deeply punctate, at middle with marked constriction (Fig. 108-109). Prothorax densely deeply punctate, anteriorly with marked preapical constriction and smooth collar-like extension. Prementum with single, apical process. Male: TA of flagellar structure, as in fig. 151. Female: Spermatheca as in fig. 228, insertion of gland shifted apicad.

Range. Fig. 247. Central Prov. (Pt. Moresby, Redscar Bay, Variarata). Extralimital distribution Australia, Western Australia (Ord River), Northern Territory (Darwin, Nimbuwah

Rock, Mt. Cahill), Queensland (Quinn Park, Cooktown, Kuranda, Cairns, Mareeba, Tolga, Mackay, Rockhampton, Bundaberg, Dallarnil, Brisbane, Tambourine). Altitude: 1-500 m.

Material examined: PAPUA NEW GUINEA, Central Prov.: 1 male, 4 females, 25 mi. radius of Pt. Moresby, VI.1928, coll. Pemberton (BPBM); 1 male, 1 female, Pt. Moresby, 25.IV.1959, leg. C.D.Michener (BPBM); 1 female, Rouna, 300-500 m, XI.1968, leg. N.L.H.Krauss (BPBM); 1 female, Pt. Moresby, 11-12.VI.1961, leg. J.H.Sedlacek (BPBM); 1 male, Aroa Estate, W of Redscar Bay, "*Eucalyptus*",1 m, 28.IX.1958, leg. J.L.Gressitt (BPBM); 1 male, 1 female, Variarata, Astrolabe Range, nr. Pt. Moresby, 400 m, "*Wenlandia paniculata*" 18.III.1956, leg. J.L.Gressitt (BPBM); 3 males, 7 females, Variarata, Astrolabe Range, nr. Pt. Moresby, 400 m, "*Eucalyptus*, grasses" 18.III.1956, leg. J.L.Gressitt (BPBM). AUSTRALIA, Western Australia: 1 female; Ord River Diversion Dam, "ex *E. camaldulensis*", 23.VII.1974, leg. K.M.Moore (ANIC). Northern Territory: 2 males, 4 females, Holmes Jungle, Berrimah, 10km S of Darwin, 12.26S 130.56E, at light, 8.XI.1972, leg. E.Britton (ANIC); 1 male, 1 female, Cooper Creek, 11 km SbyW of Nimbuwah Rock, 12.17S 133.20E, at light, 1.XI.1972, leg. E.B.Britton (ANIC); 1 male, Jim Jim Creek, 19km WSW of Mt. Cahill, 12.57S 132.33E, at light, 24.X.1972, leg. E.Britton (ANIC). Queensland: 3 males, 1 female, Quinn Park, Claudia Riv., 12.43S 143.17E, 12-21.II.1985, leg. E.D.Edwards & B.Hacobian (ANIC); 1 male, 14 km WbyN of Hope Vale Mission, 15.16S 144.59E, 7-10.V.1981, leg. I.D.Naumann (ANIC); 1 male, 14 km WbyN Hope Vale Mission, 7-10.V.1981, leg. A.Calder (ANIC); 4 male, 1 km W Cooktown, 15.28S 145.15E, 10-13.V.1981, leg. A.Calder (ANIC); 4 males, 8 females, Mt. Cook N. P., 15.29S 145.16E, 10-12.V.1981, leg. A.Calder (ANIC); 3 males, Mt. Cook N. P., 10-12.V.1981, leg. I.D.Naumann (ANIC); 2 males, Annan R., 3 km WbyS Black Mt., 15.41S 145.12E, 26-27.IV.1981, leg. A.Calder (ANIC); 1 male, 1 female, Kuranda, V.49, J.G.Brooks bequest, 1976 (ANIC); 1 female, 17,7 km N of Mt. Molloy Station Ck., 426,7 m, 21.XII.1970, J.G.Brooks (ANIC);1 male, 2 females, Cairns, 2.XI.1969, leg. R.E.Parrott (CWOB); 1 male, Barron Falls, 2.I.1965, J.G.Brooks (ANIC); 1 male, 1 female, 8 km N Mareeba, 5.II.1997, leg. H.&A.Howden (HAHC); 1 female, 8 km N Mareeba, 6.II.1997, day sweeping, leg. H.&A.Howden (HAHC); 4 males, 1 female, 8 km N Mareeba, 6.II.1997, leg. H.&A.Howden (HAHC); 1 male, 1 female, 8 km N Mareeba, 9.II.1997, leg. H.&A.Howden (HAHC); 1 female, 8 km N Mareeba, 8.II.1997, day sweeping, leg. H.&A.Howden (HAHC); 1 male, 7 km NE Tolga, light trap, II.1987, leg. R.Storey (BPBM); 1 female, Tolga scrub, II.1987, leg. R.Storey (HAHC); 3 females, 7 km NE Tolga, DPI light trap, I.1989, leg. H.&A.Howden (HAHC); 1 female, Blacks beach, nr. Mackay, 2.III.1975, leg. H.&A.Howden (HAHC); 1 female, Yeppoon, 26.I.1975, leg. H.&A.Howden (HAHC); 1 male, 32 km N Rockhampton, 8.II.1964, leg. J.Sedlacek (BPBM); 3 males, 1 female, Bundaberg, 15-30.II.1972, leg. H.Frauca (ANIC); 2 females, Bundaberg, 24.51S 152.21E, 8.III.1972, leg. H.Frauca (ANIC); 5 males, 4 females, Bundaberg, "in wet grass on river bank", 24.46S 152.25E, 15.III.1972, leg. H.Frauca (ANIC); 2 females, Bundaberg, 24.51S 152.21E, Watalgan Rg., via Rosedale, ca. 500 m, 2.IX.1972, leg. H.Frauca (ANIC); 2 females, Bundaberg, 24.51S 152.21E, Watalgan Rg., via Rosedale, ca. 500 m, 2.IX.1972, leg. H.Frauca (ANIC); 2 males, 2 females, Dallarnil, 27.VII.1975, leg. H.Frauca (ANIC); 1 male, 24 km NbyE Eidsvold, 25.09S 151.11E, 11.X.1984, leg. I.Naumann & J.Cardale (ANIC); 1 female, Brisbane, Moggill, 23-27.IX.1961, "3131", leg. J.L.Gressitt (BPBM); 1 male, Brisbane, XII.1972-III.1973, leg. J.Sedlacek (CWOB); 4 males, 2 females, 5 km SE Tambourine, on bloodwood, 22.XI.1986, leg. C.Reid (ANIC); 1 female, Laura Stn., 4.IV.1983, at M.V. light, leg. A.Walford-Huggins (ANIC) **[not located]**; 2 males, 13 km ENE of Mt.Tozer, at light, 5-10.VII.1986, leg. T.Weir & A.Calder (ANIC) **[not located]**.

Redescription.

Selected male specimen (Variarata). Length, pronotum + elytron: 2.59 mm. Coloration (Fig. 38) of head, thorax and abdomen bronze; rostrum, legs and antenna ferruginous; elytron light ferruginous except sutural interval black, elytral apex and epipleuron deep ferruginous. Head. As in fig. 108. Gena 1.01 X as long as width of head immediately behind eyes, at middle with marked constriction. Vertex shining; with dense deep punctures throughout. Eyes in dorsal view moderately prominent from lateral contour of head; medially most approximated in front of middle of eye´s length, separated by ca. 0.16 X basal width of rostrum. Frons with weak, smooth, median costa. Profile of vertex sinuate; immediately behind eye with shallow constriction, in convex line to more marked constriction behind middle, towards base evenly convex. Ventral surface of head in front of gular region shining, laterally with deep punctures becoming sparser towards middle, with median furrow. Rostrum 1.39 X as long as mouthparts; at widest point 1.41 X wider than at base; in cross section dorsally weakly rounded. Clypeus with broad, subtruncate median extension. Interantennal area with weakly sinuate lateral margins converging. Profile of rostrum with dorsal contour of interantennal area not projecting, weakly rounded; anteriorly in straight line to apex; ventral contour in straight line to apex; dorsal and ventral contour of rostrum evenly converging from base to apex. Venter of rostrum flat, basally well-delimited against venter of head, medially forming right angle towards lateroposterior postgenal recesses. Mouthparts. Prementum at base 1.7 X wider than long; with straight lateral margins markedly converging to base of single, moderately long apical processes. Antenna as in fig. 138. Proventriculus [described from Claudie-Riv.-specimen] relatively uniformly covered with spiniform setae, without distinct folds or patches bearing clusters of setae. Prothorax 1.06 X as long as wide; with moderately deep subbasal constriction; sides rounded to apex; with marked preapical constriction, anteriorly with smooth collar-like ring sloping towards head; disc shining, densely punctate with large deep punctures; in lateral aspect with side sculptured as disc. Metanotum simple, without sutural spines, without lateral lobes. Elytron at humerus simple; 2.31 X longer than wide; striae deeply impressed. Thoracic venter. Prepectus ca. 2.2 X as long as postpectus; profile in straight line obliquely dorsad to subapical constriction. Height of pterothorax 0.77 X length of elytron. Procoxa in anterior aspect 1.14 X as long as wide; profile dorsoanterior of articulation with leg bluntly angulate at ca. 120°. Legs. Profemur strongly swollen; strongly asymmetrically clavate; with distinct stalk in basal 0.24, its dorsal edge lined with denticles; ventral contour sinuate, apical 3/4 strongly convex; dorsal contour evenly weakly convex; ventral surface smooth, without protrusion. Protibia evenly curved ventrad; ventral surface moderately densely denticulate, moderately densely setose with short suberect setae; uncus terminal; anterior distal comb complete, but very indistinct with sparse thin setae; posterior distal comb oblique, ventrally shortened, very indistinct with sparse thin setae. Mesotibia subapically simple, without extension. Abdomen. Pygidium 0.89 X as long as wide; shining; densely deeply punctate, interspaces between punctures smaller than diameter of punctures, sparsely setose with recumbent setae. Venter subglabrous, laterally with sparse recumbent setae. Genitalia. Sternite VIII as in fig. 198; apex markedly sinuate with deeply concave median notch, laterally sparsely setose with short setae; base moderately bisinuate, medially weakly convex, lateral angles extended basad. Tegminal plate (Fig. 171) with sides markedly converging apicad; apex pointed, with few moderately long setae. Aedeagus (Fig. 151). Apical scoop of pedon (Fig. 185) basally not delimited against remainder of pedon, lateral margins evenly continuous, concave lateral margins converging to pointed apex. Tectum evenly sclerotized, apically subangulate. TA of flagellar structure, as in Fig. 151. Endophallus at middle with sclerite shaped like an inverted "U".

Selected female specimen (Variarata). Same as described male except: length, pronotum + elytron: 2.39 mm. Head. As in fig. 109. Gena 0.75 X as long as width of head immediately behind eyes. Profile of vertex behind eye straight, towards base rounded. Eyes separated by ca. 0.22 X basal width of rostrum. Rostrum 1.21 X as long as mouthparts; at widest point 1.33 X wider than at base. Profile of rostrum with dorsal contour of interantennal area weakly projecting, rounded; anteriorly in concave line to apex; ventral contour at base with notch, then in straight line to apex; overall shape more distinctly cuneiform. Prothorax 0.97 X as long as wide. Elytron 2.40 X longer than wide. Height of pterothorax 0.76 X length of elytron. Procoxa in anterior aspect as long as wide (1.00 X). Legs. Profemur moderately swollen; weakly asymmetrically clavate; without distinct stalk; ventral contour convex from base to apex; dorsal contour sinuate, in basal third concave, continuing in markedly convex line to apex. Protibia with dorsal contour evenly weakly convex; ventral contour weakly sinuate, in basal half weakly convex, at middle weakly concave, in straight line to apex; ventral surface denticulate at middle and before apex, sparsely setose with subrecumbent setae; tibial apex with uncus and premucro; uncus in dorsal position; premucro in ventral position; anterior distal comb ventrally shortened, not reaching ventral base of uncus. Abdomen. Pygidium 0.83 X as long as wide. Setose patch of venter 1.31 X as long as wide, consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row; one simple row of nonmodified setae on sternite VI. Genitalia. Ovipositor (Fig. 154) without styli. Sternite VIII as in fig. 213; apex weakly bilobate, laterally broadly rounded; without apodeme. Spermatheca as in fig. 228; subisodiametric from insertion of duct to shortly before apex; basally extended siphon-like towards ductus; insertion of gland shifted apicad.

Intraspecific variation. Length, pronotum + elytron: 1.78-2.63 mm (n=48, $\bar{x}$=2.34 ± 0.19). Coloration variable, especially in Australian specimens; pale specimens light ferruginous except for bluish black scutellum, sides of pterothorax with slight bluish lustre; dark specimens black with bronze to bluish lustre, rostrum pale ferruginous, abdomen deep ferruginous; in specimens from New Guinea coloration of elytron variable; darker coloration of apex and epipleuron more or less pronounced; either as in described male or elytron light ferruginous except for deeper brownish sutural interval. Prothorax 0.99-1.11 X as long as wide in males (n=18, $\bar{x}$=1.06 ± 0.03), 0.94-1.04 X as long as wide in females (n=30, $\bar{x}$=0.99 ± 0.02). Elytron 2.26-2.51 X longer than wide (n=50, $\bar{x}$=2.39 ± 0.05). Thoracic venter. Prepectus ca. 1.4-2.4 X as long as postpectus (n=8, $\bar{x}$=2.0 ± 0.3). Height of pterothorax 0.73-0.78 X length of elytron (n=50, $\bar{x}$=0.75 ± 0.01). Legs. Profemur of smaller males shorter and less swollen. Abdomen. Pygidium 1.04-1.26 X wider than long in males (n=19, $\bar{x}$=1.16 ±

0.06), 1.14-1.31 X wider than long in females (n=29, $\bar{x}$=1.23 ± 0.04). Female patch of modified setae 0.91-1.76 X as long as wide (n=29, $\bar{x}$=1.40 ± 0.17).

3.1.2.4. The *femoralis*-group

Diagnosis. Head elongate. Proventriculus with gnathal ridges and denticulate pulvilli. Apex of female protibia without premucro. Setose patch of female venter consisting of three double rows of modified setae. Ovipositor with styli.

Euops femoralis Voss, 1924

Euops femoralis Voss, 1924: 50. Complete bibliography in appendix 1.

(Figs. 39, 110-111, 139, 156, 162, 170, 184, 199, 214, 229, 244)

Diagnosis. Head elongate, as in figs. 110-111. Male: Profemur strongly asymmetrically clavate, with two rounded protuberances at apical 0.30, one on ventral surface, the other on anterior surface. TA as in fig. 162. Female: Apex of protibia without premucro. Setose patch of venter consisting of three double rows of modified setae. Ovipositor with styli (Fig. 156).

Range. Fig. 244. Jayawijaya Prov. (Okloma, Bime), Sandaun Prov. (Mianmin), East Sepik Prov. (Mt. Hunstein), Southern Highlands Prov. (Karimui). Altitude: 1000-1700 m.

Type material. Lectotype, male (by present designation): PAPUA NEW GUINEA: East Sepik Prov., Mt. Hunstein; labels: 1) [grey, rectangular] "D.N.Guinea, Hunsteinspitze, 28.II.[19]13, Kais. Augustafl. Exp., Bürgers S. G., 282 [printed]" 2) [white, rectangular] "Zool. Mus. Berlin [printed]" 3) [white, rectangular] "*Euops femoralis* n. sp. [handwritten] Det. E. Voß [printed]" 4) [red, rectangular] "LECTOTYPUS, *Euops femoralis* Voss, det. A.Riedel 2000 [printed]" (MNHB). Paralectotypes, by present designation: 2 females, same locality data as lectotype, except: 25.II.[19]13, "272" (MNHB and ZMH).

Other material examined: IRIAN JAYA, Jayawijaya Prov.: 3 males, Okloma, 1650-1800 m, 30.IX-1.X.1993, leg. A.Riedel (ARC); 1 male, 1 female, Okloma - Emdoman, 1400-1700 m, 28.IX.1993, leg. A.Riedel (ARC); 1 male, 1 female, Bime, 1600-1900 m, 11.IX. 1993, leg. A.Riedel (ARC). PAPUA NEW GUINEA, Sandaun Prov.: 1 male, N Mianmin, 700-1100 m, 20.V.1998, leg. A.Riedel (ARC); Southern Highlands Prov.: 1 male, Karimui, 1000 m, 6.VI.1961, leg. J.L.&M.Gressitt (BPBM).

Redescription.

Lectotype, male. Length, pronotum + elytron: 3.45 mm. Coloration (Fig. 39) mainly black; legs and coxae dark ferruginous; basal half of head dorsally blue; anterior surface of procoxa, humerus of elytron and scutellum greenish golden; scape of antenna deep ferruginous, funicle and club black. Head. As in fig. 110. Gena 1.56 X as long as width of head immediately behind eyes. Vertex shining; dorsally with sparse minute punctures; laterally in posterior half with transverse wrinkles. Eyes in dorsal view moderately prominent from lateral contour of head, medially contiguous for ca. 0.4 X their length. Profile of vertex in anterior half straight, in basal half evenly convex. Ventral surface of head in front of gular region dull, rugulose, with transverse costae meeting medially at increasingly acute angle towards front, reaching mid level of eye´s length, behind base of rostrum sculpture irregularly rugose, shallow median furrow indistinct. Rostrum 2.33 X as long as mouthparts; at widest point 1.42 X wider than at base; in cross section dorsally moderately rounded. Clypeus with median notch. Interantennal area with weakly sinuate lateral margins converging. Profile of rostrum with dorsal contour of interantennal area weakly projecting, rounded; anteriorly in weakly convex line to apex; ventral contour sinuate, at base concave, towards apex convex; dorsal and ventral contour of rostrum basally subparallel, in apical third converging. Venter of rostrum poorly delimited against venter of head, basally with indistinct submental median carina and with pair of shallow lateral impressions. Mouthparts. Prementum at base 1.6 X wider than long, ca. 2.9 X wider than at apex; with sinuate lateral margins converging apicad; with three moderately long, acute apical processes, subequal in length. Antenna as in fig. 139. Proventriculus with eight primary gnathal ridges; cutting edge of gnathal ridge in profile of subtriangular shape, rectangular; posteriad of each gnathal ridge with moderately large, densely setose pulvillus. Prothorax 0.94 X as long as wide; with deep subbasal constriction; sides in basal half subparallel, in apical half strongly rounded, widest in apical third, with very shallow preapical constriction; disc shining, smooth. Metanotum without sutural spines, but with pair of bluntly angular projections; laterally projecting angularly without forming distinct lateral lobe. Elytron at humerus simple; 2.52 X longer than wide; striae weakly impressed, on disc almost effaced. Thoracic venter. Prepectus ca. 1.5 X as long as postpectus; profile in straight line obliquely dorsad to apex. Height of pterothorax 0.80 X length of elytron. Procoxa in anterior aspect 1.43 X as long as wide; with weak rectangular extension ventrolateral of articulation with trochanter. Legs. Profemur strongly swollen; strongly asymmetrically clavate; ventral contour subangulate, in straight line to blunt protuberance at apical 0.30, continuing in weakly concave line to apex; dorsal contour straight; anterior surface coriaceous; with two rounded protuberances at apical 0.30, one on ventral surface, the other on anterior surface. Protibia evenly curved ventrad; ventral surface with shallow irregular sculpture, coriaceous, basally subglabrous, apically sparsely setose with short setae; uncus in dorsal position, tibial apex forming flattened protrusion ventrad of uncus; anterior distal comb complete; posterior distal comb oblique, behind tarsal articulation, dorsally and ventrally shortened, indistinct with thin setae. Mesotibia subapically simple, without extension. Abdomen. Pygidium 1.03 X as long as wide; microreticulate; sparsely, shallowly punctate; subglabrous, with few inconspicuous recumbent setae. Venter subglabrous, with sparse recumbent to subrecumbent setae. Genitalia. Sternite VIII as in fig. 199; apex bilobed, with long setae; base evenly, deeply concave. Tegminal plate (Fig. 170) with sides subparallel towards apex; apical edge broadly rounded, with dense long setae. Aedeagus. Apical scoop of pedon (Fig. 184) ca. 1.18 X as long as wide, with lateral margins subparallel, with apex truncate, shape subrectangular. Tectum with well-sclerotized lateral frame converging with straight sides to truncate apex, medially hyaline. TA as in Fig. 162. Endophallus in apical portion without sclerite.

Selected female specimen (Okloma-Emdoman). Same as described male except: length, pronotum + elytron: 3.15 mm. Coloration of elytral humerus and scutellum black with greenish lustre; antenna entirely black. Head. As in fig. 111. Gena 1.14 X as long as width of head immediately behind eyes. Profile of vertex in anterior 1/3 weakly concave, in basal 2/3 evenly convex. Rostrum 1.95 X as long as mouthparts; at widest point 1.36 X wider than at base. Profile of rostrum less markedly curved, with dorsal and ventral contour in apical half more distinctly converging than in basal half. Prothorax 1.02 X as long as wide. Elytron 2.30 X longer than wide. Height of pterothorax 0.91 X length of elytron. Procoxa in anterior aspect 1.11 X as long as wide. Legs. Profemur moderately swollen; weakly asymmetrically clavate; ventral contour in straight line to apical 0.32, weakly angulate, continuing in straight line to apex; dorsal contour sinuate, in basal third straight, continuing in markedly convex line to apex; ventral surface smooth, without protrusion. Protibia with dorsal contour evenly markedly convex; ventral contour sinuate, basally convex, apically concave; ventral surface weakly crenulate, subglabrous; tibial apex with uncus in dorsal position; without premucro; anterior distal comb complete, ventrally passing base of uncus. Abdomen. Pygidium 0.92 X as long as wide. Setose patch of venter 1.32 X as long as wide, consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row. Genitalia. Ovipositor with styli (Fig. 156). Sternite VIII as in fig. 214; apex subtruncate, laterally rounded; without apodeme. Spermatheca as in fig. 229; subisodiametric from base to shortly before apex.

Intraspecific variation. Length, pronotum + elytron: 2.69-3.50 mm (n=10, $\bar{x}$=3.00 ± 0.26). Coloration of legs either dark ferruginous (holotype, Karimui-specimen), or black; anterior surface of procoxa greenish or reddish golden. Head strongly allometric in males; rostrum and gena of larger specimens (holotype) elongate; in smaller males (Mianmin) proportions of head similar to female specimens. Prothorax 0.90-0.98 X as long as wide (n=10, $\bar{x}$=0.94 ± 0.02). Elytron 2.40-2.50 X longer than wide in males (n=8, $\bar{x}$=2.45 ± 0.03), 2.27-2.30 X longer than wide in females (n=2, $\bar{x}$=2.28). Thoracic venter. Height of pterothorax 0.81-0.88 X length of elytron in males (n=8, $\bar{x}$=0.83 ± 0.02), 0.91-0.92 X length of elytron in females (n=2, $\bar{x}$=0.91). Legs. Profemur strongly allometric; with decreasing size of specimens profemur becoming shorter and less markedly clavate; knob on anterior surface becoming indistinct in medium-sized specimens, missing in small specimens; knob on ventral surface indistinct in small specimens. Abdomen. Pygidium 0.90-1.03 X wider than long in males (n=8, $\bar{x}$=0.95 ± 0.04), 1.05-1.06 X wider than long in females (n=2, $\bar{x}$=1.06). Female patch of modified setae 1.15-1.27 X as long as wide (n=2, $\bar{x}$=1.21).

Nomenclatural note. In the original description of *Euops femoralis*, Voss (1924) states that three specimens were at hand. No holotype was fixed, no illustration of a specimen was given. All three syntypes were examined by the present author. The two females were found belonging to a different species. The designation of a lectotype is necessary to ensure stability of nomenclature. The only specimen bearing a label "*Euops femoralis* n. sp." in Voss´ handwriting is given priority and is designated as lectotype herein.

Euops, new species 15

Range. Manokwari Prov. (Wandammen Bay). Altitude: ca. 580-950 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 1 male, 1 female, Wandammen Bay, Wasior, Wondiwoi Mts., 580-950 m, 3.I.2001, leg. A.Riedel (ARC).

3.1.2.5. The *maculatus*-group

Diagnosis. Elytron in some species with round yellowish spot. Apex of female protibia without premucro. TA in lateral aspect similar as in fig. 13, without distinct basal sclerite.

Euops maculatus VOSS, 1924

Euops maculata Voss, 1924: 48. Complete bibliography in appendix 1.

(Figs. 40, 96-97, 124-125, 140, 163, 172, 186, 203, 215, 230, 244)

Diagnosis. Coloration of elytron bluish, in anterior half with oblique yellowish spot [rarely missing] (Fig. 40). Pronotum microreticulate, anteriorly at middle distinctly swollen. Male: TA as in fig. 163. Female: Apex of protibia without premucro. Setose patch of venter consisting of three double rows of modified setae. Ovipositor without styli.

Range. Fig. 244. Sorong Prov. (Mysol Isl., Salawatti Isl., Makbon), Manokwari Prov. (Wandammen Bay), Jayawijaya Prov. (Samboka), Western Prov. (Kiunga), Milne Bay Prov. (Normanby Isl.). Altitude: 30-200 m.

Type material. Lectotype, male (by present designation): IRIAN JAYA, Sorong Prov., Mysol; labels: 1) [white, rectangular] "Mysol, Wallace [handwritten]" 2) [white with black bordering, rectangular] "*fulvescens* Blik. [handwritten]" 3) [white, rectangular] "Coll. Haag [printed]" 4) [white with black bordering, rectangular] "*Euops maculata* n. sp. [handwritten], det. E. Voß [printed]" 5) [white, rectangular] "coll. DEI Eberswalde [printed]" 6) [red, rectangular] "Syntypus [printed]" 7) [red, rectangular] "Lectotype, *Euops maculatus* Voss, det. A.Riedel 2001 [printed]" (DEI). Paralectotypes: IRIAN JAYA, Sorong Prov., Mysol: 1 female; labels: 1) [white, rectangular] "Mysol, Wallace [handwritten]" 2) [white, rectangular] "Coll. Haag [printed]" 3) [red, rectangular] "Syntypus [printed]" 4) [white, rectangular] "*Euops maculata* m. [handwritten] 5) [white, rectangular] "coll. DEI Eberswalde [printed]" 6) [red, rectangular] "Paralectotype, *Euops maculatus* Voss, det. A.Riedel 2001 [printed]" (DEI).

Other material examined: IRIAN JAYA, Sorong Prov.: 27 males, 21 females, Salawatti Isl., Kalobo, ca. 10-30 m, 19-22.X.1996, leg. A.Riedel (ARC); 1 female, Salawatti Isl., Kalyam, 0-380 m, 3.XI.1996, leg. A.Riedel (ARC); 1 male, 2 females, Salawatti Isl., Waijan, SP2, ca. 50-100 m, 23-25.X.1996, leg. A.Riedel (ARC); 2 males, 1 female, Makbon, Malawor, 50-280 m, 28.I.2001, leg. A.Riedel (ARC); Manokwari Prov.: 4 males, 1 female, Wandammen Bay, Wasior, DMP logging camp, Km 38, Sararti, S 03° 05´ E 134° 27´, 100-200 m, 7-9.I.2001, leg. A.Riedel (ARC); Jayawijaya Prov.: 6 males, 8 females, Samboka, upper Kolff River, ca. 200 m, 10-14.X.1996, leg.

A.Riedel (ARC). PAPUA NEW GUINEA, Western Prov.: 1 male, 5 females, Kiunga, Fly River, 7-8.IX.1957, leg. W.W.Brandt (BPBM); 1 male, Kiunga, Fly River, 1-7.X.1957, leg. W.W.Brandt (BPBM); 1 female, Kiunga, Fly River, 15.VIII.1957, leg. W.W.Brandt (BPBM); 1 female, Kiunga, Fly River, 4-8.VII.1957, leg. W.W.Brandt (BPBM); 1 female, Kiunga, Fly River, 8-10.VIII.1957, leg. W.W.Brandt (BPBM); 1 female, Kiunga, Fly River, 9-14.X.1957, leg. W.W.Brandt (BPBM); 1 female, Kiunga, Fly River, 26-28.X.1957, leg. W.W.Brandt (BPBM); Milne Bay Prov.: 2 males, Normanby Isl., Wakaiuna, Sewa Bay, 1-5.XI.1956, leg. W.W.Brandt (BPBM); 1 male, Normanby Isl., Wakaiuna, Sewa Bay, 1-10.XI.1956, leg. W.W.Brandt (BPBM); 1 female, Normanby Isl., Wakaiuna, Sewa Bay, 21-30.XI.1956, leg. W.W.Brandt (BPBM); 1 male, Normanby Isl., Wakaiuna, Sewa Bay, 1-8.I.1957, leg. W.W.Brandt (BPBM).

Redescription.

Lectotype, male. Length, pronotum + elytron: 2.22 mm. Coloration deep ferruginous to black; elytron with bluish lustre, in anterior half with oblique yellowish creamy colored spot from interval 3 to interval 7; scutellum, elytral humerus, sides of metathorax and anterior surface of procoxa metallic green; antenna yellowish. Head. As in fig. 124. Gena 0.85 X as long as width of head immediately behind eyes. Vertex weakly microreticulate; laterally with shallow, transverse wrinkles. Eyes in dorsal view moderately prominent from lateral contour of head, medially contiguous for ca. 0.5 X their length. Profile of vertex immediately behind eye straight, towards base rounded. Ventral surface of head in front of gular region shining, weakly transversely rugulose, with deep median furrow. Rostrum 2.41 X as long as mouthparts; at widest point 1.46 X wider than at base; in cross section dorsally moderately rounded. Clypeus with median notch. Interantennal area with almost straight lateral margins converging. Profile of rostrum with dorsal contour at interantennal area forming blunt angle, rounded; anteriorly in straight line to apex; ventral contour weakly sinuate, at base weakly concave, towards apex weakly convex; dorsal and ventral contour of rostrum basally subparallel, in apical third converging. Venter of rostrum poorly delimited against venter of head, basally with indistinct submental median carina and with pair of shallow lateral impressions. Mouthparts. Prementum at base 1.6 X wider than long, ca. 3.0 X wider than at apex; with straight lateral margins converging apicad; with three moderately long, acute apical processes, subequal in length. Antenna as in fig. 140. Proventriculus (as in figs. 94-95) with eight primary gnathal ridges; cutting edge of gnathal ridge in profile of subtriangular shape, rectangular; posteriad of each gnathal ridge with moderately large, denticulate pulvillus. Prothorax 0.90 X as long as wide; with deep subbasal constriction; sides rounded to apex; with shallow preapical constriction; disc dull to weakly shining, microreticulate, with sparse shallow punctures; behind preapical constriction at middle distinctly swollen; in lateral aspect with center of side densely deeply punctate. Metanotum without sutural spines, but with indistinct pair of bluntly angular projections; with pair of lateral lobes. Elytron at humerus simple; 2.23 X longer than wide; striae moderately impressed. Thoracic venter. Prepectus short, subequal to postpectus. Height of pterothorax 0.82 X length of elytron. Procoxa in anterior aspect 1.06 X as long as wide; with weak rectangular extension ventrolateral of articulation with trochanter. Legs. Profemur moderately swollen; strongly asymmetrically clavate; dorsal and ventral contours straight in basal third, continuing in convex line to apex; anterior contour subangulate, in weakly sinuate line to angulation at apical 0.28, continuing in straight line to apex; posterior contour weakly convex; ventral surface smooth, without protrusion. Protibia evenly curved ventrad; ventral surface crenulate, in basal half subglabrous, in apical half moderately densely setose with short setae; uncus in dorsal position, tibial apex ventrad of uncus obliquely truncate; anterior distal comb complete; posterior distal comb oblique, behind tarsal articulation, dorsally and ventrally shortened. Mesotibia subapically simple, without extension. Abdomen. Pygidium 0.89 X as long as wide; microreticulate; densely, moderately deeply punctate; sparsely setose with inconspicuous, long, recumbent setae. Venter with sparse suberect setae. Genitalia. Sternite VIII as in fig. 203; apex weakly bilobed, with moderately long setae; base concave. Tegminal plate (Fig. 172) with sides subparallel towards apex; apical edge broadly rounded, with dense long setae. Aedeagus. Apical scoop of pedon (Fig. 186) ca. 0.46 X as long as wide, evenly rounded. Tectum with well-sclerotized lateral frame converging with straight sides to truncate apex, medially hyaline. TA as in Fig. 163. Endophallus in apical portion without sclerite.

Paralectotype, female. Same as described male except: length, pronotum + elytron: 2.67 mm. Coloration of body lighter ferruginous. Head. As in fig. 125. Gena 0.67 X as long as width of head immediately behind eyes. Profile of vertex immediately behind eye weakly concave, towards base evenly convex. Rostrum 2.00 X as long as mouthparts; at widest point 1.39 X wider than at base. Profile of rostrum more slender, with dorsal and ventral contour basally subparallel, in apical half converging. Prothorax 0.87 X as long as wide. Elytron 2.15 X longer than wide. Height of pterothorax 0.86 X length of elytron. Procoxa in anterior aspect 0.98 X as long as wide. Legs. Profemur similar as in male, but shorter and stouter; ventral contour convex from base to apex. Protibia with dorsal contour evenly weakly convex; ventral contour sinuate, basally convex, apically concave; ventral surface crenulate, sparsely setose with subrecumbent setae; tibial apex with uncus in dorsal position; without premucro; anterior distal comb complete, ventrally passing base of uncus. Abdomen. Pygidium 0.92 X as long as wide. Setose patch of venter 1.11 X as long as wide, consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row. Genitalia. Ovipositor without styli. Sternite VIII as in fig. 215; apex subtruncate, laterally rounded; without apodeme. Spermatheca as in fig. 230, compact; with body weakly tapering apicad.

Intraspecific variation. Four geographical forms of uncertain taxonomic status can be distinguished, mainly based on different color patterns. It is possible that some of them belong to distinct, separate species. More material should be available for a comprehensive study, especially from Papua New Guinea.

Length, pronotum + elytron: 2.09-3.25 mm (n=67, $\bar{x}$=2.64 ± 0.25). Coloration. Shape, position and tint of pale elytral spot exhibiting considerable variation. Typical color form (from Mysol, Salawatti, Sorong, Wasior) with ovate to subrotund yellowish creamy colored spot, usually wider than long, rarely as wide as long, keeping distance to both elytral suture and to humerus. Specimens from Samboka rarely as in typical color form; more often spot smaller (on interval 3 to interval 6) and of darker ferruginous tint, or entirely absent. Elytral spot of Kiunga-specimens usually large, obliquely ovate, longer than wide, coming close to humerus and sometimes also to sutural interval. Elytral spot of Normanby-specimens of ferruginous tint limited to intervals 5 to 6, about twice as long as wide. Primary color of elytron in Samboka-form with blue lustre, as in typical form; in Kiunga-form bright metallic green; in Normanby-form dark ferruginous with violet lustre. Prothorax 0.85-0.96 X as long as wide (n=66, $\bar{x}$=0.89 ± 0.03); disc in typical form and in Samboka-form with subapical median swelling more distinct in larger specimens, rarely without distinct swelling in very small specimens; Kiunga- and Normanby-form always without such subapical swelling, even in larger specimens. Elytron 2.02-2.29 X longer than wide (n=66, $\bar{x}$=2.16 ± 0.05). Thoracic venter. Height of pterothorax 0.81-0.89 X length of elytron in males (n=31, $\bar{x}$=0.85 ± 0.02), 0.83-0.91 X length of elytron in females (n=35, $\bar{x}$=0.87 ± 0.02). Legs. Profemur of larger males more strongly swollen. Abdomen. Pygidium 0.98-1.11 X wider than long in males (n=21, $\bar{x}$=1.04 ± 0.05), 1.02-1.23 X wider than long in females (n=28, $\bar{x}$=1.10 ± 0.05). Female patch of modified setae 0.84-1.26 X as long as wide (n=32, $\bar{x}$=1.05 ± 0.10).

Euops, new species 16

Range. Jayapura Prov. (Lereh), East Sepik Prov. (Amok). Altitude: 165-300 m.

Material examined: IRIAN JAYA, Jayapura Prov.: 2 males, Lereh, 300-500 m, 26.I.1996, leg. A.Riedel (ARC). PAPUA NEW GUINEA, East Sepik Prov.: 1 male, Amok (N Maprik), 165 m, 6.I.1960, leg. T.C.Maa (BPBM).

Euops, new species 17

Range. Manokwari Prov. (Wandammen Bay). Altitude: ca. 580-950 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 2 males, 1 female, Wandammen Bay, Wondiwoi Mts., Wasior, 580-950 m, 3.I.2001, leg. A.Riedel (ARC).

Euops, new species 18

Range. Paniai Prov. (Epomani). Altitude: ca. 1350-1400 m.

Material examined: IRIAN JAYA, Paniai Prov.: 16 males, 16 female, Epomani, Ugida, Km 179, 1350-1400 m, 19-20.I.1996, leg. A.Riedel (ARC).

Euops, new species 19

Range. Manokwari Prov. (Wandammen Bay), Paniai Prov. (Nabire). Altitude: 700-750 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 2 males, 2 females, Wandammen Bay, Wondiwoi Mts., Wasior, 300-700 m, 14.I.2001, leg. A.Riedel (ARC); 1 male, Nabire, Topo, Pusppensaat, Km 54, 750 m, 20-21.XII.1995, leg. A.Riedel (ARC).

Euops, new species 20

Range. Sorong Prov. (Batanta Isl.), Paniai Prov. (Epomani), Japen-Waropen Prov. (Serui), Jayapura (Cyclops Mts.), Morobe Prov. (Wau), East New Britain Prov. (Keravat). Altitude: 135-1200 m.

Material examined: IRIAN JAYA, Sorong Prov.: 2 males, Batanta Isl., Waylebet, 100-250 m, 31.X.1996, leg. A.Riedel (ARC); Japen-Waropen Prov.: 1 male, 3 females, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 23.XII.2000, leg. A.Riedel (ARC); 2 females, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 25.XII.2000, leg. A.Riedel (ARC); Paniai Prov.: 2 males, Epomani, Km 145, 550-750 m, 15-16.I.1996, leg. A.Riedel (ARC); 1 male, Epomani, Km 169, 900-1100 m, 18.I.1996, leg. A.Riedel (ARC); Jayapura Prov.: 1 male, Cyclops Mts., Ifar, 300-500 m, 29.VI.1962, leg. J.L.Gressitt (BPBM). PAPUA NEW GUINEA, Morobe Prov.: 1 male, Wau, 1200-1300 m, 1-9.IX.1965, leg. J.Sedlacek (BPBM); East New Britain Prov.: 2 males, 1 female, Keravat, 135 m, 20-25.XI.1959, leg. T.C.Maa (BPBM).

Euops, new species 21

Range. Southern Highlands Prov. (L. Kutubu, Karimui), Morobe Prov. (Wau, Sattelberg), Central Prov. (Pt. Moresby). Altitude: 500-1200 m.

Material examined: PAPUA NEW GUINEA, Southern Highlands Prov.: 1 male, Karimui, 1080 m, 13.VII.1963, leg. J.Sedlacek (BPBM); Morobe Prov.: 1 male, Finschhafen, Sattelberg, 100-800 m, 18.X.1992, leg. A.Riedel (ARC); 1 male, Wau, McAdam Park, 1200-1300 m, 7.V.1965, leg. J.Sedlacek (BPBM); 1 male, Wau, 1050-1100 m, 15.XII.1961, leg. J., J.H. & M.Sedlacek & G.Monteith (BPBM); 1 male, Wau, Mt. Missim, 950-1300 m, 8-9.I.1966, leg. J.&M.Sedlacek (BPBM); Central Prov.: 1 male, Bisianumu, E of Pt. Moresby, 500 m, 8.VI.1955, leg. J.L.Gressitt (BPBM).

Euops, new species 22

Range. Central Prov. (Daradae Plain). Altitude: 500 m.

Material examined: PAPUA NEW GUINEA, Central Prov.: 2 males, Daradae Pl´n, 80 km N to Pt. Moresby, 500 m, sweeping, 6.IX.1959, leg. T.C.Maa (ARC).

3.1.2.6. The *papua*-group

Diagnosis. Relatively large body size, length of pronotum + elytron 3.20-6.10 mm. Proventriculus with gnathal ridges and densely setose pulvilli (Figs. 92-93). Elytron at humerus with more or less distinct denticle. Apex of female protibia (Figs.74-75) without premucro. Aedeagus as in fig. 152, TA vestigial. Setose patch of female venter consisting of four double rows of modified setae (Fig. 82). Ovipositor with styli (Fig. 155).

Euops jekelii **PASCOE, 1874**

Euops jekelii PASCOE, 1874: 29. Complete bibliography in appendix 1.

(Figs. 42, 126-127, 132, 143, 155, 175, 189, 202, 220, 231, 241)

Diagnosis. Coloration (Fig. 42) of elytron deep blue; base of prothorax and elytral humerus greenish golden. Head elongate, as in figs. 126-127, 132a. Elytron at humerus with denticle. Male: Sides of prothorax anteriorly with pair of long, obliquely ventroanteriad directed spines (Fig. 132b). TA vestigial, as in fig. 152. Female: Apex of protibia without premucro. Setose patch of venter consisting of four double rows of modified setae. Ovipositor with styli.

Range. Fig. 241. Manokwari Prov. (Kebar, Manokwari). Altitude: 550 m.

Type material. Lectotype, male (by present designation): IRIAN JAYA, Manokwari Prov., Manokwari; labels: 1) [white with red bordering, round] "Type" [printed] 2) [oval, blue] "Dorey" [handwritten] 3) [white with black bordering, rectangular] "*Euops jekelii* Pasc." 4) [white with blue bordering, round] "SYNTYPE" [printed] 5) [red, rectangular] "LECTOTYPUS, *Euops jekelii* Pascoe, det. A.Riedel 1995" [printed]. (BMNH). 1 Paralectotype, locality data same as lectotype (BMNH). Both specimens have been examined years ago, presently they are not at hand.

Other material examined: IRIAN JAYA: Manokwari Prov., 1 male, 1 female, Kebar Val., W. of Manokwari, 550 m, 4-31.I.1962, leg. S.Quate (BPBM).

Redescription.

Selected male specimen (Kebar). Length, pronotum + elytron: 4.60 mm. Coloration (Fig. 42) of elytron deep blue; base of prothorax, elytral humerus, mesothorax, metathorax, abdomen, mesofemur and metafemur greenish golden; remainder black with slight bluish lustre. Head. As in fig. 127, 132a. Gena 2.19 X as long as width of head immediately behind eyes. Vertex shining; smooth except row of wrinkles and pits bordering hind margin of eye radially arranged. Eyes in dorsal view markedly prominent from lateral contour of head, medially contiguous at middle of eye´s length. Profile of vertex evenly convex from behind eye to base. Ventral surface of head in front of gular region shining, with shallow transverse wrinkles, without median furrow. Rostrum 3.18 X as long as mouthparts; at widest point 1.51 X wider than at base; in cross section dorsally flat. Clypeus with median notch. Interantennal area with distinctly bisinuate lateral margins, behind antennal insertion with subparallel sides, anteriorly smoothly converging. Profile of rostrum with dorsal contour of interantennal area weakly projecting, rounded; anteriorly in straight line to apex; ventral contour sinuate, concave in basal half, convex in apical half; dorsal and ventral contour of rostrum basally weakly converging, in apical half rostrum swollen. Venter of rostrum confluent with venter of head, basally with pair of costae from behind margin of eye anteriad to level of antennal insertion where terminating with knob-like swellings; submentum slightly concave, anteriorly with very indistinct median knob, laterally edges somewhat vaulted ventrad. Mouthparts. Prementum at base 1.5 X wider than long, ca. 2.4 X wider than at apex; with straight lateral margins converging apicad, at base of lateral apical process becoming concave; with three moderately long, acute apical processes, median apical process slightly shorter than lateral processes. Antenna as in fig. 143. Proventriculus with eight primary gnathal ridges; cutting edge of gnathal ridge in profile rounded; posteriad of each gnathal ridge with cluster of dense setae. Prothorax (Fig. 132b) 0.99 X as long as wide; with deep subbasal constriction; sides in basal half rounded, in apical half converging in straight line; without preapical constriction; anteriorly sides with pair of long, obliquely ventroanteriad directed spines; disc shining, smooth except for sparse minute punctures. Metanotum with pair of long sutural spines; with pair of lateral lobes. Elytron at humerus with denticle; 2.04 X longer than wide; striae moderately impressed. Thoracic venter. Prepectus ca. 10 X as long as postpectus; profile in weakly convex line obliquely dorsad to apex. Height of pterothorax 0.86 X length of elytron. Procoxa in anterior aspect 1.22 X as long as wide. Legs. Profemur (Fig. 132c) weakly swollen; subsymmetrically clavate; with stalk in basal 0.39, its dorsal edge lined with denticles; dorsal and ventral contour in basal half straight, in apical half weakly convex; ventral surface smooth, without protrusion. Protibia in basal half straight, in apical half strongly curved ventrad; ventral surface smooth, microreticulate, in apical half with sparse very short suberect setae; uncus terminal; anterior distal comb complete; posterior distal comb oblique, behind tarsal articulation, dorsally and ventrally shortened. Mesotibia subapically with weak, dorsoposteriad directed, rounded lobe. Abdomen. Pygidium 1.02 X as long as wide; shining, basal half faintly microreticulate; moderately densely, shallowly punctate; subglabrous, apically with few inconspicuous suberect setae. Venter subglabrous, sternites IV-VI each with submedian pair of single stout erect seta. Genitalia. Sternite VIII as in fig. 202; apex truncate; in apical half laterally with sparse, long setae; base weakly bisinuate. Tegminal plate (Fig. 175) narrow, with sides converging apicad; apex pointed, with moderately long setae. Aedeagus as in Fig. 152. Apical scoop of pedon (Fig. 189) ca. 1.11 X as long as wide, with lateral margins converging in straight line, with apex rounded. Tectum evenly sclerotized, without lateral frame; lateral margins weakly convex, subparallel, apex subtruncate, weakly angulate. TA vestigial, as in Fig. 152b. Endophallus in apical portion without sclerite.

Selected female specimen (Kebar). Same as described male except: length, pronotum + elytron: 4.70 mm. Head. As in fig. 126. Gena 1.52 X as long as width of head immediately behind eyes. Rostrum 2.21 X as long as mouthparts; at widest point 1.36 X wider than at base. Profile of rostrum more robust, with dorsal and ventral contour basally subparallel, in apical half weakly swollen and contours converging to apex. Prothorax 0.90 X as long as wide; without spines. Elytron 2.14 X longer than wide. Height of pterothorax 0.87 X length of elytron. Procoxa in anterior aspect 1.03 X as long as wide. Legs. Profemur moderately swollen; weakly asymmetrically clavate; with stalk in basal 0.31; ventral contour in basal half straight, in apical half weakly convex; dorsal contour sinuate, in basal half concave, in apical half moderately convex. Protibia with dorsal contour markedly convex; ventral contour in basal half straight, in apical half concave; ventral surface in basal half and before apex denticulate, setose with short suberect setae; tibial apex with uncus in subdorsal position; without premucro; anterior distal comb complete, ventrally passing base of uncus. Mesotibia subapically simple, without extension. Abdomen. Pygidium 0.97 X as long as wide. Setose patch of venter 1.45 X as long as wide, consisting of four double rows of modified setae on sternite III-VI with each sternite bearing one double row. Genitalia. Ovipositor with styli (Fig. 155). Sternite VIII as in fig. 220; sides converging in straight line to subtruncate apex. Spermatheca as in fig. 231; with body moderately tapering apicad.

Euops papua **HELLER, 1914**

Euops papua HELLER, 1914: 653. Complete bibliography in appendix 1.

(Figs. 43, 128, 130, 142, 173, 188, 200, 241)

Diagnosis. Male: Head elongate, as in fig. 130a. Subbasal constriction of prothorax medially interrupted by swelling extending from disc posteriad. Elytron at humerus with minute denticle. Sides of prothorax anteriorly with pair of blunt swellings (Fig. 130b). TA vestigial, as in fig. 152.

Range. Fig. 241. Merauke Prov. (Lorentz Riv.). Altitude: ca. 250 m.

Type material. Lectotype, male (by present designation): IRIAN JAYA: Merauke Prov., Lorentz Riv., Alkmaar, [ca. 250 m]; labels: 1) [red, rectangular] "Typus!" [printed] "*papua*" [handwritten] 2) "Z. NieuwGuinea, Lorentz 1909-10, Alkmaar [printed] "III.10" [handwritten] 3) "Staatl. Museum für Tierkunde, Dresden" [printed] 4) [red, rectangular] "LECTOTYPUS, *Euops papua* Heller, det. A.Riedel 1995" [printed] (SMTD). Paralectotypes: 1 male, 1 female, Alkmaar; labels: 1) "Z. NieuwGuinea, Lorentz 1909-10, Alkmaar, XI.09", 2) "142" 3) "*Euops papua* m., Det. K.M. Heller 1912" (ZMUA).

Redescription.

Lectotype, male. Length, pronotum + elytron: 4.92 mm. Coloration (Fig. 43) black with slight bluish lustre; elytron with more distinct violet bluish lustre; anterior surfaces of coxae greenish golden. Head. As in fig. 130a. Gena 1.85 X as long as width of head immediately behind eyes. Vertex shining; smooth except row of wrinkles and pits bordering hind margin of eye radially arranged. Eyes in dorsal view markedly prominent from lateral contour of head, medially contiguous at middle of eye´s length. Profile of vertex evenly convex from behind eye to base. Ventral surface of head in front of gular region shining, with shallow transverse wrinkles, without median furrow. Rostrum 4.71 X as long as mouthparts; at widest point 1.47 X wider than at base; in cross section dorsally flat. Clypeus with median notch. Interantennal area with distinctly bisinuate lateral margins, behind antennal insertion with subparallel sides, anteriorly smoothly converging. Profile of rostrum with dorsal contour of interantennal area weakly projecting, rounded; anteriorly in straight line to apex; ventral contour weakly concave to apex; dorsal and ventral contour of rostrum subparallel from base to apex. Venter of rostrum confluent with venter of head, basally with pair of costae from behind margin of eye anteriad to level of antennal insertion where terminating with knob-like swellings; submentum flat, anteriorly with very indistinct median knob, laterally edges somewhat vaulted ventrad. Mouthparts. Prementum at base 1.7 X wider than long, ca. 2.4 X wider than at apex; lateral margins markedly sinuate, basally converging in straight line, at one third from apex markedly concave; with three moderately long, acute apical processes, median apical process slightly shorter than lateral processes. Antenna as in fig. 142. Proventriculus with eight primary gnathal ridges; cutting edge of gnathal ridge in profile rounded; posteriad of each gnathal ridge with cluster of dense setae. Prothorax (Fig. 130b) 0.99 X as long as wide; with deep subbasal constriction medially interrupted by swelling extending from disc posteriad; sides basally rounded, in apical third converging in straight line; without preapical constriction; anteriorly sides with pair of blunt swellings, without spines; disc dull, microreticulate. Metanotum with pair of long sutural spines; with pair of lateral lobes. Elytron at humerus with minute denticle; 2.21 X longer than wide; striae deeply impressed. Thoracic venter. Prepectus ca. 10 X as long as postpectus; profile in straight line obliquely dorsad to apex. Height of pterothorax 0.83 X length of elytron. Procoxa in anterior aspect 1.27 X as long as wide. Legs. Profemur (Fig. 130c) weakly swollen; subsymmetrically clavate; with stalk in basal 0.37; ventral contour weakly convex; dorsal contour in basal half straight, in apical half weakly convex; ventral surface smooth, without protrusion. Protibia in basal half straight, in apical half weakly curved ventrad; ventral surface sparsely weakly denticulate, in basal half subglabrous, in apical half moderately densely setose with short suberect setae; uncus terminal; anterior distal comb complete; posterior distal comb oblique, behind tarsal articulation, dorsally and ventrally shortened. Mesotibia subapically with weak, dorsoposteriad directed, rounded lobe. Abdomen. Pygidium 0.95 X as long as wide; shining, basally faintly microreticulate; sparsely, shallowly punctate; subglabrous, with very sparse inconspicuous recumbent setae. Venter subglabrous, sternites IV-VI each with submedian pair of small clusters of stout erect seta. Genitalia. Sternite VIII as in fig. 200; apex broadly, weakly concave; in apical half laterally with dense long setae; base weakly concave. Tegminal plate (Fig. 173) with sides converging apicad; apex pointed, with moderately long setae. Aedeagus. Apical scoop of pedon (Fig. 188) ca. 1.32 X as long as wide, with lateral margins converging in straight line, with apex subangulate. Tectum evenly sclerotized, without lateral frame; lateral margins convex, converging to rounded apex. TA vestigial, as in Fig. 152. Endophallus in apical portion without sclerite.

Remark: the two specimens in ZMUA were examined in 1997 and could not be compared with the lectotype. By the present designation they are automatically deemed to be paralectotypes. Since they were not collected together with the lectotype as indicated by the different date on their label, some caution should be taken if they really belong to *E. papua* HELLER.

Euops vossi **HELLER, 1929**

Euops vossi HELLER, 1929: 111. Complete bibliography in appendix 1.

(Figs. 44, 129, 131, 141, 174, 187, 201, 241)

Diagnosis. Head elongate, as in figs. 131a; submentum with shovel-like protrusion. Elytron (Fig. 44) at humerus with small spine. Male: Sides of prothorax anteriorly with pair of long, obliquely lateroanteriad directed spines (Fig. 131b). TA vestigial, as in fig. 152.

Range. Fig. 241. Maluku Selatan Prov. (Buru, Ambon). Altitude: ca. 716-823 m.

Type material. Lectotype, male (by present designation): MOLUKKEN: Buru, Rana, 716-823 m; labels: 1) [red, rectangular] "*vossi*" [handwritten] typus! [printed] 2) [white, rectangular] "L.J.TOXOPEUS, Buru, Station 9, 26.IV-1.VI'21" [printed] 3) [blue, rectangular] "1927 [printed] 35 [handwritten]" 4) [white, rectangular] "Staatl. Museum für Tierkunde, Dresden" [printed] 5) [red, rectangular] "HOLOTYPUS, *Euops vossi* Heller, det. A.Riedel 1995" [printed] (SMTD).

Other material examined: MOLUKKEN, Ambon. 1 male; labels: 1) [white with yellow transverse line, rectangular] "Amboyna, Wallace." [printed] 2) [white, round] "Amb." [handwritten] 3) [white, rectangular] "Pascoe Coll. 93-60." [printed] (BMNH) [presumably paralectotype of *E. jekelii* PASCOE].

Redescription.

Lectotype, male. Length, pronotum + elytron: 4.10 mm. Coloration (Fig. 44) of legs and elytron deep ferruginous, with bronze lustre; antenna ferruginous, club black; remainder black. Head. As in fig. 131a. Gena 1.79 X as long as width of head immediately behind eyes. Vertex shining; smooth except row of wrinkles and pits bordering hind margin of eye radially arranged. Eyes in dorsal view markedly prominent from lateral contour of head, medially contiguous at middle of eye´s length. Profile of vertex evenly convex from behind eye to base. Ventral surface of head in front of gular region shining except anteriorly weakly microreticulate, with shallow transverse wrinkles, without median furrow. Rostrum 3.71 X as long as mouthparts; at widest point 1.37 X wider than at base; in cross section dorsally weakly rounded. Clypeus with median notch. Interantennal area with distinctly bisinuate lateral margins, behind antennal insertion with marked constriction, anteriorly with almost straight sides converging. Profile of rostrum with dorsal contour of interantennal area weakly projecting, rounded; anteriorly in weakly sinuate line to apex; ventral contour in basal half weakly concave, in apical half shovel-like protrusion of submentum markedly projecting; dorsal and ventral contour of rostrum basally weakly converging, in apical half rostrum swollen. Venter of rostrum confluent with venter of head, basally with pair of costae from behind margin of eye anteriad to level of antennal insertion where terminating with knob-like swellings; submentum with transverse, flattened process; this process ca. as long as wide, anteriorly bifid, directed ventroapicad, in lateral view slightly curved. Mouthparts. Prementum at base 1.5 X wider than long, ca. 2.2 X wider than at apex; with weakly sinuate lateral margins converging apicad, in front of middle convex, at base and apex concave; with three moderately long, acute apical processes, median apical process slightly shorter than lateral processes. Antenna as in fig. 141. Proventriculus with eight primary gnathal ridges; cutting edge of gnathal ridge in profile rounded; posteriad of each gnathal ridge with cluster of dense setae. Prothorax (Fig. 131b) 0.93 X as long as wide; with deep subbasal constriction; sides in basal half rounded, in apical half converging in straight line; without preapical constriction; anteriorly sides with pair of long, obliquely lateroanteriad directed spines; disc dull, microreticulate; anterior margin weakly, broadly emarginate, medially forming angle of ca. 150°. Metanotum with pair of short sutural spines; with pair of lateral lobes. Elytron at humerus with small spine; contour in convex line from base of humerus to apex of spine; 2.23 X longer than wide; striae moderately impressed. Thoracic venter. Prepectus ca. 10 X as long as postpectus; profile in weakly convex line obliquely dorsad to apex. Height of pterothorax 0.78 X length of elytron. Procoxa in anterior aspect 1.22 X as long as wide; ventrally weakly conically tapering (in other species broadly rounded). Legs. Profemur (Fig. 131c) weakly swollen; subsymmetrically clavate; ventral contour weakly convex; dorsal contour in basal half straight, in apical half weakly convex; ventral surface smooth, without protrusion. Protibia evenly curved ventrad; ventral surface, in basal half subglabrous and smooth, in apical half weakly denticulate and sparsely setose with short suberect setae; uncus terminal; anterior distal comb dorsally somewhat shortened; posterior distal comb shortened, behind tarsal articulation, weakly curved, almost parallel to tibial axis. Mesotibia subapically with trace of dorsoposteriad directed, rounded lobe. Abdomen. Pygidium 0.93 X as long as wide; shining, basal half faintly microreticulate; almost impunctate, apically with sparse, minute punctures; subglabrous, apically with few inconspicuous suberect setae. Venter subglabrous, sternites IV-VI each with submedian pair of single stout erect seta. Genitalia. Sternite VIII as in fig. 201; apex broadly, weakly concave; in apical third laterally with long setae; base weakly concave. Tegminal plate (Fig. 174) narrow, with sides converging apicad; apex pointed, with moderately long setae. Aedeagus. Apical scoop of pedon (Fig. 187) ca. 1.53 X as long as wide, with lateral margins subparallel, with apex rounded. Tectum evenly sclerotized, without lateral frame; lateral margins weakly convex, subparallel, apex truncate. TA vestigial, as in Fig. 152. Endophallus in apical portion without sclerite.

Euops, new species 23

Range. Madang Prov. (Adelbert Mts.), Morobe Prov. (Wau, Watut, Bulolo, Garaina), Oro Prov. (Kokoda), Central Prov. (Tapini). Altitude: 500-1700 m.

Material examined: PAPUA NEW GUINEA, Madang Prov.: 1 male, Adelbert Mts., Wanuma, 800-1000 m, 23.X.1958, leg. J.L.Gressitt (BPBM); Morobe Prov.: 1 male, 1 female, Wau, Mt. Missim, 1300 m, II.1974, leg. Sedlacek (ARC); 1 female, Wau, 1100 m, 29.VIII.1961, leg. J.&J.H.Sedlacek (BPBM); 1 female, Wau, 1200 m, 1.II.1966, leg. J.&M.Sedlacek (BPBM); 1 female, Wau, 1100 m, 22.X.1961, leg. J.Sedlacek (BPBM); 1 male, Wau, 1250 m, 9.VIII., leg. J.&M.Sedlacek (BPBM); 1 female, Wau, 1000 m, 23.II.1963, leg. H.W.Clissold (BPBM); 1 female, Wau, 1000 m, 1.III.1963, leg. H.W.Clissold (BPBM); 1 female, Wau, 1090 m, 25.I.1963, leg. J.Sedlacek (BPBM); 1 male, Wau, 1220-1250 m, 19.VIII.1964, leg. J.Sedlacek (BPBM); 1 female, Wau, 1250-1800 m, 12.IX.1965, leg. J.&M.Sedlacek (BPBM); 3 males, Wau, 1300 m, XI.1965, leg. P.Shanahan (BPBM); 1 female, Wau, Big Wau Ck., 1300 m, XI.1965, leg. P.Shanahan (BPBM); 1 male, Wau, 1200 m, 7.I.1966, leg. L.&M.Gressitt (BPBM); 1 female, Wau, Bulolo R., 900-1100 m, 25.IX.1965, leg. J.Sedlacek (BPBM); 1 female, Bulolo R., 1130 m, 17.?.1969, leg. A.B.Mirza (BPBM); 1 male, 1 female, Wau, Kujeru, 1500 m, 27.IX.1969, leg. Abid Beg Mirza (BPBM); 1 female, Wau, 1180 m, "BMF 491", 25.XII.1969, leg. J.Sedlacek (BPBM); 1 male, 1 female, Wau, 1200 m, "On Avocado, *Persea americana*", 23.XI.1978, leg. W.C.Gagne (BPBM); 2 males, Wau, 1200 m, 12.XI.1961, leg. J.Sedlacek (BPBM); 1 female, Bulolo, 700 m, 26.XI.1969, leg. J.&M.Sedlacek (BPBM); 1 female, Wau, Mt. Missim, 1100 m, 17.I.1963, leg. H.W.Clissold (BPBM); 3 males, Wau, Mt. Missim, 880-1050 m, 8-9.II.1963, leg. J.Sedlacek (BPBM); 1 male, 1 female, Wau, Bulolo R., 900-1100 m, 25.IX.1965, leg. J.Sedlacek (BPBM); 1 male, Bulolo R., 850 m, 12.I.1965, leg. J.&M.Sedlacek (BPBM); 1 female, Wau, 1200 m, 3.XII.1961, leg. J., M. & J.H.Sedlacek (BPBM); 1 female, Engabena, Watut - Aseki, 1700 m, 14.IV.1974, "# 18", leg. J.L.Gressitt (BPBM); 2 males, 2 females, Bulolo, 750 m, 5.X.1965, leg. J.Sedlacek (BPBM); 1 female, Bulolo, 700 m, 7.XI.1962, leg. J.&M.Sedlacek (BPBM); 1 male, 1 female, Upper Watut R., 24 km W Bulolo, 760 m, 5-6.III.1963, leg. J.Sedlacek (BPBM); 1 female, Wau, 1200 m, 29.VI.1961, leg. J.Sedlacek (BPBM); 1 female, Mt. Kaindi, 2350 m, leg. Tawi (BPBM); 1 male, Wau, 1200 m, 7.II.1966, leg. J.&M.Sedlacek (BPBM); 1 female, Wau, 1100 m, 4.X., leg. J.&M.Sedlacek (BPBM); 1 female, Wau, 1250 m, 9.VIII.1961, leg. J. Sedlacek (BPBM); 1 male, Wau, Wau Ecology Institute, 1150 m, II.1998, leg. A.Riedel (ARC); 1 male, Garaina, Saureli, 9-1400 m, 5.I.1968, leg. J.&M.Sedlacek (BPBM); 1 female, Garaina, 800 m, 16.I.1968, leg. J.&M.Sedlacek (BPBM); 1 female, Garaina, 20.XI.-17.XII.1969, leg. W.M.Hutton (BPBM); Central Prov.: 1 male, Tapini, 800-1000 m, XI.1968, leg. N.L.H.Krauss (BPBM); Oro Prov.: 1 male, Keparra-Sengi, Nr. Kokoda, 500 m, "Sago palm", 26.III.1956, leg. J.L.Gressitt (BPBM).

Euops, new species 24

Range. Central Prov. (Goilala). Altitude: ca. 800 m.

Material examined: PAPUA NEW GUINEA, Central Prov.: 1 male, 2 females, Owen Stanley Range, Goilala, Loloipa, [ca. 800 m], 1-15.II.1958, leg. W.W.Brandt (BPBM).

Euops, new species 25

Range. Japen-Waropen Prov. (Serui), Western Highlands Prov. (Jimmi V.). Altitude: 450-840 m.

Material examined: IRIAN JAYA, Japen-Waropen Prov.: 4 males, 8 females, Serui, Mantembu, 300-800 m, 6-9.IX.1991, leg. A.Riedel (ARC); 2 males, Serui, Mantembu, 150-450 m, 18.II.1999, leg. A.Riedel (ARC); Western Highlands Prov.: 1 male, Wum, Upper Jimmi V., 840 m, 18.VII.1955, leg. J.L.Gressitt (BPBM).

Euops, new species 26

Range. Manokwari Prov. (Wandammen Bay), Jayawijaya Prov. (Borme, Samboka), Sandaun Prov. (Mianmin), East Sepik Prov. (Torricelli Mts.). Altitude: 200-1000 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 1 male, Wandammen Bay, Wasior, DMP logging camp, Km 38, Sararti, S 03° 05´ E 134° 27´, 100-200 m, 7-9.I.2001, leg. A.Riedel (ARC); Jayawijaya Prov.: 1 male, Borme, trail to Omban, 1000-1300 m, 3.IX.1993, leg. A.Riedel (ARC); 2 males, Samboka, Upper Kolff River, ca. 200 m, 10-14.X.1996, leg. A.Riedel (ARC); PAPUA NEW GUINEA, Sandaun Prov.: 1 male, N Mianmin, 700-1100 m, 20.V.1998, leg. A.Riedel (ARC); East Sepik Prov.: 1 male, Nengian Vill., Torricelli Mts, 17-24.XI.1958, leg. W.W.Brandt (BPBM); 1 male, 1 female, Mobitei, Torricelli Mts, 750 m, 16-22.IV.1959, leg. W.W.Brandt (BPBM).

Euops, new species 27

Range. Sandaun Prov. (Vanimo), Morobe Prov. (Lae). Altitude: 100-500 m.

Material examined: PAPUA NEW GUINEA, Sandaun Prov.: 1 male, 1 female, Denake Range, Vanimo, Km 12, 500 m, 28-29.X.1992, leg. A.Riedel (ARC); Morobe Prov.: 1 male, Busu Riv., E of Lae, 100 m, 15.IX.1955, leg. J.L.Gressitt (BPBM).

Euops, new species 28

Range. Solomon Is. (Bougainville). Altitude: 150 m.

Material examined: PAPUA NEW GUINEA, Bougainville Prov.: 1 male, Bougainville Isl., Kukugai Vill., 150 m, X.1960, leg. W.W.Brandt (BPBM).

Euops, new species 29

Range. Solomon Is. (San Cristoval). Altitude: ca. 656 m.

Material examined: SOLOMON ISLANDS: 1 male, San Cristoval Isl., Wugiroga, [ca. 656 m], 8.VIII.1960, leg. C.W.O´Brien (BPBM).

Euops, new species 30

Range. Southern Highlands Prov. (Mt. Karimui). Altitude: 1000-1080 m.

Material examined: PAPUA NEW GUINEA, Southern Highlands Prov.: 1 male, Karimui, "Malaise trap" 4.VI.1961, leg. J.L.Gressitt (BPBM); 1 male, 4 females, Karimui, 1000 m, 6.VI.1961, leg. J.L.&M.Gressitt (BPBM); 1 male, 1 female, Karimui, 3.VI.1963, leg. J.L.Gressitt (BPBM); 7 males, 5 females, Karimui, 1080 m, 8-10.VII.1963, leg. J.Sedlacek (BPBM); 5 males, Karimui, 1080 m, 13.VII.1963, leg. J.Sedlacek (BPBM); 2 males, 1 female, Karimui, 1080 m, 11-12.VII.1963, leg. J.Sedlacek (BPBM); 1 male, 1 female, Karimui, 1080 m, 14-15.VII.1963, leg. J.Sedlacek (BPBM).

Euops, new species 31

Range. Jayawijaya Prov. (Dekai, Samboka), Western Prov. (Kiunga). Altitude: 14-200 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 3 males, Dekai, Brazza River, ca. 100 m, 21-22.VI.1994, leg.A.Riedel (ARC); 1 male, Samboka, Upper Kolff River, ca. 200 m, 10-14.X.1996, leg. A.Riedel (ARC); PAPUA NEW GUINEA, Western Prov.: 1 male, Kiunga, Fly River, [14 m], 9-14.X.1957, leg. W.W.Brandt (BPBM).

Euops, new species 32

Range. Biak-Numfor Prov. (Biak Isl.). Altitude: ca. 100-150 m.

Material examined: IRIAN JAYA, Biak-Numfor Prov.: 9 males, 15 females, Biak Isl., Korim, Nernu, 100-150 m, 12-14.XII.2000, leg.A.Riedel (ARC); 4 males, 3 females, Biak Isl., Korim, Nernu, 100-150 m, 1.II.2001, leg.A.Riedel (ARC); 4 males, 1 female, Biak Isl., Korim, Nernu, 100-150 m, 4.II.2001, leg.A.Riedel (ARC); 1 female, Biak Isl., Korim, Workar -Wari, 50-100 m, 14.XII.2000, leg.A.Riedel (ARC).

Euops, new species 33

Range. Paniai Prov. (Enarotali, Kamo Vall., Bilogay), Jayawijaya Prov. (Bommela), Jayapura Prov. (Waris). Altitude: 1700-2100 m.

Material examined: IRIAN JAYA, Paniai Prov.: 1 male, Enarotadi, 1850-1900 m, 4.VIII.1962, leg. J.Sedlacek (BPBM); 1 female, Enarotadi, 1850 m, 4.VIII.1962, leg. J.Sedlacek (BPBM); 1 male, 1 female, Itouda, Kamo Vall., 1500-1700 m, 18.VIII.1962, leg. J.Sedlacek (BPBM); 2 males, 1 female, Bilogay, ca. 2100-2200 m, 22-24.XII.1995, leg. A.Riedel (ARC); 1 female, Bilogay, ca. 2100-2200 m, 25.XII.1995, leg.A.Riedel (ARC); 1 male, Bilogay - Bilai, ca. 2100-2300 m, 1.I.1996, leg. A.Riedel (ARC); Jayawijaya Prov.: 5 males, 2 females, Bommela, ca. 1750 m, 30.VIII.-1.IX.1992, leg. A.Riedel (ARC); Jayapura Prov.: 1 male, Hollandia [Jayapura], VII.1938, leg. L.J.Toxopeus (NNML); 1 male, Waris, S of Hollandia, light trap, 4.VIII.1959, leg. T.C.Maa (BPBM).

Note: the specimens from Waris and Jayapura exhibit some differences (*e. g.* in the shape of the head) which could indicate that they belong to a separate species. More material should be examined for making a decision.

Euops, new species 34

Range. Biak-Numfor Prov. (Biak Isl.). Altitude: ca. 100-150 m.

Material examined: IRIAN JAYA, Biak-Numfor Prov.: 1 male, Biak Isl., 3 km S Korim Wouna, 100 m, 21-22.IV.1993, leg. A.Riedel (ARC); 1 female, Biak Isl., Korim, Workar - Wari, 50-100 m, 14.XII.2000, leg.A.Riedel (ARC); 2 female, Biak Isl., Korim, Nernu, 50-100 m, 12-14.XII.2000, leg.A.Riedel (ARC); 21 males, 10 females, Biak Isl., Korim, Nernu, 100-150 m, 1.II.2001, leg.A.Riedel (ARC); 2 males, 6 females, Biak Isl., Korim, Nernu, 100-150 m, 4.II.2001, leg.A.Riedel (ARC); 6 males, 3 females, Biak Isl., Korim, Nernu, 100-150 m, 4.II.2001, leg.A.Riedel (ARC).

Euops, new species 35

Range. Japen-Waropen Prov. (Wapoga Riv.), Western Prov. (Oriomo Riv., Morehead, Ruka, Tali, Kiunga). Altitude: ca. 3-100 m.

Material examined: IRIAN JAYA, Japen-Waropen Prov.: 1 male, 1 female, Wapoga Riv., Kwadewa, logging road, Km 80, ca. 100 m, 1-2.III.1999, leg. A.Riedel (ARC); PAPUA NEW GUINEA, Western Prov.: 1 male, 1 female, Oriomo Govt. Sta., 26-28.X.1960, leg. J.L.Gressitt (BPBM); 2 males, 1 female, Oriomo Riv., 3 m, 6.VIII.1964, leg. H.Clissold (BPBM); 1 male, 2 females, Moorhead, 18 m, 6.VII.1964, leg. H.Clissold (BPBM); 1 male, 1 female, Moorhead, 18 m, 14.VII.1964, leg. H.Clissold (BPBM); 2 males, 1 female, Ruka, 9 m, 12.VIII.1964, leg. H.Clissold (BPBM); 1 male, Tala, 3.VII.1964, leg. H.Clissold (BPBM); 1 male, Kiunga, Fly River, 14-17.VIII.1957, leg. W.W.Brandt (BPBM).

Euops, new species 36

Range. Japen-Waropen Prov. (Serui). Altitude: ca. 500-700 m.

Material examined: IRIAN JAYA, Japen-Waropen Prov.: 3 males, 1 female, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 23.III.2000, leg. A.Riedel (ARC); 1 male, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 26.XII.2000, leg. A.Riedel (ARC); 1 male, Japen Isl., Serui, Mantembu, 100-500 m, 16.XII.2000, leg. A.Riedel (ARC); 1 male, Japen Isl., Serui, Mantembu, trail to Ambaidiru, 700-1150 m, 7-9.XI.1991, leg. A.Riedel (ARC).

Euops, new species 37

Range. Southern Highlands Prov. (Mt. Giluwe), Chimu Prov. (Chimbu Vall.), Western Highlands Prov. (Tomba), Morobe Prov. (Saidor, Wau, Engabena, Aseki). Altitude: 1650-2100 m.

Material examined: PAPUA NEW GUINEA, Southern Highlands Prov.: 5 males, Dimifa, SE of Mt.Giluwe, 12.X.1958, leg. J.L.Gressitt (BPBM); Chimu Prov.: 1 male, Chimbu Vall., 1800 m, 16.V.1963, leg. J.Sedlacek (BPBM); Western Highlands Prov.: 1 male, Hagen - Mendi road, Tomba, 3.VI.1974, leg. J.Stibick (CWOB); Morobe Prov.: 2 males, Wau, 1700 m, 7.II.1963, leg. J.Sedlacek (BPBM); 1 male, Mt. Missim, 2100 m, 15.III.1968, leg. P.Colman (BPBM); 1 male, Engabena, 1800 m, 28-30.XI.1974, leg. R & Petrus (BPBM); 6 males, Aseki, 1500-1650 m, 14.X.1992, leg. A.Riedel (ARC); 1 male, Saidor, Kiambavi Vill., Finisterre Range, [ca. 1500 m,] 1-28.VIII.1958, leg. W.W.Brandt (BPBM).

Note: the specimens from Chimbu- and Western highlands province exhibit some differences in coloration which could indicate that they belongs to a separate species. More material should be examined for a decision.

Euops papua-group

Unidentified material at hand: 55 female specimens from New Guinea.

3.1.2.7. The *pygmaeus*-group

Diagnosis. Prementum with two apical teeth. Rostrum spatulate. Maxilla with ventral suture fused between galea and palpifer. Eyes dorsally distinctly separated at middle. Pronotum usually transversely rugose, rarely smooth or punctate. Apex of female protibia in the smaller species with premucro.

See Appendix 3.

Euops singularis VOSS, 1924: 12

See Appendix 3.

Euops parvus RIEDEL, 2001a

See Appendix 3.

Euops porulosus RIEDEL, 2001a

See Appendix 3.

Euops convexus RIEDEL, 2001a

See Appendix 3.

Euops paraconvexus RIEDEL, 2001a

See Appendix 3.

Euops ibelensis RIEDEL, 2001a

See Appendix 3.

Euops fraterculus RIEDEL, 2001a

See Appendix 3.

Euops platyrostris RIEDEL, 2001a

See Appendix 3.

Euops sedlaceki RIEDEL, 2001a

See Appendix 3.

Euops nothofagi RIEDEL, 2001a

See Appendix 3.

Euops bicolor RIEDEL, 2001a

See Appendix 3.

Euops anggiensis RIEDEL, 2001a

See Appendix 3.

Euops kurulu RIEDEL, 2001a

See Appendix 3.

Euops pygmaeus RIEDEL, 2001a

See Appendix 3.

3.1.2.8. The *quadrifasciculatus*-group

Diagnosis. Small body size, length of pronotum + elytron 1.56-2.97 mm. Prementum with two apical teeth. Rostrum spatulate. Pronotum usually transversely rugose, rarely smooth. Eyes large, dorsally contiguous or subcontiguous. Male abdominal venter with sternites V-VI each with pair of sublateral brushes of stout erect setae (except in *E. reidi*), usually placed on distinct longitudinal protuberances bordering median glabrous depression.

See Appendix 4.

Euops insularis VOSS, 1933a

See Appendix 4.

Euops micros RIEDEL, 2001b

See Appendix 4.

Euops lakekamuensis RIEDEL, 2001b

See Appendix 4.

Euops goilala RIEDEL, 2001b

See Appendix 4.

3.1.2.9. The *simulans*-group

Diagnosis. In some species body relatively large, pronotum + elytron: 2.09-5.10 mm. Proventriculus with gnathal ridges and setose or denticulate pulvilli. Apex of female protibia with premucro. Tegminal plate with apical edge wide, densely setose; medially with short setae, laterally with much longer ones. Usually TA with fold-out struts. Female setose patch of venter consisting of three double rows of modified setae, plus one simple row of modified or nonmodified setae.

See Appendix 5.

Euops buergersi Voss, 1924

See Appendix 5.

Euops mysolensis VOSS, 1924

See Appendix 5.

Additional material examined: IRIAN JAYA, Manokwari Prov.: 1 male, 1 female, Wandammen Bay, Wondiwoi Mts., Wasior, 250-600 m, 4.I.2001, leg. A.Riedel (ARC); Paniai Prov.: 2 males, 4 females, Nabire, Topo, Km 54, Pusppenssat, 20-21.XII.1995, leg. A.Riedel (ARC).

Euops, new species 38

Material examined: IRIAN JAYA, Jayawijaya Prov.: 1 male, Borme (to Omban), 1000-1300 m, 3.IX.1993, leg. A.Riedel (ARC).

Euops balkei RIEDEL, 2001c

See Appendix 5.

Euops, new species 39

Material examined: IRIAN JAYA, Jayawijaya Prov.: 1 male, Emdoman, 900-1200 m, 29.IX.1993, leg. A.Riedel (ARC); 1 female, Emdoman, 800-1200 m, 14-15.IX.1992, leg. A.Riedel (ARC).

Euops japensis RIEDEL, 2001c

See Appendix 5.

Euops, new species 40

Material examined: Biak-Numfor Prov.: 1 male, Biak Isl., Korim, Nernu, 100-150 m, 4.II.2001, leg. A.Riedel (ARC); 3 females, Biak Isl., Korim, Nernu, 100-150 m, 12-14.XII.2000, leg. A.Riedel (ARC).

Euops lobipes RIEDEL, 2001c

See Appendix 5.

Euops wallacei SHARP, 1889

See Appendix 5.

Euops kutubu RIEDEL, 2001c

See Appendix 5.

Euops wei RIEDEL, 2001c

See Appendix 5.

Additional material examined: PAPUA NEW GUINEA, Morobe Prov.: 1 female, Wau, 1100 m, 26.X.1961, leg. J.Sedlacek (BPBM); 1 female, Wau, 1100 m, 29.VIII.1961, leg. J.&M.Sedlacek (BPBM); 1 female, Wau, 1050 m, 30.IV.1962, leg. J.Sedlacek (BPBM); 1 female, Bulolo, 770 m, 14.VIII.1956, leg. E.J.Ford jr. (BPBM).

Euops, new species 41

Material examined: IRIAN JAYA, Japen-Waropen Prov.: 1 male, Japen Island, Serui, Mantembu, 150-450 m, 18.II.1999, leg. A.Riedel (ARC).

Euops kukukuku RIEDEL, 2001c

See Appendix 5.

Additional material examined: PAPUA NEW GUINEA, Western Highlands Prov.: 1 male, Korop, Upper Jimmi V., 1300 m, 12.VII.1955, leg. J.L.Gressitt (BPBM).

Euops batantae RIEDEL, 2001c

See Appendix 5.

Additional material examined: IRIAN JAYA, Sorong Prov.: 1 female, Batanta Isl., Waylebet, 100-250 m, 31.X.1996, leg. A.Riedel (ARC).

Euops cyclopensis RIEDEL, 2001c

See Appendix 5.

Euops, new species 42

Material examined: PAPUA NEW GUINEA, (East ?) New Britain Prov.: 1 male, Gisiluve, Nakanai Mts., 1050 m, 25-27.VII.1956, leg. E.J.Ford jr. (BPBM).

Euops reticulatus RIEDEL, 2001c

See Appendix 5.

Euops, new species 43

Material examined: IRIAN JAYA, Japen-Waropen Prov.: 1 male, Japen Island, Serui, Mantembu, 150-450 m, 18.II.1999, leg. A.Riedel (ARC).

Euops deceptus RIEDEL, 2001c

See Appendix 5.

Euops vulgaris RIEDEL, 2001c

See Appendix 5.

Euops asekianus RIEDEL, 2001c

See Appendix 5.

Additional material examined: PAPUA NEW GUINEA, Eastern Highlands Prov., 1 male, Aiyura, 14.II.1978, "*Prunus*", J.L.Gressitt (BPBM); 2 males, 10 km NE of Lufa, 1800-2100 m, 21.I.1966, leg. J.&M.Sedlacek (BPBM); Morobe Prov.: 1 male, Garaina, 800 m, 16.I.1968, Malaise trap, leg. J.&M.Sedlacek (BPBM); Central Prov.: 1 male, Mt. St. Mary, 1900 m, 8-14.VII.1968, leg. Mena (BPBM); 1 female, Mt. St. Mary, 1900 m, 22-31.VII.1968, leg. Mena (BPBM); 1 male, Guari, 1900-2100 m, X.1968, leg. N.L.H.Krauss (BPBM).

Euops simulans RIEDEL, 2001c

See Appendix 5.

Additional material examined: IRIAN JAYA, Jayawijaya Prov.: 1 male, Emdoman, 1300-1400 m, 13.IX.1992, leg. A.Riedel (ARC); 1 male, Emdoman, 1400-1550 m, 13.IX.1992, leg. A. Riedel (ARC); 1 male, Membaham (near Kosarek), 1500-1800 m, 23.IX.1991, leg. A.Riedel (ARC).

Euops angulithorax RIEDEL, 2001c

See Appendix 5.

Additional material examined: IRIAN JAYA, Manokwari Prov.: 1 male, Meydoudga (W Testega), 1200-1400 m, 5.IV.1993, leg. A.Riedel (ARC); 3 males, 1 female, Wandammen Bay, Wondiwoi Mts., Wasior, 580-950 m, 3.I.2001, leg. A.Riedel (ARC); 7 males, 2 females, Wandammen Bay, Wondiwoi Mts., Wasior, 300-700 m, 14.I.2001, leg. A.Riedel (ARC); 1 male, 1 female, Wandammen Bay, Wondiwoi Mts., Wasior, 250-600 m, 15.I.2001, leg. A.Riedel (ARC).

Euops, new species 44

Material examined: IRIAN JAYA, Jayawijaya Prov.: 1 male, Emdoman, 1400-1550 m, 13.IX.1992, leg. A.Riedel (ARC); 3 males, 3 females, Emdoman, 800-1200 m, 14-15.IX.1992, leg. A.Riedel (ARC).

Euops flyensis RIEDEL, 2001c

See Appendix 5.

Euops parangulithorax RIEDEL, 2001c

See Appendix 5.

Additional material examined: IRIAN JAYA, Biak-Numfor Prov.: 1 male, Biak Isl., Korim, Nernu, 100-150 m, 4.II.2001, leg. A.Riedel (ARC); 1 male, 2 females, Biak Isl., Korim, Roidifu, ca. 100 m, 2.II.2001, leg. A.Riedel (ARC); 1 female, Biak Isl., Suneri, 4.X.1990, leg. A.Riedel (ARC).

Euops zimmii RIEDEL, 2001c

See Appendix 5.

Additional material examined: IRIAN JAYA, Japen-Waropen Prov.: 1 male, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 25.XII.2000, leg. A.Riedel (ARC).

Euops breyniae RIEDEL, 2001c

See Appendix 5.

Euops lani RIEDEL, 2001c

See Appendix 5.

simulans-group

Unidentified material at hand: 40 female specimens from New Guinea.

3.1.2.10. The *spinosus*-group

Diagnosis. Prothorax with pair of blunt protuberances anterior to subbasal constriction. Elytron with large spine in posterior part of humerus. Male profemur with two or more spines or denticles on ventral surface. Setose patch of female venter consisting of four double rows of modified setae.

See Appendix 2.

Euops gressitti RIEDEL, 1999

See Appendix 2.

Additional material examined: PAPUA NEW GUINEA, Morobe Prov.: 1 male, 12 km NNW Wau, Mt. Kaindi, 2200 m, 10.II.2000, 7°21´S 146° 40´, elfin forest, leg. R.S. Anderson (CMNC).

Euops spinosus RIEDEL, 1999

See Appendix 2.

Additional material examined: PAPUA NEW GUINEA, Morobe Prov.: 1 male, W Pindiu, 1000-1400 m, 23.IV.1998, leg. A. Riedel; 3 males, Aseki, Oiwa, 1600-1700 m, 11-12.III.1998, leg. A.Riedel (ARC); 1 male, Aseki, Langama-road, 1600-1700 m, 21.II.1998, leg. A.Riedel (ARC).

Euops paraspinosus RIEDEL, 1999

See Appendix 2.

Euops monstruosus RIEDEL, 1999

See Appendix 2.

Euops pseudomonstruosus RIEDEL, 1999

See Appendix 2.

Euops armatus RIEDEL, 1999

See Appendix 2.

Additional material examined: PAPUA NEW GUINEA, Morobe Prov.: 1 male, Aseki, Oiwa, 1600-1700 m, 22.II.1998, leg. A.Riedel (ARC).

Euops aculeatus RIEDEL, 1999

See Appendix 2.

Euops zimmermanni RIEDEL, 1999

See Appendix 2.

Euops paniaiensis RIEDEL, 1999

See Appendix 2.

Euops yali RIEDEL, 1999

See Appendix 2.

3.1.2.11. The *testaceus*-group

Diagnosis. Body largely ferruginous or reddish (Figs. 48-49), elytron in some species black or blue. Terminal article of antenna densely clothed with erect setae (Figs. 70-71). Prementum with three apical teeth (Figs. 68-69). Usually, male mesofemur in basal quarter ventrally with tooth (Figs. 78-79).

Euops divisus PASCOE, 1874

Euops divisa Pascoe, 1874: 29. Complete bibliography in appendix 1.

(Figs. 49, 68-73, 118-119, 148, 160, 178, 191, 206, 221, 235, 245)

Diagnosis. Coloration (Fig. 49) light ferruginous, apical half of elytron black. Terminal article of antenna (Figs. 70-71, 148) elongate, densely clothed with erect setae. Male: Mesofemur in basal quarter ventrally with tooth (Figs. 78-79). Mesotibia subapically with weak, angulate process. TA as in fig. 160.

Range. Fig. 245. Sorong Prov. (Waigeo Isl., Batanta Isl.), Manokwari Prov. (Manokwari, Wandammen Bay), Jayapura Prov. (Lereh), Western Prov. (Oriomo). Altitude: 100-300 m.

Type material. Lectotype, male (by present designation): IRIAN JAYA: Manokwari Prov., Manokwari; labels: 1) [white, rectangular; cardboard on which two syntypes were originally mounted] "Dorey [handwritten]", "Dorey [handwritten]" 2) [oval, blue] "Dorey [handwritten]" 3) [white, rectangular] "*Euops divisa*, Type, Pascoe [handwritten]" 4) [white with black bordering, rectangular] "*Euops divisa* Pasc. [handwritten]" 5) [white, rectangular] "Pascoe Coll., 93-60. [printed]" 6) [white with red bordering, round] "Type [printed]" 7) [red, rectangular] LECTOTYPE, *Euops divisus* Pascoe, det. A.Riedel 2000 [printed]" (BMNH). Paralectotype, female; labels: 1) [white, rectangular] "glued on same cardboard as lectotype [printed]" 2) [white, rectangular] "Dorey, *Euops divisa* Pasc. [printed]" 3) [white, rectangular] "remounted by A. Riedel 2000 [printed]" 4) [red, rectangular] PARALECTOTYPE, *Euops divisus* Pascoe, det. A.Riedel 2000 [printed]" (BMNH).

Note: two other paralectotypes from Batchian belong to a different species (new species 49). Pascoe´s record of *E. divisus* for Batchian should therefore be deleted.

Other material examined: IRIAN JAYA, Sorong Prov.: 5 males, 8 females, Waigeo Isl., Saporkren, 0-200 m, 12-13.XI.1996, leg. A.Riedel (ARC); 1 male, 1 female, Gamang Isl. (near Waigeo), Yembeser, 0-100 m, 16.XI.1996, leg. A.Riedel (ARC); 1 female, Batanta Isl., Waylebet, 100-250 m, 31.X.1996, leg. A.Riedel (ARC); 1 female, Batanta Isl., 4 km W Yenanas, 0-250 m, 5.XI.1996, leg. A.Riedel (ARC); Manokwari Prov.: 3 males, 4 females, Wandammen Bay, Wondiwoi Mts., Wasior, 250-600 m, 4.I.2001, leg. A.Riedel (ARC); 1 male, Wandammen Bay, Wondiwoi Mts., Wasior, 300-850 m, 5.I.2001, leg. A.Riedel (ARC); 1 male, Wandammen Bay, Wondiwoi Mts., Wasior, 300-700 m, 14.I.2001, leg. A.Riedel (ARC); 1 female, Wandammen Bay, Wasior, DMP logging camp, Km 38, Sararti, S 03° 05´E 134° 27´, 100-200 m, 7-9.I.2001, leg. A.Riedel (ARC); Jayapura Prov.: 1 female, Lereh, 300-500 m, 26.I.1996, leg. A.Riedel (ARC); PAPUA NEW GUINEA, Western Prov.: 1 female, Oriomo Govt. Sta., 26-28.X.1960, leg. J.L.Gressitt (BPBM).

Redescription.

Lectotype, male. Length, pronotum + elytron: 3.30 mm. Coloration (Fig. 49) light ferruginous, apical half of elytron black; club of antenna with brownish coloration resulting from semi-coverage of black setae. Head. As in fig. 48. Gena 1.02 X as long as width of head immediately behind eyes. Vertex shining, smooth. Eyes in dorsal view markedly prominent from lateral contour of head, medially contiguous at middle of eye´s length. Profile of vertex immediately behind eye with marked constriction, posteriorly in markedly convex line to base. Ventral surface of head in front of gular region shining, weakly rugose-punctate, with median furrow. Rostrum 2.10 X as long as mouthparts; at widest point 1.40 X wider than at base; in cross section dorsally weakly rounded. Clypeus with median notch. Interantennal area with distinctly bisinuate lateral margins, behind antennal insertion with marked constriction, anteriorly with almost straight sides converging. Profile of rostrum with dorsal contour of interantennal area hardly projecting, rounded; anteriorly in straight line to apex; ventral contour in straight line to apex; dorsal and ventral contour of rostrum subparallel from base to apex. Venter of rostrum poorly delimited against venter of head, basally with indistinct submental median carina and with pair of shallow lateral impressions. Mouthparts. Prementum at base 1.3 X wider than long, ca. 2.4 X wider than at apex; with straight lateral margins converging from base to apex; with three moderately long, subacute apical processes, subequal in length. Antenna as in fig. 148; terminal article of antenna densely clothed with erect setae (Figs. 70-71). Proventriculus with eight primary gnathal ridges; cutting edge of gnathal ridge in profile of subtriangular shape, acute; posteriad of each gnathal ridge with small, denticulate pulvillus. Prothorax 1.02 X as long as wide; with deep subbasal constriction; sides rounded to apex; without preapical constriction; disc shining, smooth. Metanotum (Figs. 72-73) without sutural spines; laterally projecting angularly without forming distinct lateral lobe. Elytron at humerus simple; 2.25 X longer than wide; striae moderately impressed. Thoracic venter. Prepectus short, subequal to postpectus. Height of pterothorax 0.82 X length of elytron. Procoxa in anterior aspect 1.31 X as long as wide; with weak rectangular extension ventrolateral of articulation with trochanter. Legs. Profemur strongly swollen; strongly asymmetrically clavate; with distinct stalk in basal 0.24, its dorsal edge lined with denticles; ventral contour in basal quarter strongly concave, in straight line to blunt angulation at apical 0.35, continuing in straight line to apex; dorsal contour weakly convex from base to apex; ventral surface at angulation denticulate, without major protrusion. Protibia evenly curved ventrad; ventral surface subglabrous, with sparse but distinct denticles, each denticle bearing short seta; uncus terminal; anterior distal comb complete but indistinct with thin setae; posterior distal comb oblique, behind tarsal articulation, dorsally and ventrally shortened. Mesofemur in basal quarter ventrally with tooth. Mesotibia subapically with weak, angulate process. Abdomen. Pygidium 0.99 X as long as wide; shining, basally weakly microreticulate; densely, deeply punctate; moderately densely setose with long, inconspicuous, recumbent setae. Venter with sternites III-VI moderately densely setose with short erect to suberect setae; medially setae shorter and sparser. Genitalia. Sternite VIII as in fig. 206; apex laterally weakly bilobed, medially with broad shallow notch; in apical half setose with moderately long setae; base bisinuate, lateral angles weakly extended basad. Tegminal plate (Fig. 178) broad, with sides weakly converging, subparallel towards apex; apical edge subtruncate, with few short setae medially, with pointed tuft of much longer setae laterally. Aedeagus. Apical scoop of pedon (Fig. 191) ca. 1.71 X as long as wide, with lateral margins subparallel, with apex subangulate, weakly pointed. Tectum evenly weakly sclerotized, lateral margins subparallel, apex subangulate. TA as in Fig. 160. Endophallus in apical portion without sclerite.

Paralectotype, female. Same as described male except: length, pronotum + elytron: 3.25 mm. Head. As in fig. 119. Gena 0.78 X as long as width of head immediately behind eyes. Eyes medially most approximated at middle of eye´s length, separated by ca. 0.13 X basal width of rostrum. Profile of vertex immediately behind eye with constriction, posteriorly convex towards base. Rostrum 2.00 X as long as mouthparts; at widest point 1.35 X wider than at base. Profile of rostrum more robust, with dorsal and ventral contour in basal half subparallel to weakly diverging, in apical half weakly converging to apex. Prothorax 1.03 X as long as wide. Elytron 2.21 X longer than wide. Height of pterothorax 0.85 X length of elytron. Procoxa in anterior aspect 1.17 X as long as wide. Legs. Profemur moderately swollen; subsymmetrically clavate with stalk in basal 0.24; ventral contour evenly convex from base to apex; dorsal contour straight in basal quarter, continuing in markedly convex line to apex; ventral surface smooth, without denticles. Protibia weakly curved, basally almost straight, in apical third weakly bent ventrad; dorsal and ventral contour subparallel; ventral surface weakly denticulate, sparsely setose with short suberect setae; tibial apex with uncus and premucro; uncus in dorsal position; premucro in ventral position; anterior distal comb ventrally complete, ventrally passing base of uncus. Mesofemur simple, basally without ventral tooth. Mesotibia subapically simple, without extension. Abdomen. Pygidium 0.92 X as long as wide. Setose patch of venter 1.65 X as long as wide, consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row, plus one simple row of modified setae on sternite VI. Genitalia. Ovipositor without styli. Sternite VIII as in fig. 221; apex rounded; base with short apodeme. Spermatheca as in fig. 235; with body weakly tapering apicad.

Intraspecific variation. Length, pronotum + elytron: 3.02-4.10 mm (n=32, $\bar{x}$=3.45 ± 0.25). Coloration. Apical black area of elytron variable in shape and extent; in holotype and in specimens from Wasior elytron equally divided along more or less straight, transverse line into ferruginous basal half and black apical half; specimen from Lereh similar, but division unequal, only basal third ferruginous; ferruginous area of Waigeo- and of Batanta-specimens reaching posteriad along suture, the borderline between ferruginous and black color resembling an "M". Prothorax 0.95-1.04 X as long as wide (n=32, $\bar{x}$=1.00 ± 0.02). Elytron 2.20-2.46 X longer than wide (n=32, $\bar{x}$=2.34 ± 0.06). Thoracic venter. Height of pterothorax 0.77-0.83 X length of elytron in males (n=12, $\bar{x}$=0.80 ± 0.02), 0.79-0.86 X length of elytron in females (n=20, $\bar{x}$=0.82 ± 0.02). Abdomen. Pygidium 0.97-1.10 X wider than long in males (n=11, $\bar{x}$=1.04 ± 0.04), 1.05-1.33 X wider than long in females (n=17, $\bar{x}$=1.18 ± 0.08). Female patch of modified setae 1.30-1.89 X as long as wide (n=17, $\bar{x}$=1.52 ± 0.15).

Euops testaceus **Voss, 1929**

Euops testacea Voss, 1929: 218. Complete bibliography in appendix 1.
(Figs. 48, 94-95, 120-121, 147, 161, 179, 192, 207, 222, 236, 246)

Diagnosis. Coloration (Fig. 48) light ferruginous. Terminal article of antenna elongate, densely clothed with erect setae (as in figs. 70-71). Elytral intervals in posterior half forming regular costae. Male: Mesotibia subapically with acute process. TA as in fig. 161.

Range. Fig. 246. Sorong Prov. (Mysol Isl., Salawatti Isl.), Manokwari Prov. (Testega), Paniai Prov. (Nabire), Japen-Waropen Prov. (Wapoga Riv.), Jayapura Prov. (Rouffaer Mts., Lereh), Madang Prov. (Madang). Altitude: 40-1100 m.

Type material. Holotype, male, Mysol (BMNH): The specimen has been examined years ago, presently it is not at hand.

Other material examined: IRIAN JAYA, Sorong Prov.: 2 male, 3 females, Salawatti Isl., SP2, Waijan, ca. 50-100 m, 23-25.X.1996, leg. A.Riedel (ARC); Manokwari Prov.: 1 male, Testega, 1100-1300 m, 30.III-2.IV.1993, leg. A.Riedel (ARC); 1 male, Testega - Meydoudga, 1100-1350 m, 10.IV.1993, leg. A.Riedel (ARC); Japen-Waropen Prov.: 1 male, Wapoga Riv., Kwadewa logging camp, Km 80, 1-2.III.1999, leg. A.Riedel (ARC); Paniai Prov: 1 female, Nabire, S Geelvink Bay, 10-40 m, "jungle", 10.X.1962, leg. H.Holtmann (BPBM); Jayapura Prov.: 1 male, Mamberamo, Rouffaer Mts., Noiadi, 150-200 m, 17.III.1999, leg. A.Riedel (ARC); 2 males, 1 female, Lereh, 300-550 m, 25.I.1996, leg. A.Riedel (ARC); 1 male, 1 female, Lereh, 300-500 m, 26.I.1996, leg. A.Riedel (ARC); PAPUA NEW GUINEA, Madang Prov., "Friedrich-Wilh.-hafen [= Madang]", 1901, leg. Biró (HNHM).

Redescription.

Selected male specimen (Testega - Meydoudga). Length, pronotum + elytron: 3.85 mm. Coloration (Fig. 48) light ferruginous. Head. As in fig. 120. Gena 1.19 X as long as width of head immediately behind eyes. Vertex shining; smooth except laterally behind eye with sparse punctures. Eyes in dorsal view markedly prominent from lateral contour of head; medially most approximated at middle of eye´s length, separated by ca. 0.14 X basal width of rostrum. Frons smooth, simple. Profile of vertex behind eye with marked constriction, towards base evenly convex. Ventral surface of head in front of gular region shining, punctate, with median furrow. Rostrum 2.29 X as long as mouthparts; at widest point 1.35 X wider than at base; in cross section dorsally weakly rounded. Clypeus with median notch. Interantennal area with distinctly bisinuate lateral margins, behind antennal insertion with marked constriction, anteriorly with almost straight sides converging. Profile of rostrum with dorsal contour of interantennal area hardly projecting, rounded; anteriorly in straight line to apex; ventral contour in straight line to apex; dorsal and ventral contour of rostrum subparallel from base to apex. Venter of rostrum poorly delimited against venter of head, basally with indistinct submental median carina and with pair of shallow lateral impressions. Mouthparts. Prementum at base 1.6 X wider than long, ca. 2.2 X wider than at apex; with straight lateral margins converging in basal half, in apical half sinuate, constricted at base of lateral apical process; with three moderately long, blunt apical processes, median apical process slightly shorter than lateral processes. Antenna as in fig. 147; terminal article of antenna densely clothed with erect setae. Proventriculus (Figs. 96-97) with eight primary gnathal ridges; cutting edge of gnathal ridge in profile of subtriangular shape, acute; posteriad of each gnathal ridge with small, denticulate pulvillus. Prothorax 1.03 X as long as wide; with deep subbasal constriction; sides rounded to apex; without preapical constriction;

disc shining, smooth. Metanotum without sutural spines, but with pair of bluntly angular projections; laterally projecting angularly without forming distinct lateral lobe. Elytron at humerus simple; 2.43 X longer than wide; striae deeply impressed; intervals convex, in posterior half forming regular costae. Thoracic venter. Prepectus ca. 2 X as long as postpectus; profile in concave line dorsad to apex. Height of pterothorax 0.77 X length of elytron. Procoxa in anterior aspect 1.27 X as long as wide; with weak rectangular extension ventrolateral of articulation with trochanter. Legs. Profemur strongly swollen; strongly asymmetrically clavate; with distinct stalk in basal 0.28, its dorsal edge lined with denticles; ventral contour in basal quarter strongly concave, in weakly convex line to blunt angulation at apical 0.38, continuing in straight line to apex; dorsal contour weakly convex from base to apex; apical half of anterior surface denticulate; ventral surface without major protrusion. Protibia evenly curved ventrad; ventral surface subglabrous, with sparse but distinct denticles, each denticle bearing short seta; uncus terminal; anterior distal comb complete but indistinct with thin setae; posterior distal comb bordering with long thin setae ventral edge behind tarsal articulation. Mesotibia subapically with dorsoposteriad directed, acute process. Abdomen. Pygidium 0.94 X as long as wide; in basal half microreticulate, in apical half shining; densely, deeply punctate; sparsely setose with short, inconspicuous, recumbent setae. Venter with sternites III-VI moderately densely setose with long erect to suberect setae; medially setae shorter and sparser. Genitalia. Sternite VIII as in fig. 207; apex with broadly angulate, shallow notch; base bisinuate, lateral angles weakly extended basad; in apical third laterally with dense patch of short setae; general shape subrectangular. Tegminal plate (Fig. 179) broad, with sides subparallel towards apex; apical edge subtruncate, with sparse short setae at middle, with pointed tuft of slightly longer setae laterally. Aedeagus. Apical scoop of pedon (Fig. 192) ca. 1.27 X as long as wide, with lateral margins subparallel, with apex rounded. Tectum evenly weakly sclerotized, lateral margins subparallel, apex subangulate. TA as in Fig. 161. Endophallus in apical portion without sclerite.

Selected female specimen (Waijan). Same as described male except: length, pronotum + elytron: 3.70 mm. Head. As in fig. 121. Gena 0.85 X as long as width of head immediately behind eyes. Eyes separated by ca. 0.18 X basal width of rostrum. Rostrum 2.04 X as long as mouthparts; at widest point 1.38 X wider than at base. Profile of rostrum more robust, with dorsal and ventral contour in basal half subparallel, in apical half weakly converging to apex. Prothorax 1.01 X as long as wide. Elytron 2.26 X longer than wide. Height of pterothorax 0.83 X length of elytron. Procoxa in anterior aspect 1.15 X as long as wide. Legs. Profemur moderately swollen; subsymmetrically clavate with stalk in basal 0.24; ventral contour evenly convex from base to apex; dorsal contour straight in basal quarter, continuing in markedly convex line to apex; smooth, without denticles. Protibia weakly curved, basally almost straight, in apical third weakly bent ventrad; dorsal and ventral contour subparallel; ventral surface weakly denticulate, sparsely setose with short suberect setae tibial apex with uncus and premucro; uncus in dorsal position; premucro in ventral position; anterior distal comb ventrally complete, ventrally passing base of uncus. Mesotibia subapically simple, without extension. Abdomen. Pygidium 0.82 X as long as wide. Setose patch of venter 1.58 X as long as wide, consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row, plus one simple row of modified setae on sternite VI. Genitalia. Ovipositor without styli. Sternite VIII as in fig. 222; apex subtruncate; base with short apodeme. Spermatheca as in fig. 236; with body weakly tapering apicad.

Intraspecific variation. Length, pronotum + elytron: 3.20-3.87 mm (n=16, $\bar{x}$=3.43 ± 0.20). Prothorax 0.98-1.05 X as long as wide (n=16, $\bar{x}$=1.02 ± 0.02). Elytron 2.25-2.45 X longer than wide in males (n=9, $\bar{x}$=2.35 ± 0.07), 2.22-2.34 X longer than wide in females (n=7, $\bar{x}$=2.27 ± 0.05). Thoracic venter. Height of pterothorax 0.77-0.83 X length of elytron in males (n=9, $\bar{x}$=0.80 ± 0.02), 0.83-0.85 X length of elytron in females (n=7, $\bar{x}$=0.84 ± 0.01). Legs. Profemur in larger males longer and more strongly swollen. Abdomen. Pygidium 1.01-1.15 X wider than long in males (n=7, $\bar{x}$=1.06 ± 0.04), 1.16-1.26 X wider than long in females (n=7, $\bar{x}$=1.21 ± 0.04). Female patch of modified setae 1.40-1.58 X as long as wide (n=7, $\bar{x}$=1.50 ± 0.07).

Euops, new species 49

Range. Maluku Utara Prov. (Batchian, Halmahera, Morotai). Altitude: 100 m.

Material examined: Maluku Utara Prov.: 1 male, 1 female, Batchian, coll. Pascoe [leg. A.R.Wallace ?], paralectotypes of *E. divisus* (BMNH); 4 males, 4 females, Halmahera Isl., Sidangoli, Batu putih, 100 m, 22.XI.1999, leg. A.Riedel (ARC); 1 male, Halmahera Isl., Sidangoli, Batu putih, 100 m, 23.XI.1999, leg. A.Riedel (ARC); 12 males, 12 females, Halmahera Isl., Buli, Maba, 100 m, 8.XI.1999, leg. A.Riedel (ARC); 4 males, 2 females, Halmahera Isl., Ibu, Kampung baru, G. Alon, 100-800 m, 25.XI.1999, leg. A.Riedel (ARC); 2 males, 1 female, Morotai Isl., Kampung Raja, logging camp, 100 m, 18.XI.1999, leg. A.Riedel (ARC).

Euops, new species 50

Range. New Ireland Isl., New Britain Isl.. Altitude: 2-350 m.

Material examined: New Ireland Isl.: 4 males, 2 females, Ridge above "Camp Bishop" 15 km up Kait Riv., 250-500 m, 12.VI.1956, leg. J.L.Gressitt (BPBM); 1 male, "Camp Bishop" 15 km up Kait Riv., 125 m, 6.VII.1956, leg. J.L.Gressitt (BPBM); 1 male, Kandan, 1.I.1960, leg. W.W.Brandt (BPBM); 2 males, Gilingil Pl´n, 2 m, 6.VII.1956, leg. J.L.Gressitt (BPBM); New Britain Isl.: 1 male, 1 female, Gazelle Pen., Bainings, St. Paul´s, 350 m, 9.IX.1955, leg. J.L.Gressitt (BPBM).

Euops, new species 51

Range. Japen-Waropen Prov. (Japen Isl.); Jayapura Prov. (Lereh). Altitude: 550-600 m.

Material examined: IRIAN JAYA, Japen-Waropen Prov.: 5 males, 4 females, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 23.XII.2000, leg. A.Riedel (ARC); 1 female, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 25.XII.2000, leg. A.Riedel (ARC); Jayapura Prov.: 1 female, Lereh, 300-550 m, 25.I.1996, leg. A.Riedel (ARC).

Euops, new species 52

Range. Paniai Prov. (Mulia). Altitude: ca. 1900-2200 m.

Material examined: IRIAN JAYA, Paniai Prov.: 2 males, 4 females, Mulia, Wuyuneeri, 1900-2200 m, 6-7.VII.1994, leg. A.Riedel (ARC).

Euops, new species 53

Range. Morobe Prov. (Wau), Oro Prov. (Kokoda). Altitude: 450-1200 m.

Material examined: PAPUA NEW GUINEA, Morobe Prov.: 1 male, Wau, 1200 m, 12.XI.1961, leg. J.Sedlacek (BPBM); Oro Prov.: 3 males, Kokoda - Pitoki, 450 m, 24.III.1956, leg. J.L.Gressitt (BPBM).

3.1.2.12. The *trigemmatus*-group

Diagnosis. Body relatively small, pronotum + elytron: 2.25-3.10 mm. Apex of female protibia without premucro. Male venter with sternites IV and V densely setose with long erect setae. Setose patch of female venter with each double row of modified setae medially divided by glabrous area, thus, venter bearing six transverse clusters of modified setae.

Euops trigemmatus PASCOE, 1874

Euops trigemmata Pascoe, 1874: 28. Complete bibliography in appendix 1.

(Figs. 41, 122-123, 149, 165, 177, 193, 205, 216, 237, 243)

Diagnosis. Coloration (Fig. 41) bluish black, elytral humerus and scutellum metallic green. Pronotum shining; disc smooth, sides densely punctate. Male: TA as in fig. 165. Female: Protibia behind middle distinctly broadened. Setose patch of venter consisting of six transverse clusters of modified setae, venter medially glabrous.

Range. Maluku Utara Prov. (Batchian Isl., Halmahera Isl.), Sorong Prov. (Waigeo Isl.), Biak-Numfor Prov. (Biak Isl.). Altitude: 100-200 m.

Type material. Lectotype, male (by present designation): Maluku Utara Prov.: Batchian Isl.; labels: 1) [oval, blue] "Batchian [handwritten]" 2) [white, rectangular] "*Euops trigemmatus*, Type, Pascoe [handwritten]" 3) [white with red bordering, round] "Type [printed]" 4) [white, rectangular] "Pascoe Coll., 93-60. [printed]" 5) [red, rectangular] LECTOTYPE, *Euops trigemmatus* Pascoe, det. A.Riedel 2000 [printed]" (BMNH).

Other material examined: Maluku Utara Prov.: 4 males, 7 females, Halmahera Isl., Buli, Maba, 20-200 m, 6-7.XI.1999, leg. A.Riedel (ARC). IRIAN JAYA, Sorong Prov.: 1 male, Waigeo Isl., Kabui Bay, Wawiay, 0-250 m, 14-15.XI.1996, leg. A.Riedel (ARC); 1 female, Waigeo Isl., Saporkren, 0-200 m, 12-13.XI.1996, leg. A.Riedel (ARC); Biak-Numfor Prov.: 1 male, 1 female, Biak Isl., 3 km S Korim, 100 m, 21-22.IV.1993, leg. A.Riedel (ARC).

Redescription.

Selected male specimen (Halmahera Isl., Buli). Length, pronotum + elytron: 2.91 mm. Coloration (Fig. 41) black with bluish lustre; elytral humerus and scutellum metallic green;

pygidium ferruginous, in apical half medially with green metallic patch; antennal club black, funicle deep ferruginous. Head. As in fig. 122. Gena 0.85 X as long as width of head immediately behind eyes. Vertex shining; smooth except laterally with oblique, shallow wrinkles and sparse punctures. Eyes in dorsal view weakly prominent from lateral contour of head, medially contiguous for ca. 0.4 X their length. Profile of vertex immediately behind eye with constriction, posteriorly convex towards base. Ventral surface of head in front of gular region shining, weakly rugose-punctate, with shallow median furrow. Rostrum 1.58 X as long as mouthparts; at widest point 1.48 X wider than at base; in cross section dorsally weakly rounded. Clypeus with notch somewhat left of middle. Interantennal area with weakly sinuate lateral margins converging. Profile of rostrum with dorsal contour of interantennal area hardly projecting, rounded; anteriorly in weakly sinuate line to apex; ventral contour straight to mouthparts, angulate, continued in straight line to apex; dorsal and ventral contour of rostrum basally subparallel, in apical half converging. Venter of rostrum sparsely setose with long setae, basally well-delimited against venter of head, without median carina. Mouthparts. Prementum at base 1.8 X wider than long, ca. 2.7 X wider than at apex; lateral margins markedly sinuate, basally converging in convex line, at one third from apex concave; with three long, apical processes; median apical process rounded, shorter than acute lateral processes, and retracted into more dorsal position. Antenna as in fig. 149. Proventriculus with eight primary gnathal ridges; cutting edge of gnathal ridge in profile of subtriangular shape, rectangular; posteriad of each gnathal ridge with moderately large, weakly denticulate pulvillus. Prothorax 0.96 X as long as wide; with shallow subbasal constriction; sides weakly converging in straight line, in apical quarter rounded to shallow preapical constriction; disc shining, smooth except for minute punctures; in lateral aspect with center of side densely punctate with moderately deep punctures. Metanotum without sutural spines; with pair of lateral lobes. Elytron at humerus simple; 2.14 X longer than wide; striae moderately impressed. Thoracic venter. Prepectus shorter than postpectus; procoxae approaching anterior margin of prothorax. Height of pterothorax 0.85 X length of elytron. Procoxa in anterior aspect 1.10 X as long as wide. Legs. Profemur moderately swollen; weakly asymmetrically clavate with stalk in basal 0.26; ventral contour in straight line to apical 0.35, angulate, continuing in straight line to apex; dorsal contour sinuate, in basal quarter straight, continuing in convex line to apex; ventral surface smooth, without protrusion. Protibia evenly curved ventrad; ventral surface crenulate, with moderately dense suberect setae, in basal third subglabrous; uncus terminal; anterior distal comb complete; posterior distal comb oblique, behind tarsal articulation, dorsally shortened. Mesotibia subapically simple, without extension. Abdomen. Pygidium 0.82 X as long as wide; microreticulate; densely, deeply punctate; sparsely setose with inconspicuous, suberect setae. Venter with sternites III and VI sparsely setose, sternites IV and V densely setose with long erect setae, medially setae shorter and sparser. Genitalia. Sternite VIII as in fig. 205; apex moderately bilobed, with long setae; base concave. Tegminal plate (Fig. 177) with sides subparallel towards apex; apical edge broadly rounded, with dense long setae. Aedeagus. Apical scoop of pedon (Fig. 193) ca. 1.23 X as long as wide, with lateral margins subparallel, with apex truncate, shape subrectangular. Tectum with relatively broad markedly sclerotized lateral frame converging apicad, in basal half medially hyaline, apex subtruncate. TA as in Fig. 165. Endophallus in apical portion without sclerite.

Lectotype, female. Same as described male except: length, pronotum + elytron: 2.95 mm. Coloration with legs and coxae deep ferruginous. Head. As in fig. 123. Gena 0.84 X as long as width of head immediately behind eyes. Rostrum 1.45 X as long as mouthparts; at widest point 1.43 X wider than at base. Prothorax 0.89 X as long as wide. Elytron 2.09 X longer than wide. Height of pterothorax 0.90 X length of elytron. Procoxa in anterior aspect 0.95 X as long as wide. Legs. Dorsal contour of profemur sinuate, in basal third straight, continuing in markedly convex line to apex. Protibia with dorsal contour evenly moderately convex; ventral contour basally straight, behind middle with marked concavity, continuing in straight line to apex; greatest width of tibia behind middle where distinctly broadened, in apical half parallel-sided; ventral surface crenulate, setose with subrecumbent setae; tibial apex with uncus in dorsal position; without premucro; anterior distal comb complete, ventrally passing base of uncus. Abdomen. Pygidium 0.77 X as long as wide. Setose patch of venter 0.96 X as long as wide, consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row; each double row medially divided by broad glabrous area, thus, venter bearing six transverse clusters of modified setae. Genitalia. Ovipositor without styli. Sternite VIII as in fig. 216; apex subtruncate, laterally rounded; without apodeme. Spermatheca as in fig. 237, compact; with body weakly tapering apicad.

Intraspecific variation. Length, pronotum + elytron: 2.63-3.16 mm (n=16, $\bar{x}$=2.86 ± 0.15). Coloration. Bluish lustre rather distinct as in holotype or indistinct; abdomen and legs ranging from ferruginous over dark ferruginous to black. Prothorax 0.94-0.97 X as long as wide in males (n=12, $\bar{x}$=0.96 ± 0.02), 0.88-0.92 X as long as wide in females (n=10, $\bar{x}$=0.90 ± 0.01). Elytron 1.96-2.13 X longer than wide (n=16, $\bar{x}$=2.05 ± 0.05). Thoracic venter. Height of pterothorax 0.86-0.93 X length of elytron in males (n=6, $\bar{x}$=0.90 ± 0.03), 0.89-0.93 X length of elytron in females (n=10, $\bar{x}$=0.91 ± 0.01). Abdomen. Pygidium 1.14-1.22 X wider than long in males (n=5, $\bar{x}$=1.18 ± 0.03), 1.20-1.31 X wider than long in females (n=8, $\bar{x}$=1.27 ± 0.04). Female patch of modified setae 0.76-0.95 X as long as wide (n=10, $\bar{x}$=0.87 ± 0.06).

Nomenclatural note. PASCOE (1874) did neither fix a holotype in the original description, nor did he mention the number of specimens before him. He recorded the species from Batchian and Dorey. A male and a female syntype could be located in BMNH. The specimens belong to different species, which are placed in different species groups. The female specimen bears Pascoe´s original type label, which the male specimen lacks. Another fact that favours priority of the female over the male specimen are doubts on the locality of the latter: the blue label of the male specimen states "Batchian", but it was found that the cardboard on which it was originally mounted bears the handwriting "Dorey". Other material of this species would also support its origin from Manokwari (= Dorey). As there is not much doubt on the species identity of the female, this specimen is chosen as lectotype. The designation of a lectotype is necessary to ensure stability of nomenclature.

Euops, new species 54

Range. Manokwari Prov. (Iranmeba), Jayawijaya Prov. (Angguruk, Emdoman, Borme), Sandaun Prov. (Mianmin, Eliptamin). Altitude: 1200-1500 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 1 male, Tetaho area, Iranmeba, 1500-1700 m, 25.III.1993, leg. A.Riedel (ARC); Jayawijaya Prov.: 1 male, Angguruk, trail to Tanggeam, 1500-1800 m, 28-29.IX.1991, leg. A.Riedel (ARC); 1 male, Emdoman, 900-1200 m, 29.IX.1993, leg. A.Riedel (ARC); 1 male, Borme, 1000-1300 m, 13-18.VIII.1992, leg. A.Riedel (ARC). PAPUA NEW GUINEA, Sandaun Prov.: 1 male, S Mianmin, 800-1200 m, 19.V.1998, leg. A.Riedel (ARC); 1 female, Eliptamin Vall., 1200-1350 m, 19-30.VI.1959, leg. W.W.Brandt (BPBM).

Euops, new species 55

Range. East New Britain Prov. (Gazelle Peninsula). Altitude: 900 m.

Material examined: PAPUA NEW GUINEA, East New Britain Prov.: 1 male, Gazelle Peninsula, Mt. Sinewit, 900 m, 5-10.XI.1962, leg. J.Sedlacek (BPBM).

Euops, new species 56

Range. Morobe Prov. (Bulolo). Altitude: 700 m.

Material examined: PAPUA NEW GUINEA, Morobe Prov.: 1 male, Bulolo, 700 m, 26.XI.1969, leg. J.&M.Sedlacek (BPBM).

trigemmatus-group

Unidentified material at hand: 5 female specimens from New Guinea.

3.1.2.13. New species groups 1-7

New species group 1

Diagnosis. Body usually of medium size, pronotum + elytron: 2.25-3.45 mm. Abdomen always ferruginous or reddish, remainder of more or less extensive black coloration; if mainly ferruginous, at least head and pronotum dorsally darkened. Terminal article of antenna with recumbent setae. Prementum with three apical teeth. Apex of female protibia with premucro.

Euops, new species 57

Range. Manokwari Prov. (Testega, Wandammen Bay), Japen-Waropen Prov. (Serui), Paniai Prov. (Topo, Epomani), Jayawijaya Prov. (Emdoman, Borme). Altitude: 700-1300 m.

Material examined: IRIAN JAYA, Manokwari Prov.:1 male, 2 females, Testega, 1100-1300 m, 30.III.-2.IV.1993, leg. A.Riedel (ARC); 1 male, 2 females, Wandammen Bay, Wondiwoi Mts., Wasior, 580-950 m, 3.I.2001, leg. A.Riedel (ARC); 1 male, 2 females, Wandammen Bay, Wondiwoi Mts., Wasior, 300-850 m, 5.I.2001, leg. A.Riedel (ARC); Japen-Waropen Prov.: 2 females, Japen Isl., Serui, Mantembu, trail to Ambaidiru, 700-1150 m, 7-9.IX.1991, leg. A.Riedel (ARC); 1 female, Japen Isl., Serui, Mantembu, 300-800 m, 6-9.IX.1991, leg. A.Riedel (ARC); 4 males, 2 females, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 23.XII.2000, leg. A.Riedel (ARC); Paniai Prov.: 1 female, Nabire, Topo, Pusppensaat, Km 54, 500-700 m, 13-16.VIII.1991, leg. A.Riedel (ARC); 2 females, Epomani, Km 145, 700-800 m, 17.I.1996, leg. A.Riedel (ARC); Jayawijaya Prov.: 1 male, Emdoman,1300-1400 m, 13.IX.1992, leg. A.Riedel (ARC); 1 female, Emdoman, 800-1200 m, 14-15.IX.1992, leg. A.Riedel (ARC); 3 males, 1 female, Borme, trail to Omban, 1000-1300 m, 3.IX.1993, leg. A.Riedel (ARC).

Euops, new species 58

Range. Manokwari Prov. (Kebar, Wandammen Bay), Japen-Waropen Prov. (Wapoga Riv.), Jayawijaya Prov. (L. Archbold), Jayapura Prov. (Rouffaer Mts., Bodem, Waris, Cyclops Mts.), Morobe Prov. [border region to Gulf Prov.] (Lakekamu Basin); Central Prov. (Daradae). Altitude: 100-760 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 2 males, 1 female, Kebar Vall., 550 m, "Sweeping", 4-31.I.1962, leg. L.W.Quate (BPBM); 1 male, 1 female, Wandammen Bay, Wondiwoi Mts., Wasior, 580-950 m, 3.I.2001, leg. A.Riedel (ARC); 1 female, Wandammen Bay, Wondiwoi Mts., Wasior, 300-850 m, 5.I.2001, leg. A.Riedel (ARC); Japen-Waropen Prov.: 8 males, 5 females, Wapoga Riv., Kwadewa, logging road, Km 80, ca. 100 m, 1-2.III.1999, leg. A.Riedel (ARC); Jayawijaya Prov.: 2 males, Lake Archbold, 760 m, 26.XI.-3.XII.1961, leg. L.W.Quate (BPBM); Jayapura Prov.: 1 male, Mamberamo, Rouffaer Mts., Noiadi, 150-200 m, 17.III.1999, leg. A.Riedel (ARC); 2 males, 2 females, Bodem, 11 km SE of Oberfaren, 100 m, sweeping, 14-17.VII.1959, leg. T.C.Maa (BPBM); 1 male, Bodem, 11 km SE of Oberfaren, 100 m, 17.VII.1959, leg. T.C.Maa (BPBM); 1 male, 1 female, Waris, 450-500 m, 8-15.VIII.1959, leg. T.C.Maa (BPBM); 1 female, Sentani, Cyclops Mts., 600-1100 m, 5.X.1991, leg. A.Riedel (ARC); PAPUA NEW GUINEA, Morobe Prov.: 7 males, 2 females, Lakekamu Basin, Tekadu - Kakaro, Ivimka Riv. Stat., 150 m, 4.III.1998, leg. A.Riedel (ARC); 1 female, Lakekamu Basin, Tekadu, 200-400 m, 1.III.1998, leg. A.Riedel (ARC); Central Prov.: 1 female, Daradae, nr. Javarere, Musgrove R., 100 m ?, 3.X.1958, leg. J.L.Gressitt (BPBM).

Euops, new species 59

Range. Paniai Prov. (Epomani). Altitude: ca. 700-800 m.

Material examined: IRIAN JAYA, Paniai Prov.: 6 males, 4 females, Epomani, Km 165, 700-800 m, 17.I.1996, leg. A.Riedel (ARC).

New species group 2

Diagnosis. Coloration ferruginous. Eyes dorsally contiguous at middle. Rostrum not spatulate, its profile in basal half parallel-sided. Prementum with two apical teeth. Terminal article of antenna with recumbent setae. Pronotum smooth. Apex of female protibia with premucro.

Euops, new species 60

Range. Sorong Prov. (Waigeo Isl., Batanta Isl., Salawatti Isl.), Manokwari Prov. (Testega, Wandammen Bay), Paniai Prov. (Bilogay), Jayapura Prov. (Waris). Altitude: 200-2100 m.

Material examined: IRIAN JAYA, Sorong Prov.: 1 male, 1 female, Waigeo Isl., Saporkren, 0-200 m, 12-13.XI.1996, leg. A.Riedel (ARC); 11 males, 6 females, Batanta Isl., Waylebet, 500-820 m, 29.X.-1.XI.1996, leg. A.Riedel (ARC); 1 male, Batanta Isl., Waylebet, 100-250 m, 31.X.1996, leg. A.Riedel (ARC); 3 males, 1 female, Salawatti Isl., Solol, 0-350 m, 6-7.XI.1996, leg. A.Riedel (ARC); Manokwari Prov.:1 male, Testega, 1100-1200 m, 11.IV.1993, leg. A.Riedel (ARC); 2 males, 2 females, Wandammen Bay, Wondiwoi Mts., Wasior, 580-950 m, 3.I.2001, leg. A.Riedel (ARC); 2 males, 2 females, Wandammen Bay, Wondiwoi Mts., Wasior, 250-600 m, 4.I.2001, leg. A.Riedel (ARC); 13 males, 7 females, Wandammen Bay, Wondiwoi Mts., Wasior, 300-850 m, 5.I.2001, leg. A.Riedel (ARC); 2 males, 1 female, Wandammen Bay, Wondiwoi Mts., Wasior, 300-700 m, 14.I.2001, leg. A.Riedel (ARC); 1 male, 3 females, Wandammen Bay, Wondiwoi Mts., Wasior, 250-600 m, 15.I.2001, leg. A.Riedel (ARC); Paniai Prov.: 1 male, Bilogay, 2100-2200 m, 22-24.XII.1995, leg. A.Riedel (ARC); Jayapura Prov.: 1 male, Waris, 450-500 m, 24-31.VIII.1959, leg. T.C.Maa (BPBM).

Euops, new species 61

Range. Morobe Prov. (Wau). Altitude: 1100-1400 m.

Material examined: PAPUA NEW GUINEA, Morobe Prov.: 8 males, 3 females, Wau, Mt. Kaindi, 1400 m, 8.III.1998, leg. A.Riedel (ARC); 1 male, Wau, 1100 m, 29.VIII.1961, leg. J.&M.Sedlacek (BPBM).

Euops, new species 62

Range. Jayawijaya Prov. (Borme). Altitude: ca. 1000-1300 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 1 male, Borme, trail to Omban, 1000-1300 m, 3.IX.1993, leg. A.Riedel (ARC).

Euops, new species 63

Range. Jayawijaya Prov. (Borme). Altitude: ca. 1000-1300 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 2 males, Borme, 1000-1300 m, 13-18.VIII.1992, leg. A.Riedel (ARC).

Euops, new species 64

Range. Jayapura Prov. (Rouffaer Mts.). Altitude: ca. 150-200 m.

Material examined: IRIAN JAYA, Jayapura Prov.: 1 male, Mamberamo, Rouffaer Mts., Noiadi, 150-200 m, 17.III.1999, leg. A.Riedel (ARC).

Euops, new species 65

Range. Sorong Prov. (Waigeo Isl., Salawatti Isl.). Altitude: ca. 50-100 m.

Material examined: IRIAN JAYA, Sorong Prov.: 1 male, Waigeo Isl., Saporkren, 0-200 m, 12-13.XI.1996, leg. A.Riedel (ARC); 3 males, Salawatti Isl., SP 2, Waijan, ca. 50-100 m, 23-25.X.1996, leg. A.Riedel (ARC).

Euops, new species 66

Range. Jayawijaya Prov. (Emdoman), Jayapura Prov. (Cyclops Mts.), Sandaun Prov. (N Mianmin), Morobe Prov. (Wau, Mt. Amingwiwa) . Altitude: 950-1100 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 2 males, 1 female, Emdoman, 900-1200 m, 29.IX.1993, leg. A.Riedel (ARC); 2 males, Emdoman, 900-1200 m, 14-15.IX.1992, leg. A.Riedel (ARC); Jayapura Prov.: 1 male, Sentani, Cyclops Mts., 950-1450 m, 3.X.1992, leg. A.Riedel (ARC); Sandaun Prov.: 1 male, N Mianmin, 700-1100 m, 20.V.1998, leg. A.Riedel (ARC); PAPUA NEW GUINEA, Morobe Prov.: 1 male, Wau, 1100 m, 29.VIII.1961, leg. J.&J.H.Sedlacek (BPBM); 1 male, Mt. Amingwiwa, 1000 m, 13-14.IV.1970, leg. J.L.Gressitt (BPBM).

Euops, new species 67

Range. Jayawijaya Prov. (Borme). Altitude: ca. 1000-1300 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 1 male, Borme, 1000-1300 m, 13-18.VIII.1992, leg. A.Riedel (ARC).

Euops, new species 68

Range. Central Prov. (Daradae). Altitude: 100 m.

Material examined: PAPUA NEW GUINEA, Central Prov.: 1 male, Daradae, nr. Javarere, Musgrove R., 100 m ?, 3.X.1958, leg. J.L.Gressitt (BPBM).

Euops, new species 69

Range. Biak-Numfor Prov. (Biak Isl.). Altitude: ca. 50-100 m.

Material examined: IRIAN JAYA, Biak-Numfor Prov.: 1 male, Biak Isl., Workar - Wari, 50-100 m, 14.XII.2000, leg. A.Riedel (ARC).

Euops, new species 70

Range. Morobe Prov. (Pindiu). Altitude: ca. 1250-1400 m.

Material examined: PAPUA NEW GUINEA, Morobe Prov.: 1 male, E Pindiu, Kobau, 1250-1400 m, 24.IV.1998, leg. A.Riedel (ARC).

Euops, new species 71

Range. Manokwari Prov. (Testega). Altitude: ca. 1100-1300 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 2 males, Testega, 1100-1300 m, 30.III.-2.IV.1993, leg. A.Riedel (ARC).

Euops, new species 72

Range. Morobe Prov. (Bulolo). Altitude: 700 m.

Material examined: PAPUA NEW GUINEA, Morobe Prov.: 1 male, Bulolo, 700 m, 6.XI.1969, leg. J.&M.Sedlacek (BPBM).

Euops, new species 73

Range. Paniai Prov. (Enarotadi); Central Prov. (Woitape, Mt. Chapman). Altitude: 1600-2000 m.

Material examined: IRIAN JAYA, Paniai Prov., Enarotadi, 2000 m, 2.VIII.1955, leg. J.L.Gressitt (BPBM); PAPUA NEW GUINEA, Morobe Prov.: 1 male, Mt. Chapman, S 7° 19´ E 140° 48´, 1600 m, "6370", 5.V.1966, leg. J.L.&M.Gressitt (ARC); 1 male, Woitape, 1550-1750 m, 2-3.XI.1965, leg. J.&M.Sedlacek.

Note: there are slight morphological differences between the specimen from Irian Jaya and the specimens from Papua New Guinea. They may in fact represent separate species.

New species group 2

Unidentified material at hand: 21 female specimens from New Guinea.

New species group 3

Diagnosis. Body of medium size, length of pronotum + elytron 2.55-3.65 mm. Apex of female protibia without premucro. Usually, abdominal sternite III of male venter densely setose with short setae; if not, apex of tegmen pointed, with straight sides converging. Setose patch of female venter consisting of three double rows of modified setae and one simple row of setae. Ovipositor with styli.

Euops, new species 74

Range. Biak-Numfor Prov. (Biak Isl.); Japen-Waropen Prov. (Japen Isl.). Altitude: 150-300 m.

Material examined: IRIAN JAYA, Biak-Numfor Prov.: 1 male, 1 female, Biak Isl., Korim, Nernu, 100-150 m, 12-14.XII.2000, leg. A.Riedel (ARC); 3 males, 1 female, Biak Isl., Korim, Nernu, 100-150 m, 1.II.2001, leg. A.Riedel (ARC); 1 male, 4 females, Biak Isl., Korim, Nernu, 100-150 m, 4.II.2001, leg. A.Riedel (ARC); 1 male, Biak Isl., 3 km S Korim, 100 m, 21-22.IV.1993; Japen-Waropen Prov.: 1 male, Japen Isl., Serui, Mantembu, 300-800 m, 6-9.IX.1991 (ARC).

Euops, new species 75

Range. Jayawijaya Prov. (Emdoman, Samboka, Borme); Southern Highlands Prov. (Karimui). Altitude: 150-300 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 1 male, Emdoman, 800-1200 m, 14-15.IX.1992, leg. A.Riedel (ARC); 2 males, 1 female, Yalmabi - Samboka, 200-650 m, 9.X.1996, leg. A.Riedel (ARC); 1 male, Borme, trail to Omban, 1000-1300 m, 3.IX.1993, leg. A.Riedel (ARC);. PAPUA NEW GUINEA, Southern Highlands Prov.: 1 male, Karimui, 4.VI.1961, leg. J.L.&M.Gressitt (BPBM); 1 male, Karimui, 14-15.VII.1963, leg. J.Sedlacek (BPBM).

Euops, new species 76

Range. Jayawijaya Prov. (Taramlu). Altitude: ca. 1500-1700 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 2 males, Taramlu, 1500-1700 m, 6.IX.1993, leg. A.Riedel (ARC).

Euops, new species 77

Range. Japen-Waropen Prov. (Japen Isl.); Jayawijaya Prov. (Araucaria Camp, Emdoman, Borme). Altitude: 700-1000 m.

Material examined: IRIAN JAYA, Japen-Waropen Prov.: 1 male, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 26.XII.2000, leg. A.Riedel (ARC); Jayawijaya Prov.: 1 male, Araucaria Camp [S 3° 30´ E 139° 11´], 700 m, 22.III.1939, leg. L.J.Toxopeus (NNML); 2 males, 1 female, Emdoman, 800-1200 m, leg. A.Riedel (ARC); 3 males, 8 females, Borme, 1000-1300 m, 13-18.VIII.1992, leg. A.Riedel (ARC); 1 female, Borme, trail to Omban, 1000-1300 m, 3.IX.1993, leg. A.Riedel (ARC).

Euops, new species 78

Range. Sorong Prov. (Batanta Isl., Salawatti Isl.), Manokwari Prov. (Manokwari ?, Wandammen Bay), Paniai Prov. (Epomani), Sandaun Prov. (Mianmin). Altitude: 350-1350 m.

Material examined: IRIAN JAYA, Sorong Prov.: 2 males, 3 females, Batanta Isl., Waylebet, 500-820 m, 29.X.-1.XI.1996, leg. A.Riedel (ARC); 3 females, Batanta Isl., Waylebet, 100-500 m, 29.X.-1.XI.1996, leg. A.Riedel (ARC); 1 female, Batanta Isl., Waylebet, 100-250 m, 31.X.1996, leg. A.Riedel (ARC); 2 males, 2 females, Salwatti Isl., Kalyam, 0-380 m, 3.XI.1996, leg. A.Riedel (ARC); 11 males, 1 female, Salwatti Isl., Solol, 0-350 m, 6-7.XI.1996, leg. A.Riedel (ARC); Manokwari Prov.: 1 male, "Dorey" [= Manokwari; another label states "Batchian"], coll. Pascoe (BMNH); 1 male, Wandammen Bay, Wondiwoi Mts., Wasior, 300-850 m, 5.I.2001, leg. A.Riedel (ARC); Paniai Prov.: 1 male, 2 females, Epomani, Km 145, 550-750 m, 15-16.I.1996, leg. A.Riedel (ARC); 5 females, Epomani, Km 165, 700-800 m, 17.I.1996, leg. A.Riedel (ARC); 2 males, 2 females, Epomani, Km 169, 900-1100 m, 18.I.1996, leg. A.Riedel (ARC);1 male, Epomani, Ugida, Km 179, 1350-1400 m, 19-20.I.1996, leg. A.Riedel (ARC). PAPUA NEW GUINEA, Sandaun Prov.: 3 males, N Mianmin, 700-1100 m, 20.V.1998, leg. A.Riedel (ARC).

Euops, new species 79

Range. Manokwari Prov. (Iba), Paniai Prov. (Epomani), Western Prov. (Oriomo), Eastern Highlands Prov. (Okapa), Morobe Prov. (Wau, Aseki); Central Prov (Kumbak R., Goilala). Altitude: 10-1550 m.

Material examined: IRIAN JAYA, Manokwari Prov.:1 male, Iba, 1300 m, 7-8.IV.1993, leg. A.Riedel (ARC); Paniai Prov.: 1 male, Epomani, Ugida, Km 179, 1350-1400 m, 19-20.I.1996, leg. A.Riedel (ARC). PAPUA NEW GUINEA, Western Prov.: 1 male, Oriomo Govt. Sta., [5-10 m], 26-28.X.1960, leg. J.L.Gressitt (BPBM); Eastern Highlands Prov.: 1 male, 13 km SE Okapa, 1650-1870 m, 26.VIII.1964, leg. J.&M.Sedlacek (BPBM); Morobe Prov.: 1 male, Wau, Mt. Kaindi, coffee garden, 1550 m, 7.X.1992, leg. A.Riedel (ARC); 1 male, Wau, Mt. Missim, 1800 m, 22.III.1966, leg. J.L.Gressitt (BPBM); 1 male, 3 females, Aseki, 1000-1300 m, 19.III.1992, leg. A.Riedel (ARC); 1 male, 2 females, Aseki, Oiwa, Langama road, 1500-1700 m, 13.III.1998, leg. A.Riedel (ARC); 2 males, 2 females, Aiewa, near Poiu, S Aseki, 1500-1700 m, 14.V.1998, leg. A.Riedel (ARC); Central Prov.: 1 male, Kumbak R., 1400-2200 m, 17.VI.1971, leg. J.Sedlacek (BPBM); 3 males, Goilala, Loloipa, 25.XI.-10.XII.1957, leg. W.W.Brandt (BPBM).

Euops, new species 80

Range. Japen-Waropen Prov. (Japen Isl.). Altitude: ca. 600-700 m.

Material examined: IRIAN JAYA, Japen-Waropen Prov.: 6 males, 2 females, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 23.XII.2000, leg. A.Riedel (ARC); 1 male, 1 female, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 25.XII.2000, leg. A.Riedel (ARC).

Euops, new species 81

Range. Morobe Prov. (Wau); Oro Prov. (Popondetta). Altitude: 60-1300 m.

Material examined: IRIAN JAYA, Morobe Prov.: 1 male, Wau, 1200-1300 m, 14.IX.1965, leg. J.Sedlacek (BPBM); 1 male, Wau, Big Wau Ck., 1300 m, XI.1965, leg. P.Shanahan (BPBM); 1 male, Popondetta, 60 m, 3-4.IX.1963, leg. J.Sedlacek (BPBM).

Euops, new species 82

Range. Jayawijaya Prov. (Emdoman, Borme), Jayapura Prov. (Lereh), Sandaun Prov. (Mianmin). Altitude: 500-1000 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 6 males, 5 females, Emdoman, 800-1200 m, 14-15.IX.1992, leg. A.Riedel (ARC); 2 males, 2 females, Emdoman, 900-1200 m, 29.IX.1993, leg. A.Riedel (ARC); 1 male, Borme, trail to Omban, 1000-1300 m, 3.IX.1993, leg. A.Riedel (ARC); 1 male, Borme, 1000-1300 m, 13-18.VIII.1992, leg. A.Riedel (ARC); Jayapura Prov.: 5 males, 1 female, Lereh, 500-1000 m, 26.I.1996, leg. A.Riedel (ARC); 1 male, 2 females, Lereh, 300-500 m, 26.I.1996, leg. A.Riedel (ARC); 2 males, 2 females, Lereh, 300-550 m, 25.I.1996, leg. A.Riedel (ARC). PAPUA NEW GUINEA, Sandaun Prov.: 1 male, N Mianmin, 700-1100 m, 20.V.1998, leg. A.Riedel (ARC).

Euops, new species 83

Range. Manokwari Prov. (Testega), Paniai Prov. (Nabire), Japen-Waropen Prov. (Japen Isl.), Jayawijaya Prov. (Angguruk, Yalmabi, Galbok, Emdoman, Borme), Jayapura Prov. (Cyclops Mts.), Sandaun Prov. (Mianmin), Eastern Highlands Prov. (Kassem Pass), Morobe Prov. (Wau, Bulolo, Mindik, Pindiu), Oro Prov. (Kokoda), New Ireland. Altitude: 450-1700 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 2 males, Testega, 1100-1200 m, 11.IV.1993, leg. A.Riedel (ARC); 1 male, Testega, 1100-1300 m, 30.III-2.IV.1993, leg. A.Riedel (ARC); 1 male, Testega - Meydoudga, 1000-1350 m, 10.IV.1993, leg. A.Riedel (ARC); Paniai Prov.: 1 male, Nabire, Topo, Pusppensaat, Km 54, 750 m, 20-21.XII.1995, leg. A.Riedel (ARC); Japen-Waropen Prov.: 1 male, 1 female, Japen Isl., Serui, Mantembu, 100-500 m, 16.XII.2000, leg. A.Riedel (ARC); Jayawijaya Prov.: 2 males, Angguruk - Tanggeam, 1500-1800 m, 28-29.IX.1991, leg. A.Riedel (ARC); 2 males, Angguruk, 1600-1700 m, 21/27/30.IX.1991, leg. A.Riedel (ARC); 2 males, 2 females, Galbok (W Nalca), 1700-1800 m, 3.X.1993, leg. A.Riedel (ARC); 1 male, Emdoman, 900-1200 m, 29.IX.1993, leg. A.Riedel (ARC); 4 males, Yalmabi, 1200-1400 m, 8.X.1996, leg. A.Riedel (ARC); 1 male, 2 females, Borme, 1000-1300 m, 13-18.IX.1992, leg. A.Riedel (ARC); Jayapura Prov.: 5 males, 5 females, Cyclops Mts., Sentani, 400-500 m, 10.VIII.1992, leg. A.Riedel (ARC); 1 male, 9 females, Cyclops Mts., Sentani, 300-550 m, 2.X.1992, leg. A.Riedel (ARC); 1 male, 3 females, Cyclops Mts., Sentani, 900-1450 m, 3.X.1992, leg. A.Riedel (ARC); 2 males, 5 females, Cyclops Mts., Sentani, 300-500 m, 31.X.1992, leg. A.Riedel (ARC); 1 male, 1 female, Cyclops Mts., Sentani, 270-500 m, 26.IX.1996, leg. A.Riedel (ARC); 1 male, Cyclops Mts., Sentani, 400-700 m, 16.X.1996, leg. A.Riedel (ARC); 1 male, Cyclops Mts., Sentani, 600-1100 m, 5.X.1991, leg. A.Riedel (ARC); 1 male, 1 female, Cyclops Mts., Sentani, 1100-1600 m, 5.X.1996, leg. A.Riedel (ARC); 1 male, Cyclops Mts., near Hollandia [= Jayapura], 1000´, 1945, coll. J.Laffoon (BPBM). PAPUA NEW GUINEA, Sandaun Prov.: 2 males, N Mianmin, 700-1100 m, 20.V.1998, leg. A.Riedel (ARC); Eastern Highlands Prov.: 1 male, Kassem Prov, 510 m, "sedges", 18.VII.1963, leg. J.Sedlacek (BPBM); Morobe Prov.: 1 male, Mt. Missim, 980 m, 20.VII.1969, leg. J.L.Gressitt & Y.Hirashima (BPBM); 1 male, Wau, Wau Creek, 1100-1200 m, 6.X.1965, leg. J.Sedlacek (BPBM); 1 male, Wau, 1200 m, 25.XII.1961, leg. G.Monteith & J.Sedlacek (BPBM); 1 male, Wau, 1150 m, 7.XI.1961, leg. J.&J.H.Sedlacek (BPBM); 1 male, Wau, Bulolo R., 900-1100 m, 25.IX.1965, leg. J.Sedlacek (BPBM); 1 male, Wau, 1200-1300 m, 1-9.IX.1965, leg. J.Sedlacek (BPBM); 1 male, Bulolo, 1000 m, 26.VIII.1956, leg.E.J.Ford jr. (BPBM); 10 males, 4 females, Mindik - Pindiu, near Kuat river, 500-580 m, 28.IV.1998, leg. A.Riedel (ARC); 1 male, Mindik, 1200-1500 m, 26.IV.1998, leg. A.Riedel (ARC); 1 male, Pindiu, Kobau, 1250-1400 m, 24.IV.1998, leg. A.Riedel (ARC); 1 male, Pindiu, 870-1300 m, 21-22.IV.1963, leg. J.Sedlacek (BPBM); Central Prov: 2 males, Kokoda - Pitoki, 450 m, 24.III.1956, leg. J.L.Gressitt (BPBM); New Ireland Prov.: 1 male, New Ireland, ridge above "Camp Bishop", 15 km up Kait R., 250-750 m, 14.VII.1956, leg. J.L.Gressitt (BPBM).

Note: specimens from Irian Jaya exhibit constant differences in male genital characters (TA) to specimens from Eastern Papua New Guinea. The two specimens from Mianmin hold an intermediate position. A closer study should reveal if these forms belong to the same species or, if they represent two or possibly three distinct species.

New species group 4

Diagnosis. Funicle of antenna thick, in some species little narrower than club. In most species apical surface of male protibia on posterior side with angular extension. Elytra behind humeri slightly widening towards middle. Pterothorax unusually high, in males 0.87-0.93 X length of elytron, in females height of pterothorax 0.93-1.02 X length of elytron. Apex of female protibia without premucro.

Euops, new species 84

Range. Paniai Prov. (Bilogay, Sinak, Mulia); Jayawijaya Prov. (Mist Camp, Pronggoli, Eipomek). Altitude: ca. 1800-2200 m.

Material examined: IRIAN JAYA, Paniai Prov.: 1 male, Sinak, 2000-2200 m, 14.XII.1995, leg. A.Riedel (ARC); 2 males, 4 females, Sinak, 2000-2200 m, 14-17.XII.1995, leg. A.Riedel (ARC); 2 males, 4 females, Bilogay, 2100-2200 m, 22-24.XII.1995, leg. A.Riedel (ARC); 2 males, 4 females, Bilogay, 2100-2200 m, 24.XII.1995, leg. A.Riedel (ARC); 1 female, Bilogay, 2100-2200 m, 30.XII.1995, leg. A.Riedel (ARC); 2 males, 2 females, Mulia, Dowome, 2200-2250 m, 8.VII.1994, leg. A.Riedel (ARC); 1 male, 2 females, Mulia, Wuyuneri, 1900-2200 m, 6-7.VII.1994, leg. A.Riedel (ARC); Jayawijaya Prov.: 1 male, Mist Camp [S 3° 30´ E 139° 05´], 1800 m, 9.I.1939, leg. L.J.Toxopeus (NNML); 1 female, Top Camp [S 3° 30´ E 139° 02´], 2100 m, 5.I.1939, leg. L.J.Toxopeus (NNML); 1 female, Pronggoli, 2000-2400 m, 17-19.IX.1991, leg. A.Riedel (ARC); 1 female, Eipomek, ca. 1800-2300m, leg. A.Riedel (ARC).

Euops, new species 85

Range. Manokwari Prov. (Anggi). Altitude: ca. 2000-2150 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 1 male, Anggi, Gn. Disbehey, 2000-2150 m, 29.VIII.1991, leg. A.Riedel (ARC).

Euops, new species 86

Range. Jayawijaya Prov. (Angguruk, Bime, Taramlu, Borme). Altitude: 1300-1700 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 1 male, 1 female, Angguruk, 1600-1700 m, 21/27/30.IX.1991, leg. A.Riedel (ARC); 1 female, Bime, 1600-1800 m, 22.IX.1993, leg. A.Riedel (ARC); 5 males, 5 males, Taramlu, 1700 m, 6.IX.1993, leg. A.Riedel (ARC); 2 males, Borme, 1000-1300 m, 13-18.VIII.1992, leg. A.Riedel (ARC).

Euops, new species 87

Range. Morobe Prov. (Aseki, Garaina). Altitude: 1700-1800 m.

Material examined: PAPUA NEW GUINEA, Morobe Prov.: 2 males, Aiewa near Poiu, S Aseki, 1500-1700 m, 14.IV.1998, leg. A.Riedel (ARC); 1 male, 1 female, ca. 10 km S Garaina, Saureri, 1600-1800 m, 24-25.III.1998, leg. A.Riedel (ARC); 2 females, ca. 10 km S Garaina, Saureri, 1800-2150 m, 26.III.1998, leg. A.Riedel (ARC); 1 male, 2 females, ca. 10 km S Garaina, Saureri, 1800-2000 m, 24-26.III.1998, leg. A.Riedel (ARC).

Euops, new species 88

Range. Jayawijaya Prov. (Nalca, Bommela, Langda), Southern Highlands Prov. (Mt. Giluwe), Enga Prov. (Laiagam, Kepilam, Lake Sirunki), Eastern Highlands Prov. (Aiyura), Morobe Prov (Mt. Missim). Altitude: 1600-2600 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 1 male, Nalca, 1900-2100 m, 8.IX.1992, leg. A.Riedel (ARC); 1 female, Bommela, ca. 1750 m, 30.VIII.-1.IX.1992, leg. A.Riedel (ARC); 1 male, Langda, 2100-2300 m, 2.X.1996, leg. A.Riedel (ARC); PAPUA NEW GUINEA, Southern Highlands Prov.: 1 female, Mt. Giluwe, 2500 m, 1.V.1963, leg. J.Sedlacek (BPBM); 1 male, 1 female, Mt. Giluwe, 2550 m, 29.V.1963, leg. Sedlacek (BPBM); 1 female, Ialibu, 2600 m, 8-14.IV.1968, leg. J.L.Gressitt & Maa (BPBM); Enga Prov.: 1 male, 2 females, Lake Sirunki, 2550 m, 14.VI.1963, leg. J.Sedlacek (BPBM); 3 males, 1 female, Lake Sirunki, 2550 m, 17.VI.1963, leg. J.Sedlacek (BPBM); 1 male, Lake Sirunki, 2550 m, 18.VI.1963, leg. J.Sedlacek (BPBM); 2 males, Laiagam, 2600-2700 m, 19.VI.1963, leg. J.Sedlacek (BPBM); 2 females, Kepilam, 2420-2540 m, 21.VI.1963, leg. J.Sedlacek (BPBM); 2 males, 2 females, Kepilam, 2420-2490 m, 23.VI.1963, leg. J.Sedlacek (BPBM); Eastern Highlands Prov.: 1 female, Aiyura, 1800-1900 m, 6.I.1965, leg. J.Sedlacek (BPBM); Morobe Prov.: 1 male, 7° 15´S 146° 48´E, Mt. Missim, 1600 m, Malaise trap, 27.V.1966, leg. J.L.Gressitt (BPBM).

Euops, new species 89

Range. Morobe Prov. (Wau), Central Prov. (Kumbak R). Altitude: 1550 m.

Material examined: PAPUA NEW GUINEA, Morobe Prov.: 1 female, Wau, Mt. Kaindi, coffee garden, 1550 m, 7.X.1992, leg. A.Riedel (ARC); Central Prov.: 2 males, Kumbak R., 1400-2200 m, 17.VI.1971, leg. J.Sedlacek (BPBM).

Euops, new species 90

Range. Morobe Prov. (Menyamya), Southern Highlands Prov. (Mt. Giluwe), Eastern Highlands Prov. (Daulo Pass), Chimbu Prov. (Mt. Wilhelm), Central Prov. (Mt. Albert Edward). Altitude: 2200-3000 m.

Material examined: PAPUA NEW GUINEA, Morobe Prov.: 1 male, range between Aseki - Menyamya, 2000-2200 m, 12.IV.1998, leg. A.Riedel (ARC); Southern Highlands Prov.: 1 male, Mt. Giluwe, 2800-3280 m, 30.V.1963, leg. Sedlacek (BPBM); Eastern Highlands Prov.: 1 male, Daulo Pass, Asaro - Chimbu Divide, 3000 m, at light, 13.VI.1955, leg. J.L.Gressitt (BPBM); Chimbu Prov.: 1 female, Mt. Wilhelm, 2550-2700 m, 10.VIII.1969, leg. J.L.Gressitt & Mena (BPBM); Central Prov.: 1 male, Mt. Albert Edward, 2820 m, Malaise trap, 10.XI.1965, leg. J.Sedlacek (BPBM).

New species group 4

Unidentified material at hand: 4 female specimens from New Guinea.

New species group 5

Diagnosis. Relatively small body size, length of pronotum + elytron 1.97-2.91 mm. Prementum with three apical teeth. Eyes large, dorsally contiguous. Head at conjunction with rostrum ventrally with more or less conspicuously projecting carina. Pronotum smooth. Apex of female protibia without premucro.

Euops, new species 91

Range. Paniai Prov. (Bilogay, Sinak, Mulia, Kwiyawagi), Jayawijaya Prov. (Tiom, Jiwika, Pronggoli, Angguruk, Membaham, Galbok, Borme), Southern Highlands Prov. (Lake Kutubu), Eastern Highlands Prov. (Daulo Pass), Morobe Prov. (Mt. Piora, Wau, Aseki, Garaina). Altitude: 1000-2750 m.

Material examined: IRIAN JAYA, Paniai Prov.: 12 males, 15 females, Sinak, 2000-2200 m, 14-17.XII.1995, leg. A.Riedel (ARC); 6 males, 4 females, Bilogay, 2100-2200 m, 22-24.XII.1995, leg. A.Riedel (ARC); 1 male, 7 females, Bilogay, 2100-2200 m, 29.XII.1995, leg. A.Riedel (ARC); 2 males, 2 females, Mulia, Wuyuneri, 1900-2200 m, 6-7.VII.1994, leg. A.Riedel (ARC); 1 male, Kwiyawagi, 2750 m, 9-10.XII.1995, leg. A.Riedel (ARC); Jayawijaya Prov.: 5 males, Tiom, Wanuga, 2750-2900 m, 8.XII.1995, leg. A.Riedel (ARC); 1 male, Jiwika, trail to Wandanku, 1900-2150 m, 28-29.IX.1996, leg. A.Riedel (ARC); 3 males, 2 females, Pronggoli, 2000-2400 m, 17-19.IX.1991, leg. A.Riedel (ARC); 1 female, Membaham, 1500-1800 m, 23.IX.1991, leg. A.Riedel (ARC); 5 males, 6 females, Angguruk, 1600-1700 m, 21/27/30.IX.1991, leg. A.Riedel (ARC); 2 males, Galbok, W Nalca, 1700-1800 m, 3.X.1993 (ARC); 4 males, Borme, 1000-1300 m, 13-18.VIII.1992, leg. A.Riedel (ARC); PAPUA NEW GUINEA, Southern Highlands Prov.: 1 male, Tugiri, Lake Kutubu, 1000 m,7-9.II.1978, leg. J.L.Gressitt (BPBM); Eastern Highlands Prov.: 1 male, Daulo Pass, 2400 m, 7.VII.1963, leg. J.Sedlacek (BPBM); Morobe Prov.: 1 male, Mt. Piora, 6° 45´S 146° E, 1950 m, 12.VI.1966, leg. J.L.Gressitt (BPBM); 2 females, Aseki, Oiwa, 1600-1700 m, 22.II.1998, leg. A.Riedel (ARC); 1 female, Aseki, Oiwa, Langama-road, 1600-1700 m, 13.III.1998, leg. A.Riedel (ARC); 1 male, Aseki, Oiwa, 1700-1800 m, 10-11.IV.1998, leg. A.Riedel (ARC); 1 male, Mt. Kaindi, 1.IV.1966, leg. J.L.Gressitt (BPBM); 2 males, 6 females, Wau, Mt. Kaindi, 1850-2150 m, leg. A.Riedel (ARC); 1 male, Wau - Biaru, 1900-2100 m, 10.X.1992, leg. A.Riedel (ARC); 1 female, Wau - Biaru, 1700-2000 m, 10.X.1992, leg. A.Riedel (ARC); 1 male, Kuper range, Biaru-Camp, 2000 m, leg. A.Riedel (ARC); 1 male, 1 female, ca. 10 km S Garaina, Saureri, 1800-2000 m, 24-26.III.1998, leg. A.Riedel (ARC); 2 males, ca. 10 km S Garaina, Saureri, 1800-2150 m, 24-26.III.1998, leg. A.Riedel (ARC).

Euops, new species 92

Range. Paniai Prov. (Epomani). Altitude: ca. 1350-1400 m.

Material examined: IRIAN JAYA, Paniai Prov.: 4 males, Epomani, Ugida, Km 179 m, 1350-1400 m, 19-20.I.1996, leg. A.Riedel (ARC).

Euops, new species 93

Range. Manokwari Prov. (Testega, Warmare), Paniai Prov. (Epomani). Altitude: 700-1100 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 1 male, Manokwari, Warmare, 200-700 m, 22.VIII.1991, leg. A.Riedel (ARC); 1 male, Manokwari, Warmare, 200-700 m, 4.IX.1991, leg. A.Riedel (ARC); 2 males, Testega, 1100-1300 m, 30.III.-2.IV.1993, leg. A.Riedel (ARC); 4 males, Testega, 1100-1200 m, 11.IV.1993, leg. A.Riedel (ARC); Paniai Prov.: 1 male, Epomani, Km 165, 700-800 m, 17.I.1996, leg. A.Riedel (ARC); 2 males, 1 female, Epomani, Km 169, 900-1100 m, 18.I.1996, leg. A.Riedel (ARC).

Euops, new species 94

Range. Paniai Prov. (Sinak, Mulia, Kwiyawagi), Jayawijaya Prov. (Jiwika, Pronggoli, Nalca, Yalmabi, Bime). Altitude: 1400-2750 m.

Material examined: IRIAN JAYA, Paniai Prov.: 4 males, 2 females, Sinak, 2000-2200 m, 14-17.XII.1995, leg. A.Riedel (ARC); 1 male, Mulia, Wuyuneri, 1900-2200 m, 6-7.VII.1993, leg. A.Riedel (ARC); 3 males, 7 female, Kwiyawagi, 2750 m, 9-10.XII.1995, leg. A.Riedel (ARC); Jayawijaya Prov.: 1 female, Jiwika, trail to Wandanku, 2240-2420 m, 28.IX.1996, leg. A.Riedel (ARC); 4 males, 2 females, Pronggoli, 2000-2400 m, 17-19.IX.1991, leg. A.Riedel (ARC); 1 female, Pronggoli, ca. 2000 m, 2.VI.1998, leg. A.Riedel (ARC); 1 male, Membaham, 1500-1800 m, 23.IX.1991, leg. A.Riedel (ARC); 3 males, 7 females, Diuremna (near Nalca), 1900-2100 m, 9-11.IX.1992, leg. A.Riedel (ARC); 6 males, 8 females, Yalmabi, 1200-1400 m, 8.X.1996 (ARC); 1 male, Bime, 1600-2000 m, 10.IX.1993, leg. A.Riedel (ARC).

Euops, new species 95

Range. Manokwari Prov. (Testega). Altitude: ca. 1100-1200 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 6 males, 1 female, Testega, 1100-1300 m, 30.III.-2.IV.1993, leg. A.Riedel (ARC); 4 males, 3 females, Testega, 1100-1200 m, 11.IV.1993, leg. A.Riedel (ARC).

Euops, new species 96

Range. Jayawijaya Prov. (Angguruk, Membaham, Kosarek, Okloma, Nalca, Bommela, Bime, Borme), Sandaun Prov. (Telefomin, Eliptamin, Feramin), Morobe Prov. (Mindik ?). Altitude: 1300-1900 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 2 males, Angguruk - Tanggeam, 1500-1800 m, 28-29.IX.1991, leg. A.Riedel (ARC); 1 female, Membaham, 1500-1800 m, 23.IX.1991, leg. A.Riedel (ARC); 3 male, 1 female, Kosarek, 1650-1700 m, 25.IX.1991, leg. A.Riedel (ARC); 1 male, Okloma, 1650-1800 m, 30.IX-1.X.1993, leg. A.Riedel (ARC); 1 male, 1 female, Nalca, 1900-2100 m, 8.IX.1992, leg. A.Riedel (ARC); 1 male, 1 female, Diuremna, near Nalca, 1900-2100 m, 9-11.IX.1992, leg. A.Riedel (ARC); 13 males, 9 females, Bommela, ca. 1750 m, 30.VIII-1.IX.1992, leg. A.Riedel (ARC); 3 males, Bime, 1600-2000 m, 10.IX.1993, leg. A.Riedel (ARC); 5 males, Borme, 1000-1450 m, 12-15.VIII.1992, leg. A.Riedel (ARC); 3 males, Borme, 1000-1300 m, 13-18.VIII.1992, leg. A.Riedel (ARC); 1 male, Borme, trail to Omban, 1000-1300 m, 3.IX.1993, leg. A.Riedel (ARC); PAPUA NEW GUINEA, Sandaun Prov.: 2 males, 5 females, Telefomin, trail to Eliptamin, 1700-1900 m, 16-17.V.1998, leg. A.Riedel (ARC); 1 male, Eliptamin Vall., 1200-1350 m, 16-30.VIII.1959, leg. W.W.Brandt (BPBM); 1 female, Feramin, 11-22.II.1959, leg. W.W.Brandt (BPBM); 1 male, Feramin, 26.VIII.1963, leg. R.Straatman (BPBM); Morobe Prov.: 1 male, Mindik, 1200-1500 m, 26.IV.1998, leg. A.Riedel (ARC).

Note: the specimen from Mindik differs considerably in the structure of the apex of the protibia from the remainder of specimens; however, the TA exhibits only slight differences. Possibly, it represents a distinct species.

Euops, new species 97

Range. Japen-Waropen Prov. (Serui), Jayawijaya Prov. (Angguruk, Okloma, Borme). Altitude: 700-1600 m.

Material examined: IRIAN JAYA, Japen-Waropen Prov.: 1 male, 1 female, Serui, Kontiunai, road to Ambaidiru, 600-700 m, 25.XII.2000, leg. A.Riedel (ARC); Jayawijaya Prov.: 1 male, Angguruk, 1600-1700 m, 21/27/30.IX.1991, leg. A.Riedel (ARC); 3 males, 1 female, Okloma - Emdoman, 1400-1700 m, 28.IX.1993, leg. A.Riedel (ARC); 1 male, Emdoman, 1400-1550 m, 13.IX.1992, leg. A.Riedel (ARC); 2 males, 4 females, Borme, 1000-1450 m, 12-15.VIII.1992, leg. A.Riedel (ARC); 2 males, 8 females, Borme, 1000-1300 m, 13-18.VIII.1992, leg. A.Riedel (ARC).

Euops, new species 98

Range. Manokwari Prov. (Anggi). Altitude: ca. 700-1800 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 1 male, Ransiki, trail to Anggi, 700-1800 m, 26.VIII.1991, leg. A.Riedel (ARC).

Euops, new species 99

Range. Jayawijaya Prov. (Angguruk, Membaham, Okloma, Nalca, Bommela, Bime, Taramlu, Borme), Southern Highlands Prov. (Mt. Giluwe), Enga Prov. (Laiagam, Kepilam, Lake Sirunki), Chimbu Prov. (Keglsugl, Mt. Wilhelm), Eastern Highlands Prov. (Daulo Pass), Morobe Prov. (Wau, Engabena). Altitude: 1200-3535 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 1 male, Angguruk - Tanggeam, 1500-1800 m, 28-29.IX.1991, leg. A.Riedel (ARC); 1 male, Membaham, 1500-1800 m, 23.IX.1991, leg. A.Riedel (ARC); 1 male, Okloma, 1650-1800 m, 30.IX-1.X.1993, leg. A.Riedel (ARC); 1 male, Emdoman, 900-1200 m, 29.IX.1993, leg. A.Riedel (ARC); 9 males, 10 females, Bommela, ca. 1750 m, 30.VIII-1.IX.1992, leg. A.Riedel (ARC); 4 males, 3 females, Bime, 1600-1900 m, 11.IX.1993, leg. A.Riedel (ARC); 1 male, Taramlu, 1500-1700 m, 6.IX.1993, leg. A.Riedel (ARC); 2 males, Borme, 1000-1300 m, 13-18.VIII.1992, leg. A.Riedel (ARC); 1 male, Borme, trail to

Omban, 1000-1300 m, 3.IX.1993, leg. A.Riedel (ARC); PAPUA NEW GUINEA, Southern Highlands Prov.: 3 males, 5 females, Mt. Giluwe, 2500 m, 1.V.1963, leg. J.Sedlacek (BPBM); 1 female, Mt. Giluwe, 2550 m, 27.V.1963, leg. J.Sedlacek (BPBM); 1 female, Mt. Giluwe, N side, Malgi, 2550 m, 25-30.V.1961, leg. J.Sedlacek (BPBM); 1 male, 4 females, Mt. Giluwe, 2500 m, 6.VI.1963, leg. J.Sedlacek (BPBM); 1 male, 1 female, Mt. Giluwe, 2500 m, 7.VI.1963, leg. Sedlacek (BPBM); 1 male, 2 females, Mt. Giluwe, 2550 m, Malaise trap, 27.V.-6.VI.1963, leg. J. Sedlacek (BPBM); Enga Prov.: 1 male, 2 females, Lake Sirunki, 2550 m, 14.VI.1963, leg. J.Sedlacek (BPBM); 4 males, 3 female, Lake Sirunki, 2550 m, 18.VI.1963, leg. J.Sedlacek (BPBM); 1 male, Laiagam, 2600-2700 m, 19.VI.1963, leg. J.Sedlacek (BPBM); 3 males, 4 females, Kepilam, 2420-2540 m, 21.VI.1963, leg. J.Sedlacek (BPBM); Chimbu Prov.: 1 male, Keglsugl, 2600 m, 13.VIII.1969, Malaise trap, leg. J.L.Gressitt (BPBM); 1 male, Mt. Wilhelm, 3535-3570 m, 13.VIII.1969, leg. J.L:Gressitt (BPBM); Eastern Highlands Prov.: 1 male, Daulo Pass, 2400 m, 7.VII.1963, leg. J.Sedlacek (BPBM); Morobe Prov.: 1 male, Mt. Kaindi, 2350 m, BMPK-72, 4.IV.1967, leg. J.L.Gressitt (BPBM); 1 male, Wau, Edie Ck., 2000-2150 m, 6.IV.1965, leg. J.&M.Sedlacek (BPBM); 1 male, Wau, 1500 m, 27.VIII.1961, leg. J.Sedlacek (BPBM); 1 male, Wau, 1750 m, 14.V.1969, leg. J.Sedlacek (BPBM); 1 male, Mt. Kaindi, 1850-2150 m, 8.X.1992, leg. A.Riedel (ARC); 1 female, Engabena, 1200-1800 m, 28-30.XI.1974, leg. Reni & Petrus (BPBM).

Euops, new species 100

Range. Jayawijaya Prov. (Bommela). Altitude: 1750 m.

Material examined: IRIAN JAYA, Jayawijaya Prov.: 1 male, Bommela, 1750 m, 30.VIII.-1.IX.1992, leg. A.Riedel (ARC).

Euops, new species 101

Range. Manokwari Prov. (Wandammen Bay), Paniai Prov. (Nabire, Epomani). Altitude: 30-1350 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 2 males, 3 females, Wandammen Bay, Wondiwoi Mts., Wasior, 250-600 m, 4.I.2001, leg. A.Riedel (ARC); 1 female, Wandammen Bay, Wondiwoi Mts., Wasior, 300-700 m, 14.I.2001, leg. A.Riedel (ARC); Paniai Prov.: 1 male, Nabire, 0-30 m, 2-9.VII.1962, leg. J.Sedlacek (BPBM); 1 male, Epomani, Km 145, 550-750 m, 15-16.I.1996, leg. A.Riedel (ARC); 1 female, Epomani, Ugida, Km 179, 1350-1400 m, 19-20.I.1996, leg. A.Riedel (ARC).

Euops, new species 102

Range. Southern Highlands Prov. (Mt. Giluwe), Enga Prov. (Kepilam), Chimbu Prov. (Mt. Wilhelm), Eastern Highlands Prov. (Daulo Pass), Morobe Prov. (Lake Trist, Mt. Por, Mindik). Altitude: 1500-3000 m.

Material examined: PAPUA NEW GUINEA, Southern Highlands Prov.: 2 males, Mt. Giluwe, 2550 m, Malaise trap, 27.V.-6.VI.1963, leg. J. Sedlacek (BPBM); 1 male, Dimifa, SE of Mt. Giluwe, 2200 m, 10.X.1958, leg. J.L.Gressitt (BPBM); Enga Prov.: 2 males, 1 female, Kepilam, 2420-2490 m, 23.VI.1963, leg. J.Sedlacek (BPBM); Chimbu Prov.: 1 male, Mt. Wilhelm, 3000 m, 4.VII.1955, leg. J.L:Gressitt (BPBM); Eastern Highlands Prov.: 1 male, Daulo Pass, 2400 m, 7.VII.1963, leg. J.Sedlacek (BPBM); 1 male, Daulo Pass, 20.V.1968, leg. J.&M.Sedlacek (BPBM); 1 male, Above Daulo Pass, 2500 m, 12.VI.1955, leg. J.L.Gressitt (BPBM); Morobe Prov.: 1 male, Mt. Por, 2200-2300 m, 2.XI.1979, leg. J.L.Gressitt (BPBM); 1 male, Lake Trist, 1600 m, 21-26.XI.1966, "195. Melistoma", leg. G.A.Samuelson (BPBM); 2 males, Mindik, 1200-1500 m, 26.IV.1998, leg. A.Riedel (ARC).

Euops, new species 103

Range. Paniai Prov. (Bilogay). Altitude: ca. 2100-2200 m.

Material examined: IRIAN JAYA, 1 male, Bilogay, 2100-2200 m, 29.XII.1995, leg. A.Riedel (ARC).

Euops, new species 104

Range. Morobe Prov. (Mindik, Boana). Altitude: ca. 1200-1500 m.

Material examined: PAPUA NEW GUINEA, 1 male, 1 female, Boana, 1000-1500 m, 21-22.X.1992, leg. A.Riedel (ARC); 2 males, Mindik, 1200-1500 m, 26.IV.1998, leg. A.Riedel (ARC).

New species group 5

Unidentified material at hand: 45 female specimens from New Guinea.

New species group 6

Diagnosis. Relatively small body size, length of pronotum + elytron 2.25-2.90 mm. Coloration partly flavescent / ferruginous, at least abdomen so. Rostrum elongate, not spatulate. Gena of males elongate, 1.32-1.40 X as long as width of head immediately behind eyes. Eyes large, dorsally contiguous. Prementum with two apical teeth. Maxilla with complete ventral suture between galea and palpifer. Pronotum smooth. Apex of female protibia with premucro.

Euops, new species 105

Range. Manokwari Prov. (Anggi). Altitude: ca. 2000-2150 m.

Material examined: IRIAN JAYA, Manokwari Prov.: 1 male, 1 female, Anggi, Gn. Disbehey, 2000-2150 m, 29.VIII.1991, leg. A.Riedel (ARC).

Euops, new species 106

Range. Southern Highl. Prov. (Mt. Giluwe). Altitude: 2550 m.

Material examined: PAPUA NEW GUINEA, Southern Highl. Prov.: 1 male, Mt. Giluwe, 2550 m, Malaise trap, 27.V.-6.VI.1963, leg. J.Sedlacek (BPBM).

New species group 7

Diagnosis. Relatively small body size, length of pronotum + elytron 2.33-2.72 mm. Apex of female protibia without premucro. TA with distinct basal sclerite, ca. 0.25-0.35 of total length of rather elongate TA. Tegminal plate medially with cluster of long setae, laterally with much shorter setae.

Euops, new species 107

Range. Sorong Prov. (Batanta Isl.), Manokwari Prov. (Bomberi), Japen-Waropen Prov. (Serui), Morobe Prov. (Saidor, Wau). Altitude: 800-1200 m.

Material examined: IRIAN JAYA, Sorong Prov.: 5 males, 4 females, Batanta Isl., Waylebet, 500-820 m, 29.X.-1.XI.1996, leg. A.Riedel (ARC); Manokwari Prov.: 1 male, Bomberi, 700-900 m, 4.VI.1959, leg. J.L.Gressitt (BPBM); Japen-Waropen Prov.: 1 female, Japen Isl., Serui, Mantembu, 300-800 m, 6-9.IX.1991, leg. A.Riedel

(ARC); Morobe Prov.: 1 male, Wau, 1050 m, 19.IX.1961, leg. J.Sedlacek (BPBM); 1 male, Wau, 1200 m, 22.VIII.1961, leg. J.Sedlacek (BPBM); 1 female, Wau, 1200 m, Malaise trap, 26.X.1961, leg. J.Sedlacek (BPBM); 2 males, Wau, 1100 m, 29.VIII.1961, leg. J.&M.Sedlacek (BPBM); 1 male, Wau, 1100-1300 m, I.1966, leg. J.Sedlacek (BPBM); 1 male, Finisterre Range, Saidor, Sibog Vill., 6-16.VI.1958, leg. W.W.Brandt (BPBM).

Euops, new species 108

Range. Sorong Prov. (Batanta Isl., Salawatti Isl.), Manokwari Prov. (Wandammen Bay), Jayawijaya Prov. (Emdoman). Altitude: 100-800 m.

Material examined: IRIAN JAYA, Sorong Prov.: 1 male, Batanta Isl., Waylebet, 500-820 m, 29.X.-1.XI.1996, leg. A.Riedel (ARC); 1 male, Salawatti Isl., SP 2, Waijan, ca. 50-100 m, 23-25.X.1996, leg. A.Riedel (ARC); Manokwari Prov.: 2 males, Wandammen Bay, Wondiwoi Mts., Wasior, 300-850 m, 5.I.2001, leg. A.Riedel (ARC); 2 males, Wandammen Bay, Wondiwoi Mts., Wasior, 580-950 m, 3.I.2001, leg. A.Riedel (ARC); Jayawijaya Prov.: 1 male, Emdoman, 800-1200 m, 14-15.IX.1992, leg. A.Riedel (ARC).

Euops, various unidentied species

Unidentified material at hand: 144 female specimens from New Guinea.

3.1.3. The subgenus *Neosynaptops*

Diagnosis. Gena of head heavily sculptured, punctate; interspaces between punctures with dorsoventral wrinkles. Head ventrally in front of gular region with shallow to deep transverse costae. Proventriculus setose or denticulate, but without sclerotized gnathal ridges. Apex of female protibia with premucro.

See Appendix 6.

Euops (*Neosynaptops*) *viridiceps* VOSS, 1930

See Appendix 6.

Additional material examined: IRIAN JAYA, Biak-Numfor Prov.: 1 male, Biak Isl., Korim, Nernu, 100-150 m, 1.II.2001, leg. A.Riedel (ARC); 7 males, 3 females, Biak Isl., Korim, Nernu, 100-150 m, 4.II.2001, leg. A.Riedel (ARC); 1 female, Biak Isl., Korim, Nernu, 100-150 m, 12-14.XII.2000, leg. A.Riedel (ARC).

Euops (*Neosynaptops*) *paraviridiceps* RIEDEL, in press

See Appendix 6.

Additional material examined: IRIAN JAYA, Japen-Waropen Prov.: 2 males, 1 female, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 26.XII.2000, leg. A.Riedel (ARC); 1 female, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 25.XII.2000, leg. A.Riedel (ARC).

Euops (*Neosynaptops*) *cupreosplendens* MACLEAY, 1886

See Appendix 6.

Additional material examined: IRIAN JAYA, Japen-Waropen Prov.: 1 male, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 26.XII.2000, leg. A.Riedel (ARC); 1 female, Japen Isl., Serui, Kontiunai, road to Ambaidiru, 600-700 m, 23.XII.2000, leg. A.Riedel (ARC).

Euops (*Neosynaptops*) *doertheae* RIEDEL, in press

See Appendix 6.

Euops (*Neosynaptops*) *gladiator* RIEDEL, in press

See Appendix 6.

Additional material examined: IRIAN JAYA, Manokwari Prov.: 11 males, 4 females, Wandammen Bay, Wasior, DMP logging camp, Km38, Sararti, S 03° 05´ E 134° 27´, 100-200 m, 7-9.I.2001, leg. A.Riedel (ARC).

Euops (*Neosynaptops*) *punctaticeps* RIEDEL, in press

See Appendix 6.

Additional material examined: IRIAN JAYA, Sorong Prov.: 1 male, 3 females, Waigeo Isl., Urbinasopen, Gn. Susu, 100-450 m, 25.I.2001, leg. A.Riedel (ARC).

Euops (*Neosynaptops*) *similis* RIEDEL, in press

See Appendix 6.

Euops (*Neosynaptops*) *waigeoensis* RIEDEL, in press

See Appendix 6.

Euops (*Neosynaptops*) *wapogae* RIEDEL, in press

See Appendix 6.

3.1.4. The subgenus *Suniops*

Diagnosis. Pronotum usually more or less rugose-punctate (Fig. 64). Ventral surface of male protibia usually with conspicuous teeth on posterior edge (Fig. 67). In many species ventral surface of pro-, meso-, and metafemur each with tooth (Fig. 65). Proventriculus (Figs. 88-89) denticulate, but without sclerotized gnathal ridges.

Euops (Suniops) aerosus **PASCOE, 1874**

Euops aerosa Pascoe, 1874: 28. Complete bibliography in appendix 1.

(Figs. 45, 62-67, 88-89, 112-113, 144, 164, 176, 190, 204, 217, 232, 242)

Diagnosis. Coloration (Fig. 45) largely metallic blue to green. Pronotum (Fig. 64) microreticulate; disc transversely rugose, with shallow punctures; sides densely deeply punctate. Ventral surface of pro-, meso-, and metafemur (Fig. 65) each with tooth. Male: Ventral surface of protibia (Figs. 66-67) densely covered with long erect setae, its posterior edge serrate. TA as in fig. 164. Female: Apex of protibia without premucro. Setose patch of venter consisting of three double rows plus one simple row modified setae.

Range. Fig. 242. Maluku Utara Prov. (Batchian, Halmahera), possibly Sulawesi. Altitude: 100-200 m.

Type material. Lectotype, female (by present designation): Maluku Utara Prov.: Batchian Isl.; labels: 1) [oval, blue] "Batchian [handwritten]" 2) [white, rectangular] "*Euops aerosa*, Type, Pasc [handwritten]" 3) [white with red bordering, round] "Type [printed]" 4) [white with black bordering, rectangular] "*Euops aerosa* Pasc. [handwritten]" 5) [white, rectangular] "Pascoe Coll., 93-60. [printed]" 6) [red, rectangular] LECTOTYPE, *Euops aerosus* Pascoe, det. A.Riedel 2000 [printed]" (BMNH). Paralectotype, female; labels: 1) [white, rectangular] "[possibly] Sulawesi [handwritten - illegible]" 2) [white, rectangular] "Pascoe Coll., 93-60. [printed]" 3) [red, rectangular] PARALECTOTYPE, *Euops aerosus* Pascoe, det. A.Riedel 2000 [printed]" (BMNH).

Other material examined: Maluku Utara Prov.: 14 males, 11 females, Halmahera Isl., Sidangoli, Batu putih, 100 m, 22.XI.1999, leg. A.Riedel (ARC); 16 males, 17 females, Halmahera Isl., Sidangoli, Batu putih, 100 m, 23.XI.1999, leg. A.Riedel (ARC); 2 males, Halmahera Isl., Buli, Maba, 20-200 m, 6-7.XI.1999, leg. A.Riedel (ARC); 3 males, 1 female, Halmahera Isl., Buli, Maba, ca. 200 m, 8.XI.1999, leg. A.Riedel (ARC).

Redescription.

Selected male specimen (Halmahera Isl., Sidangoli). Length, pronotum + elytron: 3.30 mm. Coloration (Fig. 45) of elytron metallic blue; head, side of thorax, procoxa, anterior surface of meso- / metafemur, scutellum, elytral humerus and abdomen metallic green; rostrum and center of pronotum bronze; foreleg, mesotibia and metatibia black with bluish lustre; antenna black. Head. As in fig. 112. Gena 0.77 X as long as width of head immediately behind eyes. Vertex microreticulate, dull; dorsally with sparse shallow punctures; laterally with shallow transverse wrinkles. Eyes in dorsal view weakly prominent from lateral contour of head, medially contiguous for ca. 0.5 X their length. Profile of vertex evenly convex from behind eye to base. Ventral surface of head in front of gular region shining, smooth, with median furrow. Rostrum 1.88 X as long as mouthparts; at widest point 1.45 X wider than at base; in cross section dorsally moderately rounded. Clypeus with median notch. Interantennal area with weakly sinuate lateral margins converging. Profile of rostrum with dorsal contour at interantennal area hardly projecting, rounded; anteriorly in weakly convex line to apex; ventral contour convex; dorsal and ventral contour of rostrum basally subparallel, in apical half converging. Venter of rostrum smooth, evenly rounded, basally well-delimited against venter of head, medially forming right angle towards lateroposterior postgenal recesses. Mouthparts. Prementum (Figs. 62-63) at base 1.5 X wider than long, ca. 3.1 X wider than at apex; with straight lateral margins converging apicad; with three long, acute apical processes; median apical process slightly shorter than lateral processes and retracted into more dorsal position. Antenna as in fig. 144. Proventriculus (Figs. 88-89) with eight primary folds densely covered with dentiform setae; without sclerotized gnathal ridges, posteriad of primary fold without setose patch or pulvillus. Prothorax 0.97 X as long as wide; with moderately deep subbasal constriction; sides rounded to shallow preapical constriction; disc dull, microreticulate, densely punctate, at middle with oblique transverse wrinkles; in lateral aspect with side densely deeply punctate. Metanotum without sutural spines; with pair of lateral lobes. Elytron at humerus simple; 2.13 X longer than wide; striae deeply impressed; intervals transversely rugose. Thoracic venter. Prepectus short, subequal to postpectus. Height of pterothorax 0.85 X length of elytron. Procoxa in anterior aspect 0.84 X as long as wide. Legs. Profemur moderately swollen; weakly asymmetrically clavate; with stalk in basal 0.22; ventral contour convex from base to apex; dorsal contour straight in basal 1/5, continuing in convex line to apex. Ventral surface of pro-, meso-, and metafemur each with one tooth at apical 0.27-0.30; profemur with denticle, mesofemur with small tooth, metafemur with moderately large tooth. Protibia (Figs. 66-67) in basal third straight, apically strongly curved ventrad; ventral surface somewhat expanded posteriad, smooth, densely covered with long erect setae, brush-like; with anterior edge of ventral surface sparsely denticulate; posterior edge of ventral surface serrate, bearing row of acute teeth becoming denser and larger apicad; uncus terminal; anterior distal comb complete; posterior distal comb not to identify in dense setosity of ventral surface; uncus terminal; anterior distal comb complete; posterior distal comb not to identify in dense setosity of ventral surface. Mesotibia subapically simple, without extension. Abdomen. Pygidium 0.81 X as long as wide; shining, at extreme base microreticulate; densely, deeply punctate; moderately densely setose with long, inconspicuous, recumbent setae. Venter with sternites IV-VI densely setose with long, erect to suberect setae, medially shorter and sparser. Genitalia. Sternite VIII as in fig. 204; apex markedly, broadly bilobed, densely setose with long setae; base medially constricted. Tegminal plate (Fig. 176) with sides converging, subparallel towards apex; apical edge broadly rounded, with dense long setae. Aedeagus. Apical scoop of pedon (Fig. 190) ca. 0.77 X as long as wide, with lateral margins converging in straight line, with apex subangulate. Tectum medially weakly sclerotized, with moderately sclerotized sides converging in straight line to rounded apex. TA as in Fig. 164. Endophallus in apical portion without sclerite.

Lectotype, female. Same as described male except: Coloration of elytron bronze with blue lustre; elytral humerus, extreme base of elytron and sutural interval in basal 1/3 reddish golden; scutellum golden; side of abdomen and pygidium reddish golden; remainder bronze with greenish or reddish lustre. Head. As in fig. 113. Gena 0.72 X as long as width of head immediately behind eyes. length, pronotum + elytron: 2.81 mm. Rostrum 1.96 X as long as mouthparts; at widest point 1.46 X wider than at base. Prothorax 0.90 X as long as wide. Elytron 2.13 X longer than wide. Height of pterothorax 0.86 X length of elytron. Procoxa in anterior aspect 0.79 X as long as wide. Legs. Profemur similar as in male, but slightly shorter; with small tooth. Protibia with dorsal contour weakly convex; ventral contour bisinuate, basally straight, at middle convex, before apex concave; ventral surface almost smooth, at middle sparsely denticulate, sparsely setose with suberect setae; tibial apex with uncus in subdorsal position; without premucro; anterior distal comb complete, ventrally passing base of uncus. Abdomen. Pygidium 0.71 X as long as wide. Setose patch of venter

1.11 X as long as wide, consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row, plus one simple row of weakly modified setae on sternite VI. Genitalia. Ovipositor without styli. Sternite VIII as in fig. 217; sides converging in straight line to weakly rounded apex; without apodeme. Spermatheca as in fig. 232, compact; with body weakly tapering apicad.

Intraspecific variation. Length, pronotum + elytron: 2.72-3.58 mm (n=65, $\bar{x}$=3.22 ± 0.16). Prothorax 0.91-1.01 X as long as wide in males (n=32, $\bar{x}$=0.96 ± 0.02), 0.89-0.95 X as long as wide in females (n=33, $\bar{x}$=0.92 ± 0.02). Elytron 2.03-2.22 X longer than wide (n=65, $\bar{x}$=2.12 ± 0.04). Thoracic venter. Height of pterothorax 0.83-0.91 X length of elytron (n=66, $\bar{x}$=0.87 ± 0.02). Legs. Number and size of teeth on posterior edge of male protibia variable in size and number; small specimens with only 4 teeth, larger specimens with up to 7 more distinct teeth. Abdomen. Pygidium 1.21-1.43 X wider than long in males (n=27, $\bar{x}$=1.32 ± 0.06), 1.28-1.46 X wider than long in females (n=30, $\bar{x}$=1.36 ± 0.05). Female patch of modified setae 1.05-1.35 X as long as wide (n=32, $\bar{x}$=1.19 ± 0.07).

Euops (Suniops) subdentatus **Voss, 1935**

Euops subdentata Voss, 1935: 518. Complete bibliography in appendix 1.

(Figs. 46, 114-115, 145, 218, 233, 242)

Diagnosis. Coloration (Fig. 46) deep ferruginous with bluish or coppery lustre. Pronotum shining; disc weakly transversely rugose, with small punctures; sides densely deeply punctate. Ventral surface of pro-, meso-, and metafemur each with tooth. Profile of rostrum (Fig. 114-115) dorsally in front antennal insertion with distinct incision. Setose patch of venter consisting of three double rows plus one simple row modified setae.

Range. Fig. 242. Maluku Selatan Prov. (Tanimbar island group, Larat Isl.).

Type material. Lectotype, female (by present designation): Maluku Selatan Prov.: Larat Isl.; labels: 1) [white with red bordering, round] "Type [printed]" 2) "[white with red line, rectangular] Larat, F. Muir, B.M.1914-413 [printed]" 3) "[white, rectangular] Larat, F. Muir [printed]" 4) [white, rectangular] "*Euops subdentata* n. sp. [handwritten] Det. E. Voß [printed]" 5) [red, rectangular] LECTOTYPE, *Euops subdentatus* Voss, det. A.Riedel 2000 [printed]" (BMNH). Paralectotype, 1 female; labels: 1) "[white with red line, rectangular] Larat, F. Muir, B.M.1914-413 [printed]" 2) "[white, rectangular] Larat, F. Muir [printed]" 3) [red, rectangular] PARALECTOTYPE, *Euops subdentatus* Voss, det. A.Riedel 2000 [printed]" (BMNH); 1 female; labels: 1) "[white with red line, rectangular] Larat, F. Muir, B.M.1914-413 [printed]" 2) "[red with black bordering, rectangular] Cotype [printed]" 3) "[white, rectangular] *Euops subdentata* [pencil, handwritten]" 4) "[white, rectangular] *Euops subdentata* m. [handwritten]" 5) "[white, rectangular] E. Voß ded., Eing. 11 - 68 [printed]" 6) "[white with black bordering, rectangular] *subdentata* m. [handwritten]" 7) [red, rectangular] PARALECTOTYPE, *Euops subdentatus* Voss, det. A.Riedel 2000 [printed]" (ZMH). Paralectotype, male; labels: 1) "[white with red line, rectangular] Larat, F. Muir, B.M.1914-413 [printed]" 2) [red, rectangular] PARALECTOTYPE, *Euops subdentatus* Voss, det. A.Riedel 2000 [printed]" (BMNH).

Redescription.

Paralectotype, male.

Length, pronotum + elytron: 2.53 mm. Coloration (Fig. 46) of elytron ferruginous with deep blue lustre; pronotum bronze; remainder deep ferruginous with reddish coppery lustre. Head. As in fig. 114. Gena 0.65 X as long as width of head immediately behind eyes. Vertex dorsally shining and smooth at center, behind eye rugose-punctate; posteriorly and laterally with shallow transverse wrinkles. Eyes in dorsal view weakly prominent from lateral contour of head, medially contiguous for ca. 0.4 X their length. Profile of vertex immediately behind eye straight, towards base rounded. Ventral surface of head in front of gular region shining, deeply punctate, with median furrow. Rostrum 1.59 X as long as mouthparts; at widest point 1.32 X wider than at base; in cross section dorsally weakly rounded. Clypeus with median notch. Interantennal area with weakly sinuate lateral margins converging. Profile of rostrum with dorsal contour of interantennal area projecting, rounded and in front with distinct incision; anteriorly in weakly sinuate line to apex; ventral contour convex; dorsal and ventral contour of rostrum converging from base to apex. Venter of rostrum basally well-delimited against venter of head by transverse bluntly angulate furrow, without median carina. Mouthparts. Prementum at base 1.5 X wider than long, ca. 3.5 X wider than at apex; with almost straight, weakly concave lateral margins converging apicad; with three moderately long, acute apical processes; median apical process shorter than lateral processes, rounded, and retracted into more dorsal position. Antenna as in fig. 145. Proventriculus with eight primary folds densely covered with dentiform setae; without sclerotized gnathal ridges, posteriad of primary fold without setose patch or pulvillus. Prothorax 0.96 X as long as wide; with moderately deep subbasal constriction; sides rounded to shallow preapical constriction; disc shining, densely punctate with small punctures, with shallow transverse wrinkles; in lateral aspect with side densely deeply punctate. Metanotum simple; without sutural spines; without lateral lobes. Elytron at humerus simple; 2.03 X longer than wide; striae deeply impressed. Thoracic venter. Prepectus short, subequal to postpectus. Height of pterothorax 0.87 X length of elytron. Procoxa in anterior aspect 0.79 X as long as wide. Legs. Profemur moderately swollen; weakly asymmetrically clavate with stalk in basal 0.23; ventral contour convex from base to shortly before apex, there concave; dorsal contour straight in basal third, continuing in convex line to apex. Ventral surface of pro-, meso-, and metafemur each with one tooth at apical 0.28-0.30; profemur with indistinct denticle, meso- and metafemur each with small tooth. Abdomen. Pygidium 0.71 X as long as wide; shining, at extreme base microreticulate; densely, deeply punctate; sparsely setose with long, inconspicuous, recumbent setae. Venter with sternites IV-VI sparsely setose with suberect setae.

Lectotype, female. Same as described male except: length, pronotum + elytron: 2.45 mm. Head. As in fig. 115. Gena 0.63 X as long as width of head immediately behind eyes. Rostrum 1.48 X as long as mouthparts; at widest point 1.31 X wider than at base. Profile of rostrum more slender; with dorsal contour anterior of basal incision in straight line to apex. Prothorax 0.92 X as long as wide. Elytron 2.03 X longer than wide. Height of pterothorax 0.85 X length of elytron. Procoxa in anterior aspect 0.80 X as long as wide. Legs. Protibia with dorsal contour weakly convex; ventral contour bisinuate, basally straight, at middle convex, before apex concave; ventral surface almost smooth, at middle crenulate, sparsely setose with suberect setae; tibial apex with uncus in subdorsal position; without premucro; anterior distal comb complete, ventrally passing base of uncus. Abdomen. Pygidium 0.70 X as long as wide. Setose patch of venter 1.25 X as long as wide, consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row, plus one simple row of weakly modified setae on sternite VI. Genitalia. Ovipositor without styli. Sternite VIII as in fig. 218; apex broadly rounded; without apodeme. Spermatheca as in fig. 233, compact; with body weakly tapering apicad.

Note: unfortunately, the male syntype is in such poor condition that it does not appear feasible to select it as lectotype: both protibiae are broken and missing; the abdomen was dissected (not by the present author!) and the genitalia lost. For a proper redescription of this species fresh material should be collected at the type locality.

Euops(Suniops) viridiventris **Heller, 1929**

Euops viridiventris Heller, 1929: 112. Complete bibliography in appendix 1.

(Figs. 47, 116, 146, 219, 234, 242)

Diagnosis. Female: Coloration (Fig. 47) especially dorsally largely ferruginous-bronze, venter of metathorax and abdomen metallic green. Pronotum weakly microreticulate; disc weakly transversely rugose, with shallow punctures; sides densely deeply punctate. Ventral surface of femora without tooth. Apex of protibia without premucro. Setose patch of venter consisting of three double rows plus one simple row modified setae.

Range. Fig. 242. Maluku Selatan Prov. (Buru). Altitude: ca. 50 m.

Type material. Lectotype, male (by present designation): MOLUKKEN: Buru, Leksula [?], ca. 50 m; labels: 1) [red, rectangular] "*viridiventris*" [handwritten] typus [printed] 2) [white, rectangular] "L.J.TOXOPEUS, Buru, Station 1, 10.II-16.III'21" [printed] 3) [blue, rectangular] "1927 [printed] 35 [handwritten]" 4) [white, rectangular] "Staatl. Museum für Tierkunde, Dresden" [printed] 5) [red, rectangular] "Lectotype, *Euops viridiventris* Heller, det. A.Riedel 2001" [printed] (SMTD).

Redescription.

Lectotype, female. Length, pronotum + elytron: 3.03 mm. Coloration of head and pronotum dorsally black with bronze lustre; elytron deep ferruginous with bronze lustre, near scutellum metallic green and red, humerus metallic green; mesothorax, metepimeron deep ferruginous to black; side of head, side of prothorax, anterior surface of procoxa, metasternum and abdomen metallic green; antenna and legs ferruginous, anterior surface of meso- and metafemur with greenish lustre. Head. As in fig. 116. Gena 0.64 X as long as width of head immediately behind eyes. Vertex dorsally dull but not microreticulate, rugose-punctate; laterally somewhat shining, with shallow wrinkles. Eyes in dorsal view continuous with lateral contour of head, medially contiguous for ca. 0.5 X their length. Profile of vertex evenly convex from behind eye to base. Ventral surface of head in front of gular region shining, posteriorly with shallow wrinkles and almost smooth, behind base of rostrum irregularly rugose, with median furrow. Rostrum 1.58 X as long as mouthparts; at widest point 1.32 X wider than at base; in cross section dorsally weakly rounded. Clypeus with shallow, relatively broad median notch. Interantennal area with weakly sinuate lateral margins converging. Profile of rostrum with dorsal contour of interantennal area weakly projecting, rounded; anteriorly in weakly concave line to apex; ventral contour convex; dorsal and ventral contour of rostrum subparallel in basal third, then converging towards apex. Venter of rostrum basally well-delimited against venter of head by transverse bluntly angulate furrow, without median carina. Mouthparts. Prementum at base 1.5 X wider than long, ca. 2.1 X wider than at apex; with almost straight, weakly bisinuate lateral margins converging apicad; with three moderately long, blunt apical processes; median apical process shorter than lateral processes, rounded, and retracted into more dorsal position. Antenna as in fig. 146. Proventriculus with eight primary folds densely covered with dentiform setae; without sclerotized gnathal ridges, posteriad of primary fold without setose patch or pulvillus. Prothorax 0.94 X as long as wide; with moderately deep subbasal constriction; sides rounded to apex; with shallow preapical constriction; disc shining, weakly microreticulate, punctate, at middle with transverse wrinkles; in lateral aspect with side densely deeply punctate. Metanotum without sutural spines; laterally projecting angularly without forming distinct lateral lobe. Elytron at humerus simple; 2.00 X longer than wide; striae moderately impressed. Thoracic venter. Prepectus short, subequal to postpectus. Height of pterothorax 0.87 X length of elytron. Procoxa in anterior aspect 0.83 X as long as wide. Legs. Profemur moderately swollen; weakly asymmetrically clavate with stalk in basal 0.24; ventral contour in straight line to apical 0.34, angulate, continuing in weakly concave line to apex; dorsal contour straight in basal 1/4, continuing in convex line to apex. Ventral surface of pro-, meso-, and metafemur smooth, without a tooth or denticle. Protibia with dorsal contour straight, weakly curved towards base and apex; ventral contour bisinuate, basally and apically concave, at middle convex; ventral surface sparsely denticulate, subglabrous, sparsely setose with subrecumbent setae; tibial apex with uncus in dorsal position; without premucro; anterior distal comb complete, ventrally passing base of uncus. Abdomen. Pygidium 0.68 X as long as wide; shining, at extreme base microreticulate; densely, deeply punctate; sparsely setose with long, inconspicuous, recumbent setae. Setose patch of venter 1.04 X as long as wide, consisting of three double rows of modified setae on sternite III-V with each sternite bearing one double row, plus one simple row of weakly modified setae on sternite VI. Genitalia. Ovipositor without styli. Sternite VIII as in fig. 219; apex broadly rounded; without apodeme. Spermatheca as in fig. 234, compact; with body weakly tapering apicad.

Euops (Suniops), new species 45

Range. Maluku Utara Prov. (Morotai Isl.). Altitude: ca. 50-100 m.

Material examined: Maluku Utara Prov.: 6 males, 3 females, Morotai Isl., Daruba, Kampung Raja, logging camp, 50-100 m, "host: *Bauhinia* sp.: Leguminosae, Caesalpinoideae", 18.XI.1999, leg. A.Riedel (ARC).

Euops (Suniops), new species 46

Range. Maluku Selatan Prov. (Ambon Isl.).

Material examined: Maluku Selatan Prov.: 1 male, 1 female, Ambon Isl., "Amboina", I.[19]08, Coll. F.Muir (BPBM?); 1 male, Ambon Isl., "Amboina", III-IV.[19]08, Coll. F.Muir (BPBM?); 1 female, Ambon Isl., "Amboina", II.[19]08, Coll. F.Muir (BPBM?).

Euops (Suniops), new species 47

Range. Maluku Selatan Prov. (Ambon Isl.).

Material examined: Maluku Selatan Prov.: 1 male, Ambon Isl., Waai, XII.1966, leg. A.M.R.Wegner (BPBM).

Euops (Suniops), new species 48

Range. Sorong Prov. (Batanta Isl.), Biak-Numfor Prov. (Biak Isl.). Altitude: ca. 50-100 m.

Material examined: IRIAN JAYA, Sorong Prov.: 1 female, Batanta Isl., ca. 4 km W Yenanas, 0-250 m, 5.XI.1996, leg. A.Riedel (ARC); Biak-Numfor Prov.: 1 male, 1 female, Biak Isl., Korim, Workar - Wari, 50-100 m, 14.XII.2000, leg. A.Riedel (ARC).

3.2. Phylogeny

At the present state of knowledge there exist numerous obstacles to an overall phylogenetic analysis of Papuan *Euops*. First, it is extremely unlikely that all the species of this region constitute a monophyletic group. An analysis which should clarify the basal relationships of the species groups of *Euops* would have to include representatives of all the other faunal regions, too. This exacerbates the problem imposed by the large number of Papuan taxa. If all the species for which the necessary data are at hand (76) had been included, the matrix would have been extremely difficult to process within a reasonable time. To reduce this number, only two to three species have been included of those species groups that had been analyzed in the past. Care was taken to include both one or two basal representatives, and a more derived one. Unfortunately, for more than 50 % of the Papuan

1. Integument
   (0) densely setose
   (1) subglabrous, sparsely setose

2. Prementum
   (0) apically with ligula
   (1) without ligula

3. Prementum; labial palpi
   (0) present, with two articles
   (1) vestigial
   (2) absent

4. Prementum
   (0) anteriorly sides not extended; if shape subquadrate, with pair of lateral costae anterior of palpi and with median process
   (1) anteriorly with sides extended; shape trapezoid or subquadrate, with submedian pair of costae and median depression / incision

5. Prementum
   (0) with three apical processes
   (1) median process absent
   (2) lateral processes absent

6. Prementum
   (0) ventrally rather flat, without sharp edges
   (1) with acute, laterally flattened processes, each with sharp median edge

7. Maxilla with ventral suture between galea and palpifer
   (0) present
   (1) fused

8. Mandibles
   (0) thin; exodontous
   (1) thick; laterally without teeth

9. Shape of rostrum
   (0) not spatulate, dorsal and ventral contour in lateral aspect subparallel or weakly converging apicad, lateral contours in dorsal aspect weakly widening; cross section before apex weakly compressed dorsoventrally
   (1) spatulate; dorsal and ventral contour in lateral aspect strongly converging apicad, lateral contours in dorsal aspect strongly widening; cross section before apex distinctly compressed dorsoventrally

10. Gena
   (0) smooth or punctate
   (1) markedly punctate-rugose

11. Eyes dorsally
   (0) separated by more than eye´s length
   (1) approximate or contiguous

12. Ventral surface of rostrum basally
   (0) smooth, without longitudinal costae
   (1) with pair of well-delimited, longitudinal costae narrowing anteriad, terminating with rounded tips slightly in front of level of antennal insertion

13. Ventral surface of male rostrum; submentum at suture with prementum
   (0) simple; or, if if submentum with protrusions not forming transverse ridge
   (1) swollen, forming medially interrupted ridge

14. Antenna; terminal article
   (0) ca. 1.5-2 X as long as wide; densely clothed with recumbent setae
   (1) elongate, at least 3 X as long as wide; densely clothed with erect setae

15. Proventriculus
   (0) completely membranous; without sclerotized gnathal ridges
   (1) with sclerotized gnathal ridges

16. Proventriculus; membranous folds
   (0) bearing setae
   (1) bearing denticles

17. Proventriculus
   (0) with eight primary folds / gnathal ridges; intermediary folds unarmed

(1) with eight primary gnathal ridges and eight secondary gnathal ridges

18. Proventriculus
    (0) posterior of each primary gnathal ridge without modification, *e. g.*, no tuft of long setae, no raised area
    (1) posterior of each primary gnathal ridge with cluster of long setae
    (2) posterior of each primary gnathal ridge with pulvillus provided with or without distinct denticles

19. Prothorax; subbasal constriction
    (0) if present not interrupted laterally by carina
    (1) interrupted laterally by carina directed obliquely towards elytral humerus

20. Prothorax
    (0) evenly convex anterior to subbasal constriction
    (1) with pair of blunt protuberances anterior to subbasal constriction

21. Pronotum; disc
    (0) smooth, or punctate
    (1) transversely rugose or punctate-rugose

22. Thoracic venter; length of male prepectus
    (0) short; 1.0-4.0 X longer than postpectus
    (1) long; 4.0-14.0 X longer than postpectus

23. Male protibia; apex
    (0) with ventral contour evenly continuous or subcontinuous with uncus; uncus in terminal position
    (1) weakly to strongly angularly protruding ventrad of uncus; uncus in dorsal position

24. Tibial apex
    (0) with spurs; without uncus
    (1) with uncus; without spurs

25. Female protibia
    (0) with uncus plus distinct premucro
    (1) with uncus plus vestigial premucro
    (2) with uncus, but without premucro

26. Male protibia; anterior setose fringe
    (0) well-developed; from dorsal to ventral tibial edge, or ending shortly before it (at most one third of tibial width from ventral tibial edge)
    (1) vestigial; with few thin setae between dorsal tibial edge and base of uncus

27. Female protibia; ventral surface
    (0) simple, without carina
    (1) with carina, which usually extends from anterior ventral edge to posterior surface

28. Male profemur; ventral surface
    (0) smooth, without modifications
    (1) with more or less distinctly setose knob, sometimes with indistinct setose ridge
    (2) anteriorly with subtruncate protuberance
    (3) with numerous glabrous spines and denticles

29. Profemur; anterior surface
    (0) smooth or with scattered granules
    (1) basally with longitudinal row of setiferous denticles

30. Meso-, and metafemur; ventral surface
    (0) simple; without tooth
    (1) each with tooth

31. Tarsal claws
    (0) free; appendiculate
    (1) connate; simple

32. Uncus of male metatibia
    (0) simple, without accessory tooth
    (1) at base with accessory tooth

33. Mesotibia and metatibia on dorsal edge
    (0) smooth; without crenulation
    (1) indistinctly crenulate
    (2) distinctly crenulate

34. Male mesotibia; dorsal edge subapically
    (0) simple, without extension
    (1) with more or less distinct, usually lobe-like or angulate process

35. Elytral humerus (excluded from analysis)
    (0) simple; evenly rounded
    (1) with denticle
    (2) with small spine
    (3) with large spine

36. Metanotum
    (0) without lateral lobes or with pair of bluntly angular projections appearing as indistinct lateral lobes
    (1) with distinct lateral lobes

37. Metanotum
    (0) without sutural spines or with indistinct angulations
    (1) with distinct sutural spines

38. Female metacoxae
    (0) without mycetangiae
    (1) with mycetangiae

39. Female abdominal venter
    (0) without modified setae
    (1) with erect modified setae, arranged in transverse rows

40. Female abdominal venter
    (0) without concentrations of pores
    (1) with concentration of pores associated with glands

41. Female abdominal venter
    (0) modified setae apically flattened and twisted
    (1) modified setae flattened, lanceolate

42. Female abdomen ventrally with setose patch
    (0) consisting of four double rows of modified setae
    (1) consisting of three double rows of modified setae and with one simple row of modified or nonmodified setae on sternite VI
    (2) consisting of three double or simple rows of modified setae; sternite VI without transverse row of setae

43. Sternite VII
    (0) becoming narrower dorsad, not projecting over base of pygidium
    (1) widening dorsad, obliquely truncate, in lateral aspect distinctly projecting over base of retracted pygidium

44. Male sternite VIII
    (0) at apical margin with long setae, at middle shorter and sparser
    (1) at apical margin evenly setose with long setae

45. Tegminal plate, apical edge
    (0) rounded, evenly setose
    (1) pointed
    (2) bilobed, or rounded with pair of lateral tufts of setae, medially glabrous or with short setae
    (3) broadly rounded, glabrous; subapically on ventral surface with two densely setose patches of long setae

46. Aedeagus; transfer apparatus
    (0) absent, endophallus entirely membranous
    (1) well-developed; symmetrical
    (2) vestigial; vestige symmetrical
    (3) strongly asymmetrical or developed as flagellum

47. Aedeagus; transfer apparatus
    (0) without fold-out struts
    (1) with fold-out struts

48. Ovipositor
    (0) with styli
    (1) without styli

49. Female sternite VIII
    (0) with apodeme
    (1) without apodeme

50. Spermatheca
    (0) at insertion of ductus simple
    (1) basally extended siphon-like towards ductus

Tab. 2. Character list for the phylogenetic analysis.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Rhynchites	0	0	0	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	-	2	0	0	0	0	0	0	0	-	-	0	0	0	1	0	0	0	0
Attelabus	1	1	0	0	0	-	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	-	0	0	0	3	-	0	0	0
Apoderus	1	1	1	1	1	-	0	1	0	0	0	0	0	0	0	0	0	0	0	0	?	1	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	-	-	0	0	0	3	-	0	1	0
Lamprolabus	1	1	1	1	1	-	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	-	-	0	0	0	3	-	0	1	0
Euscelophilus	0	1	1	1	1	-	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	-	-	0	0	0	3	-	0	1	0
E. armatipennis	1	1	2	0	0	0	0	1	0	0	1	0	0	0	1	-	0	2	0	0	0	0	1	1	0	0	0	2	0	0	1	0	2	1	2	1	1	1	1	1	0	1	0	0	0	1	0	1	0	0
E. coelestinus	1	1	2	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	0	2	1	0	1	0	1	1	1	0	2	0	0	0	1	0	1	0	1
E. ruficornis	1	1	2	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	2	1	0	0	0	1	1	1	0	2	0	0	0	1	0	1	0	1
E. tibialis	1	1	2	0	0	?	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	?	0	1	0	2	1	1	1	0	1	1	1	0	2	0	0	3	3	-	1	0	1
E. violaceus	1	1	2	0	0	0	0	1	0	0	1	0	?	0	0	0	0	0	0	0	0	?	1	1	0	?	0	?	0	0	1	0	2	?	0	1	0	1	1	1	0	2	0	0	?	?	?	1	0	1
E. suturalis	1	1	2	0	2	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	2	0	0	0	0	1	1	1	1	1	0	0	1	3	-	1	1	1
E. femoralis	1	1	2	0	0	0	0	1	0	0	1	0	0	0	1	-	0	2	0	0	0	0	1	1	2	0	0	0	0	0	1	0	2	0	0	1	0	1	1	1	0	2	0	0	0	1	0	0	1	0
E. maculatus	1	1	2	0	0	0	0	1	0	0	1	0	0	0	1	-	0	2	0	0	0	0	1	1	2	0	0	0	0	0	1	0	2	0	0	1	0	1	1	1	0	2	0	0	0	1	0	1	1	0
E. cupreospl.	1	1	2	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	0	2	0	2	0	1	1	1	1	0	1	0	1	0	1	0	1	1	0
E. paraviridiceps	1	1	2	0	0	0	0	1	0	1	1	1	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	2	0	0	0	1	1	1	1	0	1	0	1	0	1	0	1	1	0
E. jekelii	1	1	2	0	0	0	0	1	0	0	1	1	0	0	1	-	0	1	0	0	0	1	1	1	2	0	0	0	0	0	1	0	2	1	1	1	1	1	1	1	0	0	0	0	1	2	0	0	1	0
E. papua	1	1	2	0	0	0	0	1	0	0	1	1	0	0	1	-	0	1	0	0	0	1	1	1	?	0	?	?	0	0	1	0	2	1	1	1	1	1	1	1	?	0	0	0	1	2	0	?	?	?
E. vossi	1	1	2	0	0	0	0	1	0	0	1	1	0	0	1	-	0	1	0	0	0	1	1	1	?	0	?	?	0	0	1	0	2	1	2	1	1	1	1	1	?	0	0	0	1	2	0	?	?	?
E. singularis	1	1	2	0	1	0	1	1	1	0	1	0	0	0	1	-	0	0	0	0	1	0	1	1	0	0	0	2	0	0	1	0	2	0	0	0	0	1	1	1	1	1	0	0	0	1	0	1	0	0
E. parvus	1	1	2	0	1	0	1	1	1	0	1	0	0	0	1	-	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	2	0	0	0	0	1	1	1	1	1	0	0	0	1	0	1	0	0
E. kurulu	1	1	2	0	1	0	1	1	1	0	1	0	0	0	1	-	0	0	0	0	1	0	1	1	0	0	0	0	0	0	1	1	2	0	0	0	0	1	1	1	1	1	0	0	0	1	0	1	1	0
E. reidi	1	1	2	0	1	0	0	1	1	0	1	0	0	0	1	-	0	0	0	0	1	0	1	1	0	0	1	1	1	0	1	0	2	0	0	0	0	1	1	1	0	1	0	0	0	1	0	1	1	0
E. bakewelli	1	1	2	0	1	0	0	1	1	0	1	0	0	0	1	-	0	0	0	0	1	0	1	1	0	0	1	1	1	0	1	0	2	1	0	0	0	1	1	1	1	1	0	0	0	1	0	1	0	0
E. buergersi	1	1	2	0	0	0	0	1	0	0	1	0	0	0	1	-	0	2	0	0	0	0	1	1	0	0	0	0	0	0	1	0	2	0	0	1	0	1	1	1	0	1	0	0	2	1	0	1	0	0
E. mysolensis	1	1	2	0	0	0	0	1	0	0	1	0	1	0	1	-	0	2	0	0	0	1	1	1	0	0	0	0	0	0	1	0	2	0	0	1	1	1	1	1	0	1	0	0	2	1	1	1	0	0
E. japensis	1	1	2	0	0	0	0	1	0	0	1	0	1	0	1	-	0	1	0	0	1	1	1	1	0	0	0	0	0	0	1	0	2	0	0	1	1	1	1	1	0	1	0	0	2	1	1	1	1	0
E. gressitti	1	1	2	0	0	1	0	1	0	0	1	0	0	0	1	-	1	1	1	1	0	0	1	1	0	1	0	3	0	0	1	0	1	0	3	0	0	1	1	0	0	0	1	0	2	1	0	1	1	0
E. spinosus	1	1	2	0	0	1	0	1	0	0	1	0	0	0	1	-	1	1	1	1	0	0	1	1	0	1	0	3	0	0	1	0	1	0	3	0	0	1	1	0	0	0	1	0	2	1	0	1	1	0
E. aerosus	1	1	2	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	1	0	1	1	2	0	?	0	0	1	1	0	2	0	0	1	0	1	1	1	0	1	0	0	0	1	0	1	1	0
E. subdentatus	1	1	2	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	1	0	1	1	2	?	0	0	0	1	1	0	2	?	0	0	0	1	1	1	0	1	0	0	0	?	?	1	1	0
E. viridiventris	1	1	2	0	0	0	0	1	0	0	1	0	?	0	0	1	0	0	0	0	1	?	1	1	2	?	0	?	0	0	1	0	2	?	0	0	0	1	1	1	0	1	0	0	0	?	?	1	1	0
E. divisus	1	1	2	0	0	0	0	1	0	0	1	0	0	1	1	-	0	2	0	0	0	0	1	1	0	0	0	0	0	0	1	0	2	1	0	0	0	1	1	1	0	1	0	0	2	1	0	1	0	0
E. testaceus	1	1	2	0	0	0	0	1	0	0	1	0	0	1	1	-	0	2	0	0	0	0	1	1	0	0	0	0	0	0	1	0	2	1	0	0	0	1	1	1	0	1	0	0	2	1	0	1	0	0
E. trigemmatus	1	1	2	0	0	0	0	1	0	0	1	0	0	0	1	-	0	2	0	0	0	0	1	1	2	0	0	0	0	0	1	0	2	0	0	1	0	1	1	1	0	2	0	0	0	1	0	1	1	0

Tab. xy. Data matrix for the cladistic analysis. Unknown character states are coded "?", not applicable ones are coded "-". *Rhynchites auratus* Linné, *Attelabus nitens* Scopoli, *Apoderus coryli* Linné, *Lamprolabus trapezicollis* Heller and an unidentified species of *Euscelophilus* were included as outgroup representatives (only generic name given above). *Euops* is abbreviated "*E.*".

Euops species, including entire species groups, no taxonomic descriptions exist. The same is true for the other faunal regions. Therefore, the present analysis is extremely unbalanced in the selection of taxa. It should be considered more as a preliminary study than a final result.

Despite of all these drawbacks, this overall analysis serves as a test for the previous analyses of the species groups. Furthermore, it will provide criteria for the selection of outgroup representatives for future analyses of the species groups yet unstudied. Also, the character list should be useful for such studies for which it can be modified and extended. As a matter of fact, the careful selection of taxa and characters is critical for the results of a cladistic analysis. Therefore, it was decided against on including a few arbitrarily chosen species of other faunal regions. The fauna of these other regions should be studied thoroughly enough, so that the species to be included in an analysis can be chosen carefully and that their characters are well understood in a wider context. Clearly, there should be some reciprocal illumination between the cladistic analyses of single species groups and the analysis of deeper-level relationships.

The cladistic analysis was performed using PAUP 3.1.1 (SWOFFORD, 1993). *Rhynchites auratus* Linnaeus, *Attelabus nitens* Scopoli, *Apoderus coryli* Linnaeus, *Lamprolabus bispinosus* Gyllenhal and an unidentified species of *Euscelophilus* were included as outgroup representatives. *Rhynchites auratus* Linnaeus was selected as "outgroup", the others were treated with the ingroup. The matrix of 34 taxa and 50 characters is shown in table 3. Since a number of multistate characters with up to four states are included, the "scale for equal character weighting" option is applied to all characters with a base weight of 1000. All characters are unordered. The analysis is performed using heuristic search by stepwise, random addition, performing 100 repetitions.

Character 35 was excluded from the reconstruction of the final analysis as it had proved to be extremely prone to convergence earlier (RIEDEL, 1995, unpublished Diploma thesis). The analysis resulted in 189 shortest, equally parsimonious trees: length = 84330 steps (minimum possible length = 48998 steps, maximum possible length = 212494 steps), CI=0.581, RI=0.784, RC=0.455. The strict consensus is shown in fig. 14, a selected tree with all characters and changes traced in fig. 15.

Both the selected tree and the consensus tree obtained are fully compatible with previous phylogenetic hypotheses with the exception of the *simulans*-group. As outlined in Appendix 5 the *simulans*-group is difficult to define at its base which resorts especially to its most basal species, *E. buergersi* Voss. Consequently, in this analysis it was placed in a different clade than *E. mysolensis* and *E. japensis*, the other two representatives of the *simulans*-group. Apart from this predictable conflict, all the species groups were retained in the analysis: representatives of the *spinosus*-group, the *pygmaeus*-group, the *quadrifasciculatus*-group and of *Neosynaptops* were each grouped together. For a detailed discussion of their phylogeny see appendices 2, 3, 5 and 6.

Probably, the most important result of the analysis concerns the uneven distribution of characters along the tree. The Attelabinae are well-defined, as is *Euops*, the ingroup. Also, most of the species groups are defined by a satisfactory number of derived characters; in the appendices it is demonstrated that there are enough characters available to infer the phylogenetic relationships within species groups. However, at the level of species group interrelationships there is a great paucity of characters: character 15 (presence of gnathal ridges in the proventriculus), 18 (presence of pulvilli in the proventriculus), 36 (lateral lobes of the metanotum), 42 (setose patch of female venter), 45 (male tegminal plate), and 49 (apodeme of female sternite VIII) are used to resolve the relationships of most of the larger clades (Fig. 15). However, all of them contain homoplasy in the reconstruction (consistency index of character 15 = 0.5; character 18 = 0.667; character 36 = 0.2; character 42 = 0.5; character 45 = 0.5; character 49 = 0.143). As a consequence, these branches collapse in the consensus tree (Fig. 14). This problem will become worse when additional species groups are added. They will most likely contain additional characters, but these will only support branches within these new species groups. The number of characters useful in reconstructing the deep-level intrageneric relationships of *Euops* will remain the same unless new methods are applied to find additional ones. For example, studies of internal morphology could add suitable characters. Also, a molecular approach appears feasible to obtain some resolution on the basal level of the tree. Clearly, the characters used herein are valuable in diagnosing the species and in reconstructing phylogenies within species groups, but they are less significant on a deeper level.

There remain those species / species groups to be discussed that have not been analyzed before. The *coelestinus*-group (*E. coelestinus*, *E. tibialis*, *E. violaceus*, *E. ruficornis*) is supported by characters 34 (male mesotibia with dorsal, lobe-like extension), 42 (sternite VI of female venter without transverse row of setae) and 50 (spermatheca extended siphon-like towards ductus). All three characters involve homoplasies. The first two have the same character state in a number of other groups and it is hard to assess if this pattern evolved due to (repeated) convergence or by independent reduction. However, the third character, the structure of the spermatheca is more peculiar. The only other species group with a similar extension towards the ductus is the *eucalypti*-group. There may be a correlation between this female character and the presence of a flagellum in the male genital: *E. tibialis*, the only species with a flagellum in the *coelestinus*-group possesses an extraordinary long extension of the spermatheca. The males of the *eucalypti*-group all have flagella as transfer apparati; the morphological structure of them is different from the one of *E. tibialis*. This dependence of characters may explain a convergent evolution of the spermathecal siphon which could be an apomorphy each of the *eucalypti*-group and of the *coelestinus*-group. Apart from this character, there are others, more difficult to define, supporting a monophyly of the *coelestinus*-group: the antenna is usually of slender shape and of pale coloration; the transfer apparati have a similar morphology except for the highly derived *E. tibialis*.

The discussion of the subgenus *Suniops* suffers greatly from the highly limited number of taxa (3 out of at least 60 Indoaustralian species) and our ignorance of male characters for *E. viridiventris* and *E. subdentatus*. Again, all of the characters defining the clade of three included *Suniops*-species are of very uncertain value as they are found in other groups of *Euops* as well. The punctate-rugose sculpture of the pronotum is a recurring feature within *Suniops* and may be the most useful one of them. Nevertheless, the group could be well-defined based on a male character: the ventral surface of the male protibia is typically provided with a row of teeth of specific arrangement. Moreover, the ventrally dentate femora of the majority of *Suniops* are a unique character in *Euops*. An analysis of the entire subgenus should examine whether this character is secondarily reduced or primarily absent in *E. viridiventris*; the latter possibility is most parsimonious in the present analysis.

Euops suturalis is the only representative of the predominantly Australian *eucalypti*-group in New Guinea. With the exception of character 45 (pointed tegminal plate), the "autapomorphies" of *E. suturalis* are in fact synapomorphies of the *eucalypti*-group. Concerning its position as the most basal clade of the "*pygmaeus*-complex" see the discussions in appendix 3 and 4.

The numerous characters supporting the common clade of *E. jekelii*, *E. papua* and *E. vossi* apply not only to these three species, but to the entire *papua*-group. In the first place, the structure of the male genitalia is typical of the *papua*-group (apex of tegminal plate pointed; transfer apparatus vestigial, as in fig. 152), which is also remarkably conservative within this group.

The clade comprising *E. femoralis*, *E. maculatus* and *E. trigemmatus* is supported by three equivocal characters. The present evidence for this clade is weak. However, a close phylogenetic relationship is likely at least for *E. maculatus* and *E. trigemmatus*; the transfer apparatuses (Figs. 163, 165) of both species possess a structural similarity that could be the result of homology. A revision of the entire species groups they each belong to (see above in chapter 3.1.2) would be critical in learning about the ground pattern of these groups; this in return could help us in understanding the relationship of the three species mentioned.

The *testaceus*-group is defined in the present analysis by two characters: one is the secondary loss of the lateral lobe of the metanotum; with a consistency index of 0.2 this character should be given little credit. However, the second one is unique within the genus: the last article of the antennal club is densely covered with erect setae and is in some cases elongate in shape. This character applies to all the species of the *testaceus*-group examined

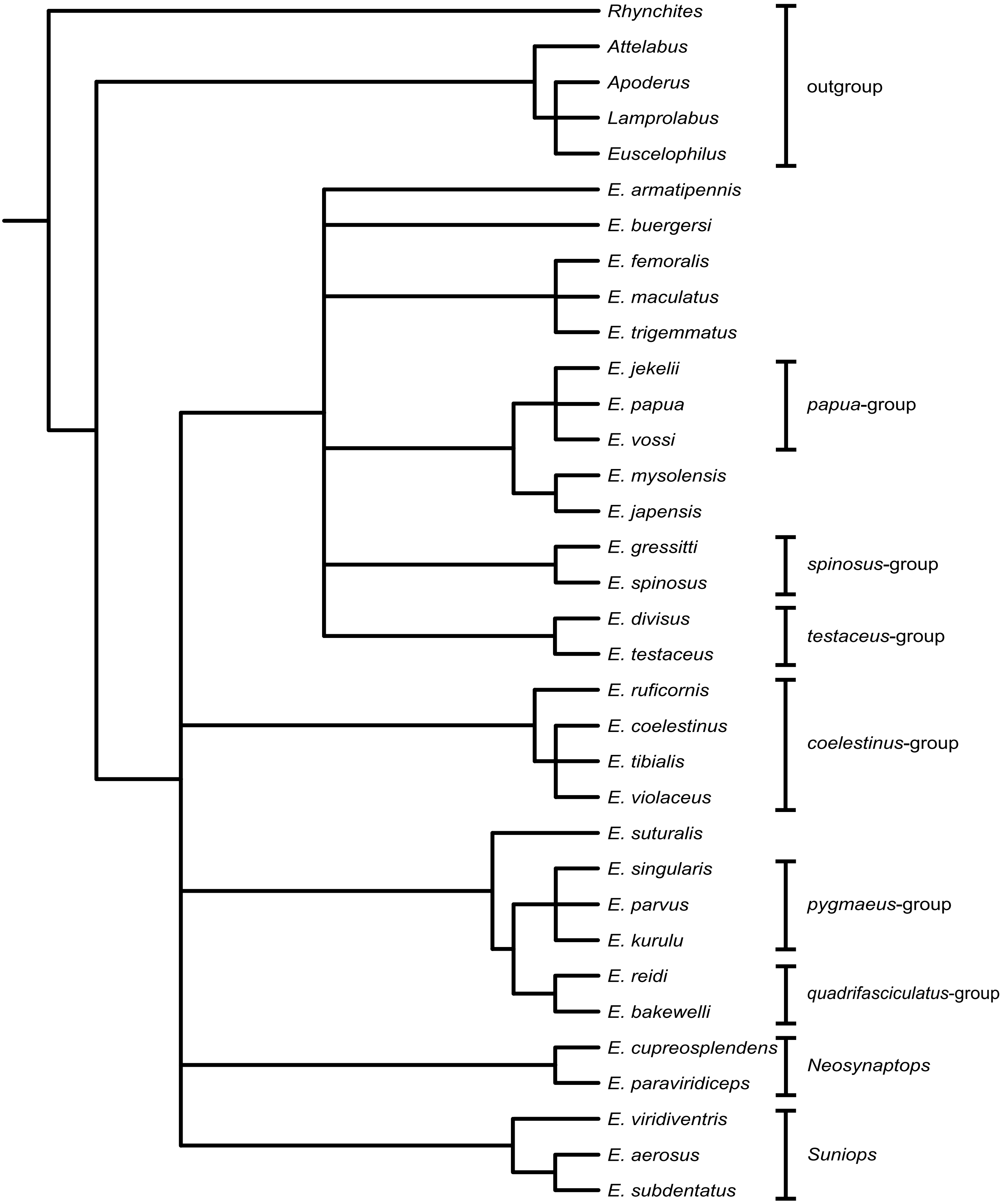


Fig.14. Strict consensus of 189 primary cladograms resulting from the analysis of the matrix shown in Tab. 3.

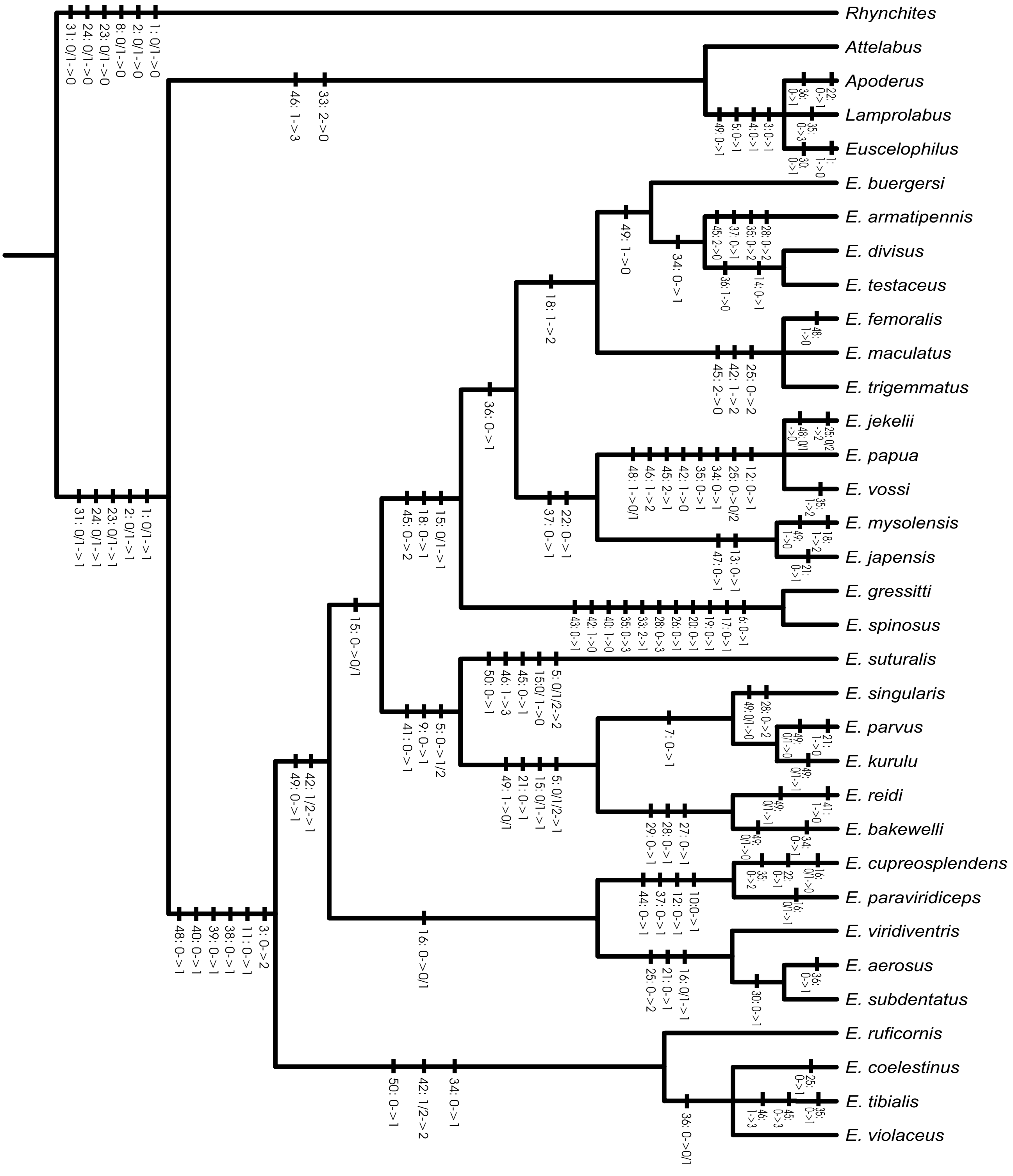


Fig.15. One selected cladogram of 189 equally parsimonious cladograms resulting from the analysis of the matrix shown in Tab. 3. The characters are plotted on the branches: numbers before colon refer to the characters, numbers after colon to the state, both as given in the text under "Phylogenetic analysis". Equally parsimonious states of ambiguous characters are separated from each other by slashes.

by me. Furthermore, in most of the species the male possesses a peculiar tooth dorsally at the base of the mesofemur (Figs. 78-79). This tooth is absent in *E. testaceus*, so it was useless in the present analysis. However, a comprehensive study of the *testaceus*-group may prove that it belongs to its ground pattern. Although characters of coloration are usually very instable in phylogeny (and were not considered in the analysis for this reason), it should be noted that all the species of the *testaceous*-group are either of a completely testaceous to ferruginous color, or have only some parts of their body black or bluish. This character gives additional support to a monophyly of the *testaceous*-group as treated in chapter 3.1.2.

Another interesting result of the present study concerns the outgroup representatives included: efforts to homologize structures of the prementum revealed an agreement of relevant characters in *Apoderus*, *Lamprolabus* and *Euscelophilus*. The labial palpi were used as landmarks. In *Attelabus nitens* they are well-developed, inserting laterally on the prementum (Fig. 52). In front of each palpus there is a distinct costa. A median apical tooth is present. In *Euscelophilus* the labial palpi are much reduced and their position is shifted mesad (Fig. 53). The pair of costae in front of them is in a submedian position, and it appears that this shift was accomplished by a lateral extension of the sides of the prementum. The median apical tooth is absent, it is presumably reduced. This basic pattern is found also in *Apoderus* and in *Lamprolabus*, but the palpi became even more vestigial in these two genera (Figs. 54-55). Unfortunately, in all the *Euops* species examined the labial palpi are completely absent (Figs. 63, 69), so they can not be used as landmarks in this genus. However, the general shape and the possession of a median apical tooth in most species suggests that the prementum of *Euops* is derived from an ancestor possessing an *Attelabus*-type prementum. Thus, the structure of the prementum requires a common ancestry of *Apoderus*, *Lamprolabus* and *Euscelophilus*, which excludes *Attelabus* and *Euops*. This hypothesis is supported by the apomorphic absence of an apodeme of the female sternite VIII. More representatives of attelabid genera should be examined before a new system of Attelabidae is proposed. See also chapter 1.2.2. for additional comments. In any case, it is very unlikely that the "Apoderinae" will retain the level of a separate subfamily in a phylogenetic system.

3.3. Biology

3.3.1. The association with host plants

General facts on the biology of *Euops* have been outlined in the introductory chapters 1.2.2 and 1.2.3, especially concerning the nidification technique.

As emphasized in chapter 2.2.1, *Euops* specimens aggregate on fresh shoots of their host plants. Only very tender leaves which are usually of light green, yellowish or pink coloration are accepted for food. Such leaves are also used by the females for nidification. When recording a host for a *Euops* species, it must be made certain that it is used as food, or for nidification which is more easily visible in the field. Records such as "*Alpinia*" (Zingiberaceae) for new species 13, or "sedges" for new species 83 are almost certainly erroneous. I have never observed *Euops* feeding on Monocotyl plants, and from the leaf texture I consider it impossible that they are used as host plants.

The main problem in establishing host associations is not so much ascertaining the host plant of a given *Euops* species in the field, but its later identification. Plants with fresh leaves rarely have flowers or fruits at the same time. However, identification of tropical plants based on vegetative characters alone is almost impossible (unless molecular techniques are applied). Thus, the list of Papuan *Euops* with more or less reliable host records is short (Tab. 4).

armatipennis-group	*E. armatipennis*	*Elaeocarpus* sp. [?]	Eleocarpaceae
coelestinus-group	*Euops*, new species 12	*Mallotus* sp.	Euphorbiaceae
eucalypti-group	*E. suturalis*	*Eucalyptus* sp.	Myrtaceae
maculatus-group	*E. maculatus*	*Diospyros* sp.	Ebenaceae
papua-group	*Euops*, new species 23	*Persea americana*	Lauracea
pygmaeus-group	*E. singularis*	*Nothofagus* sp.	Nothofagaceae
pygmaeus-group	*E. platyrostris*	*Nothofagus* sp.	Nothofagaceae
pygmaeus-group	*E. sedlaceki*	*Nothofagus* sp.	Nothofagaceae
pygmaeus-group	*E. kurulu*	*Nothofagus* sp.	Nothofagaceae
pygmaeus-group	*E. parvus*	*Nothofagus starkenborghi*	Nothofagaceae
pygmaeus-group	*E. porulosus*	*Nothofagus perryi*	Nothofagaceae
pygmaeus-group	*E. nothofagi*	*Nothofagus perryi*	Nothofagaceae
pygmaeus-group	*E. bicolor*	*Nothofagus perryi*	Nothofagaceae
pygmaeus-group	*E. pygmaeus*	*Nothofagus carri*	Nothofagaceae
(*quadrifasciculatus*-gr.	*E. bakewelli*	*Eucalyptus dives*, *E. pauciflora*, *E. delegatensis*	Myrtacea)
(*quadrifasciculatus*-gr.	*E. oberprielerii*	*Eucalyptus* sp.	Myrtacea)
quadrifasciculatus-gr.	*E. lakekamuensis*	*Lindsayomyrtus racemoides*	Myrtacea
simulans-group	*E. asekianus*	*Prunus* sp. [?]	Rosaceae
simulans-group	*E. breyniae*	*Breynia* sp.	Euphorbiaceae
simulans-group	*E. mysolensis*	*Decaspermum* sp.	Myrtaceae
spinosus-group	*E. zimmermanni*	*Litsea* sp.	Lauraceae
Suniops	*E. aerosus*	*Diospyros* sp.	Ebenaceae
Suniops	*Euops*, new species 45	*Bauhinia* sp.	Leguminosae

Tab. 4. Host plants of Papuan *Euops* species. Two Australian *Euops* species are given in brackets. Records for monocotyl hosts are regarded as false and are not included herein.

It is obvious that a wide range of angiosperm hosts are utilized by Papuan *Euops*. Nevertheless, some species groups are restricted to hosts belonging to one genus (*E. pygmaeus* group: *Nothofagus*) or one family of plants (*E. eucalypti*-group / *E. quadrifasciculatus*-group: Myrtaceae). For a comprehensive discussion of the relationship between these species groups and their hosts see appendix 4. Before further considerations, more data should be collected.

3.3.2. The association with fungi

Chapter 1.2.3 provides a general description of the fungus symbiosis of *Euops*. Chapter 2.2.2 outlines the methods used to study these fungi. For various reasons, it was not possible to obtain exhaustive results on the fungus symbiosis of *Euops*. However, the findings may be valuable for future studies.

The material contained in the "spore reservoir", respectively the "spore incubator", is of a characteristic homogenous texture ranging from crumbly to waxy. When the material was examined microscopically in one specimen no difference between material from the "spore reservoir" and the "spore incubator" could be found. Both contained mainly spores. The material is hydrophobic and does not dissolve in water but rather sticks to the forceps or the wall of the microtube. It was found that specimens contain different amounts of spore material: this ranged from no visible material at all over small amounts to a stage where the fungus material seemed to pour out of the split between thorax and abdomen. There appears to be a marked correlation between the age of the specimen and the amount of fungus spores contained. Teneral females with soft cuticle never contained visible amounts of fungus material.

The fungus material contained in females of the same *Euops* species is of the same coloration, but there are differences between species of *Euops*. In females of *E. spinosus* it is greenish grey, in new species 61 it is creamy white and in new species 99 it is rusty red. There was a congruence between the characters of the spores and the cultures obtained. For example, the cultures obtained from *E. spinosus* possess spores of greenish grey coloration, too. The spores contained in the three *Euops* species mentioned grew readily on the medium used. However, plates inoculated with spores obtained from one specimen of *E. armatus* and from a number of specimens of new species 83 remained sterile. This seems to suggest that many *Euops* species have associations with various species of fungi. Not all of them grow on standard medium.

A sample of fungus material obtained from *E. spinosus* was placed in a microtube with sterile water. It was kept in the fridge for several weeks. After that it was inoculated on plates in Germany using a professional sterile bench. The fungus growing very closely resembles the cultures obtained from the same species of *Euops* in New Guinea and is probably the same species. This result is of special importance to future studies. When spore samples can be maintained in viable condition in sterile water, this means that the fungi can be cultivated under more professional conditions than available in New Guinea. However, attempts to isolate the spores from entire specimens of *Euops* appear to me unlikely to yield good results. If the beetles are killed and preserved as usual for collection purpose (*e. g.* using ethylacetate, alcohol or chlorocresol) the spores are unlikely to survive. If such chemicals are avoided, the specimens may start to rot and the mycetangia are contaminated by other microorganisms.

The cultures obtained appear to belong to the genus *Penicillium* (personal communication: BEENKEN, München; KIRSCHNER, Tübingen). This genus is rather notorious as a contaminant and not so much as a specific symbiont. Therefore, there remain some doubts if really the correct fungi have been cultivated.

From an evolutionary perspective an association with a group of primarily unspecific saprophytic fungi appears not unlikely. When attelabid nidi fall to the ground they will be colonized by various fungi present on the site. In *Euops*, the nidus is inoculated by the female with one (or few) such species - for unknown benefits of the offspring. Why should it not be various species of *Penicillium*? It has to be the task of a professional mycologist to cultivate and identify the fungi present in the mycetangia of female *Euops*. The fact that the isolated fungi belong to a relatively common group of destruents should not deter from further studies to identify the species and their biological properties.

4. Discussion

4.1. The state of knowledge of the Papuan *Euops*-fauna

The previous chapters summarized the available information on the Papuan *Euops*-fauna: before the commencement of this study 24 valid species of Papuan *Euops* were known from inadequate descriptions. These species were herein revised and redescribed. The descriptions of 52 additional species were published by the present author. Furthermore, another 108 *Euops* species from the Papuan region can be clearly recognized from the material at hand. They could be described as soon as time and / or funding becomes available. Thus, in all, 184 *Euops* species from the Papuan region can be recognized at present. Remaining is the unsorted material of female specimens which is not included in this calculation. Without the corresponding males it is neither possible to sort the species in a reliable manner, nor to describe them. For this reason, these specimens were excluded from the present census. Nevertheless, it is obvious that this material contains additional undescribed species. The total of 184 can not be considered the final number of *Euops* species of the Papuan region. The unsorted females provides enough evidence for the true number being above 200 species.

In this respect a look at the rates of discovery of the *Euops* species is also informative. The cumulative number of species discovered in an area follows a sigmoid graph, at least in theory. In the beginning, relatively few species are discovered. A reason for that may be that relevant techniques are not yet readily available. In New Guinea this resorts both to collecting techniques and to the general inaccessibility of the region. After an exponential growth phase, the graph enters a saturation phase. The likelihood of finding new species decreases when the number of the known species is getting close to the total number of existing species. The *Euops* species of the Papuan region are listed in chronological order by the year of their discovery in Tab. 5. Unlike in other studies (*e. g.* O´BRIEN & WIBMER, 1979) not the date of the description of a species is plotted, as in this case the activities of single specialists would be reflected, rather than the rate of species-discoveries. The year when the first male of a species is collected is used as an indicator of its discovery; only with the first male specimen at hand is it possible to distinguish it from other related species and to prepare a useful description.

1: *E. aerosus*: Wallace, 1858
2: *E. coelestinus*: Wallace, 1858
3: *E. divisus*: Wallace, 1858
4: *E. jekelii:* Wallace, 1858
5: *E. testaceus:* Mysol, Wallace
6: *E. trigemmatus*: Wallace, 1858
7: *E. wallacei*: Wallace, 1858
8: *E.* new species 49: Wallace, 1858
9: *E.* new species 78: Wallace, 1858

10: *E. violaceus*: Wallace, 1859
11: *E. vossi*: Wallace, 1859

12: *E. angulithorax*: Allen/Wallace, 1860
13: *E. maculatus*: Allen/Wallace, 1860
14: *E. mysolensis*: Allen/Wallace, 1860
15: *E. tibialis*: Allen/Wallace, 1860

16: *E. cupreosplendens*: Macleay, 1885

17: *E. ruficornis*: Biró, 1897

18: new species 46: Muir, 1908

19: *E. papua*: Lorentz-Exp., 1910

20: *E. singularis*: Bürgers, 1912

21: *E. armatipennis*: Bürgers, 1913
22: *E. femoralis*: Bürgers, 1913
23: *E. buergersi*: Bürgers, 1913

24: *E. subdentatus*: Muir, 1914

25: *E. viridiventris*: Toxopeus, 1921

26: *E. suturalis*: LEA, 1928 [first record in NG]

27: *E. viridiceps*: Anon., described 1930

28: *E. insularis*: Anon., described 1933

29: new species 33: Toxopeus, 1938
30: *E. lobipes*: Olthof, 1938

31: new species 77: Toxopeus, 1939
32: new species 84: Toxopeus, 1939
33: *E. paniaiensis*: K. N. A. G. Exp., 1939
34: *E. spinosus*: K. N. A. G. Exp., 1939

35: new species 25: Gressitt, 1955
36: new species 21: Gressitt, 1955
37: new species 27: Gressitt, 1955
38: *E. parvus*: Gressitt, 1955
39: *E. kukukuku*: Gressitt, 1955
40: *E. vulgaris*: Gressitt, 1955
41: new species 50: Gressitt, 1955
42: new species 73: Gressitt, 1955
43: new species 90: Gressitt, 1955
44: new species 102: Gressitt, 1955

45: *E. wei*: Ford, 1956
46: new species 42: Ford, 1956
47: *E. balkei*: Brandt, 1956
48: new species 23: Gressitt, 1956
49: *E. monstruosus*: Sedlacek, 1956
50: new species 53: Gressitt, 1956
51: new species 83: Gressitt, 1956

52: *E. goilala*: Brandt, 1957
53: new species 14: Brandt, 1957
54: new species 31: Brandt, 1957
55: new species 35: Brandt, 1957
56: new species 79: Brandt, 1957
57: new species 7: Brandt, 1958
58: new species 24: Brandt, 1958
59: new species 26: Brandt, 1958
60: new species 37: Brandt,1958
61: new species 107: Brandt, 1958
62: *E. gressitti*: Gressitt, 1958
63: new species 8: Gressitt, 1958
64: new species 11: Gressitt, 1958
65: new species 13: Gressitt, 1958
66: new species 68: Gressitt, 1958

67: new species 96: Brandt, 1959
68: new species 3: Maa, 1959
69: new species 20: Maa, 1959
70: new species 22: Maa, 1959
71: new species 58: Maa, 1959
72: new species 60: Maa, 1959

73: new species 28: Brandt, 1960
74: new species 16: Maa, 1960
75: new species 29: O´Brien, 1960

76: new species 30: Gressitt, 1961
77: new species 75: Gressitt, 1961
78: new species 1: Sedlacek et al., 1961
79: new species 10: Sedlacek, 1961
80: new species 61: Sedlacek, 1961
81: new species 66: Sedlacek, 1961
82: new species 99: Sedlacek, 1961

83: new species 55: Sedlacek, 1962
84: new species 101: Sedlacek, 1962

85: *E. pseudomonstruosus*: Sedlacek, 1963
86: *E. aculeatus*: Sedlacek, 1963
87: *E. sedlaceki*: Sedlacek, 1963
88: new species 81: Sedlacek, 1963
89: new species 88: Sedlacek, 1963
90: new species 91: Sedlacek, 1963
91: new species 106: Sedlacek, 1963

92: *E. pygmaeus*: Sedlacek, 1965

93: *E. asekianus*: Sedlacek, 1966
94: new species 47: Wegner, 1966

95: *E. paraviridiceps*: Sedlacek, 1969
96: *E. flyensis*: Sedlacek, 1969
97: new species 56: Sedlacek, 1969
98: new species 72: Sedlacek, 1969

99: new species 89: Sedlacek, 1971

100: new species 12: Sakomadoro, 1974

101: *E. zimmermanni*: Gagne, 1978
102: *E. kutubu*: Gressitt & Wita, 1978

103: *E. fraterculus*: Gressitt, 1979

104: *E. kurulu*: Riedel, 1990
105: new species 40: Riedel, 1990
106: *E. breyniae*: Riedel, 1990
107: *E. lani*: Riedel, 1990

108: *E. gladiator*: Riedel, 1991
109: *E. convexus*: Riedel, 1991
110: *E. paraconvexus*: Riedel, 1991
111: *E. anggiensis*: Riedel, 1991
112: *E. japensis*: Riedel, 1991
113: *E. cyclopensis*: Riedel, 1991
114: *E. simulans*: Riedel, 1991
115: *E. parangulithorax*: Riedel, 1991
116: *E. armatus*: Riedel, 1991
117: *E. yali*: Riedel, 1991
118: new species 4: Riedel, 1991
119: new species 5: Riedel, 1991
120: new species 6: Riedel, 1991
121: new species 36: Riedel, 1991
122: new species 57: Riedel, 1991
123: new species 74: Riedel, 1991
124: new species 85: Riedel, 1991
125: new species 86: Riedel 1991
126: new species 93: Riedel, 1991
127: new species 94: Riedel, 1991
128: new species 97: Riedel, 1991
129: new species 98: Riedel, 1991
130: new species 105: Riedel, 1991

131: *E. reticulatus*: Riedel, 1992
132: *E. deceptus*: Riedel, 1992
133: new species 44: Riedel, 1992
134: new species 54: Riedel, 1992
135: new species 67: Riedel, 1992
136: new species 82: Riedel, 1992
137: new species 100: Riedel, 1992
138: new species 104: Riedel, 1992
139: new species 108: Riedel, 1992

140: *E. ibelensis*: Riedel, 1993
141: *E. platyrostris*: Riedel, 1993
142: *E. micros*: Riedel, 1993
143: *E. paraspinosus*: Riedel, 1993
144: new species 34: Riedel, 1993
145: new species 38: Riedel, 1993
146: new species 39: Riedel, 1993
147: new species 62: Riedel, 1993
148: new species 63: Riedel, 1993
149: new species 71: Riedel, 1993
150: new species 76: Riedel, 1993
151: new species 95: Riedel, 1993

152: new species 52: Riedel, 1994

153: *E. porulosus*: Riedel, 1995
154: *E. nothofagi*: Riedel, 1995
155: *E. bicolor*: Riedel, 1995
156: new species 103: Riedel, 1995
157: new species 19: Riedel, 1995

158: *E. doertheae*: Riedel, 1996
159: *E. punctaticeps*: Riedel, 1996
160: *E. similis*: Riedel, 1996
161: *E. waigeoensis*: Riedel, 1996
162: new species 18: Riedel, 1996
163: *E. batantae*: Riedel, 1996
164: *E. zimmii*: Riedel, 1996
165: new species 59: Riedel, 1996
166: new species 65: Riedel, 1996
167: new species 92: Riedel, 1996
168: *E. lakekamuensis*: Riedel, 1998
169: new species 9: Riedel, 1998
170: new species 70: Riedel, 1998
171: new species 87: Riedel, 1998

172: *E. wapogae*: Riedel, 1999
173: new species 41: Riedel, 1999
174: new species 43: Riedel, 1999
175: new species 45: Riedel, 1999
176: new species 64: Riedel, 1999

177: new species 2: Riedel, 2000
178: new species 32: Riedel, 2000
179: new species 48: Riedel, 2000
180: new species 51: Riedel, 2000
181: new species 69: Riedel, 2000
182: new species 80: Riedel, 2000

183: new species 15: Riedel, 2001
184: new species 17: Riedel, 2001

Tab. 5. Papuan *Euops* species in chronological order by the year of their discovery. Herein, "Discovery" is regarded not the publication of a species-description, but the first record of a male specimen of a species. The collector´s name and the year of collecting is given after the colon. Species collected by Wallace were dated approximately using the information given by Wallace (1869).

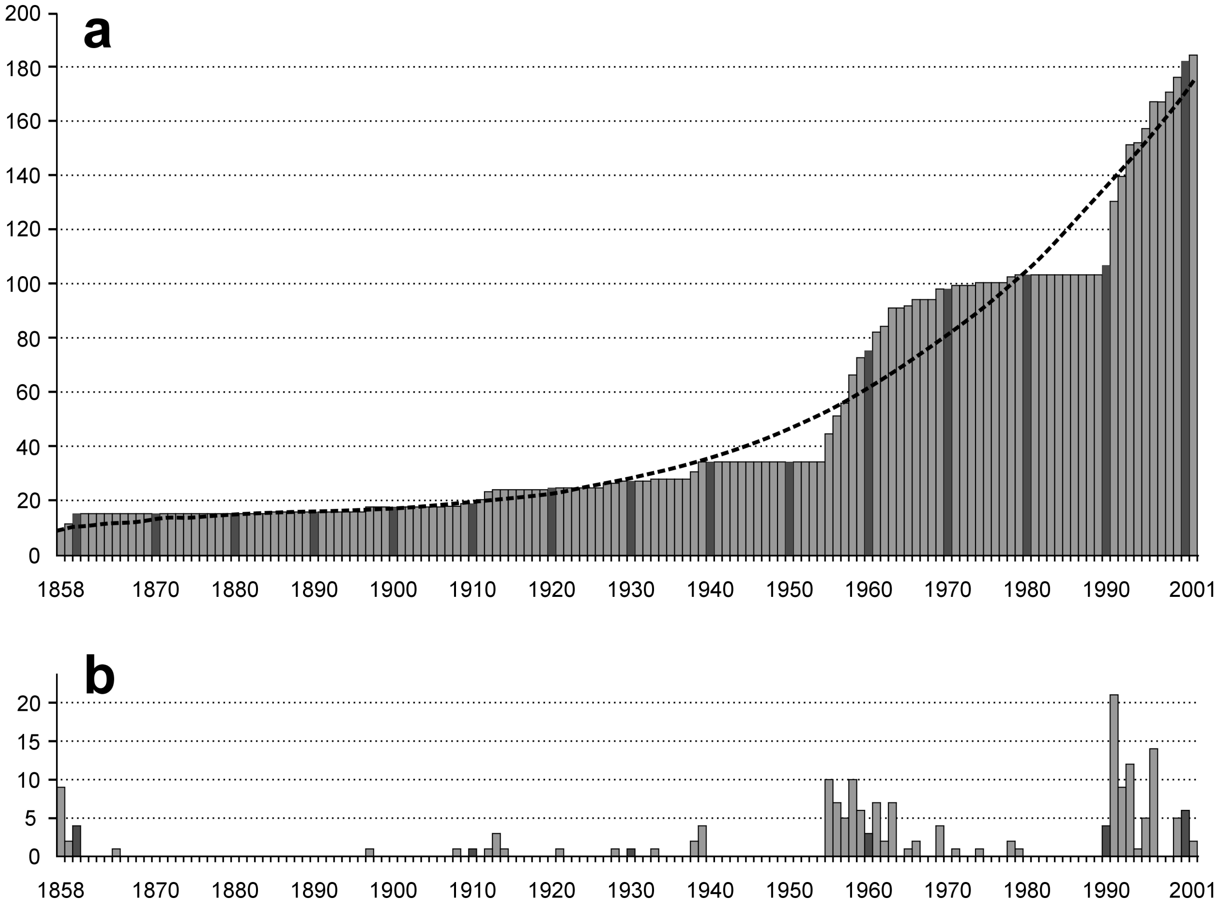


Fig. 16. Discovery of Papuan *Euops* species. Numbers are based on the date of collecting of the first male specimen of a species, not on the date of its publication. Also undescribed species are counted (See table 5). Above (a): cumulative numbers of species discovered per year. Broken line shows general trend (3rd order polynomic trend curve, calculated by Microsoft Excel. Below (b): newly discovered species per year.

Table 5 and fig. 16 show that the discovery of new species in the Papuan region is still in an exponential growth phase. During the last collecting journey to Irian Jaya the present author collected eight additional *Euops* species. Both this fact, and the trend curve of fig. 16, makes clear that the total number of *Euops* species of the Papuan region must be significantly higher than the 184 we know today. Applying strict mathematics, it would be possible to calculate the mid-point of this trend curve and make a prediction on the total number of existing species. However, as the data are heavily influenced by the activities of only two collectors (*i. e.* J.L.GRESSITT / the present author) we should be cautious applying mathematical calculations which are based on statistically even data. Rather, I would like to make an intuitive estimate. As said above, the number of Papuan *Euops* species must be at least 200, a census which can be substantiated by the material at hand. Considering the fact that vast areas of New Guinea (presumably rich in endemics) have never been searched for phytophagous Coleoptera, and that many *Euops* species tend to be seasonal, it is clear that a great percentage of the fauna remains so far undiscovered. I would estimate that the

Papuan region harbours at least 300 species of *Euops*, but even this may turn out to be a gross underestimate.

4.2. Chorology

4.2.1. Regional diversity of *Euops*

At the commencement of this study, 134 species and 10 subspecies of *Euops* were recognized as valid worldwide (RIEDEL, 1998). The 23 species of the Papuan region made up a proportion of 17 % of the world fauna. In the course of this study 55 species were described as new, 52 from the Papuan region. One species was placed into synonymy, one subspecies was raised to species level. Thus, at present (2002) 189 described species of *Euops* exist worldwide. One Australian species (*E. suturalis* LEA) was also recorded for the Papuan region. So, 76 described species are reported for the Papuan region, constituting 40 % of the world fauna. If we furthermore consider the ascertained numbers of undescribed species at hand, namely 108 for the Papuan region, and 23 for Wallacea (mostly from Sulawesi), there exists a minimum number of 320 species of *Euops* worldwide, 184 of them occurring in the Papuan region. This means that the Papuan fauna of *Euops* could possibly make up as much as 58 % of the world fauna.

This anticipation could be exaggerated: other zoogeographic regions such as Madagasy, Africa and Asia are likely to harbour new species of *Euops* that will be found once those regions are being studied properly. During this study a great amount of field work was focused on New Guinea, so the present situation might appear unbalanced. However, regions such as Africa or India have a much longer history of entomological field work than New Guinea. There is no question that additional new species of *Euops* will be discovered in the regions mentioned but the same can be expected of the Papuan region. Judging from my personal experience of collecting in India, Malaysia and West Indonesia I doubt that the *Euops* species to be discovered west of Wallace´s line will outnumber the new ones found in Wallacea, New Guinea and Australia. In Malaysia I found *Euops* much scarcer than in New Guinea, both in number of species and in specimens, although applying the same collecting techniques. A species richness comparable to New Guinea was found only in Sulawesi.

There may be an ecological reason for this difference. Other leaf-rolling Attelabinae occur sympatrically with *Euops* in the Old-world tropics west of Wallace´s line. In Africa and Asia there are hundreds of species of Apoderini, a group of weevils with ecological requirements apparently very similar to *Euops*. The same can be said about other, less speciose attelabine genera. In Sulawesi and the Philippines only very few of these potentially competing species occur. None of them occurs in New Guinea and Australia. It is impossible to decide if other attelabids are virtually absent from the region east of Wallace´s line because of the presence of a rich fauna of *Euops*, or, if *Euops* could diversify there because of the absence of the other attelabids´ competition. Yet, it is obvious that the presence, respectively the absence of a closely related group with similar ecological requirements, will have a fundamental influence on the evolutionary fate of a group. It is remarkable that east of Wallace´s line *Euops* species of a relatively large body size occur. In Africa and Asia attelabids larger than 5 mm usually belong to the Apoderini, and species of *Euops* tend to be of a minute stature.

Bearing this in mind, and considering the favourable environmental conditions for attelabids in New Guinea (juxtaposed to the unsuitably dry / cold conditions in vast areas of Australia), it appears no longer unlikely that the Papuan region contributes more than 50 % of the world fauna of *Euops*.

Australian region, excluding Papuan: 25 species
(*affinis*, *bakewelli*, *clavigerus*, *contactus*, *corrugatus*, *coxalis*, *effulgens*, *episternalis*, *eucalypti*, *falcatus*, *flavomaculatus*, *impuncticollis*, *lateralis*, *leai*, *micans*, *montanus*, *niger*, *parvoarmatus*, *pulchellus*, *quadrifasciculatus*, *rudis*, *strigiventris*, *suturalis*, *tuberculatus*, *victoriensis*)

Papuan region excluding Australian s.s. / including Maluku: 23 species
(*aerosus*, *armatipennis*, *buergersi*, *coelestinus*, *cupreosplendens*, *divisus*, *femoralis*, *insularis*, *jekelii*, *maculatus*, *mysolensis,* *papua*, *picipes*, *singularis*, *subdentatus*, *testaceus*, *tibialis*, *trigemmatus*, *violaceus*, *viridiceps*, *viridiventris*, *vossi*, *wallacei*)

Wallacea s. s., excluding Maluku: 25 species
(*aerosus*, *anceps*, *apicalis*, *boviei*, *cribrarius*, *cupreus*, *cuprinus*, *cupripennis*, *cyanellus*, *dentatus*, *elongatus*, *fuscocupreus*, *jucundus*, *moseri*, *palawanus*, *parvulus*, *plicatus*, *rufitarsis*, *schultzei*, *semicupreus*, *subopacus*, *turbaticollis*, *viridifuscus*, *viridulus*, *willemoesi*)

Oriental region excluding Wallacea: 35 species
(*aerosus*, *amethystinus*, *anceps*, *andrewesi*, *armipes*, *barbieri*, *blandus*, *borneoensis*, *bowringii*, *championi*, *chinensis*, *clarus*, *cuprifulgens*, *fulgidus*, *gardneri*, *gratiosus*, *ignitus*, *indigenus*, *javanicus*, *keiseri*, *kharsu*, *mesosternalis*, *nigricollis*, *nitidicollis*, *paradoxus*, *peguensis*, *sandakanensis*, *scutellaris*, *semimetallicus*, *striatus*, *submetallicus*, *suffundens*, *tonkinensis*, *viridicollis*, *walshi*)

Palearctic region: 6 species
(*konoi*, *lespedezae*, *politus*, *punctatostriatus*, *pustulosus*, *splendidus*)

Afrotropical region: 12 species
(*aeneicollis*, *burgeoni*, *cyaneus*, *guineensis*, *ilaegiae*, *monticolus*, *morio*, *parilis*, *schoutedeni*, *semiviolaceus*, *togoensis*, *wittei*)

Madagasy region: 10 species
(*alluaudi*, *conicollis*, *convexicollis*, *distinctus*, *goudotii*, *janthinus*, *longipes*, *luteicornis*, *ruginotus*, *vadoni*)

Seychelle Islands: 1 species
(*viriditinctus*)

Tab. 6. *Euops* species recorded from different zoogeographic regions, as of 1998. *Euops aerosus* is listed for three regions, *Euops anceps* for two regions. The total number of *Euops* species recognized in 1998 is 134 (data from appendix 1, modified).

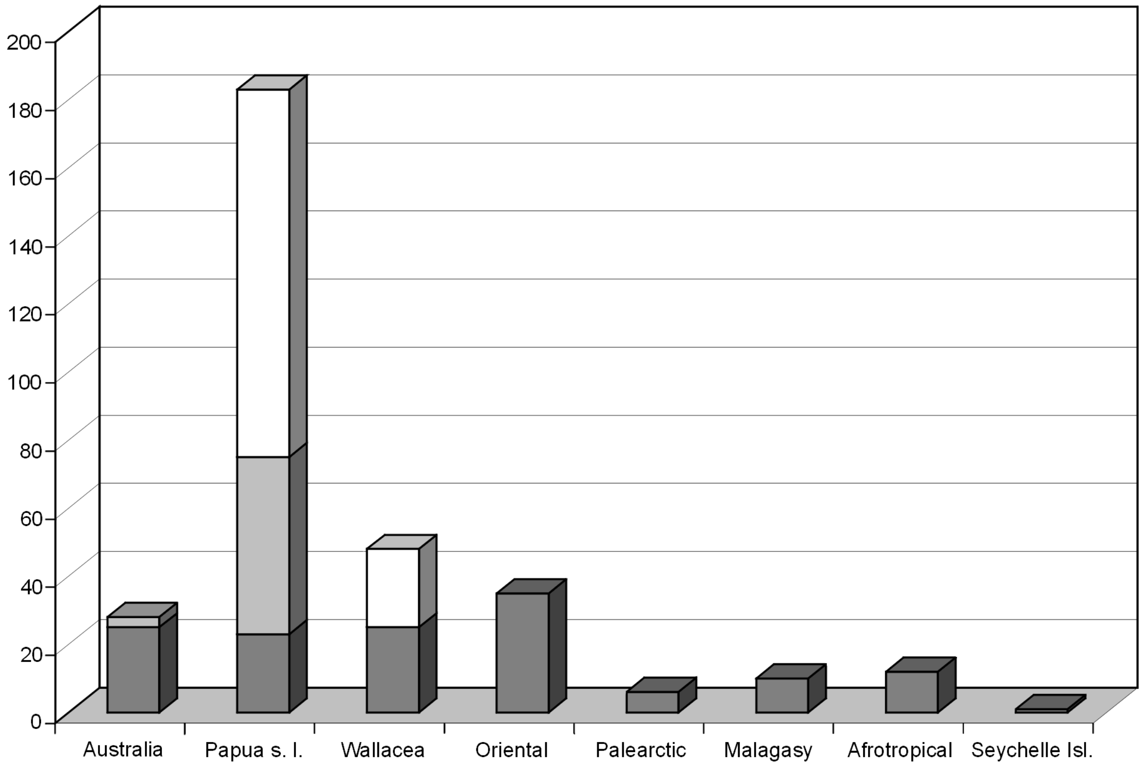


Fig. 17. Numbers of *Euops* species recorded from different zoogeographic regions. Numbers as of 1998 shaded in dark grey. Species added in the course of this study (2002) shaded in pale grey. Ascertained numbers of undescribed species at hand white.

4.2.2. Species richness at different altitudes

In a tropical country with high mountains such as New Guinea, changes in the vegetation along an altitudinal gradient are marked and have always fascinated naturalists (HUMBOLDT in: HAUFF, 1874). Of course, not only the flora changes with altitude but also the fauna. Naturally, phytophagous insects are not only affected by the abiotic changes of the environment along an altitudinal gradient, but also by the changes of the vegetation. The supposedly close ties of the phytophagous insects to their host plants give good reason to examine the altitudinal distribution of *Euops* species in relation to the vegetation zones (see chapter 1.3.5.). This can be obtained only indirectly by their altitudinal range since the data of most *Euops* specimens examined omit information on the forest type they were found,. This method involves inaccuracies caused by the local differences in altitude of given forest types as outlined above. For a final judgement and analysis, the data are not yet sufficient. However, some general considerations are possible. On the one hand, 155 Papuan *Euops* species can be assigned to a specific altitudinal zone, more or less congruent with the recognized altitudinal vegetation zones (Tab. 7). On the other hand only 23 species can not be assigned to a single zone, 19 of them having an extraordinary broad altitudinal distribution of more than 900 m.

Lowland zone (0-700 m / 200 m zone-overlap allowed): 59 species, e / w = 34 / 25.
aerosus (w), *batantae* (e), *coelestinus* (w), *divisus* (w), *doertheae* (e), *flyensis* (w), *gladiator* (e), *japensis* (e), *jekelii* (e), *lakekamuensis* (e), *lobipes* (w), *maculatus* (w), *mysolensis* (w), *papua* (e), *parangulithorax* (w), *punctaticeps* (e), *similis* (e), *suturalis* (w), *trigemmatus* (w), *viridiventris* (e), *waigeoensis* (e), *wapogae* (e), *zimmii* (w), n.s.2 (e), n.s.3 (e), n.s.6 (e), n.s.7 (w), n.s.13 (e), n.s.14 (w), n.s.16 (w), n.s.22 (e), n.s.25 (w), n.s.27 (w), n.s.28 (e), n.s.29 (e), n.s.31 (w), n.s.32 (e), n.s.34 (e), n.s.35 (w), n.s.36 (e), n.s.40 (e), n.s.41 (e), n.s.43 (e), n.s.45 (e), n.s.48 (w), n.s.49 (w), n.s.50 (w), n.s.51 (w), n.s.56 (e), n.s.58 (w), n.s.64 (e), n.s.65 (e), n.s.68 (e), n.s.69 (e), n.s.72 (e), n.s.74 (e), n.s.75 (w), n.s.80 (e), n.s.108 (w)

Lower montane zone (701-1800 m / 200 m zone-overlap allowed): 66 species, e / w = 42 / 24.
asekianus (w), *angulithorax* (w), *armatus* (w), *balkei* (w), *buergersi* (e), *cyclopensis* (e), *femoralis* (w), *goilala* (e), *kukukuku* (w), *kutubu* (e), *micros* (e), *monstruosus* (e), *paniaiensis* (e), *pseudomonstruosus* (e), *reticulatus* (e), *ruficornis* (w), *simulans* (w), *singularis* (w), *wei* (e), *vossi* (w), *yali* (e), n.s.1 (w), n.s.4 (e), n.s.5 (e), n.s.8 (e), n.s.9 (e), n.s.10 (e), n.s.11 (w), n.s.15 (e), n.s.17 (e), n.s.18 (e), n.s.19 (e), n.s.21 (w), n.s.23 (w), n.s.24 (e), n.s.30 (e), n.s.38 (e), n.s.39 (e), n.s.42 (e), n.s.44 (e), n.s.54 (w), n.s.55 (e), n.s.57 (w), n.s.59 (e), n.s.61 (e), n.s.62 (e), n.s.63 (e), n.s.66 (w), n.s.67 (e), n.s.70 (e), n.s.71 (e), n.s.76 (e), n.s.77 (w), n.s.82 (w), n.s.86 (e), n.s.87 (e), n.s.89 (w), n.s.92 (e), n.s.93 (w), n.s.95 (e), n.s.96 (w), n.s.97 (w), n.s.98 (e), n.s.100 (e), n.s.104 (e), n.s.107 (w)

Mid montane zone (1801-2900 m / 200 m zone-overlap allowed): 30 species, e / w = 20 / 10.
aculeatus (e), *anggiensis* (e), *bicolor* (e), *breyniae* (e), *convexus* (e), *deceptus* (e), *fraterculus* (e), *gressitti* (w), *ibelensis* (e), *kurulu* (e), *lani* (w), *nothofagi* (e), *paraspinosus* (e), *paraconvexus* (e), *porulosus* (e), *platyrostris* (e), *pygmaeus* (w), *sedlaceki* (w), *zimmermanni* (w), n.s.33 (w), n.s.37 (w), n.s.52 (e), n.s.73 (w), n.s.84 (e), n.s.85 (e), n.s.88 (w), n.s.90 (w), n.s.103 (e), n.s.105 (e), n.s.106 (e)

Upper montane zone (2901-3900 m / 200 m zone-overlap allowed): 0 species

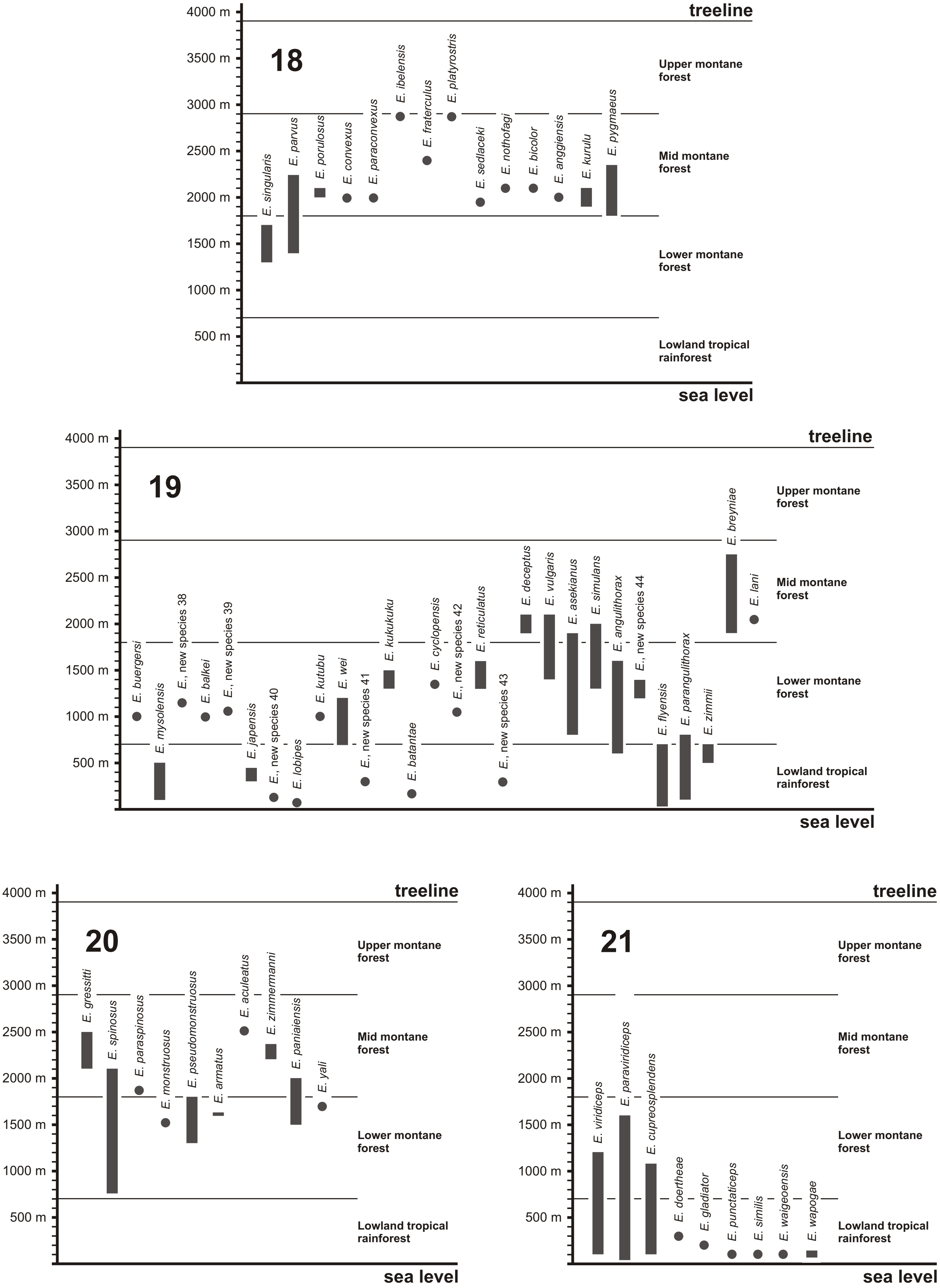
Species not fitting in any of the above zones; with altitudinal interval of more than 900 m: 19 species, e / w = 0 / 19.
armatipennis (w), *cupreosplendens* (w), *spinosus* (w), *paraviridiceps* (w), *tibialis* (w), *testaceus* (w), *viridiceps* (w), n.s.12 (w), n.s.60 (w), n.s.79 (w), n.s.81 (w), n.s.83 (w), n.s.91 (w), n.s.94 (w), n.s.99 (w), n.s.101 (w), n.s.102 (w), n.s.20 (w), n.s.78 (w)

Species not fitting in any of the above zones; with altitudinal interval of less than 900 m: 4 species, e / w = 0 / 4.
parvus (w), *vulgaris* (w), n.s.26 (w), n.s.53 (w)

Species with unknown altidude: 6 species
insularis (e), *subdentatus* (e), *violaceus* (e), *wallacei* (e), n.s.46 (e), n.s.47 (e)

Tab. 7. Number of Papuan *Euops* species each recorded for altitudinal vegetation zones. If the data of the specimens do not include discrete altitudes, but only altitudinal intervals (above recorded with "ca."), the mean of the altitudinal limits was used herein and treated such as one discrete altitude. Endemic species were considered those with a distributional area measuring less than 150 km. Endemic species are marked (e), widespread species (w).

It must be admitted that the data are influenced by the long number of unique records which provide only one distinct altitude. Once more material becomes available it is likely that their known range will expand. However, the majority of Papuan *Euops* species with sufficient records has a relatively narrow altitudinal distribution of about 500 m. In some cases this preference for specific altitudinal zones appears to be phylogenetically determined. The *gladiator*-subgroup of *Neosynaptops* is confined to lowland habitats below 300 m (Fig. 21). The *spinosus*-group occurs in montane habitats only and is absent from the lowlands (Fig. 20). The same is true for the *pygmaeus*-group (Fig. 18) which occurs with 12 out of 14



Figs. 18-21. Diagram of the altitudinal distribution of the species of four different monophyletic groups of Papuan *Euops*; (18) *pygmaeus*-group; (19) *simulans*-group; (20) *spinosus*-group; (21) *Neosynaptops*.

species in the mid montane forest; the remaining two species dwell in the lower montane forest. This pattern is most easily understood: being strictly associated with the plant genus *Nothofagus* which is *per se* an indicator of the mid montane forest type, the *pygmaeus*-group is bound to the same zone. The *simulans* group is probably the species group with the greatest diversity of altitudinal habitats within *Euops* (Fig. 19). It ranges from lowland habitats to the mid montane zone with the majority of species in lower montane forests. However, most of the species seem to be confined to specific vegetation zones. We can conclude that the majority of Papuan *Euops* is confined to specific altitudinal zones; in some cases species forming a monophyletic group share the same zone. As a matter of fact, such groups have their greatest species diversity in a discrete altitudinal zone.

But what does the overall pattern for Papuan *Euops* look like? Table 8 lists the number species recorded for each altitudinal zones measured in steps of 100 m. These data are used for the histogram in fig. 22.

0-100 m: 38 species

(*aerosus*, *armatipennis*, *cupreosplendens*, *divisus*, *flyensis*, *lobipes*, *maculatus*, *mysolensis*, *parangulithorax*, *paraviridiceps*, *punctaticeps*, *similis*, *suturalis*, *testaceus*, *trigemmatus*, *viridiceps*, *viridiventris*, *waigeoensis*, *wapogae*, n.s.3, n.s.12, n.s.14, n.s.27, n.s.31, n.s.34, n.s.35, n.s.45, n.s.48, n.s.49, n.s.50, n.s.58, n.s.65, n.s.68, n.s.69, n.s.79, n.s.81, n.s.101, n.s.108)

101-200 m: 39 species

(*aerosus*, *armatipennis*, *batantae*, *cupreosplendens*, *divisus*, *flyensis*, *gladiator*, *lakekamuensis*, *maculatus*, *mysolensis*, *parangulithorax*, *paraviridiceps*, *suturalis*, *testaceus*, *tibialis*, *trigemmatus*, *wapogae*, *viridiceps*, n.s.12, n.s.14, n.s.16, n.s.20, n.s.26, n.s.27, n.s.28, n.s.31, n.s.32, n.s.34, n.s.40, n.s.50, n.s.58, n.s.60, n.s.64, n.s.74, n.s.75, n.s.79, n.s.81, n.s.101, n.s.108)

201-300 m: 33 species

(*armatipennis*, *coelestinus*, *cupreosplendens*, *divisus*, *doertheae*, *flyensis*, *japensis*, *mysolensis*, *papua*, *parangulithorax*, *paraviridiceps*, *suturalis*, *testaceus*, *tibialis*, *viridiceps*, n.s.12, n.s.13, n.s.14, n.s.16, n.s.20, n.s.26, n.s.27, n.s.41, n.s.43, n.s.50, n.s.58, n.s.60, n.s.74, n.s.75, n.s.79, n.s.81, n.s.101, n.s.108)

301-400 m: 25 species

(*armatipennis*, *coelestinus*, *cupreosplendens*, *flyensis*, *japensis*, *mysolensis*, *parangulithorax*, *paraviridiceps*, *suturalis*, *tibialis*, *testaceus*, *viridiceps*, n.s.12, n.s.14, n.s.20, n.s.26, n.s.27, n.s.50, n.s.58, n.s.60, n.s.78, n.s.79, n.s.81, n.s.101, n.s.108)

401-500 m: 35 species

(*armatipennis*, *coelestinus*, *cupreosplendens*, *flyensis*, *japensis*, *mysolensis*, *parangulithorax*, *paraviridiceps*, *ruficornis*, *suturalis*, *testaceus*, *tibialis*, *viridiceps*, *zimmii*, n.s.6, n.s.7, n.s.12, n.s.14, n.s.20, n.s.21, n.s.22, n.s.23, n.s.25, n.s.26, n.s.27, n.s.53, n.s.58, n.s.60, n.s.78, n.s.79, n.s.81, n.s.82, n.s.83, n.s.101, n.s.108)

501-600 m: 34 species

(*angulithorax*, *armatipennis, coelestinus*, *cupreosplendens*, *flyensis*, *jekelii*, *parangulithorax*, *paraviridiceps*, *ruficornis*, *testaceus*, *tibialis*, *viridiceps*, *zimmii*, n.s.6, n.s.7, n.s.12, n.s.14, n.s.20, n.s.21, n.s.23, n.s.25, n.s.26, n.s.36, n.s.51, n.s.53, n.s.58, n.s.60, n.s.78, n.s.79, n.s.81, n.s.82, n.s.83, n.s.101, n.s.108)

601-700 m: 43 species

(*armatipennis*, *angulithorax*, *coelestinus*, *flyensis*, *parangulithorax, paraviridiceps*, *cupreosplendens*, *ruficornis*, *testaceus*, *tibialis*, *viridiceps*, *wei*, *zimmii*, n.s.2, n.s.4, n.s.6, n.s.7, n.s.12, n.s.14, n.s.19, n.s.20, n.s.21, n.s.23, n.s.25, n.s.26, n.s.29, n.s.53, n.s.56, n.s.57, n.s.58, n.s.60, n.s.72, n.s.77, n.s.78, n.s.79, n.s.80, n.s.81, n.s.82, n.s.83, n.s.93, n.s.97, n.s.101, n.s.108)

701-800 m: 44 species

(*angulithorax*, *armatipennis*, *asekianus*, *cupreosplendens*, *goilala*, *parangulithorax*, *paraviridiceps*, *ruficornis*, *spinosus*, *testaceus*, *tibialis*, *viridiceps*, *vossi*, *wei*, n.s.4, n.s.6, n.s.7, n.s.9, n.s.12, n.s.15, n.s.17, n.s.19, n.s.20, n.s.21, n.s.23, n.s.24, n.s.25, n.s.26, n.s.53, n.s.57, n.s.58, n.s.59, n.s.60, n.s.77, n.s.78, n.s.79, n.s.81, n.s.82, n.s.83, n.s.93, n.s.97, n.s.101, n.s.107, n.s.108)

801-900 m: 32 species

(*angulithorax*, *armatipennis*, *asekianus*, *cupreosplendens*, *paraviridiceps*, *ruficornis*, *spinosus*, *testaceus*, *tibialis*, *viridiceps*, *wei*, n.s.9, n.s.12, n.s.20, n.s.21, n.s.23, n.s.25, n.s.26, n.s.53, n.s.55, n.s.57, n.s.60, n.s.77, n.s.78, n.s.79, n.s.81, n.s.82, n.s.83, n.s.93, n.s.97, n.s.101, n.s.107)

901-1000 m: 37 species

(*angulithorax*, *armatipennis*, *asekianus*, *balkei*, *buergersi*, *cupreosplendens*, *femoralis*, *kutubu*, *paraviridiceps*, *ruficornis*, *spinosus*, *testaceus*, *tibialis*, *viridiceps*, *wei*, n.s.9, n.s.12, n.s.20, n.s.21, n.s.23, n.s.26, n.s.30, n.s.53, n.s.57, n.s.60, n.s.66, n.s.77, n.s.78, n.s.79, n.s.81, n.s.82, n.s.83, n.s.91, n.s.93, n.s.97, n.s.101, n.s.107)

1001-1100 m: 36 species

(*angulithorax*, *armatipennis*, *asekianus*, *cupreosplendens*, *femoralis*, *paraviridiceps*, *ruficornis*, *spinosus*, *testaceus*, *tibialis*, *viridiceps*, *wei*, n.s.1, n.s.9, n.s.11, n.s.12, n.s.20, n.s.21, n.s.23, n.s.30, n.s.39, n.s.42, n.s.53, n.s.57, n.s.60, n.s.61, n.s.66, n.s.78, n.s.79, n.s.81, n.s.83, n.s.91, n.s.93, n.s.97, n.s.101, n.s.107)

1101-1200 m: 38 species

(*angulithorax*, *asekianus*, *femoralis*, *micros*, *paraviridiceps*, *ruficornis*, *spinosus*, *tibialis*, *viridiceps*, *wei*, n.s.1, n.s.5, n.s.11, n.s.12, n.s.20, n.s.21, n.s.23, n.s.38, n.s.44, n.s.53, n.s.54, n.s.57, n.s.60, n.s.61, n.s.62, n.s.63, n.s.67, n.s.71, n.s.78, n.s.79, n.s.81, n.s.83, n.s.91, n.s.95, n.s.97, n.s.99, n.s.101, n.s.107)

1201-1300 m: 34 species

(*angulithorax*, *asekianus*, *femoralis*, *kukukuku*, *paraviridiceps*, *pseudomonstruosus*, *reticulatus*, *ruficornis*, *simulans*, *singularis*, *spinosus*, *tibialis*, n.s.1, n.s.5, n.s.8, n.s.11, n.s.12, n.s.23, n.s.44, n.s.54, n.s.57, n.s.60, n.s.61, n.s.78, n.s.79, n.s.81, n.s.83, n.s.86, n.s.91, n.s.96, n.s.97, n.s.98, n.s.99, n.s.101).

1301-1400 m: 39 species

(*angulithorax*, *asekianus*, *cyclopensis*, *femoralis*, *paraviridiceps*, *parvus*, *pseudomonstruosus*, *kukukuku*, *reticulatus*, *ruficornis*, *simulans*, *singularis*, *spinosus*, *tibialis*, *vulgaris*, n.s.1, n.s.5, n.s.8, n.s.11, n.s.12, n.s.18, n.s.23, n.s.44, n.s.54, n.s.60, n.s.61, n.s.70, n.s.78, n.s.79, n.s.83, n.s.86, n.s.91, n.s.92, n.s.94, n.s.96, n.s.97, n.s.99, n.s.101, n.s.104)

1401-1500 m: 33 species

(*angulithorax*, *asekianus*, *femoralis*, *kukukuku*, *paniaiensis*, *paraviridiceps*, *parvus*, *pseudomonstruosus*, *reticulatus*, *ruficornis*, *singularis*, *simulans*, *spinosus*, *tibialis*, *vulgaris*, n.s.1, n.s.5, n.s.8, n.s.10, n.s.11, n.s.12, n.s.23, n.s.54, n.s.60, n.s.79, n.s.83, n.s.86, n.s.91, n.s.94, n.s.96, n.s.97, n.s.99, n.s.102)

1501-1600 m: 35 species

(*armatus*, *angulithorax*, *asekianus*, *femoralis*, *monstruosus*, *paraviridiceps*, *paniaiensis*, *parvus*, *pseudomonstruosus*, *reticulatus*, *ruficornis*, *simulans*, *singularis*, *spinosus*, *vulgaris*, n.s.1, n.s.5, n.s.10, n.s.11, n.s.12, n.s.23, n.s.60, n.s.73, n.s.76, n.s.79, n.s.83, n.s.86, n.s.88, n.s.89, n.s.91, n.s.94, n.s.96, n.s.97, n.s.99, n.s.102)

1601-1700 m: 30 species

(*armatus*, *asekianus*, *femoralis*, *paniaiensis*, *parvus*, *pseudomonstruosus*, *ruficornis*, *simulans*, *singularis*, *spinosus*, *vulgaris*, *yali*, n.s.1, n.s.5, n.s.11, n.s.12, n.s.23, n.s.33, n.s.37, n.s.60, n.s.73, n.s.83, n.s.86, n.s.87, n.s.88, n.s.91, n.s.94, n.s.96, n.s.99, n.s.102)

1701-1800 m: 20 species

(*asekianus*, *paniaiensis*, *parvus*, *pseudomonstruosus*, *pygmaeus*, *simulans*, *spinosus*, *vulgaris*, n.s.33, n.s.37, n.s.60, n.s.73, n.s.87, n.s.88, n.s.91, n.s.94, n.s.96, n.s.99, n.s.100, n.s.102)

1801-1900 m: 20 species

(*asekianus*, *breyniae*, *kurulu*, *paniaiensis*, *paraspinosus*, *parvus*, *pygmaeus*, *simulans*, *spinosus*, *vulgaris*, n.s.33, n.s.37, n.s.60, n.s.73, n.s.88, n.s.91, n.s.94, n.s.96, n.s.99, n.s.102)

1901-2000 m: 23 species

(*anggiensis*, *breyniae*, *deceptus*, *kurulu*, *paniaiensis*, *paraconvexus*, *parvus*, *porulosus*, *pygmaeus*, *sedlaceki*, *simulans*, *spinosus*, *vulgaris*, n.s.33, n.s.37, n.s.60, n.s.73, n.s.84, n.s.88, n.s.91, n.s.94, n.s.99, n.s.102)

2001-2100 m: 22 species

(*bicolor*, *breyniae*, *gressitti*, *kurulu*, *lani*, *nothofagi*, *parvus*, *porulosus*, *pygmaeus*, *spinosus*, *vulgaris*, n.s.33, n.s.37, n.s.52, n.s.60, n.s.85, n.s.88, n.s.91, n.s.94, n.s.99, n.s.102, n.s.105)

2101-2200 m: 13 species (*breyniae*, *convexus*, *gressitti*, *parvus*, *pygmaeus*, *zimmermanni*, n.s.88, n.s.90, n.s.91, n.s.94, n.s.99, n.s.102, n.s.103)

2201-2300 m: 11 species

(*breyniae*, *gressitti*, *parvus*, *pygmaeus*, *zimmermanni*, n.s.88, n.s.90, n.s.91, n.s.94, n.s.99, n.s.102)

2301-2400 m: 11 species

(*breyniae*, *fraterculus*, *gressitti*, *pygmaeus*, *zimmermanni*, n.s.88, n.s.90, n.s.91, n.s.94, n.s.99, n.s.102)

2401-2500 m: 9 species

(*aculeatus*, *breyniae*, *gressitti*, n.s.88, n.s.90, n.s.91, n.s.94, n.s.99, n.s.102)

2501-2600 m: 8 species

(*breyniae*, n.s.88, n.s.90, n.s.91, n.s.94, n.s.99, n.s.102, n.s.106)

2601-2700 m: 6 species

(*breyniae*, n.s.90, n.s.91, n.s.94, n.s.99, n.s.102)

2701-2800 m: 6 species

(*breyniae*, n.s.90, n.s.91, n.s.94, n.s.99, n.s.102)

2801-2900 m: 5 species

(*ibelensis*, *platyrostris*, n.s.90, n.s.99, n.s.102)

2901-3000 m: 3 species

(n.s.90, n.s.99, n.s.102)

3001-3535 m: 1 species

(n.s.99)

Tab. 8. Number of Papuan *Euops* species each recorded for altitudinal zones measured in steps of 100 m. If the data of the specimens do not include discrete altitudes, but only altitudinal intervals (above recorded with "ca."), the mean of the altitudinal limits was used herein and treated such as one discrete altitude. Species from localities of unknown altitude are not included (*insularis*, *subdentatus*, *violaceus*, *wallacei*, n.s.46, n.s.47).

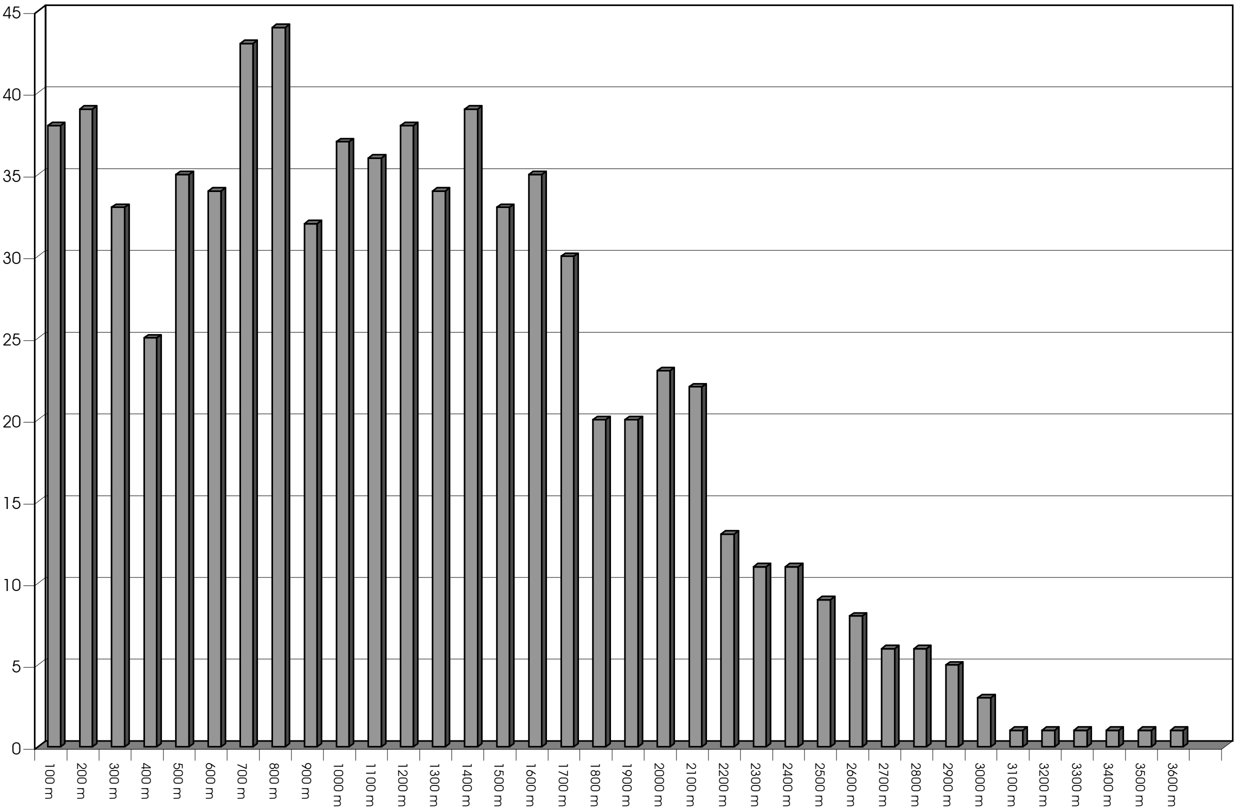


Fig. 22. Diagram illustrating change of number of Papuan *Euops* species with altitude. See table 8 for the data used. Note maximum diversity at 700-800 m altitude. Diversity remains at a high level until at least 1600 m altitude.

There are two important points evident from fig. 22: first, the highest diversity of *Euops* is between 700 m and 800 m altitude with 44 species. At sea level (0-100 m) there are only records for 38 species. Second, relatively high levels of diversity are maintained until the lower part of the mid montane forest zone. The lower montane forest at 1300-1400 m harbours more *Euops* species (39) than the zone above sea level (38). A marked decline in diversity of *Euops* is not reached before 2100 m where there are still 22 species present. Few species reach 3000 m, and there is only one record for 3535 m, shortly below the tree line.

The first point, namely the diversity peak between 700 and 800 m can be explained relatively easily. At this zone, lowland forest gives way to lower montane forest. Both forest types have specific species of *Euops*. Thus, the altitudinal zone at this boundary shares *Euops* species of both forest types, resulting in an unusually high diversity.

The second point is more difficult to explain. There is general support for the view that species richness of tropical insects declines with elevation (WOLDA, 1987). PARSONS (1999) confirmed this general trend in the butterfly fauna of Papua New Guinea, but he points out that this does not apply to selected montane groups, *e. g. Delias*, which has the greatest number of species at 1800 m. HAMMOND (1990) found the same in beetles studied in North Sulawesi, among the groups he found more diverse at higher elevations are some of Curculionoidea. *Euops* seems to belong to those groups of organisms which have a preference for montane habitats.

The difference in diversity of Papuan *Euops* between a given highland locality and a lowland locality may be even more marked than it appears in fig. 22. The histogram is based on cumulative data of the entire Papuan region. As the surface area of the lowlands is larger than the one of the highlands, the local species diversity of a highland locality is underrepresented. It is obvious that the relatively small area above 2000 m can not harbour as many species as the much larger area below. Nevertheless, at a certain locality species diversity may be higher above 2000 m, than at sea level. A comparison of the maximum species numbers at different localities substantiates this view. Not surprisingly, Wau holds the rank of the most-*Euops*-diverse place on earth with 27 species. One reason for this is the amount of field work carried out here; the Wau Ecology Institute was used as a base for field-survey for decades. However, if we look for the number two of this ranking, it turns out to be Borme, a remote village in the highlands of Irian Jaya. The present author has visited this place together with M. Balke in 1992 and 1993; presumably, we were the first zoologists to do field work at this mission station. The air strip is at about 900 m altitude and it is possible to climb within a few hours a ridge of 2000 m. Thus, a variety of habitats can be covered. Altogether, we have spent only nine days in this place. During this very limited period I have collected 23 species of *Euops*. This is much more diverse than the best lowland localities: there are ten species recorded for Biak island where I have spent ten days, made use of a car and visited a number of localities. Moreover, this island had been visited by other entomologists. A similar situation we find in Waigeo island. The ten days I spent there collecting yielded eight species of *Euops*. Still, both islands were excellent localities if we compare with others: though the Archbold expedition spent several weeks at Bernhard Camp in the floodplain of the Mamberamo river (ARCHBOLD et al., 1942), the only *Euops* species contained in the material is *E. lobipes*. My personal collecting efforts in the Asmat region near Senggo produced a female of a species related to *E. lobipes* and some specimens assigned to *E. paraviridiceps*. In flat forests around Timika, the only species found was *E. paraviridiceps*.

The general preference of *Euops* for montane habitats could have something to do with the larval development in the nidus. Once the female weevil cuts the nidus off the leaf it falls into the leaf litter - or into a less favourable place. If this happens to be a swamp the larva has poor chances to successfully complete its development. Vast areas of lowland forests in New Guinea are regularly flooded, especially in the flat regions near the big rivers, such as the Fly, the Mamberamo, or the Sepik. Such flooding could kill the greater part of the *Euops* populations in the subimaginal stages. In fact, very few specimens and species of *Euops* are known from such areas. Lowland areas with endemic species of *Neosynaptops* are all in hilly country, in the most diverse place (*i. e.* Biak island, Waigeo island) with well-drained coral limestone.

Another reason could be the more rapid breakdown of the leaf-litter in the lowlands. The litter-layer is thin, and material fallen to the ground is soon eaten by groups such as diplopods and termites. Possibly, in lowland habitats the *Euops*-larva does not have enough time to develop before the nidus is attacked.

PATTERSON et al. (1998) drew attention to the fact that species numbers of birds and bats show smooth declines with elevation along a transect in Peru, but species numbers of mice did not. GASTON (2000) shows the graph for bats of PATTERSON et al. (1998), but not the one for mice. The existence and significance of such montane groups is often overlooked or ignored. As outlined by PATTERSON et al. (1998) lowland habitats are usually rich in widespread species, whereas montane habitats have a smaller number of species which tend to be endemic. This aspect can be confirmed in Papuan *Euops* (Tab. 7), although it is less marked than expected. The lowland zone exhibits 58 % endemism of its specific *Euops* species, the lower montane zone 64 %, and the mid montane zone 67 %. Possibly, this trend would become more obvious when the distributional areas become known more precisely.

Furthermore, it should not be forgotten that a high proportion of strictly montane relicts exist, not only in *Euops* but also in other groups of weevils. Some of them are associated with plants of Gondwanic origin (*e. g. Araucaria*, *Nothofagus*, *Podocarpus*). The *pygmaeus*-group of *Euops* living on *Nothofagus* could be such an old Australian relict. Another one are the three nemonychid species of the genus *Aragomacer* associated with *Araucaria* described by KUSCHEL (1994). Several species of an undescribed genus of Caridae lives on *Podocarpus*- and *Dacrycarpus*-hosts at high altitude of 2800 - 3500 m; its closest relatives are known from Chile and Patagonia (RIEDEL, unpublished information). Such a pattern is repeatedly found in other groups of plants and animals. The biological value of such relicts should not be underestimated when strategies of conservation measures are being developed.

In conservation biology groups such as birds and ants are traditionally used for rapid assessment surveys, both of them being very speciose in lowland habitats but quickly losing diversity with increasing elevation. This may be one reason for a higher priority of lowland areas in conservation strategies which is evident in the map of Papua New Guinea given by MARGULES & PRESSEY (2000). From the perspective of a coleopterist the designation of a high priority conservation area in swampy basins such as the Mamberamo, or the Lakekamu is a bad choice. If priority has to be given to lowland areas, at least foothill regions should be selected, such as present in the Rouffaer mountains. The greatest challenge will be the preservation of lower and mid montane habitats. This region is densely populated by native people. Efforts to preserve the remaining montane forests will more easily result in conflicts with the local population than this will be the case in uninhabited lowland swamps. Nevertheless, a significant portion of the Papuan biodiversity is restricted to montane habitats, both in number of species and in their biological importance. The negative effects of the fragmentations of the montane habitats must not be overestimated. In a region where major portions of the biodiversity consist of arthropods, and not so much of large birds or mammals that depend on vast areas of undisturbed land, even small montane relict forests fulfil an invaluable function to preserve numerous species. Lower and mid montane forests deserve more efforts for their conservation than they are today given.

4.3. Zoogeography

4.3.1. General biogeography of the Papuan region

New Guinea is a region where biota of two hemispheres collide and intermingle. It is the only place on earth where Laurasian oaks (Fagaceae: *Lithocarpus*) occur together with the "trans-Antarctic" southern beeches (Nothofagaceae: *Nothofagus*) (GRESSITT, 1982a). Thus, there is an inherent conflict if one tries to assign it to either one of the regions. It was attempted to solve this conflict by examining the different proportions of species or groups that seemed to belong to one of them: WALLACE (1876) assigns the Papuan region (plus Sulawesi) to the Australian faunal region calling it "austro-malayan subregion". He was followed by most zoogeographers, see for example DARLINGTON (1957). Phytogeographers on the contrary found in the Papuan flora closer affinities with the tropical Asian one and placed New Guinea and its surrounding islands within the Indo-Malesian floral region (STEENIS, 1950). GRESSITT (1982b: p. 732) sees in his summary of Papuan beetle biogeography higher degrees of Oriental derivation than DARLINGTON (1971) had shown for Papuan Carabidae. GRESSITT argues that this could be a result of the close ties of phytophagous insects to the predominantly oriental flora.

Central to zoogeographic studies of selected taxa that seem to have invaded a certain area is the "progression rule" of HENNIG (1966): within a continuous range of a monophyletic group it is considered possible that a transformation series of characters would run parallel with progression in space, such that the youngest members would be on the geographical periphery of a group. In the absence of phylogenetic analyses, some zoogeographers used an unbalanced distribution of species-numbers to hint on the center of the groups´ origin. In some cases the center of origin may be the area with the highest number of species. However, care must be taken because it may be just as well an area of local diversification.

If dispersal is allowed as an a-priori-means to explain Papuan biogeography (which seems reasonable for an island that has emerged from the sea in the geologically recent past) basically two different faunal elements must be distinguished, an Oriental and an Australian. Both terms resort to the center of origin of a given taxon. As always in biogeography and phylogeny, hierarchies must be taken into account. If for example, an Oriental or an Australian species enters New Guinea and subsequently undergoes a rapid evolution and speciation in this region, the resulting monophylum may be called a "Papuan element". In some cases such "Papuan elements" are highly derived and their origin is unclear.

It is worthwhile to review the zoogeography of some well-studied groups of vertebrates. According to FLANNERY (1990), the indigenous mammal fauna of New Guinea consists of 190 species belonging to only four orders: Monotremata (2 species), Marsupialia (60 species), Rodentia (57 species) and Chiroptera (71 species). The first two of them are clearly Australian elements. Although some subgroups of the Rodentia and the Chiroptera may first have colonized Australia from Asia and subsequently entered New Guinea from the south, they are both originally Oriental elements. Thus, although the mammals of New Guinea are commonly considered being predominantly "Australian" only 33 % of the species belong to the Australian element while 67 % belong to the Oriental one.

The situation is similar in the composition of the frog fauna (ALLISON, 1996) which consists of only four native families which can be equally divided between the regions. Hylidae (76 species) and Myobatrachidae (7 species) arrived from Australia, Ranidae (13 species) and Microhylidae (104 species) originated from SE Asia. Mammals and frogs colonized New Guinea with relatively few taxa, both from Australia and from Asia, which underwent considerable subsequent diversification.

The situation is more complicated in birds which are represented by 66 families in New Guinea (PRATT, 1982). Being mostly capable of migrations over sea it is no surprise that there is considerable faunal exchange with neighbouring regions - the ranges of 44 families encompass both the Oriental and the Australian region. Nevertheless, the proportions of species of some families differ so markedly that the borders of the Sahul- and the Sunda-shelf are especially evident in birds. Families such as Psittacidae or Meliphagidae are good examples for typical Australian elements. Moreover, there is a bird family which is a good example for a "Papuan element": the birds of paradise (Paradisaeidae). Obviously, this family has evolved within New Guinea, with only two species occurring outside the Papuan region in northern Queensland.

Groups that have diversified within the Papuan region and strictly adhere to its boundaries are especially numerous among the insects: *Arachnopus* (Curculionidae, Coleoptera), *Leptognatha* (Cicindelidae, Coleoptera), *Polyrhanis* (Cicindelidae, Coleoptera), *Promechus* (Chrysomelidae, Coleoptera), *Stricklandia* (Carabidae, Coleoptera), *Tmesisternus* (Cerambycidae, Coleoptera).

Some groups enter the rainforests of Australia with a few species, but they do not reach islands to the west such as Sulawesi. As will be explained in chapter 4.3.4 the separation between the Papuan and the Australian biota is mainly achieved by ecological factors. Typically, Papuan elements are adapted to tropical rainforest, whereas Australian elements are restricted to sclerophyl savannah habitats. At the interface, there is an interdigitation (not an intergradation) of both biota. Savannah regions in the south of New Guinea possess a flora and fauna that is predominantly Australian. The vegetation is dominated by *Eucalyptus* and *Melaleuca*; the agile wallaby (*Macropus agilis*), the taipan (*Oxyuranus scutellatus*) and the frilled lizard (*Chlamydosaurus kingii*) occur, just as in Australia. On the other hand, there are pockets of "Papuan" rainforest in Australia, namely at Lockerbie (tip of peninsula), and at Mc. Illwraith range and Iron range (both mid of peninsula). Many species that are typical of the rainforests in New Guinea are found in these forest isolates: as mentioned above, the birds of paradise (Paradisaeidae); other examples are *Tricondyla aptera* (Cicindelidae), *Ornithoptera* (Papilionidae, Lepidoptera), *Pantorhytes* (Curculionidae, Coleoptera). Nevertheless, as shown by KIKKAWA et al. (1981) the majority of Papuan taxa of New Guinea do not reach these isolates of rather depauperate Papuan rainforest. There is no need to include them in the Papuan region as outlined in chapter 1.3.1.

After the widespread acceptance of the continental drift theory, biogeography changed drastically. PLATNICK & NELSON (1978) clearly differentiated between the two principal options causing a given distribution: vicariance and dispersal. Vicariance means that the range of a taxon is disrupted by a barrier. In the case of dispersal, the barrier predates the taxon which evolved in one region and subsequently dispersed into the other one. The evolution of taxa with poor abilities for dispersal may largely follow geological vicariance events, such as the break-up of a continent or of an island arc. Thus, the sequence of the break-up can be traced in the reconstructed phylogeny of suitable taxa. Methods of modern biogeography are summarized by HUMPHRIES & PARENTI (1986). Central to it is the availability of robust cladistic hypotheses on monophyletic groups and the identification of "areas of endemism". The latter are areas that are characterized by overlapping distributions of endemic species or monophyletic species groups. If the names of the taxa in a given cladogram are substituted by the respective areas they occupy, a scheme of the relationships of those areas is obtained. If the pattern observed is not unique for the group in consideration but repetitive in other groups studied, it is likely that this pattern is the result of historic events that have influenced the phylogeny and the distribution of those groups in exactly the same way. TURNER et al. (2001) examined dispersal pathways of various plant and animal taxa within Southeast Asia employing cladistic methods. However, there was considerable conflict in the data set and the resulting patterns were too weakly supported to allow general conclusions. Another possible explanation for congruent biogeographic patterns can be sought in geology.

As outlined in chapter 1.3.3, New Guinea is a composite of various geological terrains. It is tempting to examine how far the evolution of Papuan biota followed the geological history of island arc accretions or the movement of continental fragments. Unfortunately, only few animal groups have been studied well enough so far to draw conclusions. POLHEMUS & POLHEMUS (1998) have studied aquatic Heteroptera. They found in *Ptilomera*, a genus of waterstriders, a pattern that seems to reflect accretion of two different island arcs to New Guinea. However, most of the species they refer to are yet undescribed and the cladistic analysis they used was in preparation. Most important are the studies on Cicadas summed up by DUFFELS (1986), DUFFELS & BOER (1990), and BOER (1995). They see a coherence of the northern ranges of New Guinea to other fragments of the Outer Melanesian Arc (OMA), such as the Bismarck Archipelago, the Solomon Islands, Vanuatu, Fiji and Tonga. This OMA-region has a sister area relationship to central New Guinea , which forms a part of the Inner Melanesian Arc (IMA). The birdshead region forms another area of endemism which has a sister area relationship to OMA plus Maluku. DUFFELS (1986) and DUFFELS & BOER (1990) go as far as postulating that New Guinea can not be regarded as an area of endemism in itself.

4.3.2. Dispersal versus vicariance - the worldwide zoogeographic pattern of *Euops*

Both dispersal and vicariance could account for the worldwide distributional pattern of *Euops* (Fig. 2). A deep-level analysis of *Euops* phylogeny including representatives of all faunal regions could possibly answer which of both processes prevailed. However, with the focus on the Papuan region and the absence of such phylogenetic data, only some general facts can be considered herein.

Euops occurs on all the Southern continents except for South America. This could speak for an ancient Gondwanic distribution that would fall in the category of vicariance. The absence in South America would have to be explained either by primary absence, or by secondary extinction.

It must be kept in mind that *Euops* depends on Angiosperm host plants. As outlined, for example, by BEHRENSMEYER et al. (1992) and TRUSWELL et al. (1987) Angiosperms were at an early stage of their evolution when the fragments of Gondwanaland separated. It is unlikely that Angiosperm hosts suitable for *Euops* were spread in sufficient density over all the fragments of the Southern continent. If *Euops* is indeed of Cretaceous age, it is likely that dispersal played at least some role when it followed the early expansion of its Angiosperm hosts over the Southern continents.

However, according to the "dispersal hypothesis" proper, the present distribution of *Euops* would reflect much more recent events. It assumes that *Euops* evolved in one region (possibly Africa or Asia) and dispersed into New Guinea and Australia from the north. This should not have happened before the Miocene when the Australian plate had drifted far enough to the north so that it could come into contact with Asian biota.

There are reasons that speak for each of the two hypotheses. *Euops* is unknown (and most likely absent) from New Zealand and New Caledonia, but one species (*E. viriditinctus* CHAMPION) is endemic to the Seychelle Islands. All three terrains mentioned are of continental origin and became isolated during the late Cretaceous (SCOTESE et al., 1988). New Zealand and New Caledonia are rich in relict groups that exhibit old Gondwanic distributions. An example are the Rhadinocybinae, a subfamily of Apionid weevils (WANAT, 2001). The absence of *Euops* in both island groups gives support to the dispersal hypothesis. However, its presence in the Seychelle Islands is much easier explained with the vicariance hypothesis. Since these islands were left behind from the Indian plate, they have been very isolated. If the ancestors of *E. viriditinctus* should have reached them during the Tertiary, a long distance dispersal over sea would have to be postulated. However, a study of the Papuan fauna clearly demonstrates that even relatively short distances over sea (ca. 100 km) act as effective barriers to dispersal of *Euops*.

The sister-group of *Euops* is unknown and there is no phylogenetic analysis of Attelabidae available. However, judging from some characters (*e. g.* reduction of labial palpi; reduction of body vestiture; reduction of ovipositor structures) *Euops* is a rather derived taxon. Other Attelabid genera that appear more basal are either restricted to the holarctic region (*e. g. Attelabus*), or to Africa (*Plassoderinus*). Furthermore, Australia is clearly on the periphery of generic diversity of Attelabinae with *Euops* as the only representative.

The climatic preference of taxa must also be considered. Old Gondwanic elements of the Australian fauna usually have their regional centers of diversity in Southern Australia, resorting to temperate conditions which were widespread during much of the earlier history of the Australian continent (KEAST, 1981: 1926 f.; MAIN, 1981: 1068). The opposite is the case in the distribution of *Euops*; it is most diverse in tropical latitudes.

A discussion of host plant associations and its implication for zoogeography of *Euops* can be found in RIEDEL (2001b).

To sum up: there are two hypotheses explaining the worldwide pattern of *Euops* distribution. Either, *Euops* is of Gondwanic origin which implies a long evolutionary history in Australia and New Guinea. Or, it colonized the Australian region via Southeast Asia at a much later date. At present, there seem to be more indications speaking for the latter hypothesis. However, the presence of *Euops viriditinctus* CHAMPION on the Seychelle Islands, and the composition of the Papuan *Euops* fauna (see below) are not consistent with the dispersal hypothesis. A deep-level phylogenetic analysis of *Euops* and Attelabidae in general would be needed for a final decision.

4.3.3. Zoogeographic patterns of Indoaustralian *Euops*

The main problem in determining areas of endemism using *Euops* is the relatively poor state of knowledge (see chapter 4.1). If there is only one record of a certain species, it is impossible to outline the area of endemism. There are few species that seem to be spread over most areas of the Papuan region. So, the majority of other species are endemic to a certain degree. But without a fair number of records in the area of endemism and an equivalent number of failed attempt to find the species in other areas, it is risky to speak of an endemic species; it may be a rare but widespread species that can be found on the other end of the region after sufficient field work. If areas of endemism are determined based on small monophyletic groups, the chances to identify them correctly are bigger. So, in the following I focus mainly on distributional patterns as exhibited by species groups.

If we look at the distribution of *Neosynaptops* (Fig. 25) and of the *simulans*-group (Fig. 26) we find that both are fairly evenly distributed over the Papuan region *sensu strictu* plus the Bismarck archipelago. These two monophyletic species groups are spread in continental parts of the birdshead, in terrains belonging to two different island arcs (*e. g.* Batanta island, Cyclops Mts), Central New Guinea, and at least the northern part of the Southern continental platform. This includes both the major geological terrains (see Fig. 6), and the areas of endemism recognized by BOER (1995) for Cicadas. If we consider the distribution of the *spinosus*-group (Fig. 23) we find that it occurs in at least three terrains of completely different geological history: the birdshead, Central New Guinea, and the Huon Peninsula. However, all the areas included are above 1000 m altitude. The same pattern is obvious from the distribution of the *pygmaeus*-group (Fig. 24) which seems rather to adhere to environmental constraints (elevation; see also chapter 4.2.2) than to geological boundaries. However, we must not forget that all these species groups do not occur outside

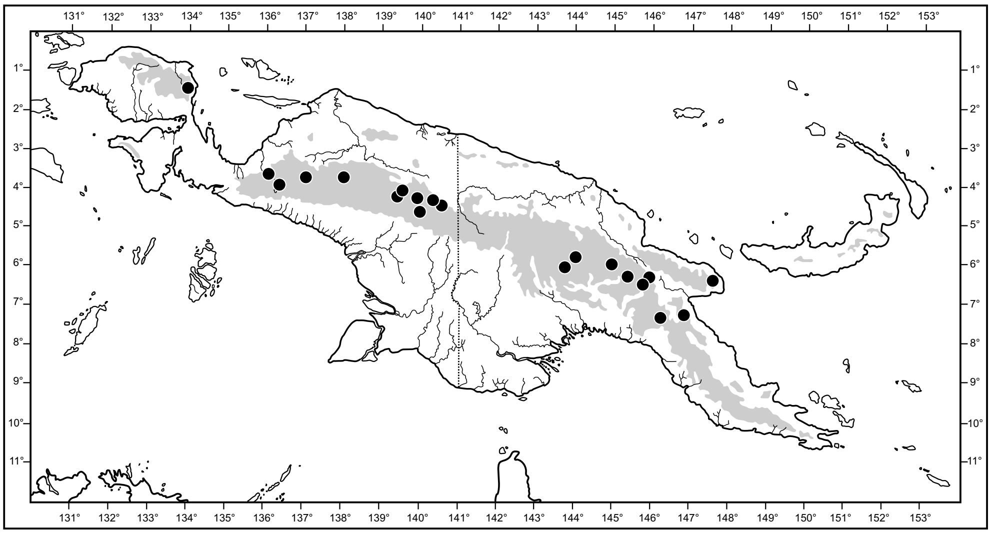


Fig. 23. Distribution of the *spinosus*-group of *Euops*. Areas above 1000 m are shaded.

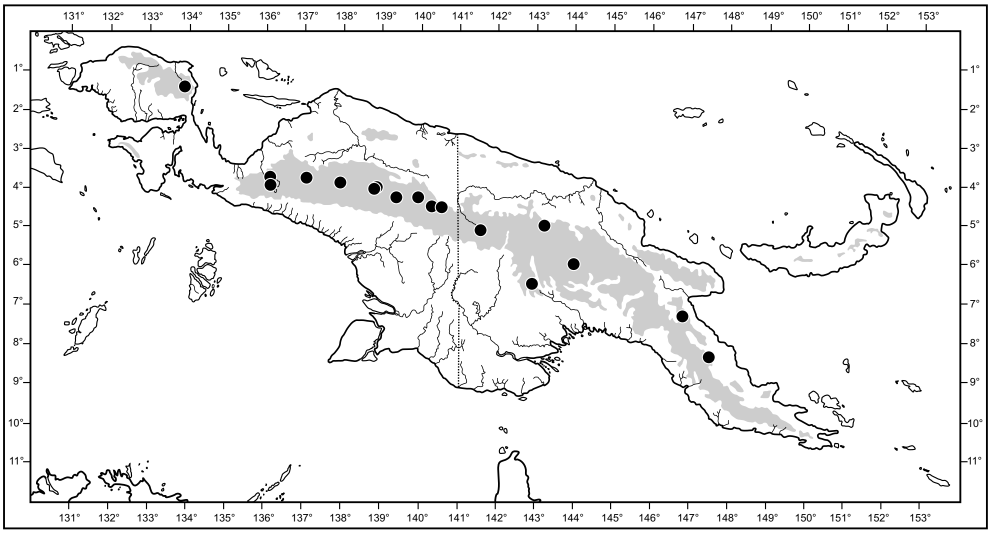


Fig. 24. Distribution of the *pygmaeus*-group of *Euops*. Areas above 1000 m are shaded.

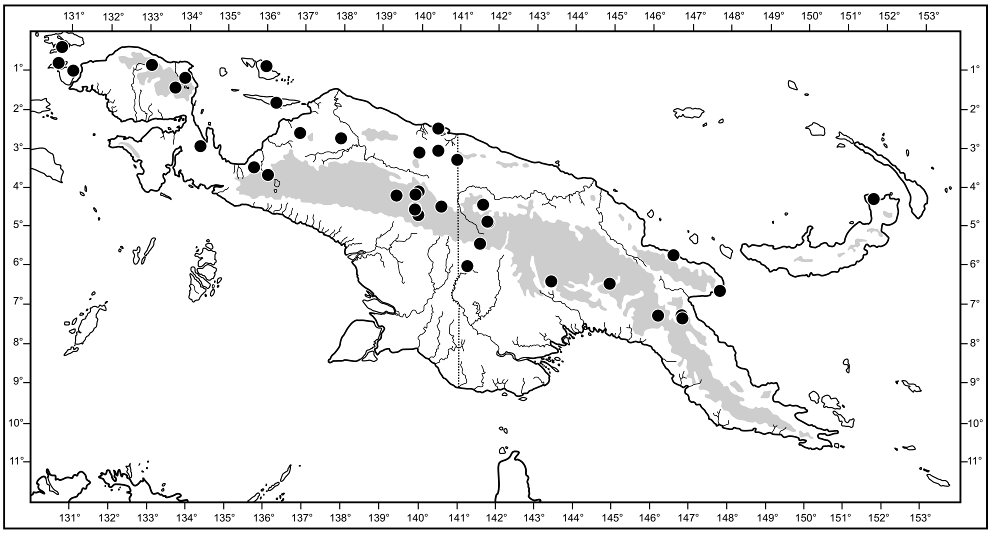


Fig. 25. Distribution of the subgenus *Neosynaptops* of *Euops*. Areas above 1000 m are shaded.

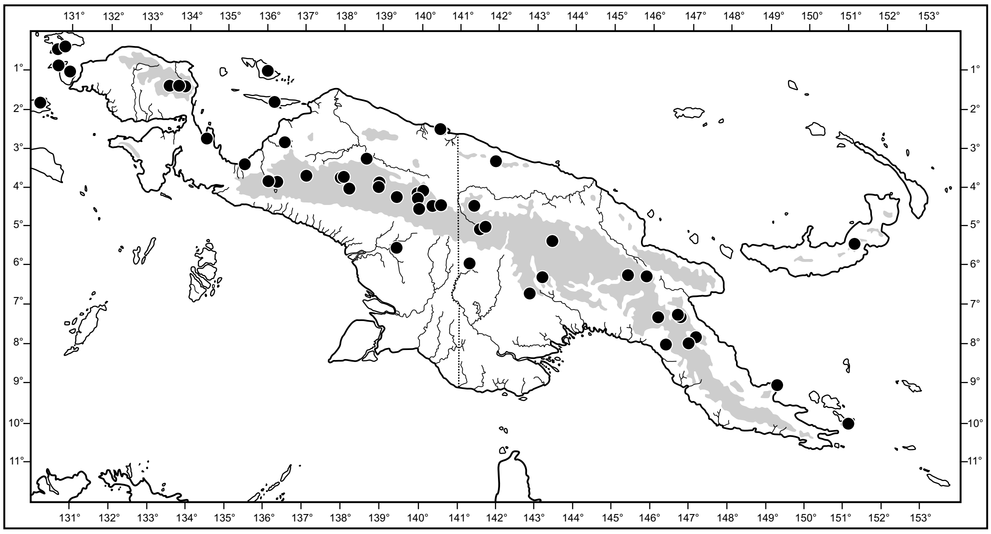


Fig. 26. Distribution of the *simulans*-group of *Euops*. Areas above 1000 m are shaded.

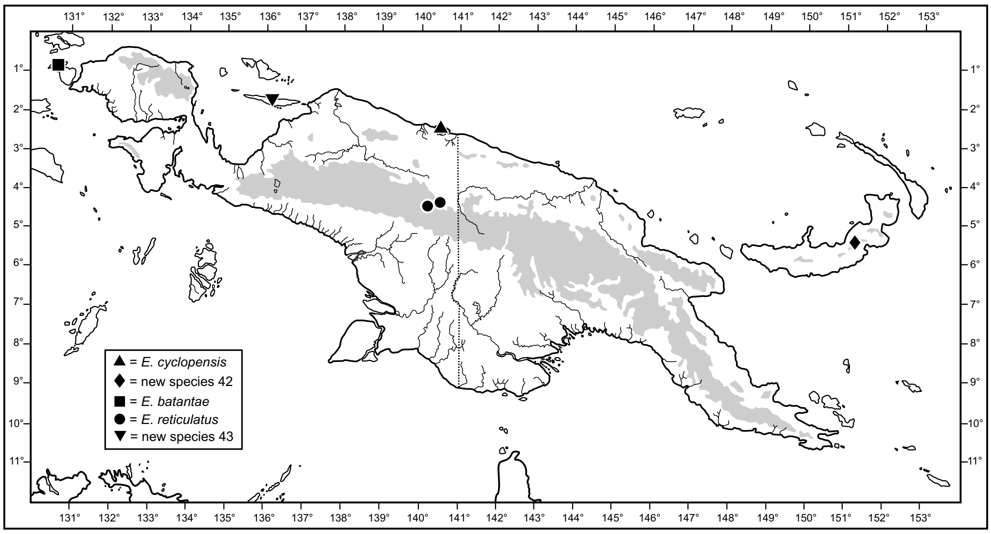


Fig. 27. Distribution of the *reticulatus*-subgroup of the *simulans*-group of *Euops*. Areas above 1000 m are shaded.

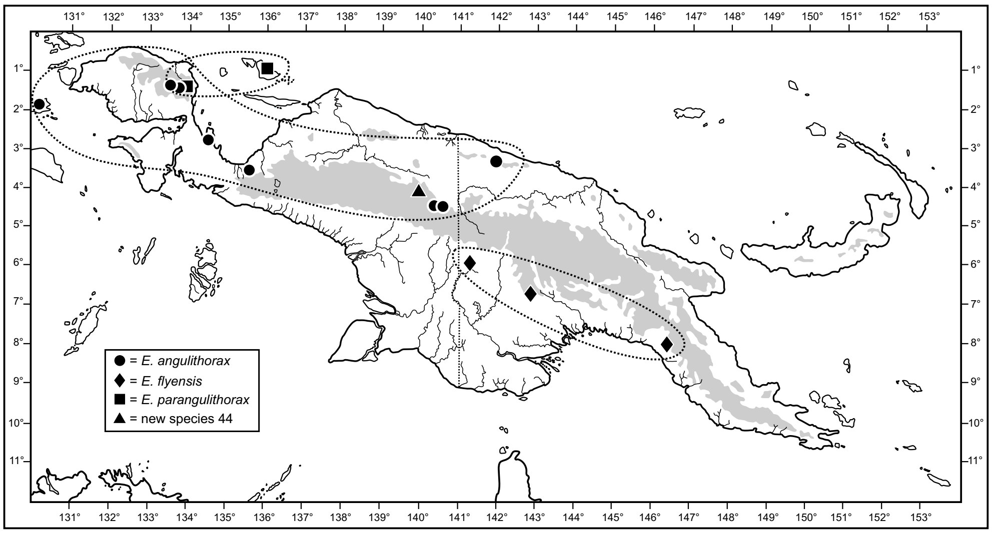


Fig. 28. Distribution of the *angulithorax*-subgroup of the *simulans*-group *Euops*. Areas above 1000 m are shaded.

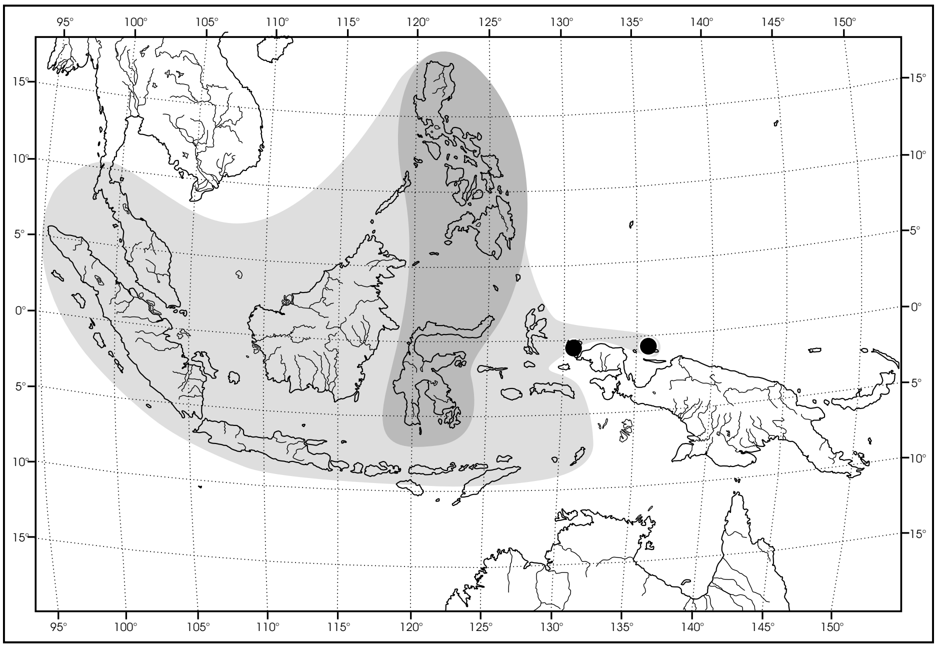


Fig. 29. Distribution of the subgenus *Suniops* of *Euops* (shaded in grey). 75% of the species at hand are from Sulawesi and from the Philippines (shaded in dark grey). One species (new species 48) is recorded from Batanta- and from Biak-Island (dots).

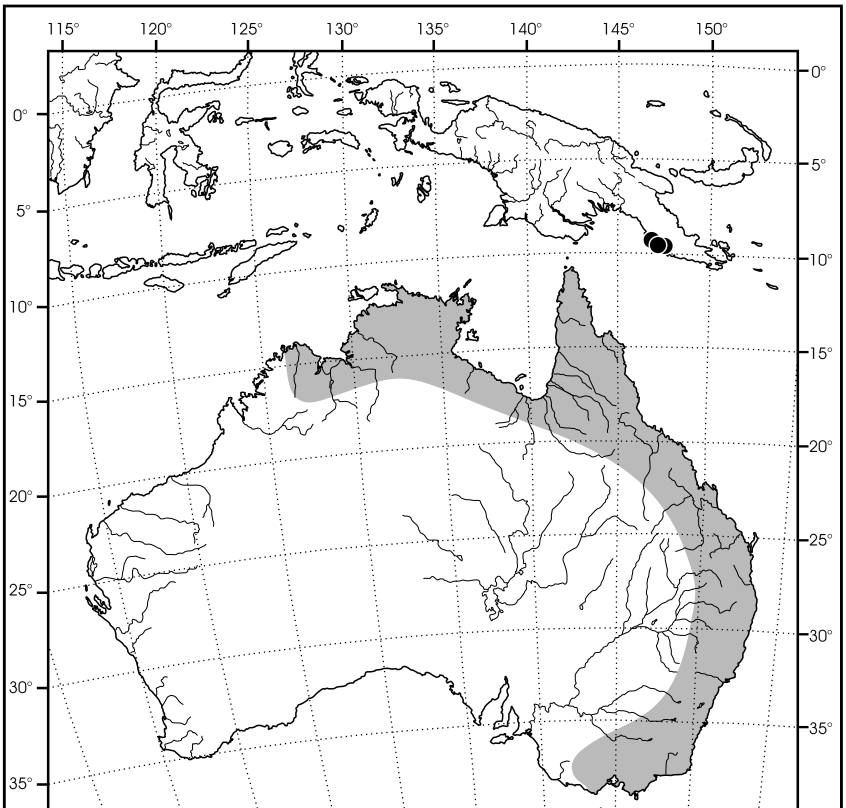


Fig. 30. Distribution of the *eucalypti*-group of *Euops*, shaded in grey (at least 10 species). One species (*E. suturalis*) is also recorded from the savannah region of Pt. Moresby (dots).

the Papuan region. Extensive *Euops* material from both Sulawesi and Australia was screened, but none of these species groups were found. The geological boundary of the Sahul shelf is strictly respected. The *papua*-group has the widest distribution of all groups of Papuan *Euops* (Fig. 31): It is spread from South Maluku over New Guinea to the Solomon Islands, thus occupying the entire Papuan region *sensu lato*. Again, it does not cross Weber´s line to the west.

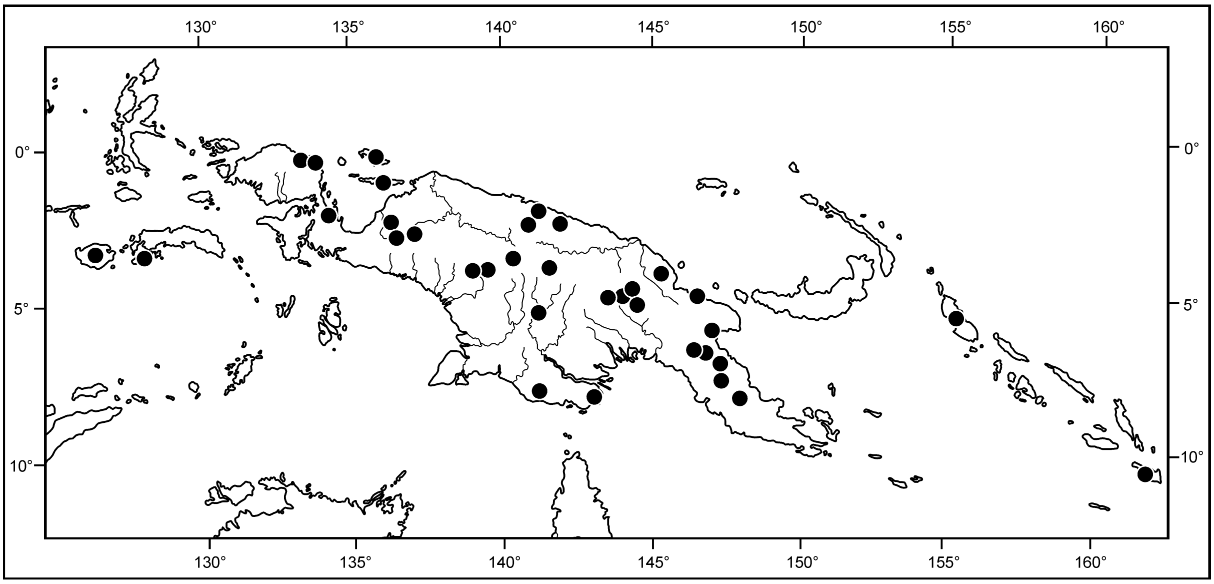


Fig. 31. Map showing the distribution of the *papua*-group of *Euops*.

Let us have a look at smaller, well-founded monophyletic subgroups of the *simulans*-group. The *reticulatus*-subgroup seems like a candidate for an "Outer Melanesian Arc" distribution pattern, as long as we consider only *Euops cyclopensis* and new species 42 and 43. However, *Euops batantae* is on a fragment of a much younger arc accretion event and *Euops reticulatus* is found on the rim of the continental platform. There seems to be a fair degree of endemism in the species of this subgroup, nevertheless, the distribution pattern does not reflect the sequence of geological events. The situation is similar in the *angulithorax*-subgroup with relatively wide, partly overlapping areas which also include a variety of geological terrains.

As outlined in chapter 3.1.2 there are 21 distinct species groups of *Euops* occurring in the Papuan region, 17 of which are endemic. Three species groups also occur in Australia: the *maculatus*-group, which is most likely a Papuan element that is represented in the rainforests of Queensland with one species, *i. e. E. flavomaculatus* LEA. The *quadrifasciculatus*-group which is of uncertain origin (see discussion in appendix 5). And third, the *eucalypti*-group which is clearly an Australian element that enters New Guinea with the widespread *E. suturalis* LEA (Fig. 30). The Oriental subgenus *Suniops* is the only species group of *Euops* occurring in the Philippines and in Sulawesi where it is extremely speciose with more than 50 species. It occurs with only four species in Maluku and enters the Papuan region *sensu strictu* with only one single species (Fig. 29).

It is difficult to estimate the number of species groups of *Euops* occurring in the Oriental and the Australian regions without their thorough revision. Nevertheless, I dare to estimate that Australia harbours about seven species groups. The Oriental region might have about the same number. This in mind, the Papuan fauna of *Euops* can be considered as extremely diverse, both concerning the number of species, and morphological diversity as represented by the number of 21 different species groups. Also, there is a remarkable degree of endemism with 81 % of the species groups strictly confined to the Papuan region. This becomes even more pronounced on species level, where only two out of 184 Papuan species (1.1%) occur outside the Papuan region.

The composition of the *Euops* fauna of North Maluku (Halmahera, Batchian, Morotai) is remarkable. Despite personal field work, there are only four *Euops* species recorded from there: *E.* (*Suniops*) *aerosus* Pasc., *E.* (*Suniops*) new species 45, *E. trigemmatus* Pasc., and new species 49 of the *testaceus*-group. This is extremely depauperate for an island group of this size. The distance from North Maluku to Sulawesi and to New Guinea is about equal. The *Euops* fauna seems to reflect this, as it is equally divided between two species of *Suniops* (that are probably derived from Sulawesi) and two species belonging to typical Papuan species groups. From this can be deduced that North Maluku possesses most likely no autochthonous fauna of *Euops*, but one that has arrived recently both from the west and the east. Again, this contrasts to the situation in Cicadas where there are distinct relationships to terrains in the east (DUFFELS, 1986).

To sum up: the *Euops* fauna of the Papuan region is extremely rich, both in respect to the number of species, and the morphological diversity as measured in the number of species groups. It is highly endemic to the Papuan region as outlined in Fig. 3, but areas of endemism based on geological terrains as suggested by DUFFELS (1986) and BOER (1995) are largely ignored. The Philippines and Sulawesi have a *Euops* fauna rich in species. Nevertheless, it is relatively uniform as they all belong to the subgenus *Suniops* which reaches the Papuan region with only a single species. The fauna of Maluku is depauperate and consists of equal parts of species that arrived from Sulawesi and the Philippines in the west and the Papuan region in the east. There is little overlap between the Papuan fauna and a moderately rich Australian fauna of *Euops*.

4.3.4. General interpretation of the zoogeographic patterns of Indoaustralian *Euops*

There is a marked discrepancy between the geological history of New Guinea and the composition of its fauna of *Euops*. This seeming conflict could not be resolved by the present study, rather it was brought to light. As outlined in chapter 1.3.3 New Guinea is of relatively recent age and the presence of major land areas before the Miocene is unlikely. From the geological point of view it should be comparable with the Wallacea region. It consists of an aggregation of island arcs and continental fragments, just like the Philippines. Nevertheless, the presence of many more species groups tempts us to assume a much older age for the endemic Papuan *Euops* fauna.

Dependent on our choice of hypothesis for the worldwide distribution of *Euops*, different aspects of the Papuan fauna appear especially intriguing. If we adhere to the vicariance hypothesis and *Euops* is considered a Gondwana relict, the long period of evolution and isolation would explain the diversity of the Papuan fauna which would have evolved on the Australian plate before New Guinea came into existence. This would perfectly account for the distinctness of the fauna to the west, with most Papuan *Euops* groups unable to cross Lydekker´s Line and none of them reaching Sulawesi or the Philippines. However, it would be hard to understand its distinctness from the Australian fauna. New Guinea is a refugium for many groups that were unable to adapt to the desiccation of the Australian continent, but in most cases representatives of those taxa survived in rainforest pockets on the Australian east coast (*e. g.* WANAT, 2001 for Apionidae). Only the *Euops quadrifasciculatus*-group exhibits such a pattern, 20 other species groups of *Euops* do not.

If we prefer the dispersal hypothesis, *Euops* should have entered terrains of what was to become New Guinea from the Oriental region. This would explain the distinctness from the Australian fauna. Australia would have been colonized from the tropics by a few groups that could adapt to arid and cool conditions. *Euops* would have found rich resources and, in the absence of other leaf-rolling Attelabids, no ecological competition. This led to a rapid radiation both in Australia and New Guinea. The latter region with its initial fragmentation into various islands, its rapidly growing mountains, and its lush coverage with rain forest offered especially favourable conditions for the evolution of a large number of species. The main puzzle involving this scenario is the composition of the *Euops* fauna of Wallacea. It is unlikely that either the Philippines, Sulawesi, Halmahera or Ceram have been used as stepping stones. Presumably, these islands were later colonized by the subgenus *Suniops* which also performed an extensive radiation.

There are few other taxa that exhibit a similarly disjunct distribution between Sundaland and New Guinea. BAEHR (1998) reports that the Leleupidiini of the Carabidae seem to be absent from Wallacea. However, there are several species reported from the Papuan Peninsula of New Guinea and from Australia. WALLACE (1876) sees similar gaps in the distribution of some genera of birds, *e. g.* in *Pomatorhinus*, *Alcippe* (Timaliidae) and in *Arachnothera* (Nectariniidae).

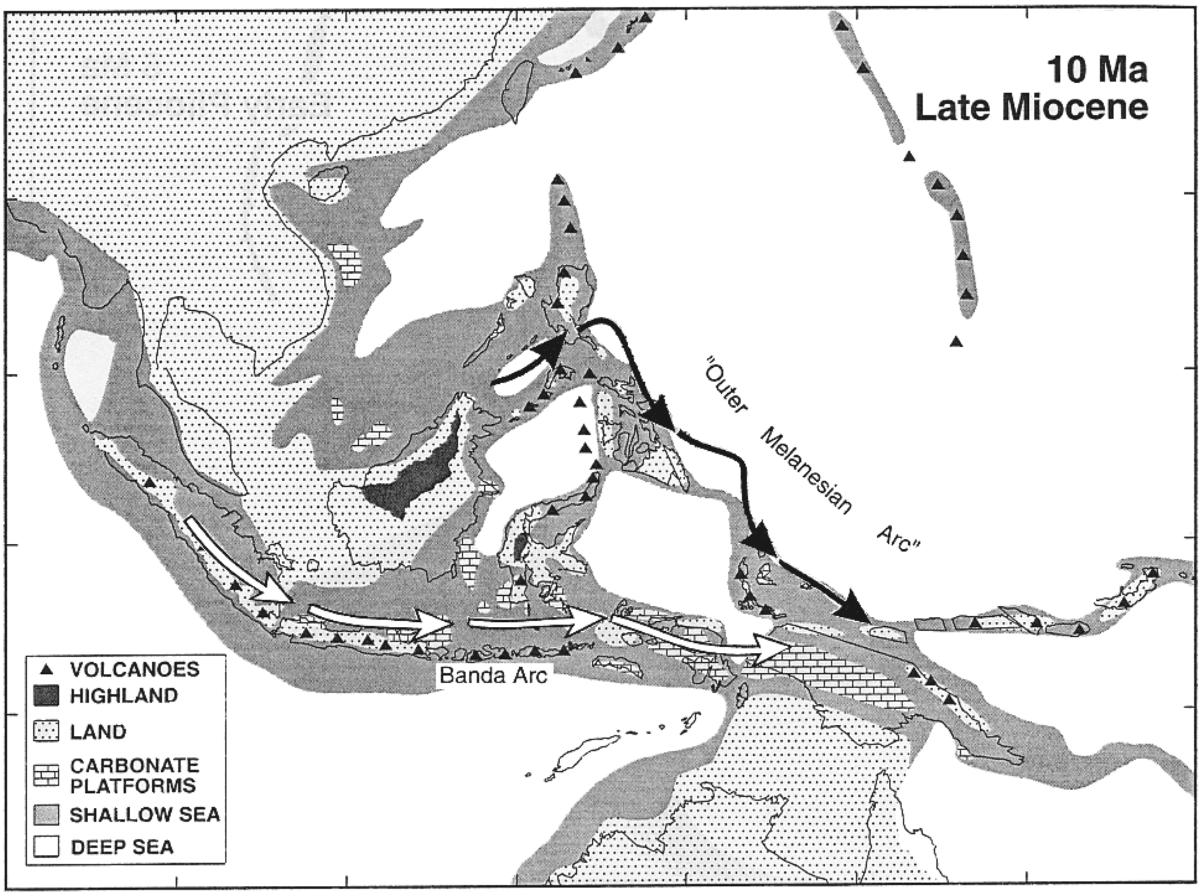


Fig. 32. Geological reconstruction of SE Asia at 10 Ma. Two possible routes to disperse from Asia to New Guinea are indicated by arrows. Modified from HALL (1998) and SCHOT (1998).

Putting aside the issue of how *Euops* initially reached New Guinea, we find pleistocene sea level fluctuations of greatest importance to present distributions of *Euops*. The subject was already recognized by WALLACE (1881), for a more recent review see VORIS (2000). I was unable to recognize "arc patterns" in Papuan *Euops* that conform to geological terrains. Such patterns were found by POLHEMUS & POLHEMUS (1998), DUFFELS (1986), DUFFELS & BOER (1990), and BOER (1995) in waterstriders, respectively Cicadas. DUFFELS (1986) cites the differences in the fauna of Japen and Biak island as exhibited by danaid butterflies and *Dobsonia* fruitbats to support an "Outer Melanesian Arc" pattern. Such differences can also be observed in *Euops* and other animals and plants. However, they can more easily be attributed to the fact that Japen was connected to the mainland during the pleistocene, whereas Biak remained insular (Fig. 4).

GRESSITT (1982b: p. 732) sees closer relationships of Papuan beetles to the Oriental fauna than to the Australian one. He refers to the close floristic ties which could have helped especially phytophagous groups to colonize from the west. However, ties to host plants seem to have had less impact than the remaining sea-barriers. *Euops aerosus* and *E. maculatus* feed on the same or a closely related plant species, presumably belonging to the genus

Diospyros. *Euops aerosus* occurs on Halmahera island, *E. maculatus* on Mysol 165 km to the east. Neither species managed to cross this barrier, although arriving specimens would have found favourable conditions on the other side.

The separation of the Papuan fauna in respect to the Australian one can not be explained by Torres Strait acting as a sea barrier. As shown by VORIS (2000) a lowering of the present sea level by only ten metres is sufficient to establish a land bridge between Australia and New Guinea. During the past 250 000 years this land connection existed 91 % of the time. Thus, the present situation of New Guinea being an island is rather the exception than the rule. However, as outlined in chapter 1.3.5 a broad savannah corridor effectively isolated the Papuan rainforests from similar habitats in Australia. Paradoxically, as demonstrated by NIX & KALMA (1972), this barrier was especially broad and effective during periods of land connection. WALKER (1972: p. 399), in his discussion of Torres Strait biogeography, asserts that "The main floristic break between "typically Australian" and "typically New Guinean" vegetation lies at the foot of the high mountains of New Guinea and around the edges of its lowland rainforests, not at the Strait itself." The isolation of Papuan biota is maintained towards Australia by a marked ecological barrier, the importance of the seaway can be neglected. As outlined in chapter 4.3.1, there is an area where a patchwork of both Australian and Papuan biota exists. *Euops suturalis* LEA, a widespread Australian species also occurs in New Guinea, but there it is confined to the "Australian" savannah region around Port Moresby. On the other hand, there are isolates of "Papuan" rainforest in the Cape York peninsula of Australia. These areas have never been searched specifically for *Euops*. Possibly, with sufficient field work some Papuan species groups of *Euops* could be recorded.

The Papuan region possesses an incredibly rich and diverse *Euops* fauna. It is possible that this is due to a long evolutionary history, or that it evolved rapidly under the exceptionally favourable conditions present in New Guinea. The zoogeographic patterns of *Euops* within the Papuan region do not give us a clue which of the alternatives to favour. Being largely incongruent with areas of endemism based on the long geological history, both explanations could be possible. Mechanisms that heavily influenced biogeographic patterns during the Quaternary, such as sea level fluctuations or shifts in vegetation zones seemed to have the ruling influence on the distributions of many taxa. It appears that the suspicion of HALL (1998) was justified, at least in the case of Papuan *Euops*: "The present distribution of plants and animals in SE Asia may owe much more to the last one million years than the preceding 30 million years."

5. Acknowledgements

To Prof. Dr. G. Haszprunar I am much indebted, not only for accepting an entomological topic, but also for his valuable guidance and patient supervision. Dr. M. Baehr made many stimulating comments and gave an expert´s report on this thesis. I want to thank them and the many other employees of the ZSM for providing working space and a pleasant social environment. I am grateful to Dr. W. Schawaller who arranged that this study could be completed at SMNS under equally favorable conditions.

My special thanks to Dr. G.A. Samuelson (Honolulu) for the loan of the valuable *Euops* material of the BPBM and for his patience. Drs. A. Howden and R.S. Anderson (both Ottawa), Dr. R. de Jong (Leiden), Prof. Dr. C.W. O´Brien (Tallahassee), and Dr. P. Stüben (Mönchen-Gladbach) provided additional specimens. Thanks are also due to Prof. Dr. R. Abraham, H. Riefenstahl, and T. Tolasch (all Hamburg), J. Beard, R.T. Thompson and Dr. C. Lyal (all BMNH), L. Behne (DEI), Drs. F. Hieke and M. Uhlig (both MNHB), Dr. O. Merkl (HNHM), Drs. R. Oberprieler and E.C. Zimmerman (both Canberra), Dr. R. Poggi (Genoa), and Dr. C. Reid (AMS) for the loan of type material.

Furthermore, I want to thank the following persons for reviewing earlier versions of this manuscript (or parts of it) and for suggesting helpful improvements: Prof. Dr. G. Haszprunar, Prof. Dr. H. Bohn (Munich), Dr. M. Baehr, T. Saks, and M. Spies (all Munich), Prof. Dr. C.W. O´Brien (Tallahassee), Dr. M. Balke (Berlin), Dr. R. Anderson (Ottawa), Dr. C. Häuser (Stuttgart), and Dr. H. Schmalfuss (Stuttgart). Drs. M. Balke and M. Wanat provided unpublished manuscripts. Dr. R. Trusch (Munich) helped with advice and literature on phylogenetic methods.

Prof. Dr. R. Agerer, L. Beenken, E. Marksteiner (all Munich), and Dr. R. Kirschner (Tübingen) provided mycological expertise and support in my attempts to study the fungus symbiosis of *Euops*. Dr. H. Förther (Munich), Drs. A. Whalen and L. Craven (Canberra), and Dr. Jan-Frits Veldkamp (Leiden) kindly identified samples of host plants. The phone number of Dr. R. Melzer (Munich) was an unfailing "hotline" when technical problems occurred during preparing the SEM-photographs.

K. Fabian (Essen), R. Kühbandner (Munich), and J. Swietojanska (Wroclaw) provided excellent artwork illustrating the habitus of selected *Euops* species. The reproduction of color plates was rendered possible through the generosity of Dr. K. Auerswald (Bad Aibling) and T. Zimmermann (Würzburg), and by the help of BIOPAT e.V.

This work was supported by a PhD scholarship awarded to the author by the University of Munich (LMU). The journey to Papua New Guinea in 1998 was sponsored in part by the German academic exchange service (DAAD).

Last, but not least, my warmest thanks to the people of Indonesia and Papua New Guinea: Terimakasih banyak ! Tenkyu tru ! The field work would not have been possible without the generous hospitality and help of many local people. This applies both to many native Papuans (mainly belonging to the Ekagi-, Moni-, Dani-, Yali-, Eipo- and Katembang-tribes), to numerous people of west Indonesian roots, and to some expats. Families living under extremely modest circumstances freely shared their house and meals with me. There are too many to list who have helped me in one way or the other in New Guinea. Just a few should be named: My work was supported by Samkris Tindige in Sorong, by the missionaries W. Lunow (Anggi) and L. Cole (Borme), by Dr. P.H. Hoyois of former PUSPPENSSAT (Nabire), by the friendly staff of P.T. Wapoga (Wapoga River) and of P.T. Darma Multi Perseda (Wasior). In Papua New Guinea I was supported by M. Hudson and V. Kotaseao in Wau, by B. Gamui and his colleagues of Ivimka Research Station (Lakekamu Basin) and by J. Christansen and his family in Aseki. H. Sakulas supported my stay at Wau Ecology Institute. M. Laki (National Research Institute, Boroko) provided his kind assistance to arrange my research visa. M. Balke (Berlin) proved to be the best possible travelling companion.

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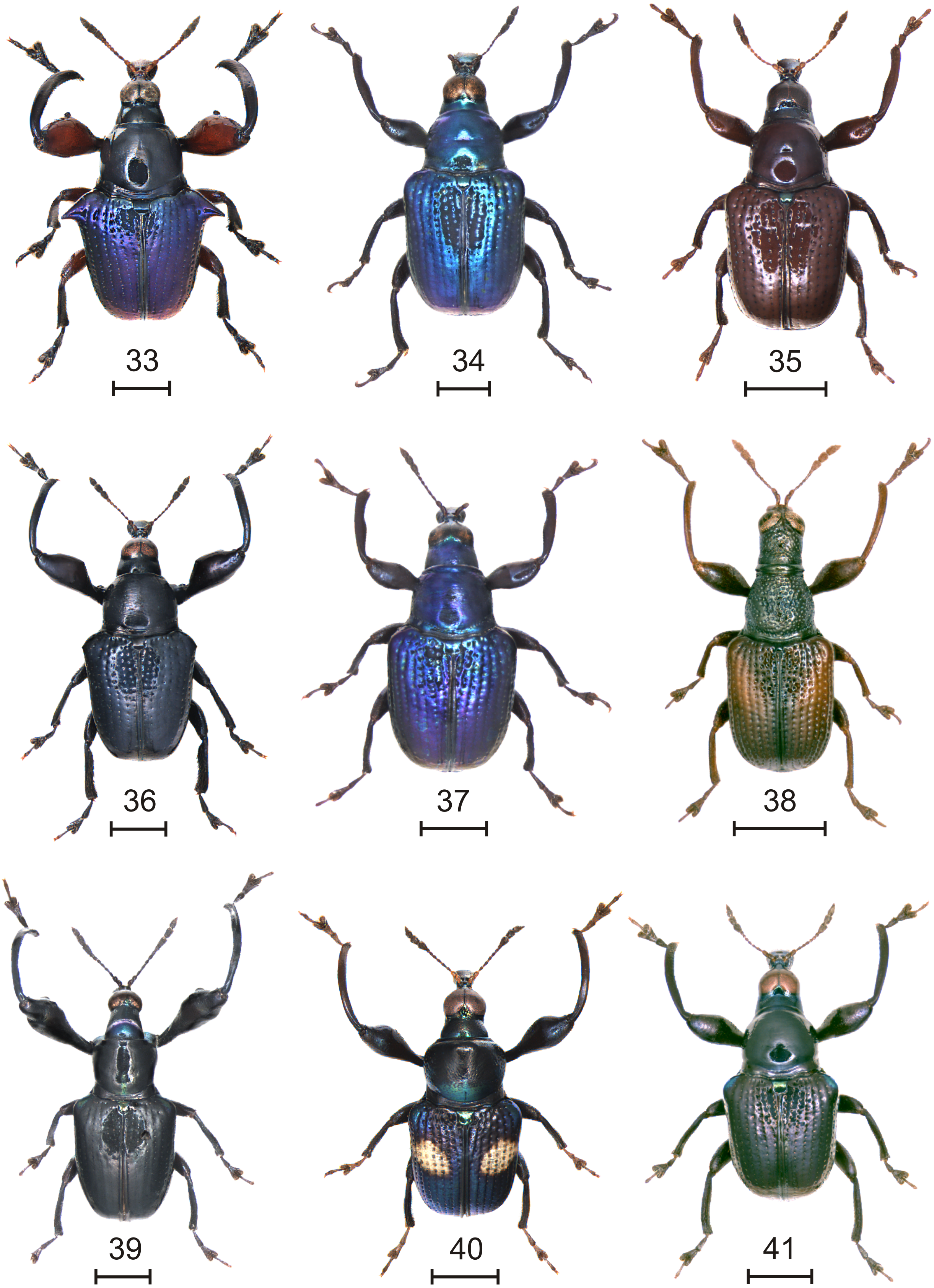
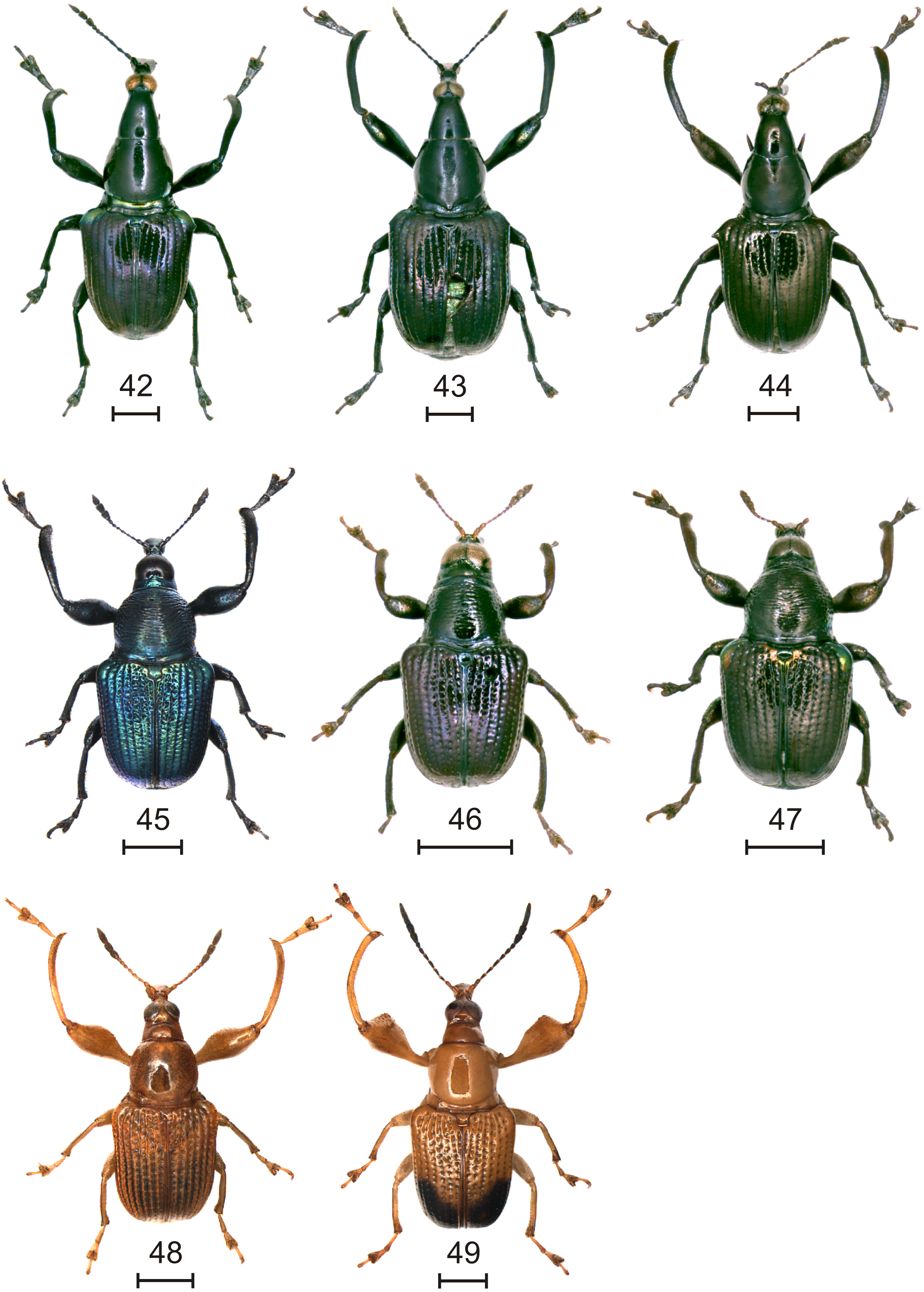
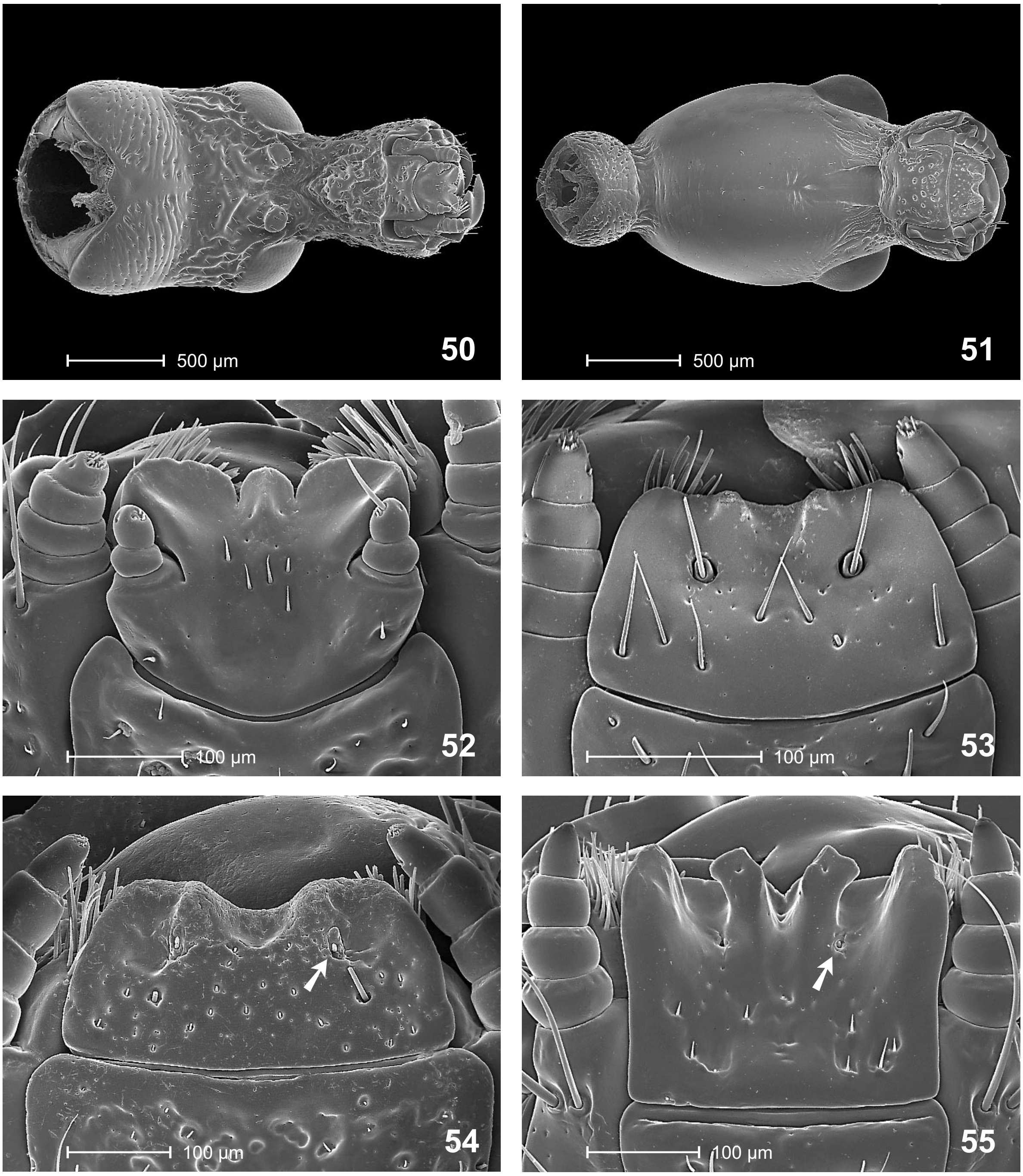


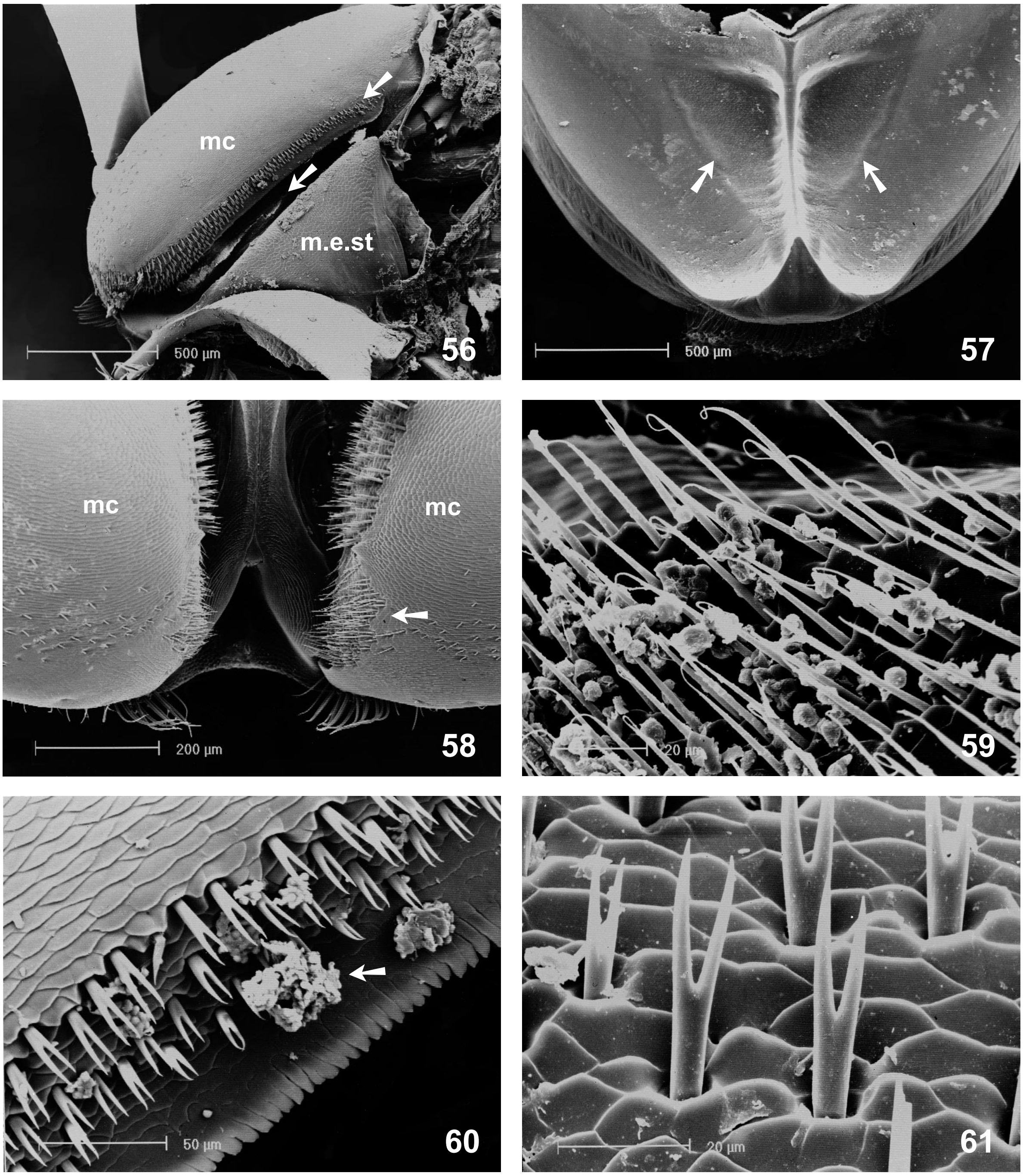
Figs. 33-41. Habitus of *Euops* spp.: (33) *E. armatipennis*, male (Lereh); (34) *E. coelestinus*, lectotype; (35) *E. ruficornis*, holotype; (36) *E. tibialis*, male (Serui); (37) *E. violaceus*, lectotype; (38) *E. suturalis* (Variarata); (39) *E. femoralis*, lectotype; (40) *E. maculatus* (Salawatti Isl., Kalobo); (41) *E. trigemmatus* (Halmahera Isl., Buli). Scale bars 1 mm.



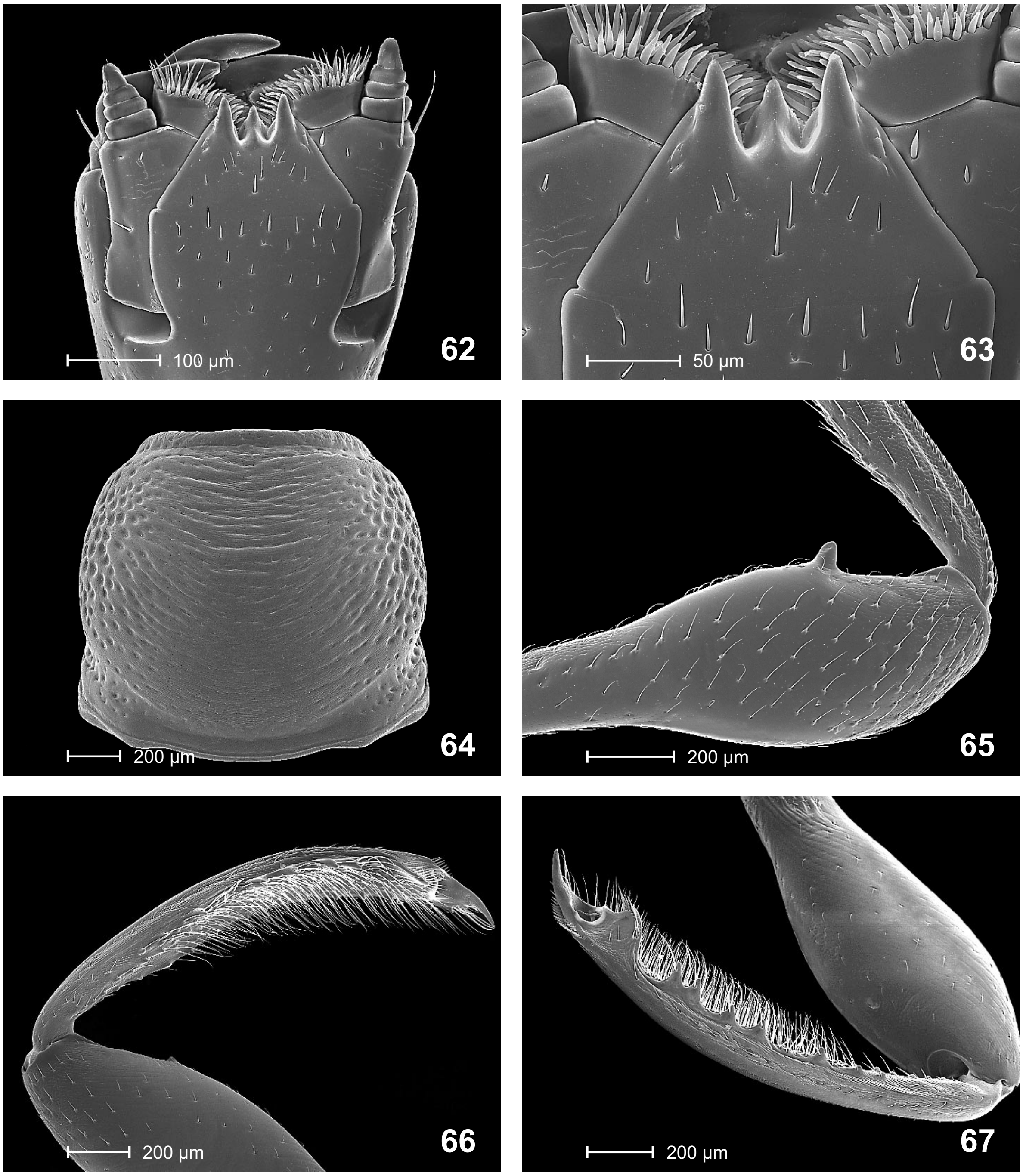
Figs. 42-49. **Habitus of *Euops* spp.: (42) *E. jekelii*, male (Kebar); (43) *E. papua*, lectotype; (44) *E. vossi*, lectotype; (45) *E. aerosus*, male (Halmahera Isl., Sidangoli); (46) *E. subdentatus*, female paralectotype; (47) *E. viridiventris*, lectotype; (48) *E. testaceus*, male (Salwatti Isl., Waijan); (49) *E. divisus* (Waigeo Isl., Saporkren). Scale bars 1 mm.**



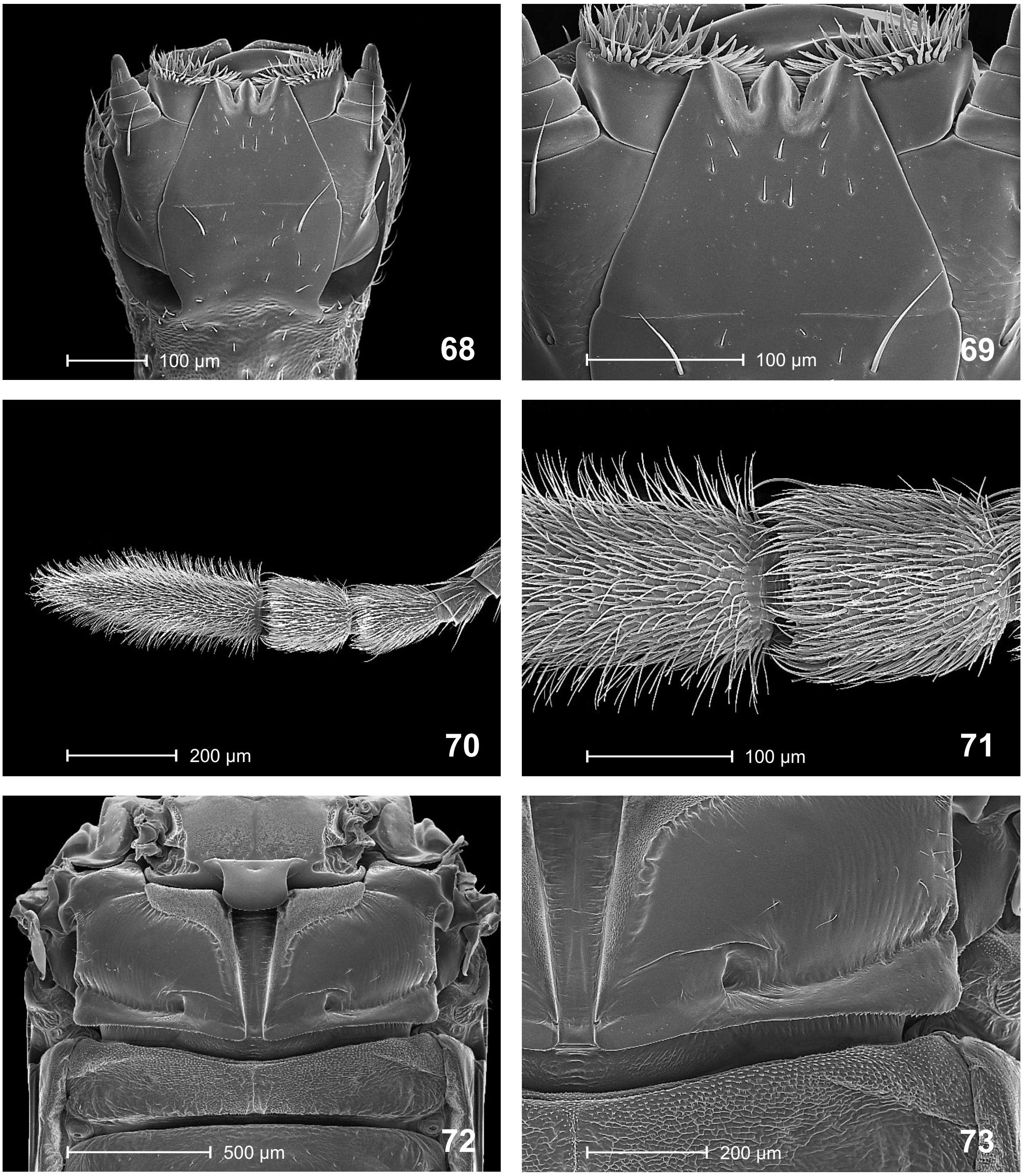
Figs. 50-55. Head and mouthparts of attelabid genera. Figs. 50-51. Ventral surface of head; (50) *Attelabus nitens* Scop.; (51) *Apoderus coryli* L.; note basal constriction; Figs. 52-55. Prementum; note position of labial palpi (when vestigial marked by arrows) and the costae in front of them; (52) *Attelabus nitens* Scopoli; (53) *Euscelophilus* cf. *gibbicollis* Schilsky; (54) *Apoderus coryli* Linne; (55) *Lamprolabus bispinosus* Gyllenhal.



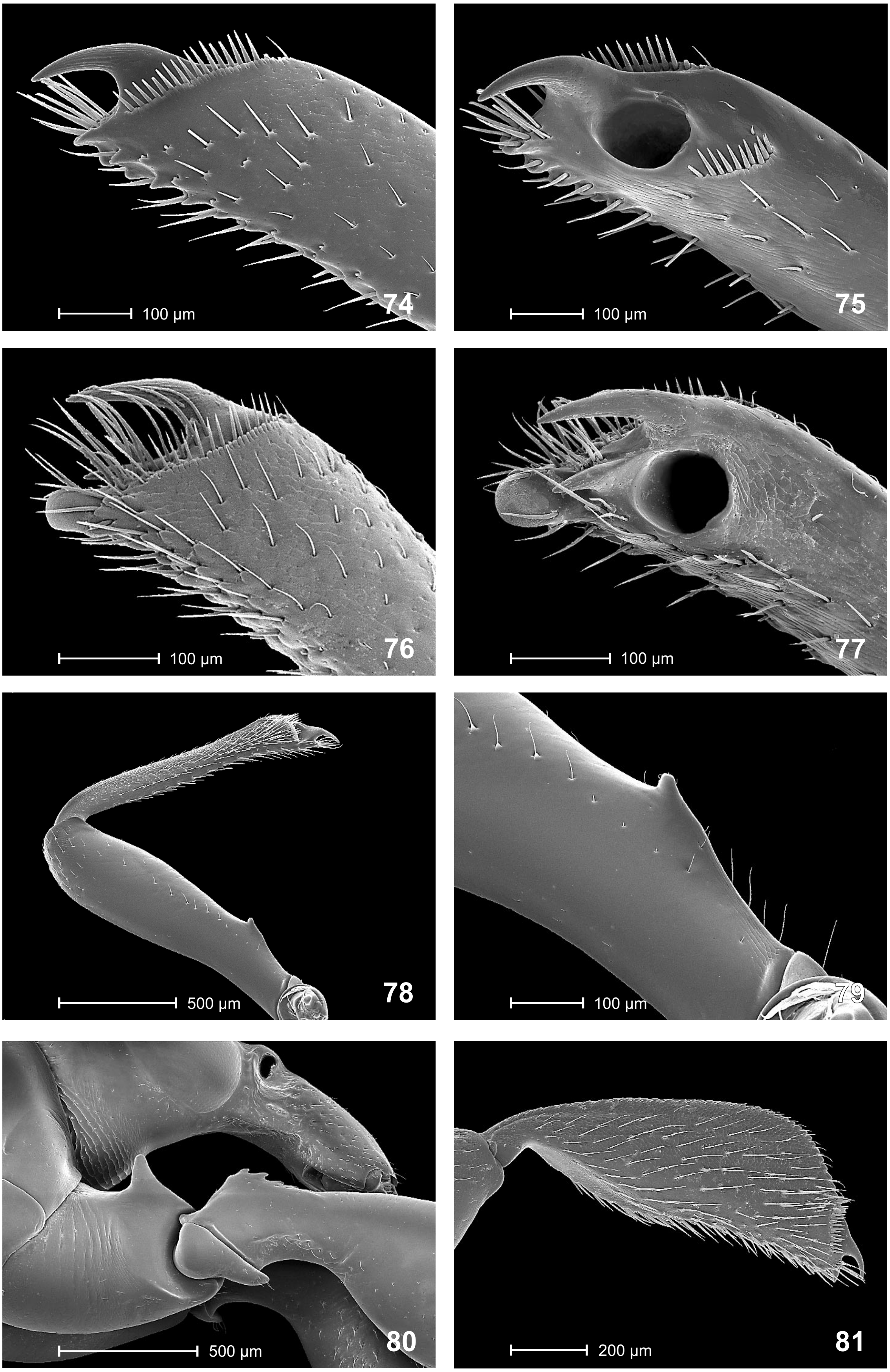
Figs. 56-61. *Euops*, new species 25 (*papua*-group); mycetangial structures of female *Euops*. (56) Metathorax in obliquely posterior aspect after removal of abdomen; mc = metacoxa, m.e.st.= metendosternite; one arrow marking spore mass in space between metacoxa and metendosternite; another arrow marking row of bifurcate setae on mesal margin of metacoxa; (57) abdomen in anterior aspect, after removal of thorax; pair of depressions (spore reservoir) marked by arrows; (58) ventral part of metathorax in posterior aspect after removal of abdomen; note three different types of setae on mesal edge of metacoxa; patch of simple setae on right coxa marked by arrow; (59) detail of patch of simple setae from previous figure; note spores between setae; (60) mesal edge of metacoxa with row of bifurcate setae; cluster of spores marked by arrow; (61) bifurcate setae of previous figure in detail.



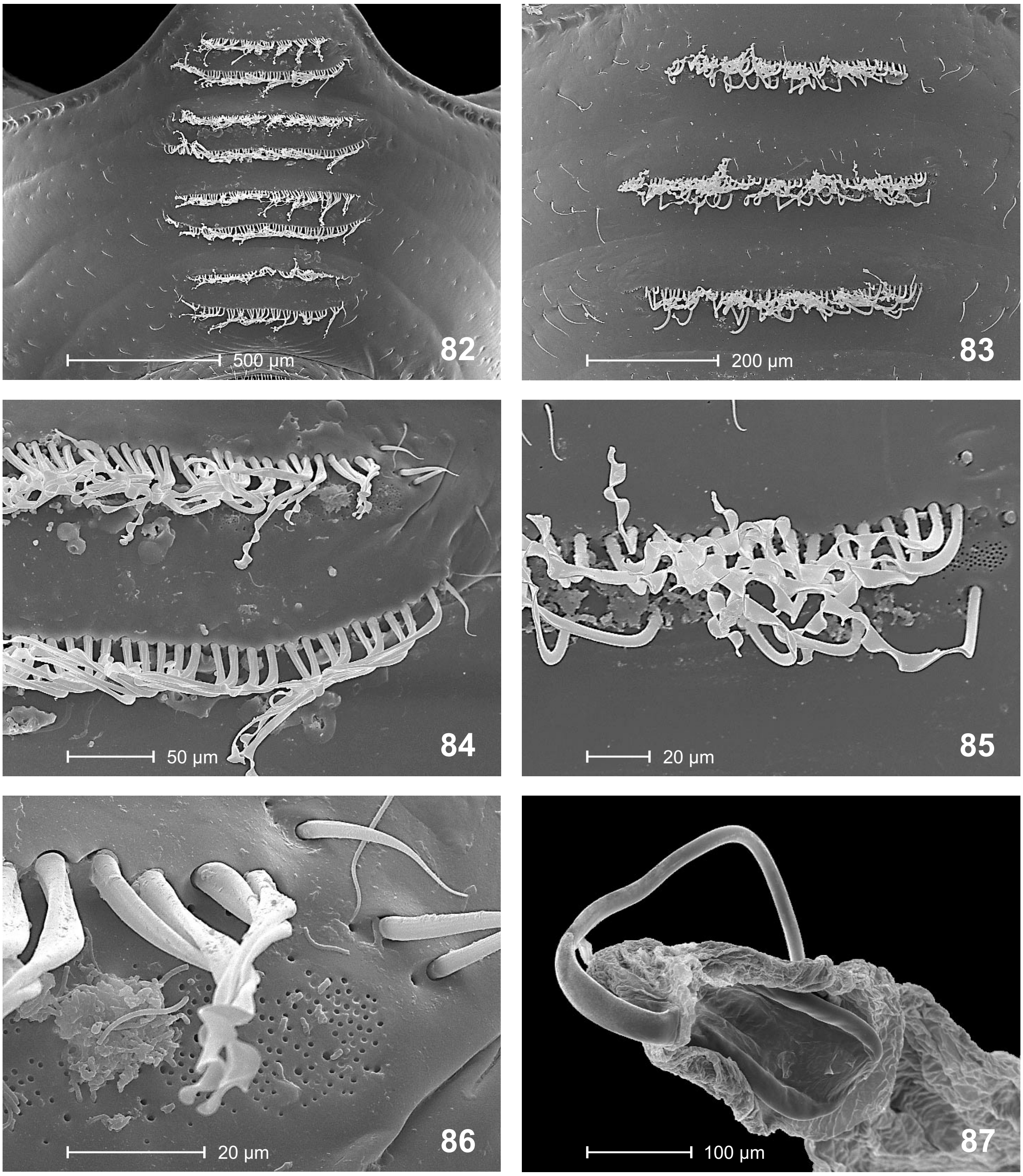
Figs. 62-67. ***Euops aerosus*** **Pascoe, male (Sidangoli); (62-63) apex of rostrum in ventral aspect; overall view (left); prementum in detail (right); (64) prothorax; (65) metafemur; note tooth on ventral surface; (66-67) protibia; in vetroanterior aspect (left); in dorsoposterior aspect (right).**



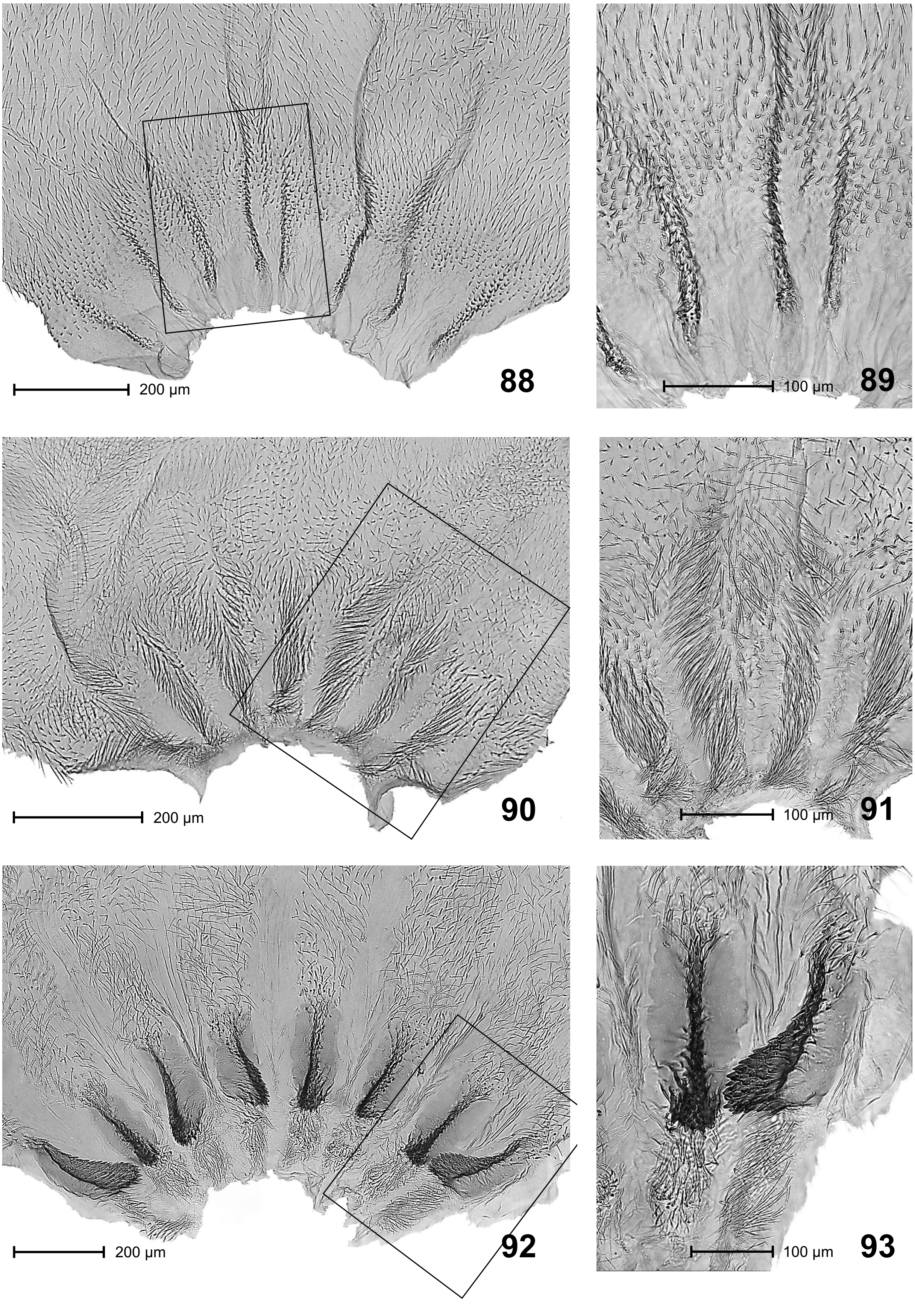
Figs. 68-73. ***Euops divisus*** **PASCOE, female (Saporkren); (68-69) apex of rostrum in ventral aspect; overall view (left); prementum in detail (right); (70-71) club of antenna; overall view (left); detail (right) note erect setae of terminal article; (72-73) Thorax and abdomen in dorsal aspect, elytra and wings removed; overall view (left), detail of hind margin of metanotum (right).**



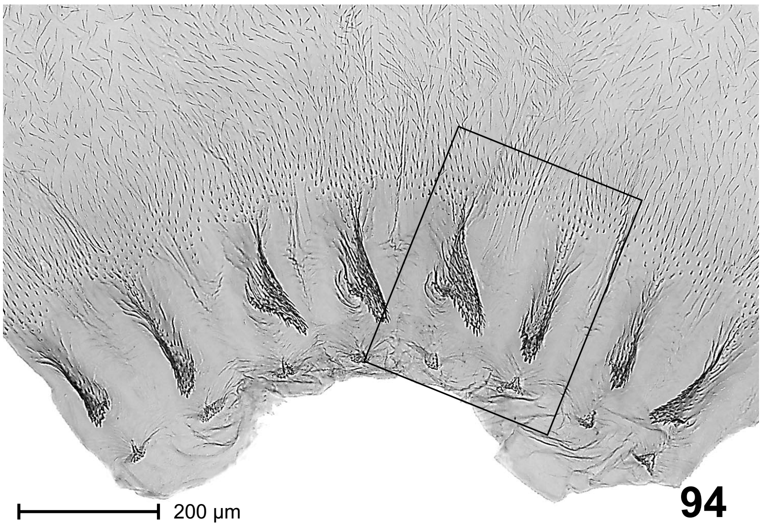
Figs. 74-81. ***Euops*** **spp.; apex of female protibia from anterior (left), from posterior (right); (74-75) new species 23 (*papua*-group), (Wau); note absence of premucro; (76-77) new species 1 (*armatipennis*-group), (Wau); note "hidden" premucro. Figs. 78-79. Midleg of male *Euops*, new species 49 (*testaceus*-group), (Halmahera, Buli); note tooth on ventral surface of femur (fig. 79, detail). Figs. 80-81. *Euops tibialis*, male (Borme); (80) procoxa and base of foreleg; (81) metatibia.**



Figs. 82-87. Abdominal venter of female *Euops* spp. with patch of modified setae; (82, 84, 86) new species 23 (*papua*-group), (Wau); (83, 85) *E. tibialis* (Emdoman); note that double rows have merged to single rows of modified setae. Fig. 87. Everted transfer apparatus of male *E. tibialis* (Borme).



Figs. 88-93. Proventriculus of *Euops* spp.; overall view (left); detail (right): (88-89) *E. aerosus* (Sidangoli); (90-91) *E. tibialis* (Cyclops Mts.); (92-93) *Euops*, *papua*-group, new species 23 (Engabena).



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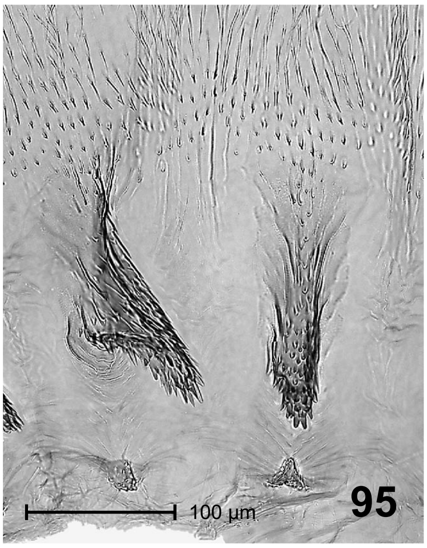

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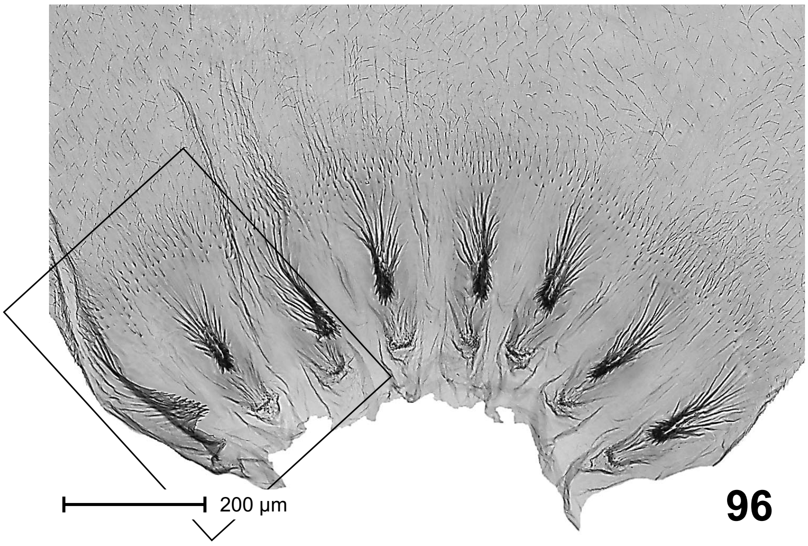

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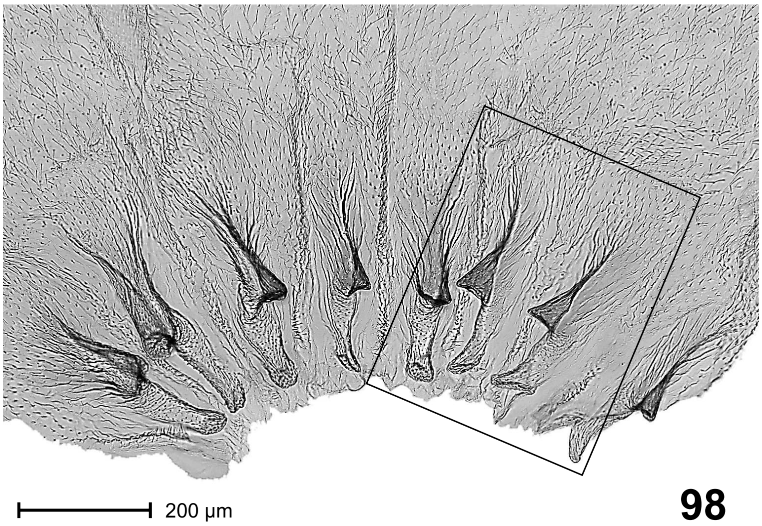

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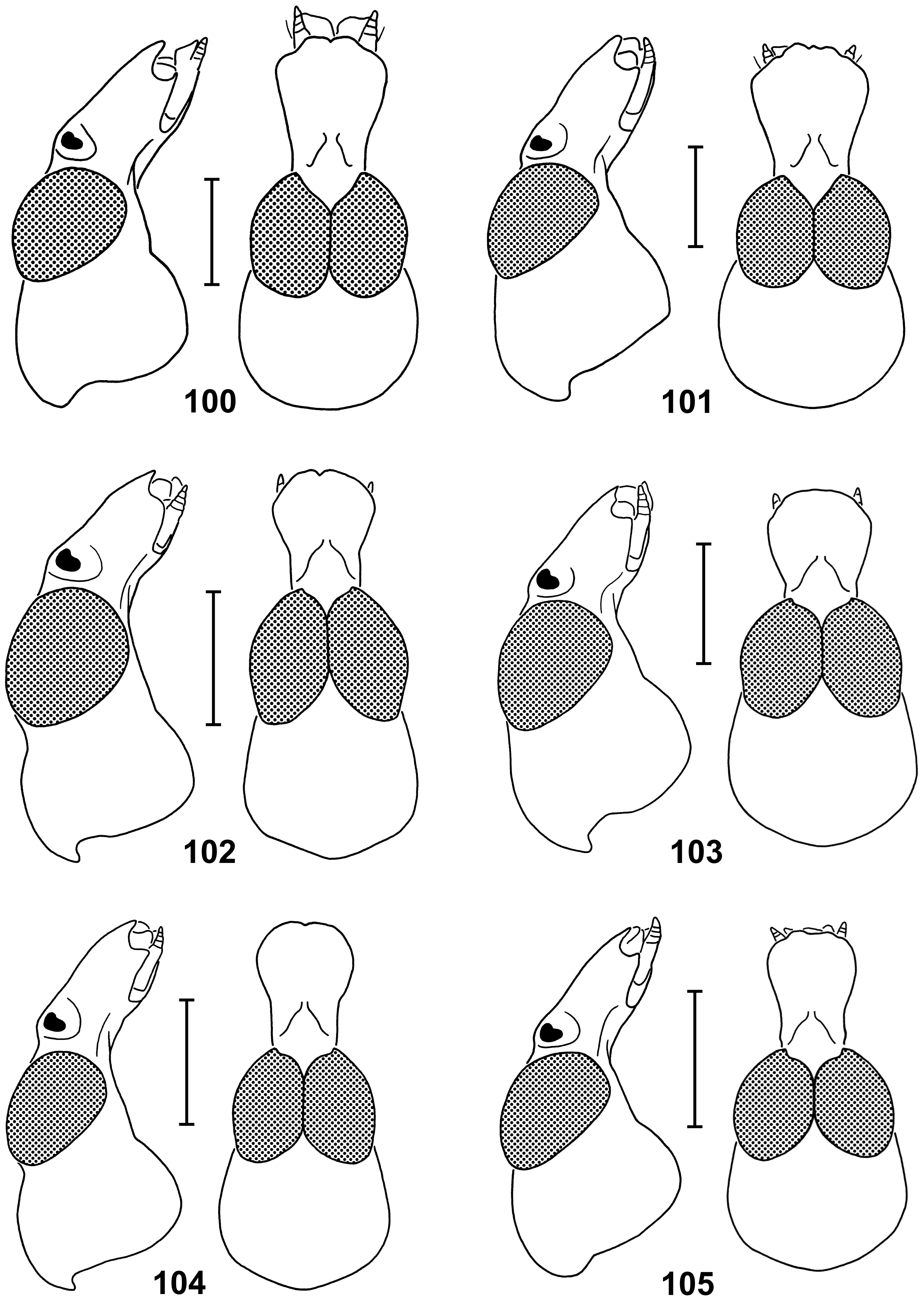
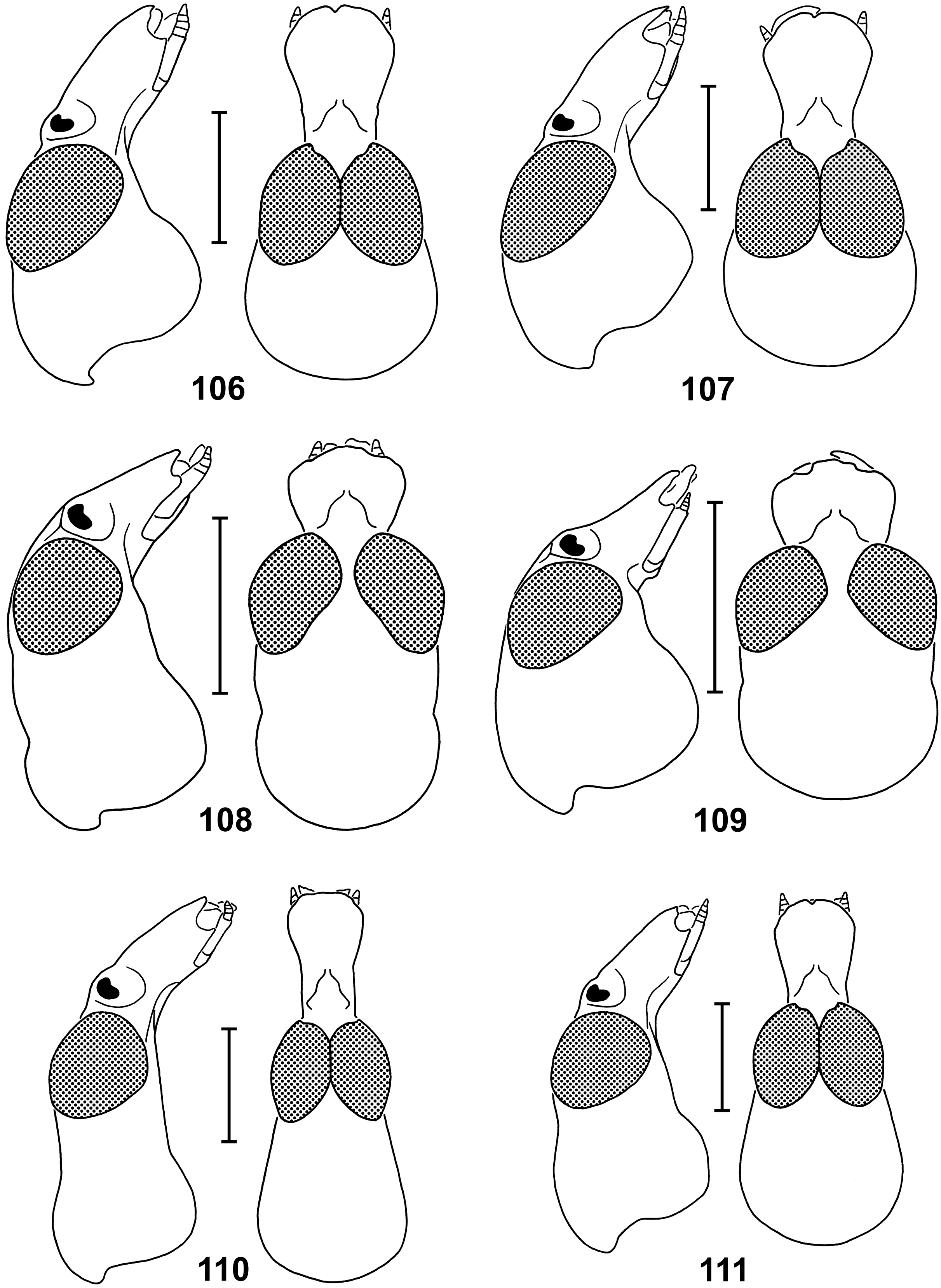
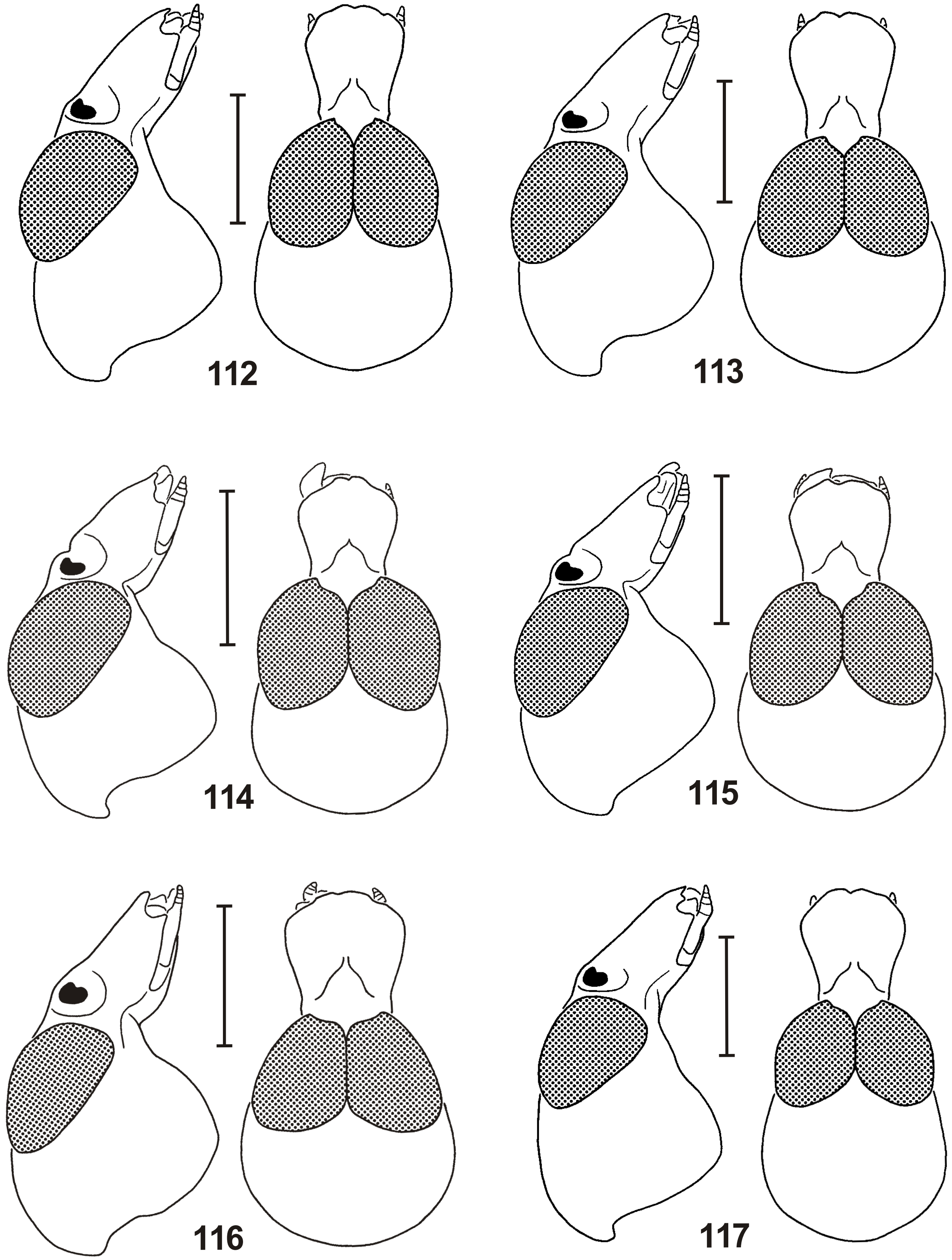
Figs. 94-99. Proventriculus of *Euops* spp.; overall view (left); detail (right): (94-95) *E. testaceus* (Wapoga River); (96-97) *E. maculatus* (Kalobo); (98-99) *E. armatipennis* (Angoram).



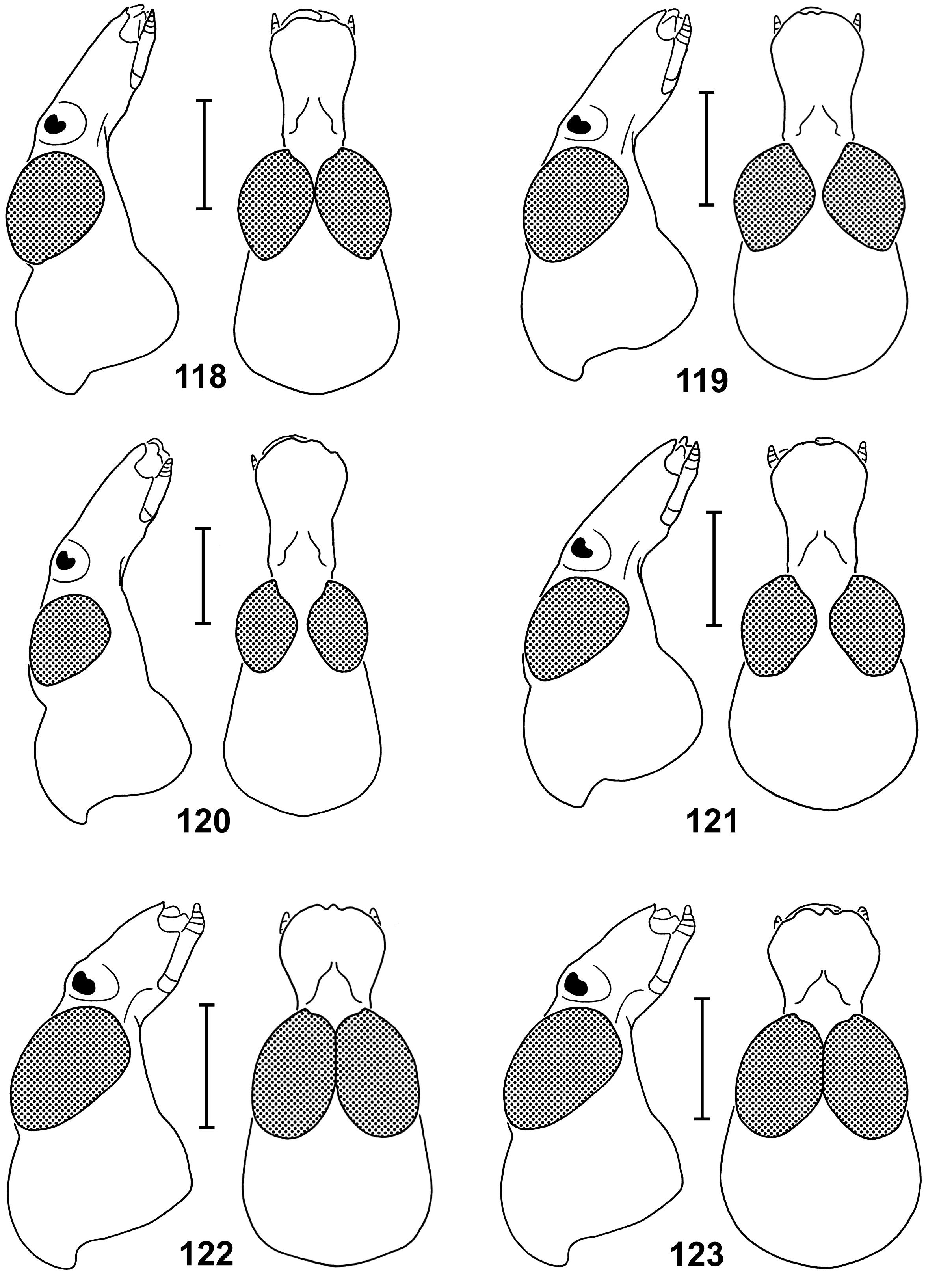
Figs. 100-105. Head of *Euops* spp. in lateral aspect (left) and in dorsal aspect (right): (100) male *E. armatipennis*, holotype; (101) female *E. armatipennis* (Angoram); (102) male *E. coelestinus* (Ransiki); (103) female *E. coelestinus*, lectotype; (104) male *E. ruficornis* (Wau); (105) female *E. ruficornis*, holotype. Scale lines 0.5 mm.



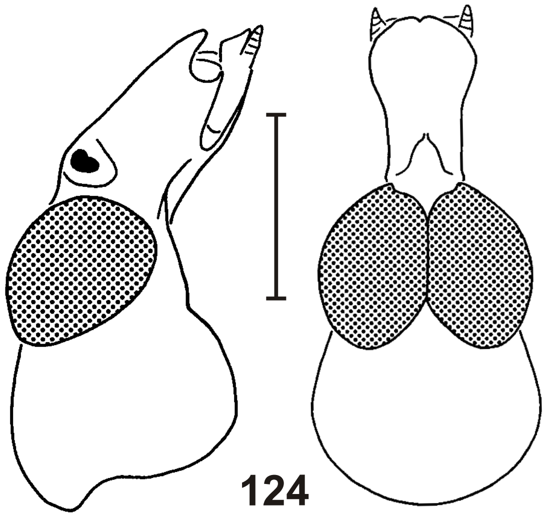
Figs. 106-111. Head of *Euops* spp. in lateral aspect (left) and in dorsal aspect (right): (106) male *E. tibialis*, (Emdoman); (107) female *E. tibialis* (Emdoman); (108) male *E. suturalis* (Variarata); (109) female *E. suturalis*, (Pt. Moresby); (110) male *E. femoralis* (Okloma); (111) female *E. femoralis* (Okloma-Emdoman). Scale lines 0.5 mm.



Figs. 112-117. Head of *Euops* spp. in lateral aspect (left) and in dorsal aspect (right): (112) male *E. aerosus*, (Sidangoli); (113) female *E. aerosus* (Sidangoli); (114) male *E. subdentatus*, paralectotype; (115) female *E. subdentatus*, lectotype; (116) female *E. viridiventris*, holotype; (117) female *E. violaceus*, lectotype. Scale lines 0.5 mm.



Figs. 118-123. Head of *Euops* spp. in lateral aspect (left) and in dorsal aspect (right): (118) male *E. divisus* (Saporkren); (119) female *E. divisus* (Saporkren); (120) male *E. testaceus* (Testega - Meydoudga); (121) female *E. testaceus* (Waijan); (122) male *E. trigemmatus* (Buli); (123) female *E. trigemmatus*, lectotype. Scale lines 0.5 mm.



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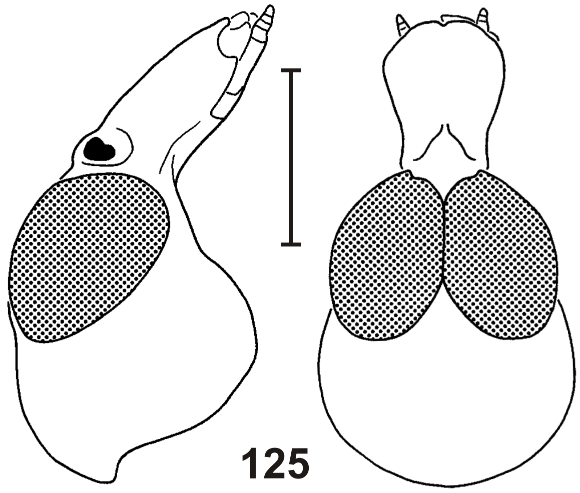

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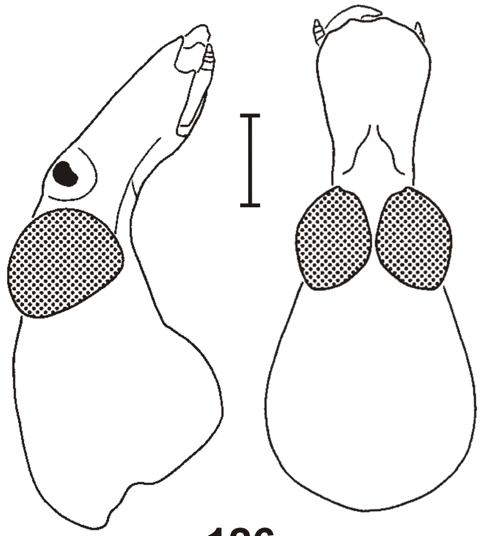

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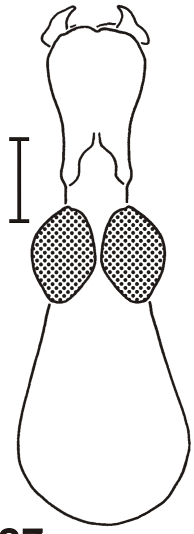

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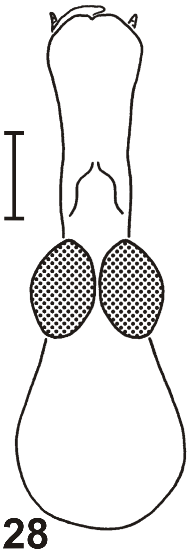

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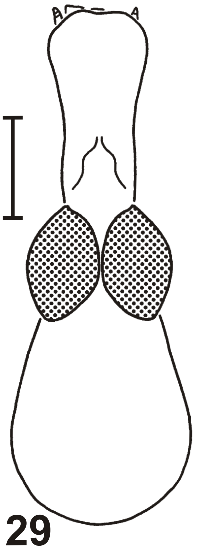

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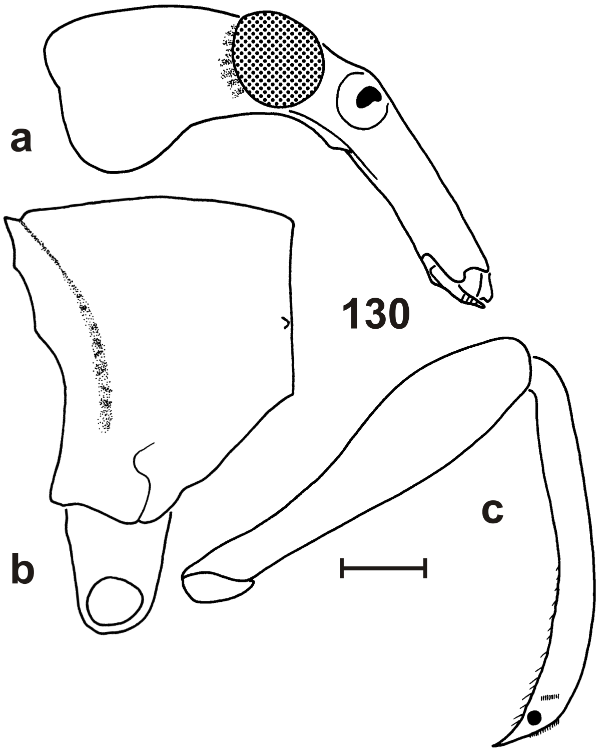
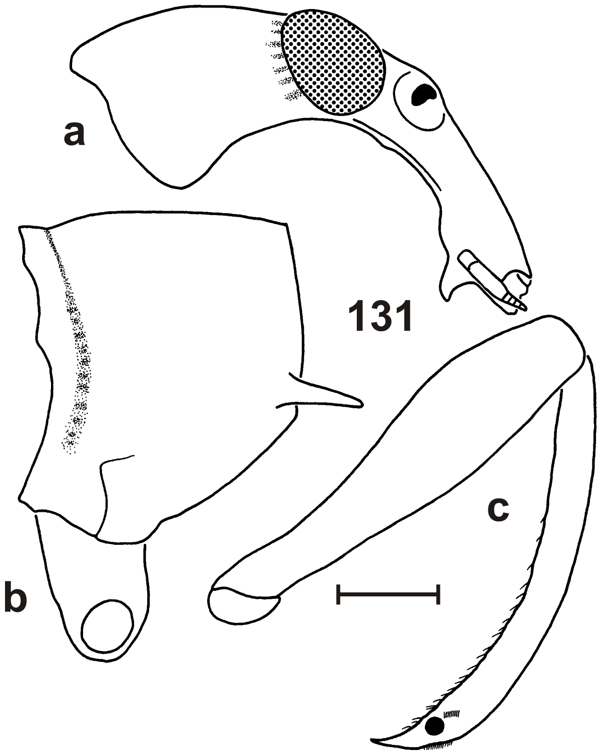
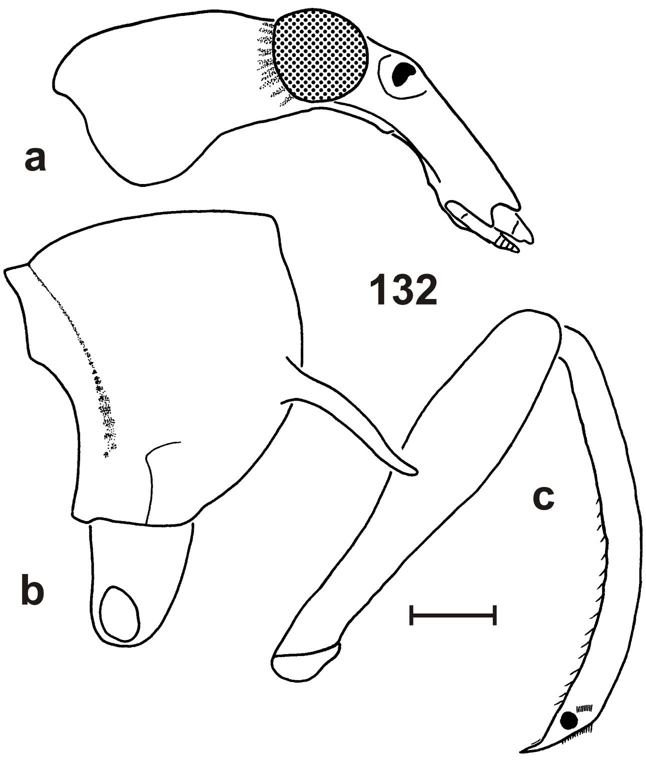
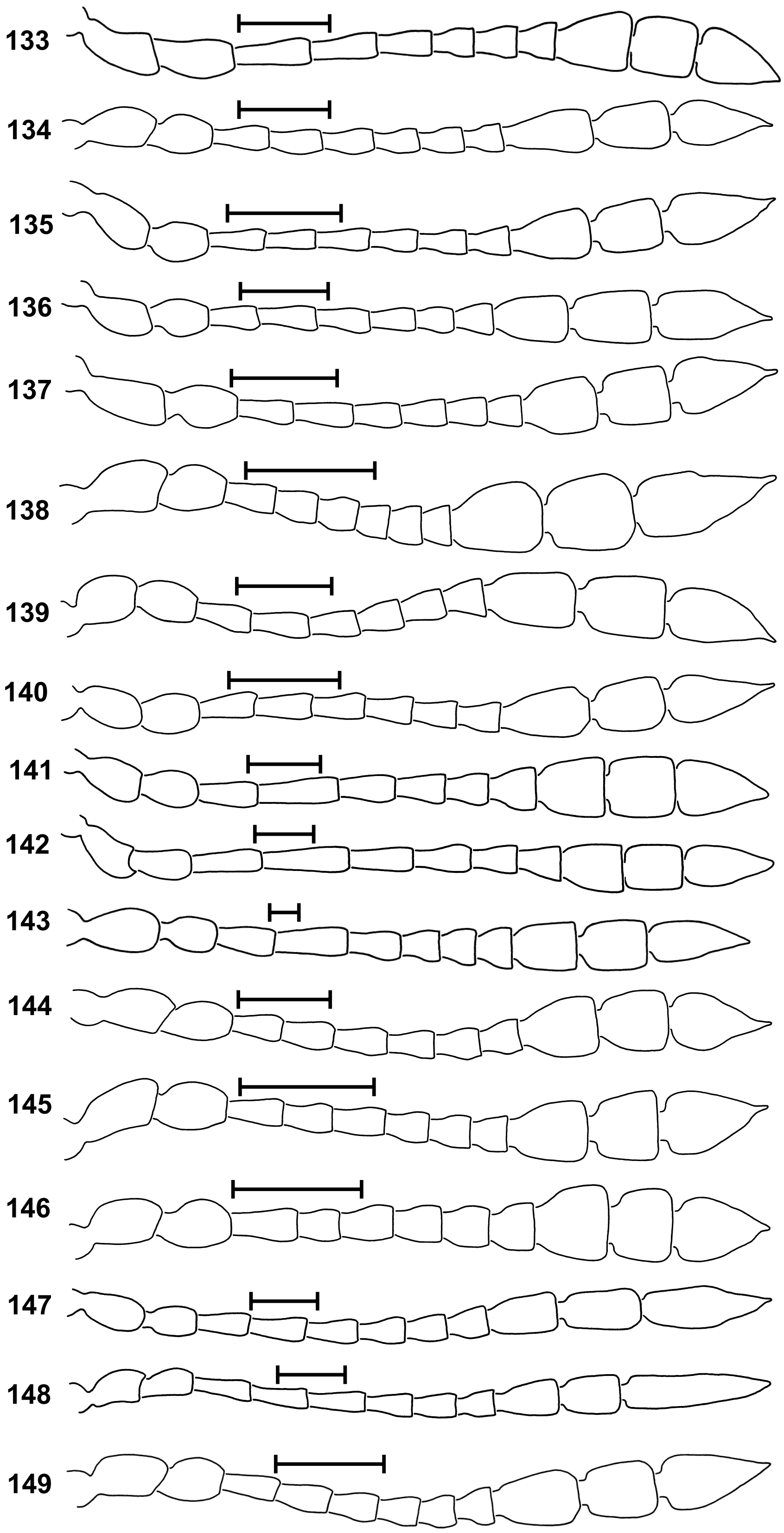
Figs. 124-126. Head of *Euops* spp. in lateral aspect (left) and in dorsal aspect (right): (124) male *E. maculatus* (Kalobo); (125) female *E. maculatus*, paralectotype; (126) female *E. jekelii* (Kebar). Figs. 127-129. Head of *Euops* spp. in dorsal aspect: (127) male *E. jekelii* (Kebar); (128) male *E. papua*, lectotype; (129) male *E. vossi*, holotype. Scale lines 0.5 mm.



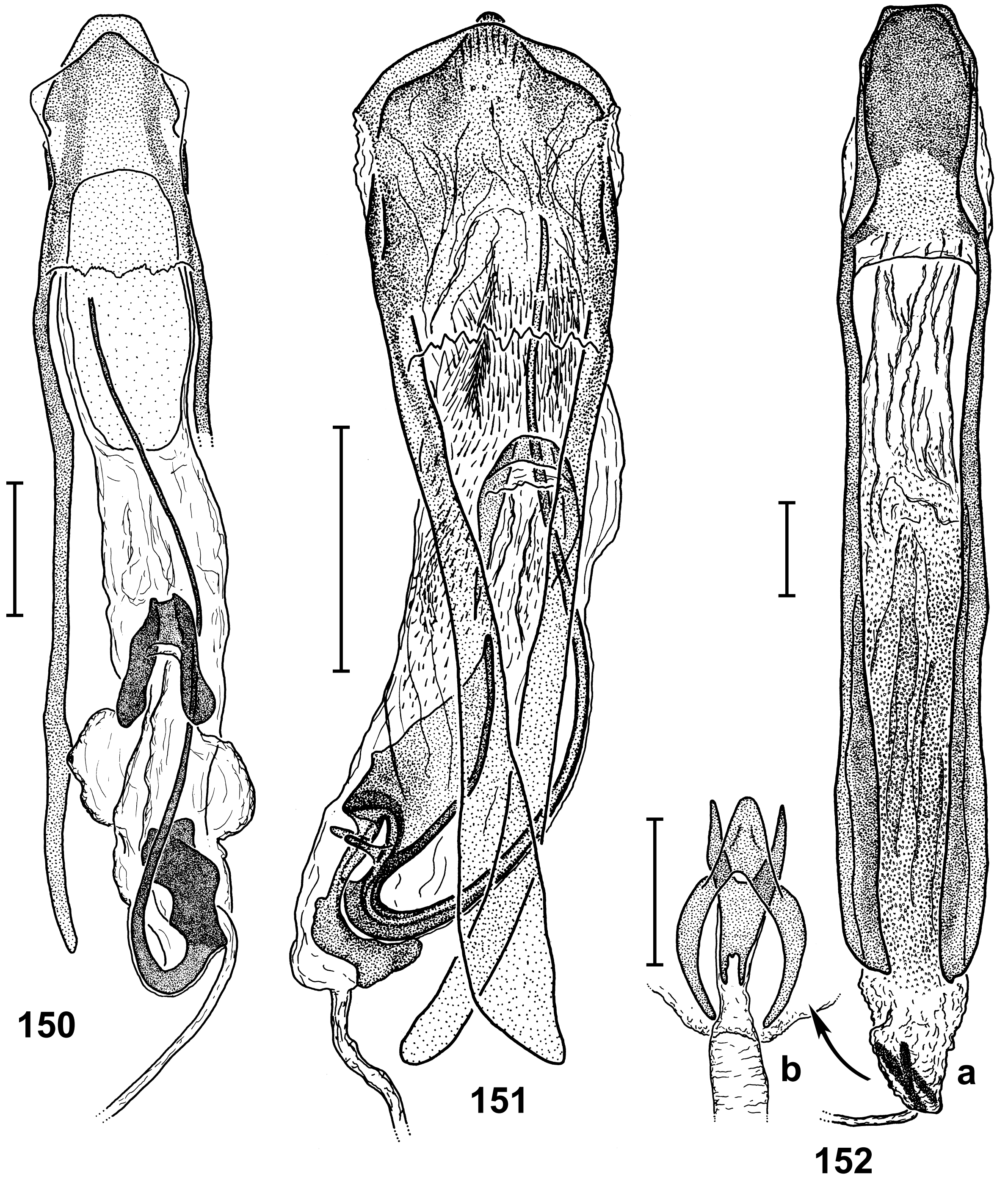




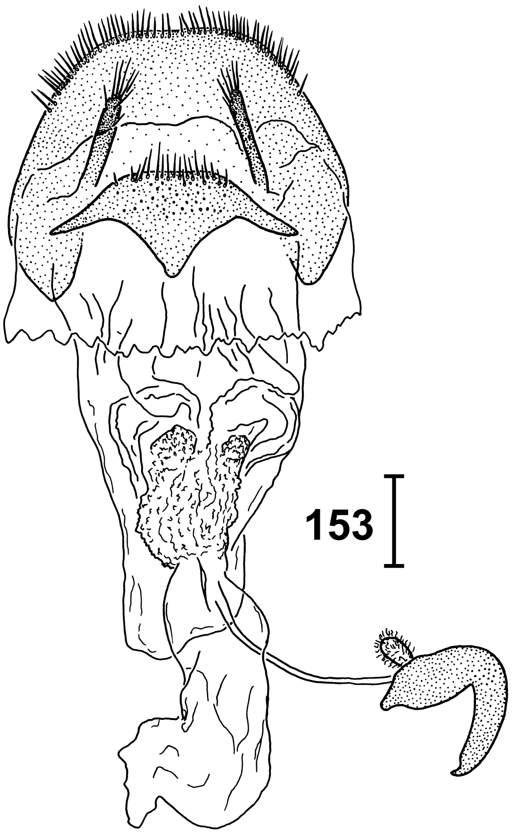
Figs. 130-132. *Euops* spp., (a) head, (b) prothorax, (c) foreleg, all in lateral aspect: (130) male *E. papua*, lectotype; (131) male *E. vossi*, holotype; (132) male *E. jekelii* (Kebar). Scale lines 0.5 mm.



Figs. 133-149. Antenna of *Euops* spp.: (133) *E. armatipennis* (Angoram); (134) *E. coelestinus* (Ransiki); (135) *E. ruficornis*, holotype; (136) *E. tibialis* (Emdoman); (137) *E. violaceus*, lectotype; (138) *E. suturalis* (Variarata); (139) *E. femoralis* (Okloma); (140) *E. maculatus* (Kalobo); (141) *E. vossi* (holotype); (142) *E. papua*, lectotype; (143) *E. jekelii* (Kebar); (144) *E. aerosus* (Sidangoli); (145) *E. subdentatus*, lectotype; (146) *E. viridiventris*, holotype; (147) *E. testaceus* (Meydoudga - Testega); (148) *E. divisus* (Saporkren); (149) *E. trigemmatus*, lectotype. Scale lines 200 µm.



Figs. 150-152. Male genitalia of *Euops* spp.; aedeagus in dorsal aspect: (150) *E. tibialis* (Borme), scale line 200 µm; (151) *E. suturalis* (Variarata), scale line 200 µm; (152a) *Euops* sp., *papua*-group, new species 31 (Dekai), scale line 200 µm; (152b) detail of transfer apparatus, scale line 100 µm.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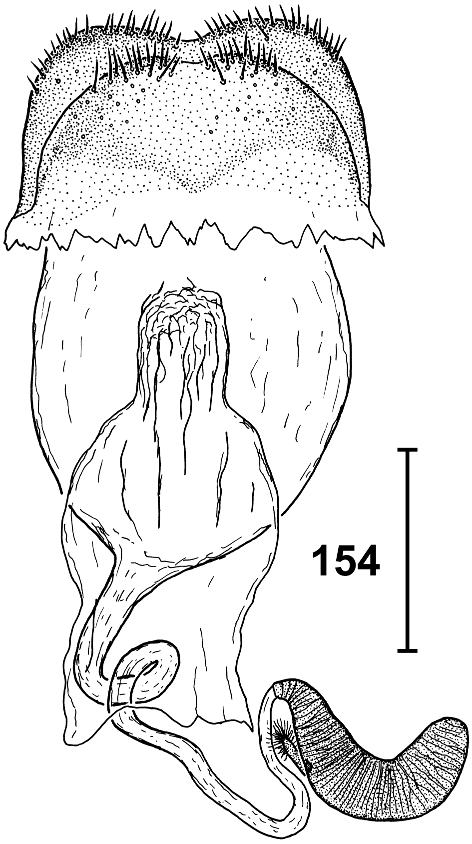
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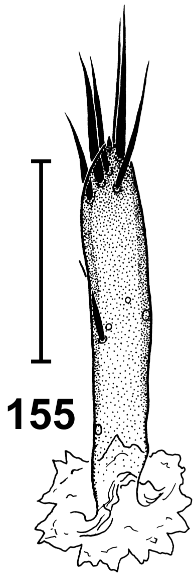
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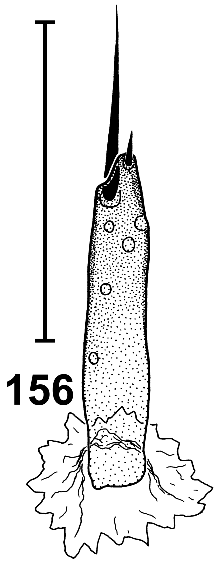
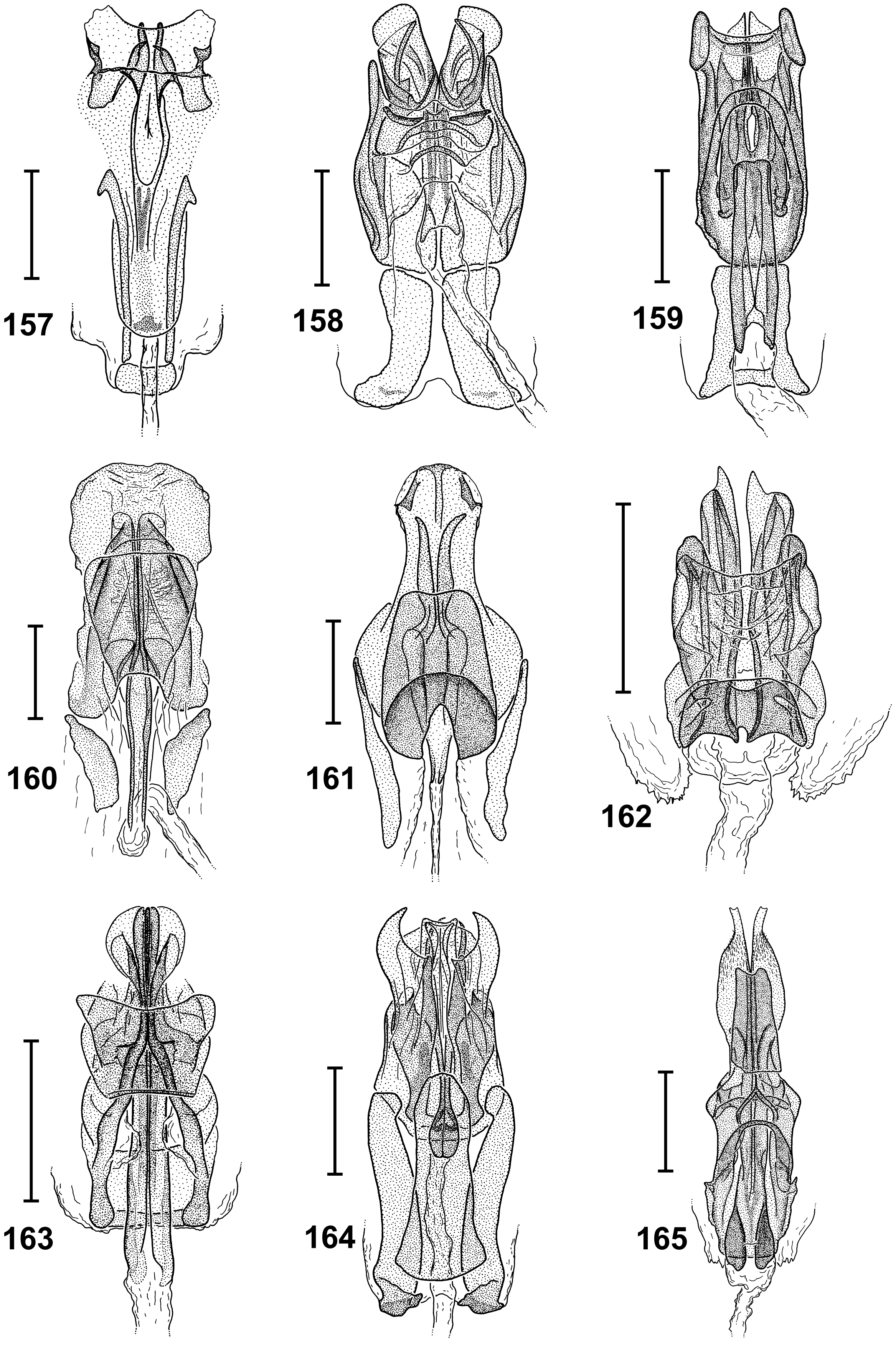
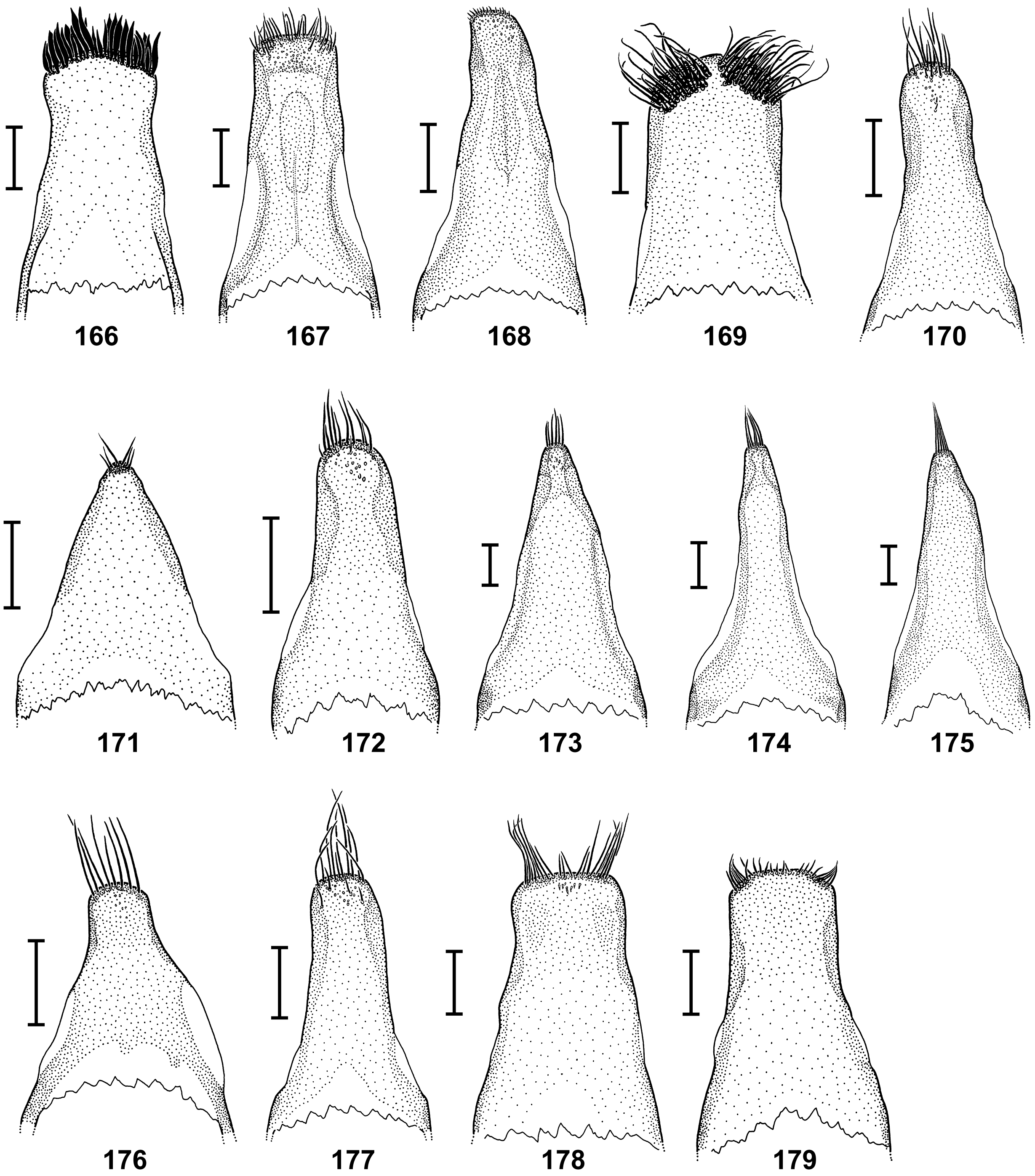

156

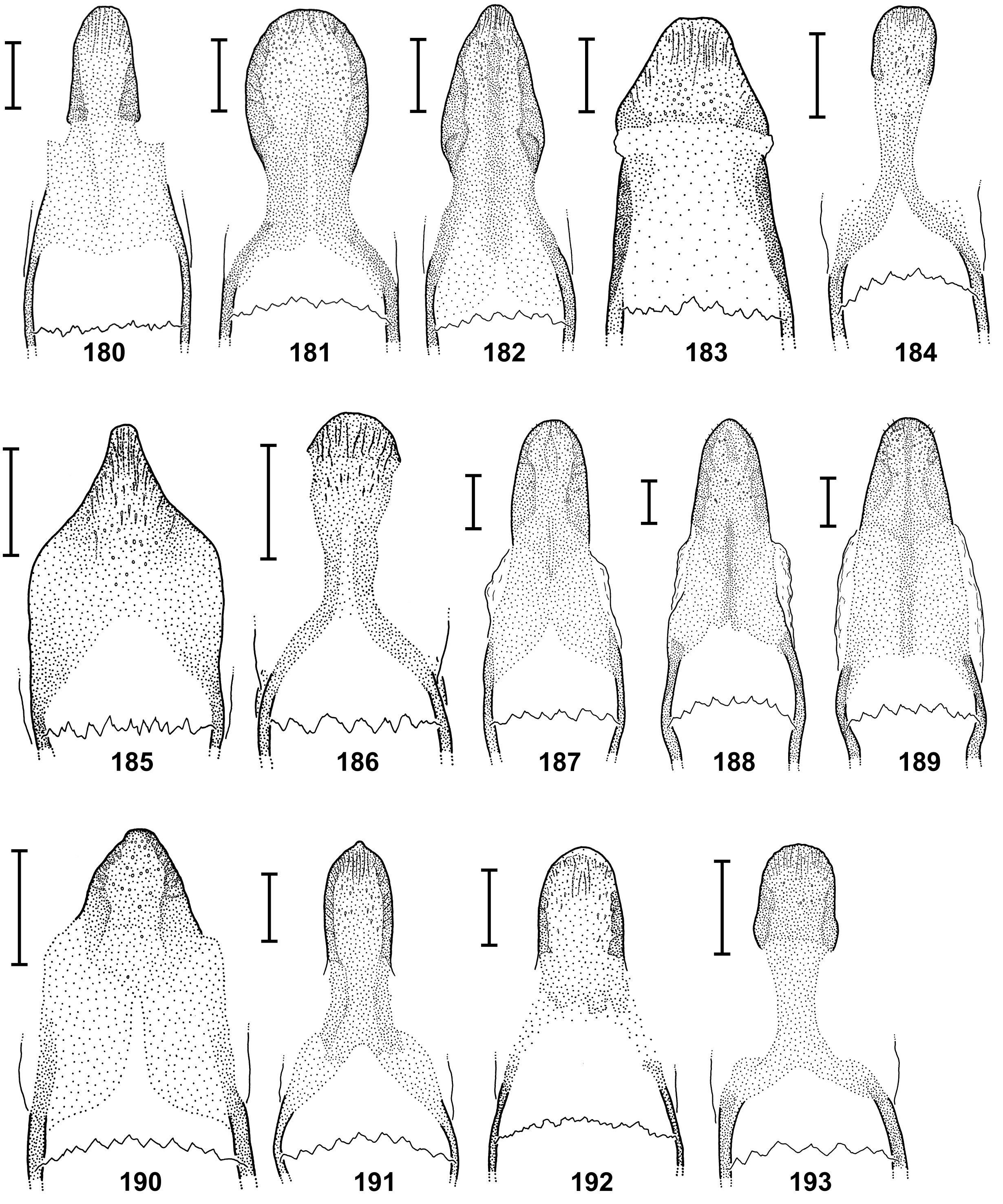
Figs. 153-156. Female genitalia of *Euops* spp; in ventral aspect: (153) *Euops* sp., *papua*-group, cf. new species 33 (Mulia), scale line 200 µm; note presence of styli; (154) *E. suturalis* (Variarata), scale line 200 µm. Figs. 155-156. Stylus of *Euops* spp. (155) *E. jekelii* (Kebar), scale line 100 µm; (156) *E. femoralis* (Okloma - Emdoman), scale line 100 µm.



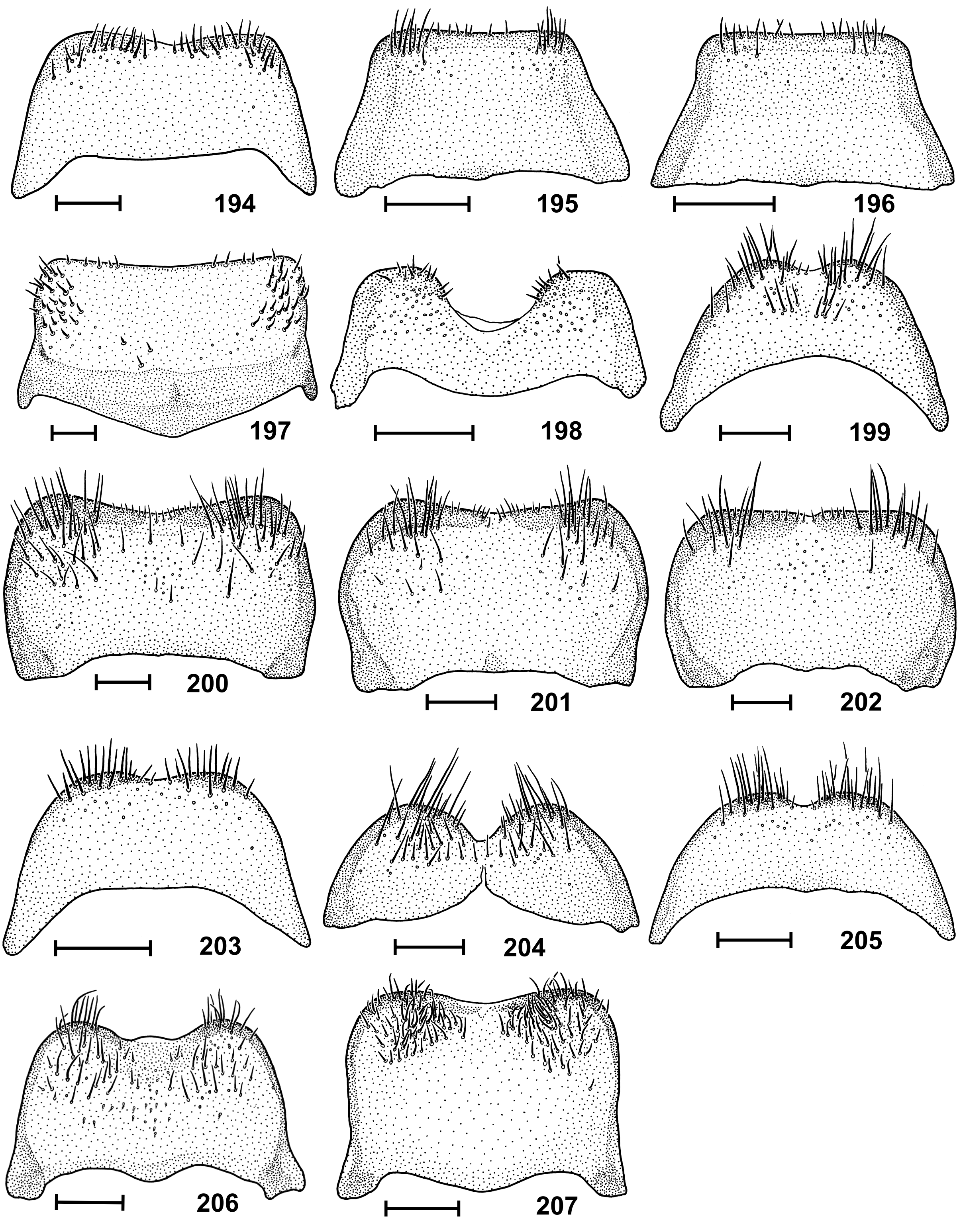
Figs. 157-165. Male genitalia of *Euops* spp.; transfer apparatus of aedeagus in dorsal aspect: (157) *E. armatipennis* (Karimui); (158) *E. coelestinus* (Membey); (159) *E. ruficornis* (Wau); (160) *E. divisus* (Saporkren); (161) *E. testaceus* (Testega); (162) *E. femoralis*, lectotype; (163) *E. maculatus*, lectotype; (164) *E. aerosus* (Sidangoli); (165) *E. trigemmatus* (Buli). Scale lines 100 µm.



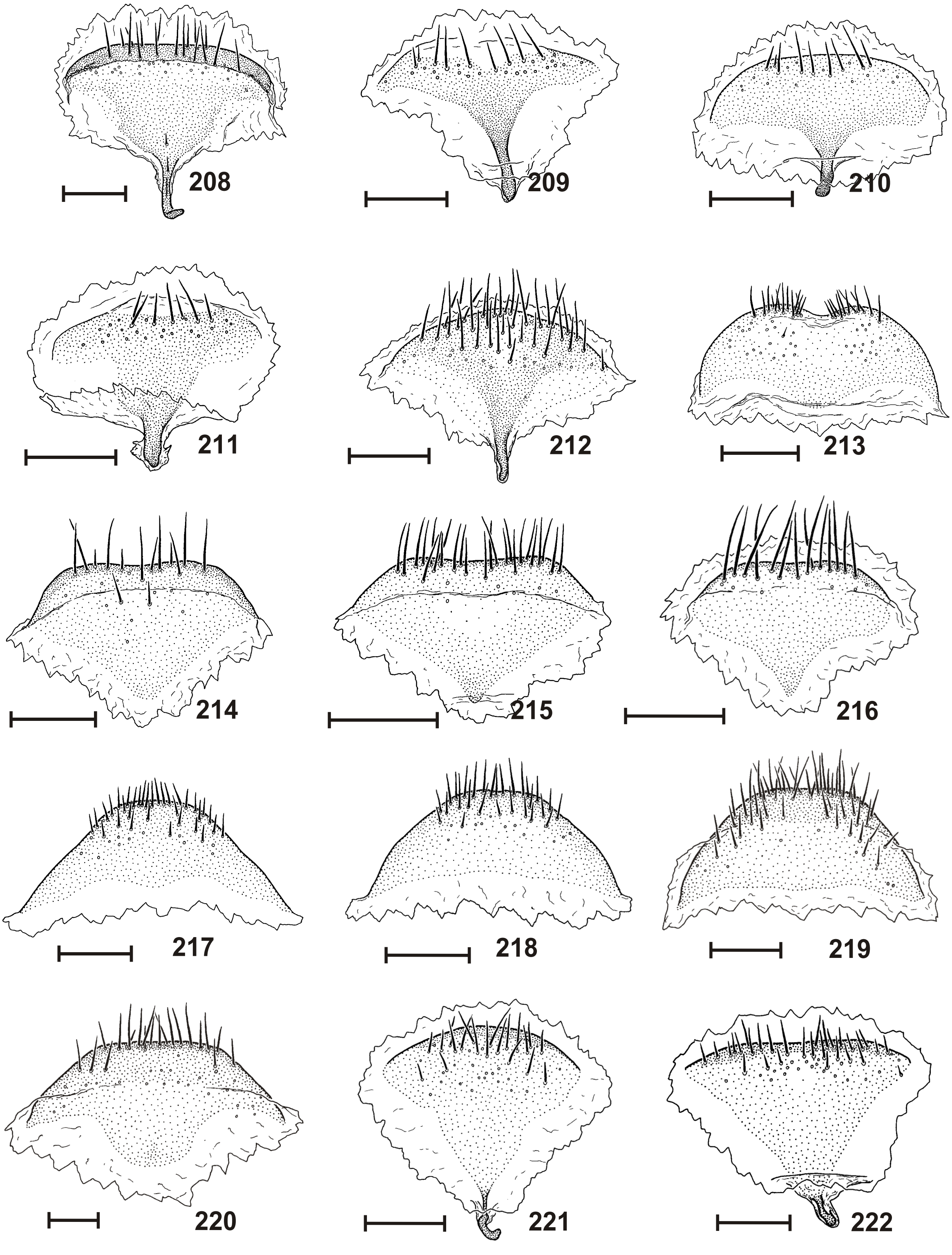
Figs. 166-179. Male genitalia of *Euops* spp.; dorsal plate of tegmen; except for fig. 169 all in dorsal aspect: (166) *E. armatipennis*, holotype; (167) *E. coelestinus* (Ransiki); (168) *E. ruficornis* (Wau); (169) *E. tibialis* (Borme), in ventral aspect; (170) *E. femoralis*, lectotype; (171) *E. suturalis* (Variarata); (172) *E. maculatus*, lectotype; (173) *E. papua*, lectotype; (174) *E. vossi*, holotype; (175) *E. jekelii* (Kebar); (176) *E. aerosus* (Sidangoli); (177) *E. trigemmatus* (Buli); (178) *E. divisus* (Saporkren); (179) *E. testaceus* (Testega - Meydoudga). Scale lines 100 µm.



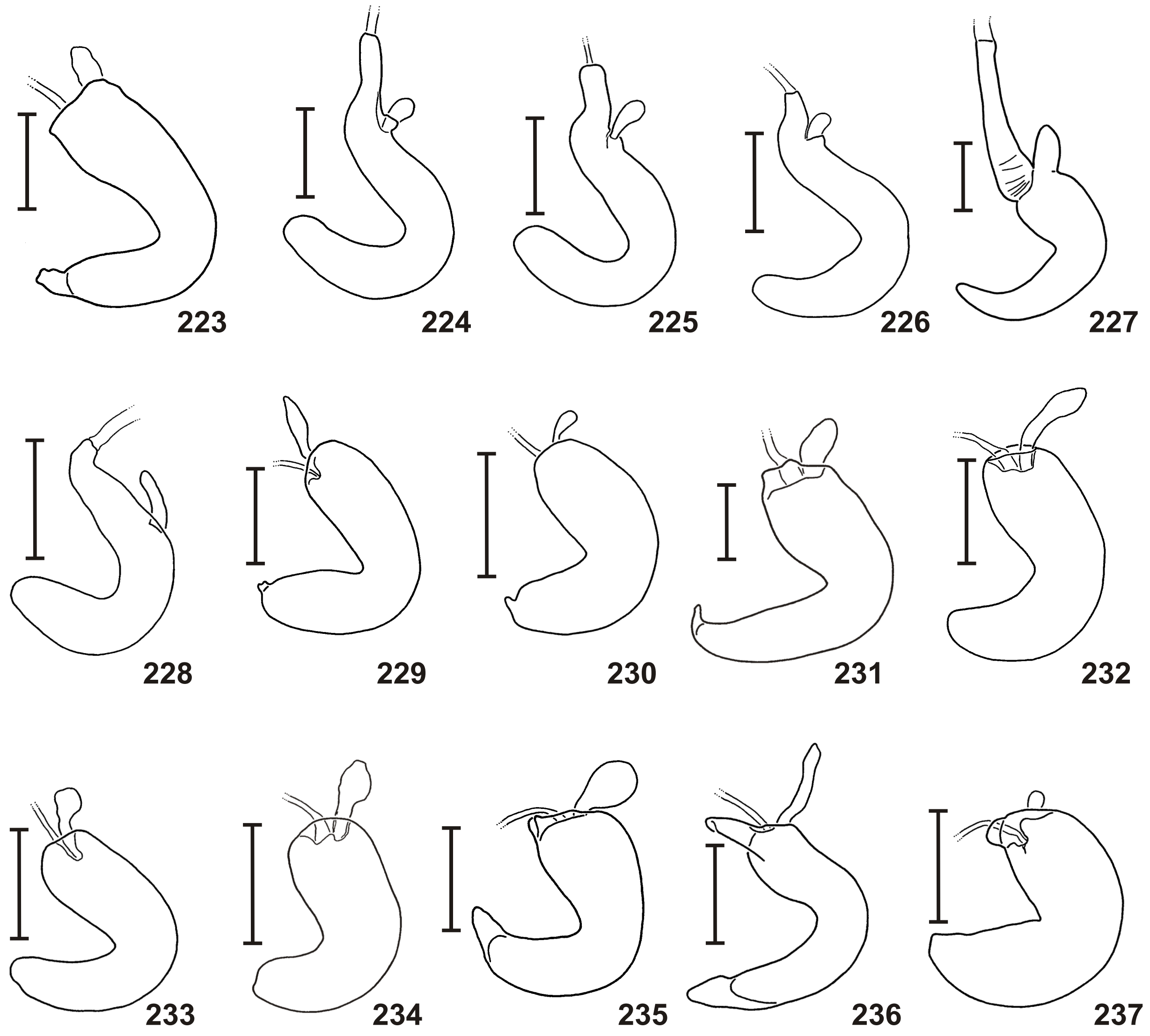
Figs. 180-193. Male genitalia of *Euops* spp.; pedon of aedeagus in ventral aspect: (180) *E. armatipennis* (Karimui); (181) *E. coelestinus* (Ransiki); (182) *E. ruficornis* (Wau); (183) *E. tibialis* (Borme); (184) *E. femoralis*, lectotype; (185) *E. suturalis* (Variarata); (186) *E. maculatus*, lectotype; (187) *E. vossi*, holotype; (188) *E. papua*, lectotype; (189) *E. jekelii* (Kebar); (190) *E. aerosus* (Sidangoli); (191) *E. divisus* (Saporkren); (192) *E. testaceus* (Testega); (193) *E. trigemmatus* (Buli). Scale lines 100 µm.



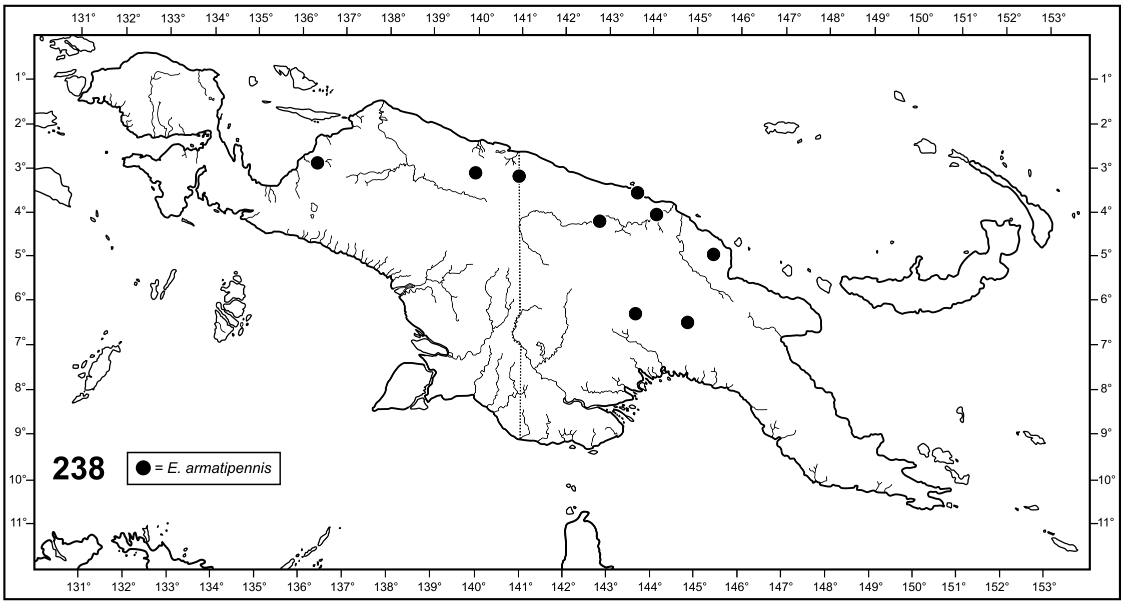
Figs. 194-207. Male sternite VIII of *Euops* spp.: (194) *E. armatipennis* (Karimui); (195) *E. coelestinus* (Ransiki); (196) *E. ruficornis* (Wau); (197) *E. tibialis* (Borme); (198) *E. suturalis* (Variarata); (199) *E. femoralis*, lectotype; (200) *E. papua*, lectotype; (201) *E. vossi*, holotype; (202) *E. jekelii* (Kebar); (203) *E. maculatus*, lectotype; (204) *E. aerosus* (Sidangoli); (205) *E. trigemmatus* (Buli); (206) *E. divisus* (Saporkren); (207) *E. testaceus* (Testega - Meydoudga). Scale lines 100 µm.

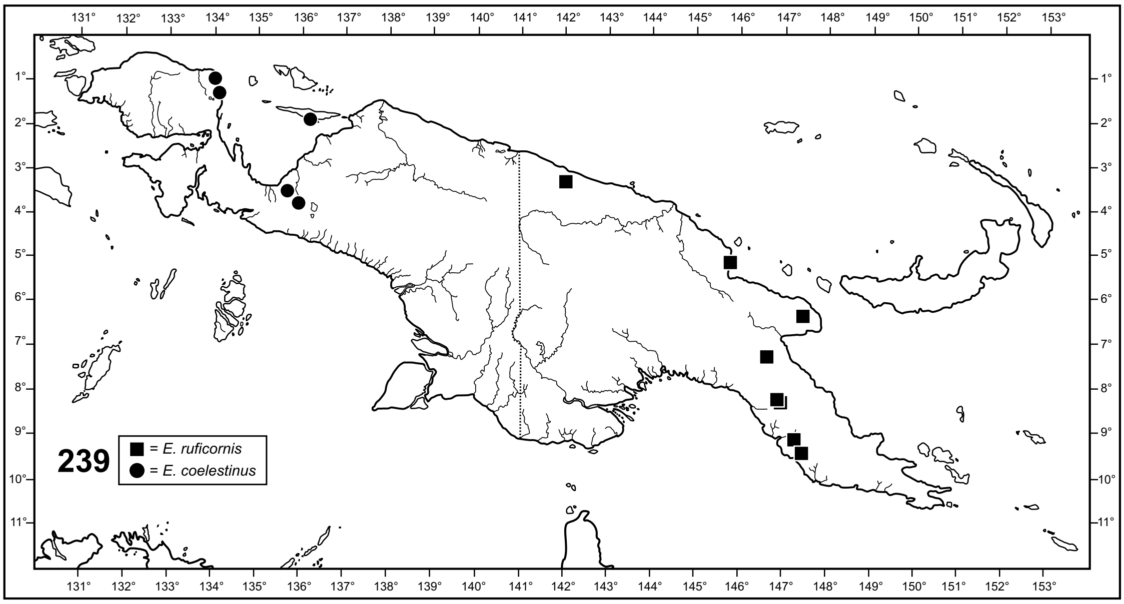


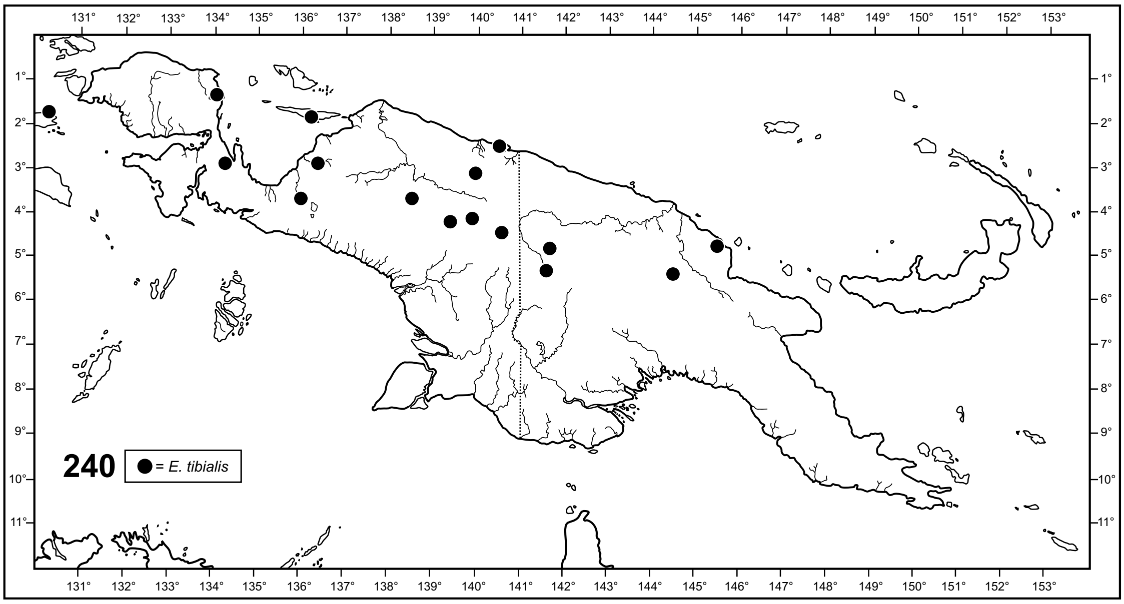
Figs. 208-222. Female sternite VIII of *Euops* spp.: (208) *E. armatipennis* (Angoram); (209) *E. coelestinus*, lectotype; (210) *E. ruficornis*, holotype; (211) *E. violaceus*, lectotype; (212) *E. tibialis* (Emdoman); (213) *E. suturalis* (Variarata); (214) *E. femoralis* (Okloma -Emdoman); (215) *E. maculatus*, paralectotype; (216) *E. trigemmatus*, lectotype; (217) *E. aerosus*, lectotype; (218) *E. subdentatus*, lectotype; (219) *E. viridiventris*, holotype; (220) *E. jekelii* (Kebar); (221) *E. divisus* (Saporkren); (222) *E. testaceus* (Waijan). Scale lines 100 µm.



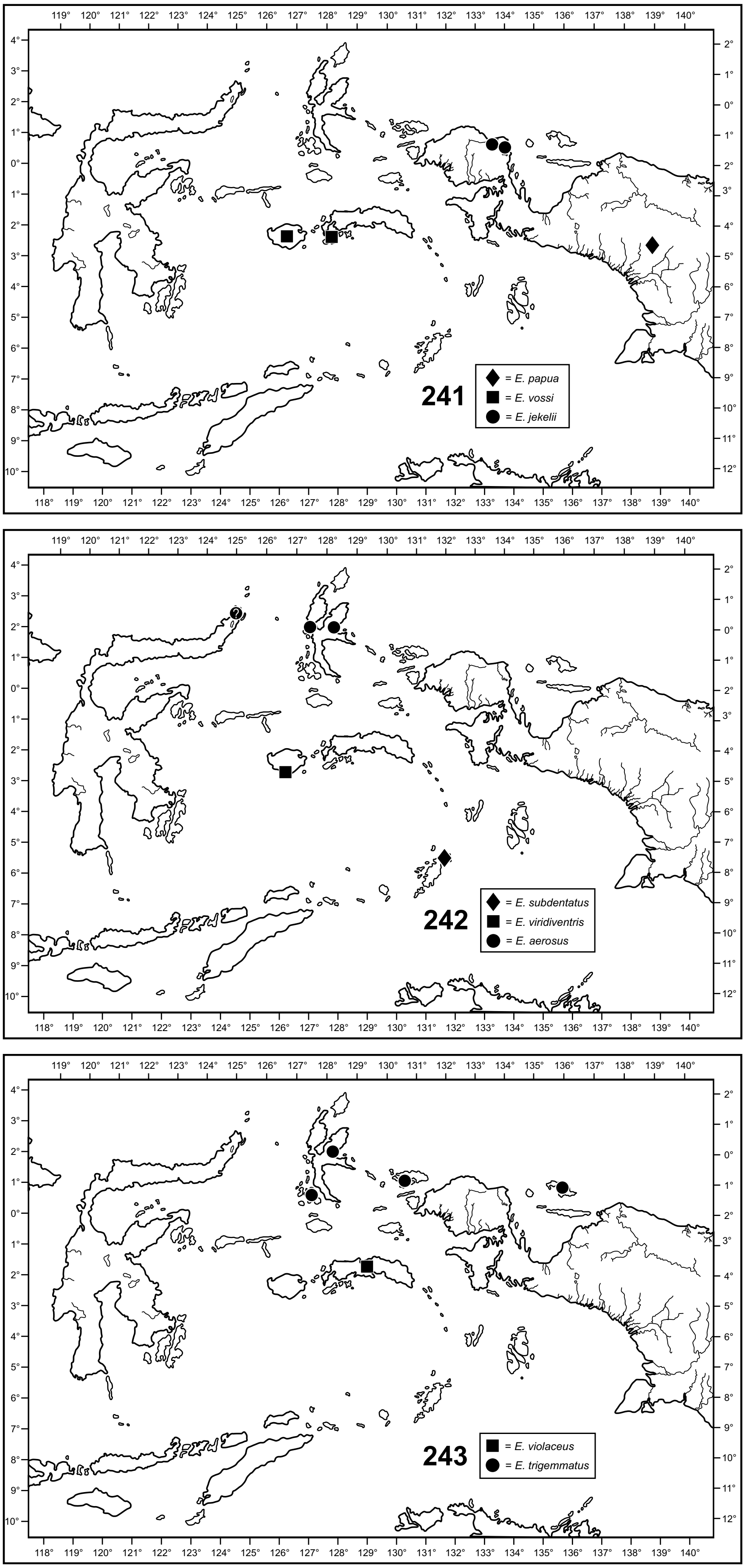
Figs. 223-237. Spermatheca of *Euops* spp.: (223) *E. armatipennis* (Lereh); (224) *E. coelestinus*, lectotype; (225) *E. ruficornis*, holotype; (226) *E. violaceus*, lectotype; (227) *E. tibialis* (Emdoman); (228) *E. suturalis* (Variarata); (229) *E. femoralis* (Okloma-Emdoman); (230) *E. maculatus* (Kalobo); (231) *E. jekelii* (Kebar); (232) *E. aerosus*, lectotype; (233) *E. subdentatus*, lectotype; (234) *E. viridiventris*, holotype; (235) *E. divisus* (Saporkren); (236) *E. testaceus* (Waijan); (237) *E. trigemmatus*, lectotype. Scale lines 100μm.



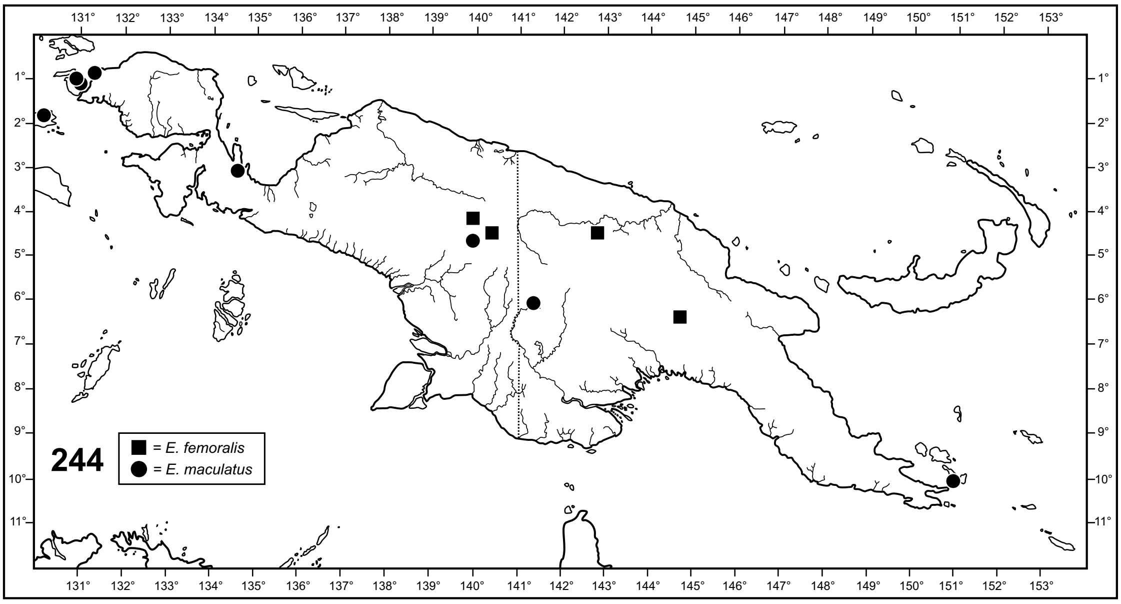


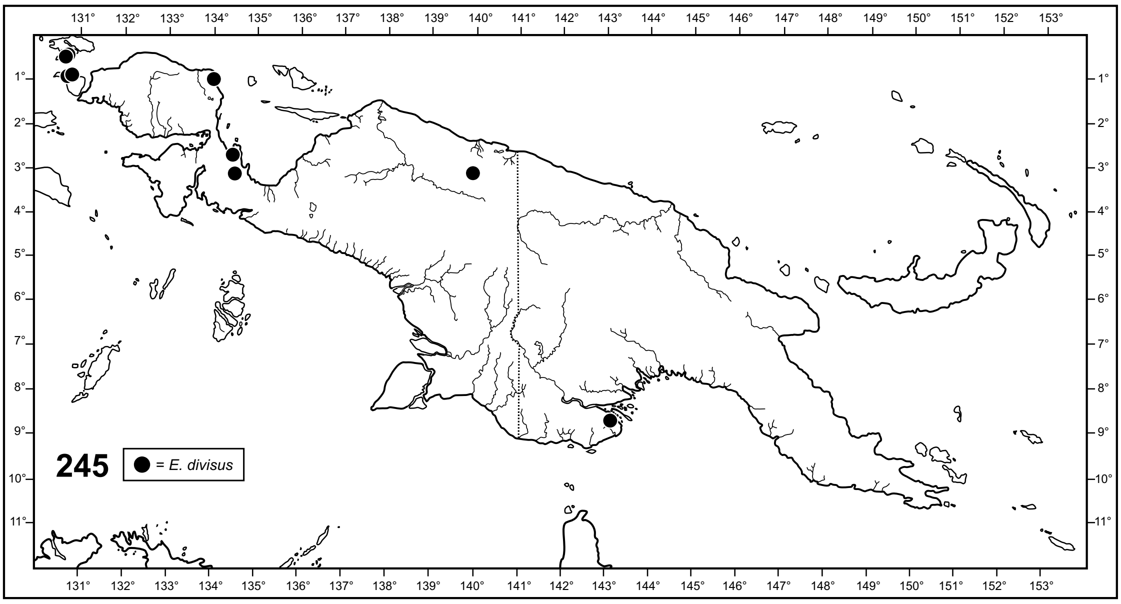


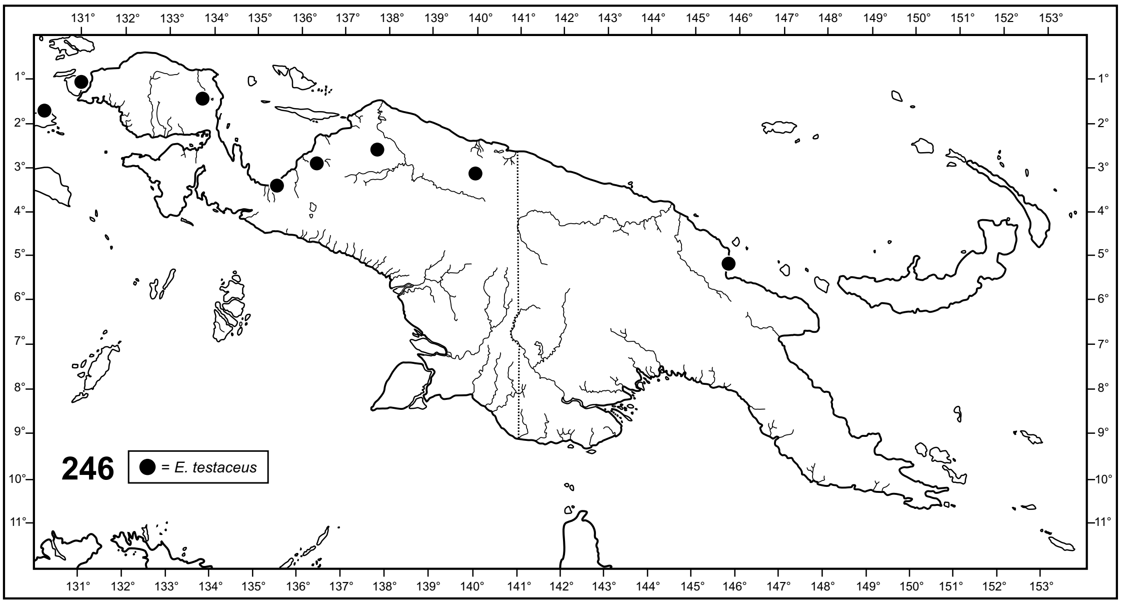
Figs. 238-240. Distribution maps of *Euops* spp.: (238) *E. armatipennis*; (239) *E. coelestinus*, *E. ruficornis*; (240) *E. tibialis*.



Figs. 241-243. Distribution maps of *Euops* spp.: (241) *E. jekelii*, *E. papua*, *E. vossi*; (242) *E. aerosus*, *E. subdentatus*, *E. viridiventris*; (243) *E. trigemmatus*, *E. violaceus*.







Figs. 244-246. Distribution maps of *Euops* spp.: (244) *E. femoralis*, *E. maculatus*; (245) *E. divisus*; (246) *E. testaceus*.

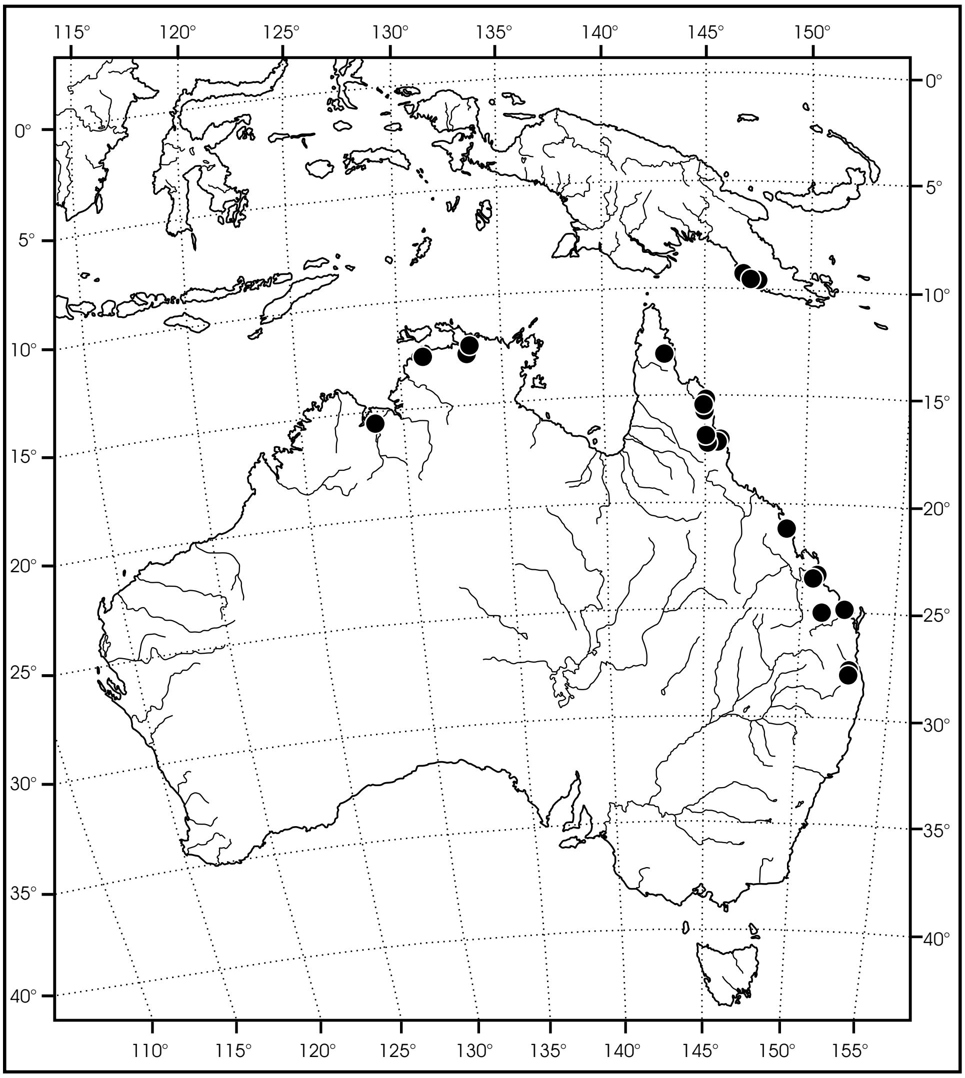


Fig. 247. Distribution map of *Euops suturalis*.

Curriculum vitae

Personal Details:

Dipl.-Biol. Alexander Riedel

Zoologische Staatssammlung
Münchhausenstr. 21
D-81247 München, Germany
Tel. 089 81 07 138
e-mail: alexander_riedel@web.de

18.VIII.1969	Born in Augsburg, Germany	
	Status	single
	Nationality	German

Schooling:

1976-1980	Primary school in Friedberg / Bayern
1980-1989	Wernher-von-Braun Gymnasium (science-oriented high school)
VI.1989	Abitur (final examination), grade 1.7 (1 = A, 2 = B, etc.)

Academic education:

1989-1995	Ludwig-Maximilians-Universität (LMU), München, Department of Biology	
I-II.1995	Diploma main examination	
	Major subject:	Zoology
	1st Minor subject:	Palaeontology
	2nd Minor subject:	Syst. Botany
	3rd Minor subject:	Ecology
III-X.1995	Diploma thesis: "Studien zur Taxonomie und Phylogenie der Rüsselkäfergattung *Euops* (Coleoptera: Curculionoidea: Attelabidae) Supervisor: Prof. Dr. H. Bohn, LMU	
XI.1995	Award of the academic degree "Diplomated Biologist" General mark 1.0 "with honours"	
Since III.1996	Doctoral dissertation work, "Taxonomy, phylogeny, and zoogeography of the weevil genus *Euops* (Insecta: Coleoptera: Curculionoidea) in the Papuan Region" Supervisor: Prof. Dr. G. Haszprunar, LMU	

Scholarships:

VII.1996-XII.1998	Scholarship of the LMU (Graduiertenförderung)
II-VI.1998	Scholarship by the DAAD (Deutscher Akademischer Austausch Dienst) supporting field work in Papua New Guinea

Relevant positions

1991-1999	Scientific assistant at the "Zoologische Staatssammlung München", sections "Orthoptera" and "Coleoptera": Preparing, sorting, and cataloguing of collection material
1994, 1996	Teaching assistant for the university course "general morphology of animals" (6 weeks each)
I. 2000-XII.2001	Scientific trainee at the entomology section of the "Staatliches Museum für Naturkunde Stuttgart"
Since I.2001	Supervisor of the butterfly exhibition at the Botanical Garden München

Appendix 1:

Catalogue and bibliography of the genus *Euops* (Insecta, Coleoptera, Curculionoidea, Attelabidae).

published 1998: Spixiana 21 (2): 97-124.

Appendix 2:

The *spinosus*-group of *Euops* SCHOENHERR (Coleoptera: Curculionoidea, Attelabidae), weevils with humeral spines from New Guinea.

published 1999: Entomologica Scandinavica 30 (1): 75-117.

Appendix 3:

The *pygmaeus*-group of *Euops* SCHOENHERR (Coleoptera, Curculionoidea, Attelabidae), weevils associated with *Nothofagus* in New Guinea.

published 2001: Journal of Natural History 35 (8): 1173-1237.

Appendix 4:

Revision of the *Euops quadrifasciculatus*-group (Coleoptera: Curculionoidea: Attelabidae) from the Australian region, with a discussion of shifts between *Nothofagus* and *Eucalyptus* host plants.

published 2001: Invertebrate Taxonomy 15 (4): 551-587.

Appendix 5:

Revision of the *simulans*-group of *Euops* SCHOENHERR (Coleoptera, Curculionoidea, Attelabidae) from the Papuan region.

published 2001: Deutsche Entomologische Zeitschrift 48 (2): 139-221.

Appendix 6:

Revision of the subgenus *Neosynaptops* VOSS of *Euops* SCHOENHERR (Coleoptera, Curculionoidea, Attelabidae) from the Papuan region.

published 2002: Zoologica Scripta 31 (2): 135-165.