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Monograph of the subtribe Elaterina (Insecta: Coleoptera: Elateridae: Elaterinae)

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Abstract. The new subtribe Elaterina subtribus novum is phylogenetically justified and systematically established. The species of the genera *Brachyelater* gen. nov., *Diplostethus* Schwarz, 1907, *Elater* Linnaeus, 1758, *Leptinostethus* gen. nov., *Mulsanteus* Gozis, 1875, *Nipponoelater* Kishii, 1985, *Sericus* Eschscholtz, 1829, *Taiwanostethus* Kishii, 1994, *Orthostethus* Lacordaire, 1857, *Parallelostethus* Schwarz, 1906, *Pittonotus* Kiesenwetter, 1859 and *Pseudagriotes* Schwarz, 1898 are revised concerning their phylogenetically important characters. Beside the new subtribe, two new genera are established, 12 new species are described and 26 new nomenclatural combinations, three new synonymies and five species incertae sedis are proposed. Records of known species are given and keys to genera and species are provided. New subtribe: Elaterina subtribus novum. New genera: *Leptinostethus* gen. nov. and *Brachyelater* gen. nov. New species: *Leptinostethus javanensis* sp. nov. (Java), *Nipponoelater cameronensis* sp. nov. (Malaysia: Pahang), *N. fraterulus* sp. nov. (Malaysia: Taiping), *N. gorodinskii* sp. nov. (Malaysia: Borneo), *N. indosinensis* sp. nov. (Laos: Louangnamtha), *N. heilongjiangensis* sp. nov. (China: Heilongjiang), *N. kradungensis* sp. nov. (Thailand: Loei), *N. malaysiensis* sp. nov. (Malaysia: Taiping), *N. meratensis* sp. nov. (Indonesia: Borneo), *N. philippinensis* sp. nov. (Philippines: Luzon), *N. rubellus* sp. nov. (Taiwan: Puli), *N. ullongensis* sp. nov. (South Korea: Ullong Is.). New nomenclatural combinations proposed: *Diplostethus carolinensis* (Schaeffer, 1916) comb. nov., *D. texanus* (Leconte, 1853) comb. nov., *Elater magnicollis* (Fleutiaux, 1918) comb. nov., *E. thoracicus* (Fleutiaux, 1918) comb. nov., *Leptinostethus macassariensis* (Candèze, 1863) comb. nov., *L. ceylanicus* (Candèze, 1863) comb. nov., *L. conicipennis* (Schwarz, 1902) comb. nov., *Nipponoelater brancuccii* (Schimmel, 1996) comb. nov., *N. werneri* (Schimmel, 1996) comb. nov., *N. cinnamomeus* (Schimmel, 1998) comb. nov., *N. henscheli* (Schimmel, 2007) comb. nov., *N. juttae* (Schimmel, 2007) comb. nov., *N. rufopilosus* (Candèze, 1893) comb. nov., *N. sinensis* (Candèze, 1881) comb. nov., *N. vietnamensis* (Schimmel, 1996) comb. nov., *N. rubiginosus* (Candèze, 1889) comb. nov., *N. tenebrosus* (Schwarz, 1898) comb. nov., *N. uhligi* (Schimmel, 1996) comb. nov., *N. maindroni* (Fleutiaux, 1905) comb. nov., *N. palawanensis* (Ôhira, 1974) comb. nov., *Taiwanostethus sihleticus* (Candèze, 1881) comb. nov., *Brachyelater hoabinhus* (Fleutiaux, 1936) comb. nov., *B. phongsalyensis* (Schimmel et Tarnawski, 2007) comb. nov.,

B. strbai (Schimmel, 2003) comb. nov., *B. vitalisi* (Fleutiaux, 1918) comb. nov. New synonymies: *Elater businskyi* Schimmel, 2003 syn. nov. [=*Elater thoracicus* (Fleutiaux, 1918)], *E. karikalensis* Schimmel, 1996 syn. nov. [=*Nipponoelater maindroni* (Fleutiaux, 1905)], *Ludius subnitidus* Fleutiaux, 1918 syn. nov. [=*Taiwanostethus sihleticus* (Candèze, 1881)] syn. nov. Species incertae sedis: *Ludius erubescens* Candèze, 1878, *L. exutus* Candèze, 1863, *L. lineatus* Candèze, 1863, *L. serraticornis* Motschulsky, 1859, *L. hydropicus* Candèze, 1881. *Brachyelater vitalisi* (Fleutiaux, 1918) is recorded in this paper for the first time from Laos, *Elater solskyi* (Suzuki, 1985) is recorded here for the first time from China and Korea, *Nipponoelater henscheli* (Schimmel, 2007) is recorded here for the first time from Laos and from Vietnam, *N. vietnamensis* (Schimmel, 1996) for the first time from Myanmar, *N. sieboldi* (Candèze, 1873) is recorded for the first time from Korea, *N. tenebrosus* (Schwarz, 1898) is recorded for the first time from Sumatra and *Taiwanostethus sihleticus* (Candèze, 1881) is recorded for the first time from Thailand. *Nipponoelater ullongensis* sp. nov. is the first species of the genus which is recorded from Korea.

Key words: entomology, taxonomy, Coleoptera, Elateridae, Elaterinae, Elaterina subtribus novum, new genera, new species, phylogenetical analysis, Palaearctic, Nearctic, Neotropical, Australian and Oriental Regions.

CONTENTS

1. INTRODUCTION

The genus *Elater* was described by LINNAEUS (1758) in the tenth edition of the Systema Naturae. Today, the name *Elater* is also used as the etymon for the supra-family Elateriformia, for the family Elateridae, for the subfamily Elaterinae and for the tribe Elaterini. LINNAEUS (1758) in his listing placed 24 different species under the genus *Elater*, but in later times all of these species, except for *Elater ferrugineus*, have been transferred to different genera by subsequent workers. Therefore, the only species left from LINNAEUS original listing and which still belongs to the genus *Elater* is *E. ferrugineus*. Also, the species which we consider today as belonging to the genus *Elater*, have often been transferred to other groups, such as *Ludius* BERTHOLD, 1827 and *Steatoderus* DEJEAN, 1833, *Parallelostethus* SCHWARZ (1906) and *Orthostethus* LACORDAIRE (1857).

CANDÉZE (1891) in his Catalogue Methodique des Élatérides connus en 1890, published nine species of the genus *Ludius* Berthold, 1827 (*Elater* sensu LINNAEUS), and beside these, in the same work, various species of the genus *Mulsanteus* GOZIS, 1875, *Procraerus* REITTER, 1905 and *Ectamenogonus* BUYSSON, 1893, as belonging to the genus *Ludius*. Then, in 1906, SCHWARZ published in his Genera Insectorum a new genus *Parallelostethus*, in which he included six species from Sumatra, Java, Darjeeling, Assam, Sikkim, Ceylon, Sulawesi, from the Philippines and one species from North-America. Some of these species formerly have been considered to belong to the genus *Ludius* by CANDÈZE (1891).

SCHENKLING (1927) in the Coleopterorum Catalogus, placed the species of the genus *Elater* under the genera *Ludius*, *Neotrichophorus* (= *Mulsanteus* GOZIS, 1875) and *Parallelostethus.*

The same author (SCHENKLING 1927) placed various species of the genus *Ludius* (*Elater*) collected in Africa in his listing: *L. bennigseni* SCHWARZ, 1898, *L. concameratus* (SCHWARZ, 1903), *L. fulvus* SCHWARZ, 1903, *L. lineaticollis* SCHWARZ, 1898 and *L. penicillatus* (GERSTAECKER, 1871). However, all of the mentioned species have been transferred to other genera subsequently by later authors (GIRARD, 1971: 643-644), resulting in the fact that species of the genus *Elater* as of our present knowledge are not occur in Africa.

Also, some of the species of the genus *Ludius* (*Elater*) which had been placed by SCHENKLING (1927) as occurring in North America have subsequently (and also in this paper) been transferred to different further genera, which entails that only a few species of the new subtribe Elaterina are known today from the Nearctic Region. In the same paper SCHENKLING (1927) also listed various species of the genus *Ludius* (*Elater*) from Central and South America, which subsequently have also been transferred to various further species-groups. The only real *Elater* species occurring in South America are *E. decorus* GERMAR (1843) and *E. ruficollis* SOLIER (1851).

The genus *Pittonotus* KIESENWETTER (1859) is also listed in the SCHENKLING catalogue (1927) beside the genus *Diplostethus* SCHWARZ (1906). While the genus *Pittonotus* includes two species from the Palaearctic Region, the genus *Diplostethus* contains exclusively species from the Nearctic and the Neotropical Region.

Roache (1960) published a revision of the North American Elaterid Beetles of the tribe Elaterini, and Quezada (1974) described the geographical distribution of the species *Elater decorus* which occur in the Neotropical Region.

More recently, in the year 1985, Kishii described a new subgenus of *Elater*, *Nipponoelater*, with the species *E.* (*Nipponoelater*) *sieboldi* and *E.* (*Nipponoelater*) *kometsuki.* But the subgenus *Nipponoelater* has later been synonymised by Ôhira (1997) with the genus *Orthostethus* Lacordaire (1857), and the mentioned Japanese species, as well as some of their subspecies, Ôhira (1997) transferred with new name combinations to the genus *Orthostethus.*

Lately, in 1994, Kishii described another new genus closely allied to *Elater* and *Orthostethus*: *Taiwanostethus* with a new species, *T. tanidai* from Taiwan. In 1998, the same author raised *Nipponoelater* up to generic status.

In 1996 Calder published the "*Click beetles*: *Genera of the Australian Elateridae*", a monograph on invertebrate taxonomy.

In 2007 Schimmel et Tarnawski published a revision of the species of the genus *Mulsanteus* Gozis, 1875 from Southeast Asia. In this study the authors transferred two species which formerly had been placed under *Neotrichophorus* (*Mulsanteus*) to the genus *Elater*: *E. hoabinhus* (Fleutiaux, 1936) and *E. vitalisi* (Fleutiaux, 1918).

In this paper we publish the results of a worldwide revision of the genera in the tribe Elaterini which result in the establishment of a new subtribe named Elaterina.

2. ABBREVIATIONS AND METHODS

The following abbreviations have been used:

A1 (2)	Analis 1 (2);
a.s.l.	Above sea level;
C	Cubitus;
CPG	Coll. Platia, Gatteo, Italy;
Cm	Costa media;
Cr	Costa radialis;
CRG	Coll. Riese, Genova, Italy;
CSV	Coll. Schimmel, Vinningen, Germany;
CTW	Coll. Tarnawski, Wrocław, Poland;
Fm	Flight muscles;
ICZN	International code for zoological nomenclature;
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany;
Spm.	Specimen;
TICB	Tamin insect collection, Brno, Czech Republic;
TM	Termeszettudomany Museum, Budapest, Hungary;
Tpqn	Terminus post quem non.

The examination of the collected material has been executed using a ZEISS Stemi 2000-C binocular with an ocular micrometer. Photographs were taken with a NIKON E4500 camera with a TV2/3”C 0.63x adaptor to the binocular. Body length of the specimens has been measured from apical margin of frons up to apex of elytra, and body width along base angles of pronotum by using the ocular micrometer. The examined specimens are fixed on white paste-board. The genitalia of the males have been pulled out of the abdomen, cleaned and fixed beside the body of the specimen using water-soluble transparent glue. Types of new species have been marked with red labels indicating the type status (holotype or paratype), the gender, and the name of the species and of the author.

The keys to genera and to species are provided basing on characters of the males (some exceptions), and are structured as dichotomous tables.

The lists of species are provided as commentary lists. The species of the various genera are listed in accordance with their distributions in the following zoogeographical Regions and Subregions (sensu Franz and Beier 1970):

1. The Palaearctic Region including the species from Europe, Central Asia, Korea and Japan.
2. The Indian and the Ceylonese Subregions including Himalayas. The Indian and the Ceylonese Subregions belong to the Oriental Region, while the fauna of the Himalayas is Palaearctic. To acquire a better overview about the appertaining species, the mentioned Subregions are combined here in one section.
3. The Indochinese Subregion which is a part of the Oriental Region, with species from Myanmar, China, Thailand, Laos and from Vietnam.

4. The Malayan Subregion which is part of the Oriental Region, with species from Malaysia Peninsula, from Sunda archipelago with Borneo, Sumatra and Java, from the Philippines and Palawan, as well as from Taiwan.
5. The Wallacea including Celebes, Halmahera, Lombok, Sumbawa, Flores, Timor and the Maluku Islands.
6. The Australian Region including Australia and Papua New Guinea.
7. The Nearctic Region including North America.
8. The Neotropical Region including South America, Central America and Mexico.

Geographical check-lists of the groups and of the species, and chorological distribution patterns, which are divided into various altitudinal zones, given as table-charts. The distribution of the populations of the various species-groups (genera) is shown on maps, especially of South-Eastern Asia.

The systematical position of the subtribe Elaterina as member of the kingdom Animalia is given from kingdom to genus level considering the systematic categories: kingdom, diviso, phylum, classis, ordo, familia, tribus, genera and the subsections between them. Used literature: Hentschel et Wagner (1996), Kaestner (1967, 1969, 1972, 1973), Kükenthal et all (1971) and Remane et all (1974).

A phylogenetic hypothesis on the subtribe Elaterina is provided basing on the principle of parsimony and on the outgroup character comparison. For the given phylogenetic hypotheses and the monophyletic tree, especially the works of Ax (1984, 1988) and Hennig (1950, 1953, 1955, 1969, 1974, and 1982) have been considered. The phylogenetic structure of the tribe is analysed under the assumption of dichotomous speciation with the two possible biological events of the total extinction or the continuing existence of the ancestor population. The three computational hypotheses: synapomorphy, symplesiomorphy and convergence have been considered for the hypothesis, and the following methods have been used:

1. The evolutionary species concept. The concept is based on the requirement that "…a single lineage of ancestor-descendant populations maintains its identity from other such lineages and has its own evolutionary tendencies and historical fate" sensu Wiley (1978, 1979, 1980, 1981) in Ax (1984) and Willmann (1983, 1992).
2. The principle of parsimony. This requires the evolution of a new character to be derived from autapomorphous transformation in the ancestral line and by the synapomorphous transfer of the new character to the descendants. Multiple separate development and convergent transformations of the single character would be the alternative to synapomorphy.
3. The out-group character comparison. This requires that two species or groups of species (adelphotaxa) derived from a common ancestral line have synapomorphous characters which are realised only in these taxa. Compared with further groups of species the adelphotaxa should have the majority of symplesiomorphous characters.

The present distribution and the disjunctions of the species' populations have been analysed and discussed basing on the Pangaea theory (most used literature: THENIUS, 1977) and on the phylogenetical hypotheses in this paper.

In the following the meaning of some technical terms which are used in the descriptions, in the determination keys and in the dating of species and groups into the Earth-historical time frame are explained. Generally, the terms: trapezoidal, subtrapezoidal, rectangular, sub-rectangular and campaniform refer to the outline of the pronotum assessed from dorsal view; the terms: parallel, sub-parallel and cuneate refer to the outline of the body or of the elytra, assessed from dorsal view; the terms: serrate, dentate, lamellate, sublamellate refer to the form of the fourth to the tenth antennomere, while the terms: elongate and slender are used for the general impression of the antennae and of the body of the specimen.

Technical terms and their meanings:

1. Trapezoidal: pronotum is conspicuously wider posteriorly than anteriorly; lateral sides are straight.
2. Subtrapezoidal: Pronotum is conspicuously wider posteriorly than anteriorly; lateral sides are slightly bent.
3. Rectangular: Pronotum is just slightly wider posteriorly than anteriorly; lateral sides are straight.
4. Subrectangular: Pronotum is just slightly wider posteriorly than anteriorly; lateral sides are slightly bent.
5. Campaniform: Pronotum is slightly or conspicuously wider posteriorly than anteriorly; lateral sides conspicuously bent and narrowed at the base of hind-angles.
6. Parallel: Elytra and body run in parallel lines for more than 80% of the total length, the lines are straight.
7. Sub-parallel: Elytra or body run on parallel lines for more than 80% of the total length, the lines are slightly bent.
8. Serrate: Antennomere is apically conspicuously wider than basally, apical edge is acute.
9. Dentate: Antennomere is apically conspicuously wider than basally, apical edge is curved.
10. Lamellate: Antennomere is apically conspicuously wider than basally, apical edge is finger-likely extended.
11. Sublamellate: Antennomere is apically conspicuously wider than basally, its apical edge is just allusively extended.
12. Terminus post quem non: constitute the time after which the speciation of an ancestor could not have originated.

The given geographical check-lists constitute a rough help for orientation only. The sectioning is given as political pattern. The given overview is taken from data of the JUNK and SCHENKLING catalogues (1925, 1927), from the data of the material sent us

to study, that of CSV, and from a so far unpublished catalogue of Prof. Dr. G. Platia, of Elateridae described after the abovementioned catalogue.

For a few species of the studied genera for which we had not been able to find their types or newly collected material to study, or for which we could not clear the systematical position basing on the descriptions, we placed as species incertae sedis.

3. COMPARATIVE AND PHYLOGENETIC ANALYSES

3.1. COMPARATIVE ANALYSIS OF THE GENERA

During the study on the species of the genera *Elater* and closely allied we realized that some of the species formerly considered to belong to the genus *Elater* are conspicuously different from other species concerning their general body appearance and many other characters. The species of one of the mentioned groups possess very elongate, sub-parallel and slender bodies with elytra having a distinct fusiform thorn at the inner side of the apexes. For this group of species a name is already available, *Nipponoelater* (fig. 4) published by KISHII (1985), but was synonymised by ÔHIRA (1997) with the genus *Orthostethus* (fig. 5). The species of the genus *Nipponoelater* are conspicuously different from these of *Orthostethus* and both genera surely represent different monophyletic groups of the tribe Elaterini. Especially the form and the structure of the mesosternal fossa is different in the mentioned groups: in the species of the genus *Orthostethus* (fig. 11) the mesosternal fossa have horizontal sides with anterior portions strongly declivous (this is the case also for species of the genus *Taiwanostethus*), while in the species of *Nipponoelater* the sides of the mesosternal fossa are gradually declivous throughout the whole length (fig. 10). The head of the species of the genus *Orthostethus* is slightly concave between the eyes, and even in these of *Nipponoelater*. Further differences may be found in the form of antennae and the structure of the integument. For the mentioned reason, we take *Nipponoelater* as a well-founded taxon, which therefore in the following is being accepted as a valid genus.

A further species-group which is noticeably different from others treated here is *Brachyelater* gen. nov. (figs. 38-41). The species of this group have formerly been considered to belong to the genera *Mulsanteus* and *Elater*. But they are different from the species of both genera in many characters and therefore we are going to place them in a separate and new genus.

In 1906, when SCHWARZ published the genus *Parallelostethus*, he included five species from South-Eastern Asia in this species-group: *P. rubiginosa*, *P. acutus*, *P. ceylanicus*, *P. macassariensis* and *P. conicipennis*, and one species from North America *P. attenuatus*. Unfortunately, SCHWARZ (1906) did not designate the type species for *Parallelostethus*. The type designation has been executed subsequently by HYSLOP (1921) who selected *Elater attenuatus* SAY, 1825 (the only American species of the group) to be the type of *Parallelostethus* (figs. 6, 12). Since that time, as there are conspicuous differences between the species of *Parallelostethus* from South-Eastern Asia and the *P. attenuatus* from North America, a serious problem has been created for the taxonomical grouping of the species of *Parallelostethus* from South-Eastern Asia.

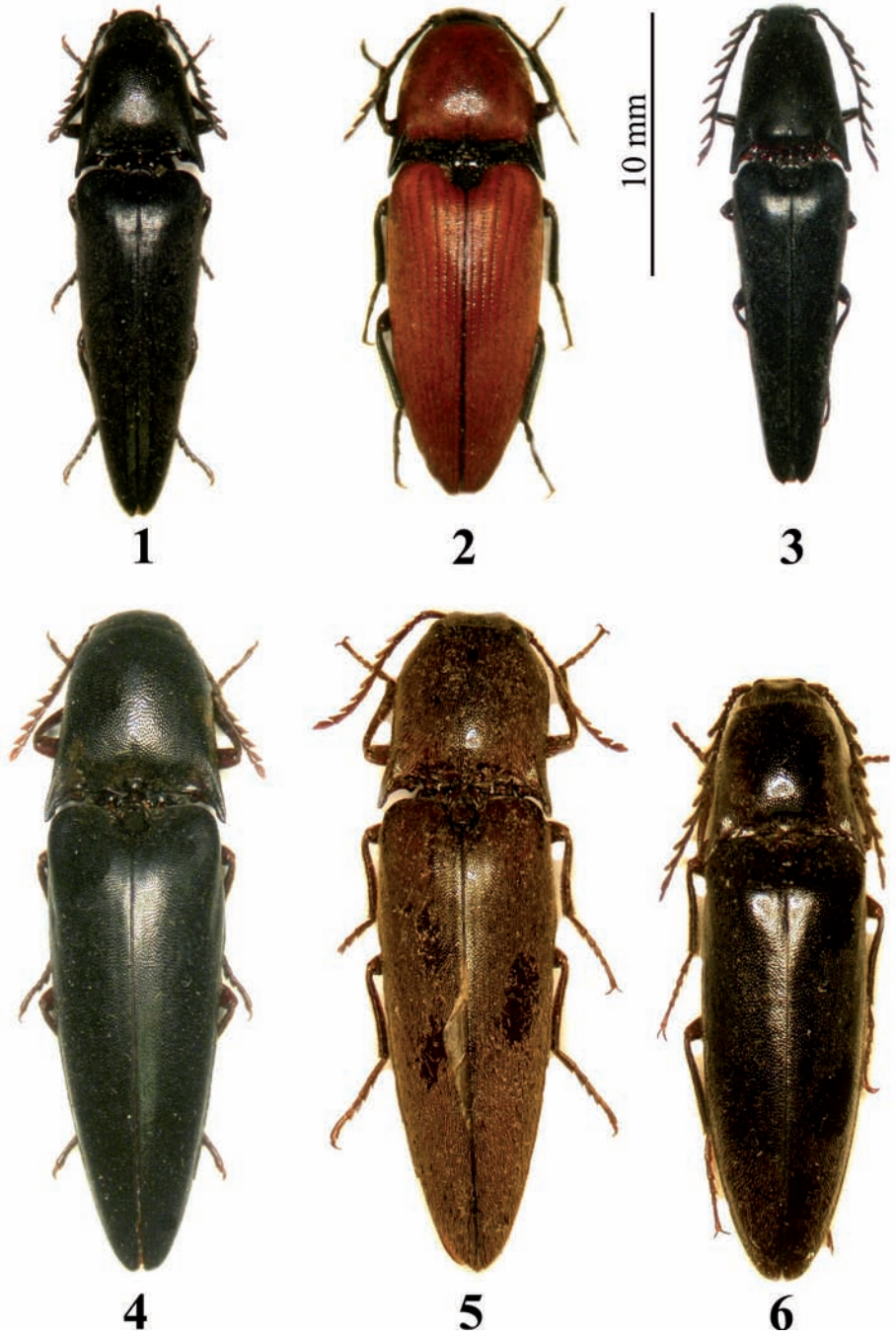
The most evident differences between the abovementioned species from South-Eastern Asia and the *P. attenuatus* are the body form of the specimen the form of the pronotum and of the scutellum. The body form of *P. attenuatus* is elliptic, and that of the species from South-Eastern Asia is elongate with distinctly wedge-shaped elytra. The length ratio of pronotum to elytra of the mentioned species is as following (measured on material preserved in the collection of the first author of this paper): *P. attenuatus*:

60:167 = 1:2.783; *P. ceylanicus*: 60:133 = 1:2.217; *P. acutus*: 62:132 = 1:2.129; *P. conicipennis*: 73:170 = 1:2.328; *P. macassariensis*: 76:175 = 1:2.303. The average length ratio of pronotum and elytra in the species from South-Eastern Asia is 1:2.247, while that of *P. attenuatus* is 1:2.783. Further differences may be found in the mesosternal fossa and in the prosternal apophysis, as well as in the form of the scutellum which has a cuneate form and a clypeate surface in the species from South-Eastern Asia while it is sub-parallel and plain in *P. attenuatus*. For this reason we see a necessity to separate both groups systematically and create a new genus for some of the abovementioned species from South-Eastern Asia: *Leptinostethus* gen. nov. (fig. 3). Another of the species which Schwarz (1907) included into the genus *Parallelostethus* is the *P. acutus* (fig. 46). This species is transferred in this paper to the genus *Elater* Linnaeus, 1758, as its appearance and the systematically important characters fit the genus.

Aphanobius infuscatus Germar, 1844, the type species of *Orthostethus* has a sub-parallel body and sub-parallel elytra with a length/width ratio of approximately 1:2.7; the apexes of the elytra are orbicular with a small, barely visible thorn on the inner side; the sides of mesosternal fossa are horizontal posteriorly, anteriorly strongly declivous and distinctly divergent; the prosternal apophysis is parallel to body axis and with an abduct angle medially; the integument is covered with punctures with flat and shiny interstices; the pubescence is bristly and declivous. Especially the prosternal apophysis of the species of *Orthostethus* (fig. 11) is similar to that of the species of *Taiwanostethus* and may have been the reason why Kishii (1994) compared *Taiwanostethus* with *Orthostethus*: "After my recent careful examination (…) I have resulted in coming to a conclusion that the Taiwanese species is closely allied to the *Orthostethus* surely" (Kishii, 1994: 7-8). The species of the genus *Taiwanostethus* are also overtaken here as belonging to the new subtribe Elaterina.

For the phylogenetic assessment it was necessary to study all the species-groups of the tribe Elaterini. Therefore, the genera *Brachyelater* gen. nov., *Diplostethus* Schwarz, 1907, *Elater* Linnaeus, 1758, *Leptinostethus* gen. nov., *Mulsanteus* Gozis, 1875, *Nipponoelater* Kishii, 1985, *Sericus* Eschscholtz, 1829, *Taiwanostethus* Kishii (1994), *Orthostethus* Lacordaire, 1857, *Parallelostethus* Schwarz, 1906, *Pittonotus* Kiesenwetter, 1859 and *Pseudagriotes* Schwarz, 1898 have been included in the study.

As an overall result of our study, we are in the position to find several identical characters in the various species-groups. As all species of the genera *Elater* Linnaeus, 1758, *Nipponoelater* Kishii, 1985, *Leptinostethus* gen. nov., *Taiwanostethus* Kishii (1994), *Orthostethus* Lacordaire, 1857 and *Parallelostethus* Schwarz, 1906 possess various common identical characters, especially in the structure and shape of the metacoxal plates (figs. 13-18) and the mesosternal fossa (figs. 7-12), we take these as an indication of a close relationship between these species-groups. Therefore, in the following we are going to establish a higher taxonomical group joining the aforementioned genera into a new subtribe named Elaterina.



Figs. 1-6. Some species of the genera: 1 – *Taiwanostethus* sp., 2 – *Elater* sp., 3 – *Leptinostethus* sp., 4 – *Nipponoelater* sp., 5 – *Orthostethus* sp., 6 – *Parallelostethus* sp.

3.2. ASSESSMENT OF IMPORTANT CHARACTERS OF THE COMPARED SPECIES-GROUPS

In the following, some important characters of species and species-groups of the tribe Elaterini will be compared. These comparisons are used for the selection of the homologous characters of the species and for the formation of the phylogenetically based groups. The measurements were taken from the material of the first author's collection. The following genera of the tribe Elaterini have been considered: *Brachyelater*, *Diplostethus*, *Elater*, *Leptinostethus*, *Mulsanteus*, *Nipponoelater*, *Orthostethus, Parallelostethus*, *Pittonotus*, *Pseudagriotes*, *Sericus* and *Taiwanostethus*.

Body measures:

The body length of the specimens of the tribe Elaterini ranges between 7.00 to 30.02 mm, the body width between 1.70 to 8.62 mm. The length-width ratio of the specimen ranges between 4.05:1 and 3.48:1, depending on the outline of the body.

Body form and outline:

The body forms of the species are different for each of the genera and range between a sub-parallel body form for species of the genus *Brachyelater*, *Sericus*, *Pseudagriotes*, *Parallelostethus*, *Nipponoelater* and *Orthostethus*, an elliptical body form for the specimens of the genera *Diplostethus*, *Elater* and *Pittonotus*, and a wedge-shaped one for the specimens of the genera *Leptinostethus*, *Mulsanteus*, *Taiwanostethus* and *Sericus*.

Prosternal apophysis:

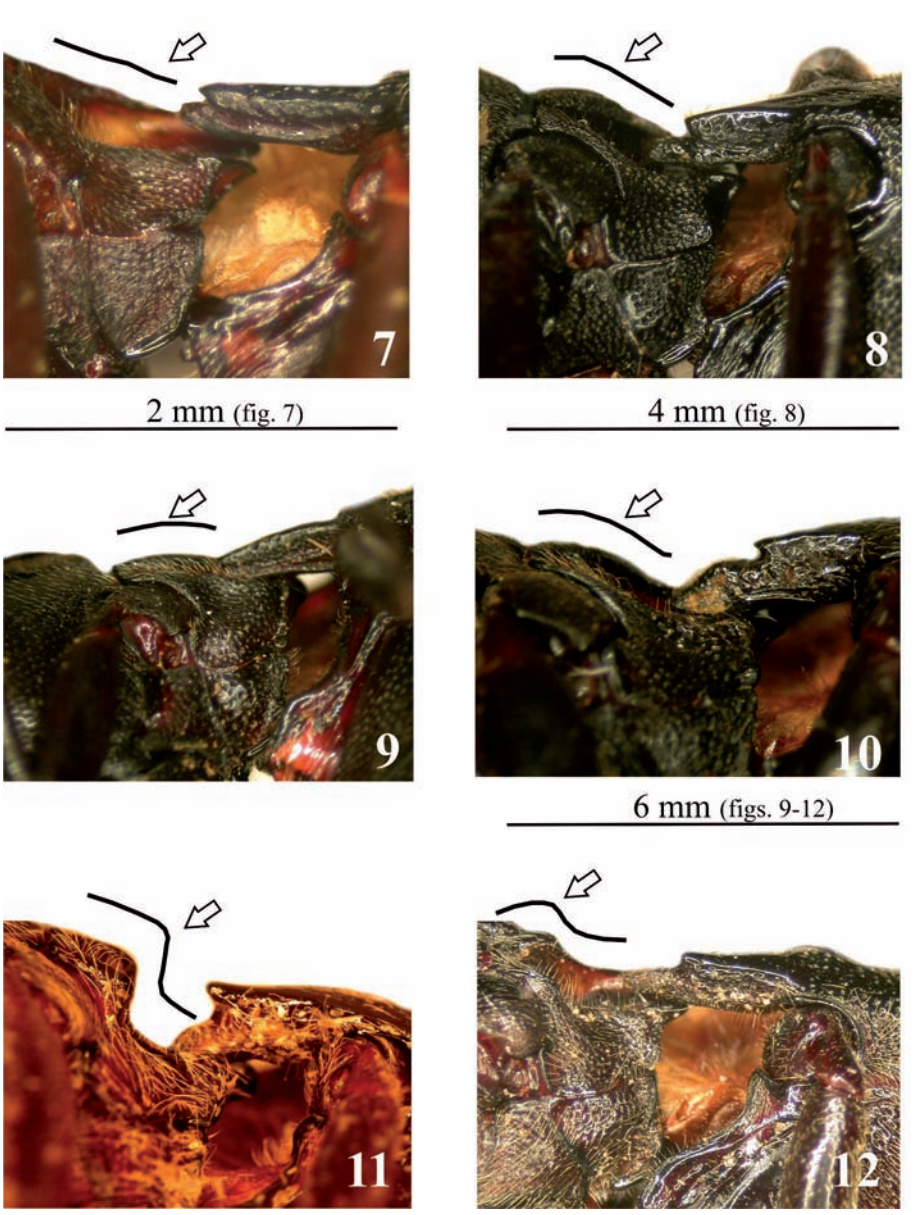
The prosternal apophysis is parallel to body axis, apically bifid emarginated in all species of the genera *Brachyelater*, *Mulsanteus* and *Sericus* and slightly proximal to body axis and with a conspicuously uncinate deposition medially in further genera of the tribe Elaterina (genera *Leptinostethus*, *Elater*, *Nipponoelater*, *Parallelostethus*, *Taiwanostethus*, *Orthostethus*) or with a rectangular deposition short after the procoxae (genera *Diplostethus* and *Pittonotus*).

Mesosternal fossa:

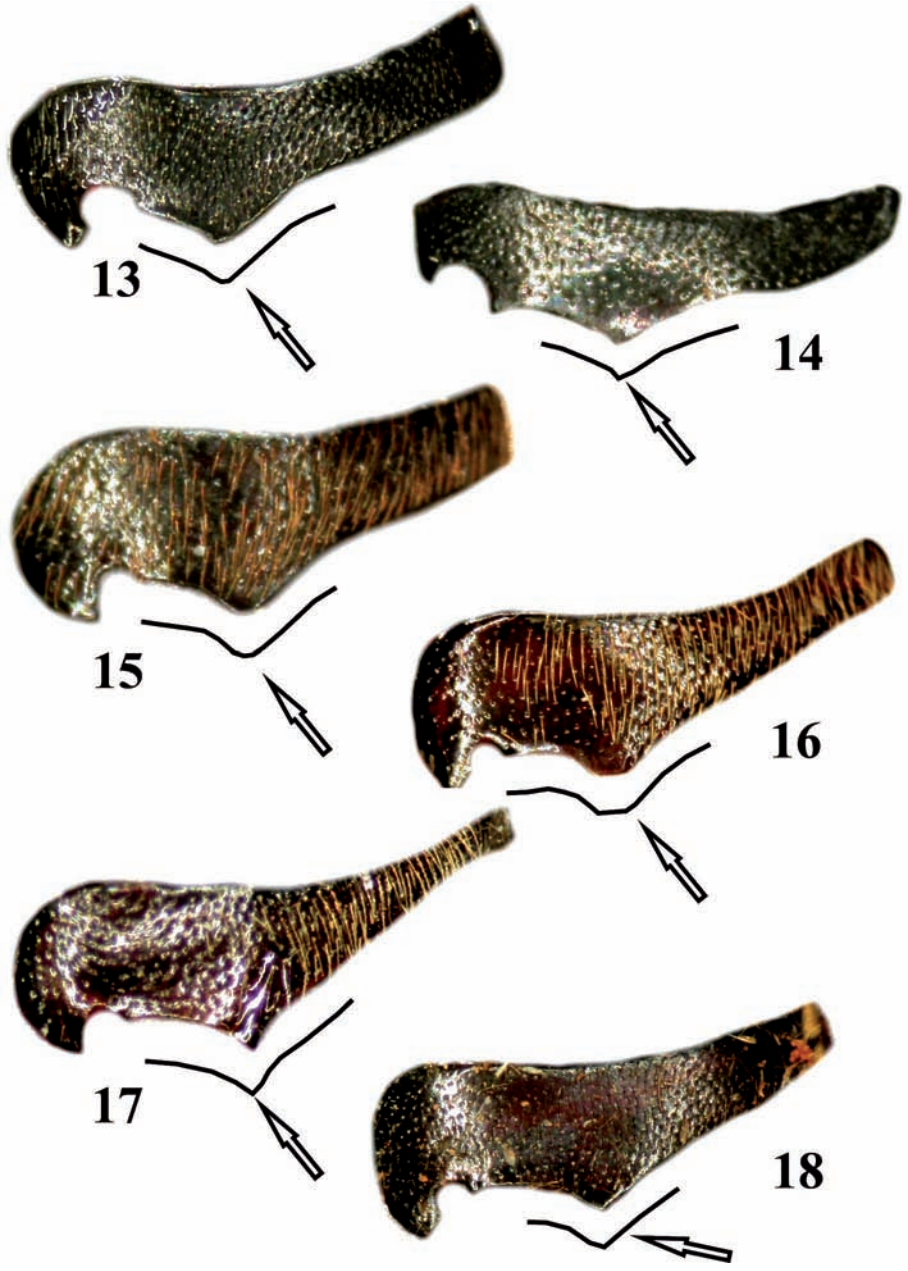
The sides of the mesosternal fossa are horizontal posterior in the species of the genera *Brachyelater*, *Mulsanteus* and *Sericus*, gradually declivous throughout its length in *Elater* and *Nipponoelater* and gradually declivous throughout its length and nearly sub-parallel to body axis in the species of the genus *Leptinostethus* or with horizontal vaulted sides in *Orthostethus*, *Parallelostethus* and *Taiwanostethus.*

Metacoxal plates:

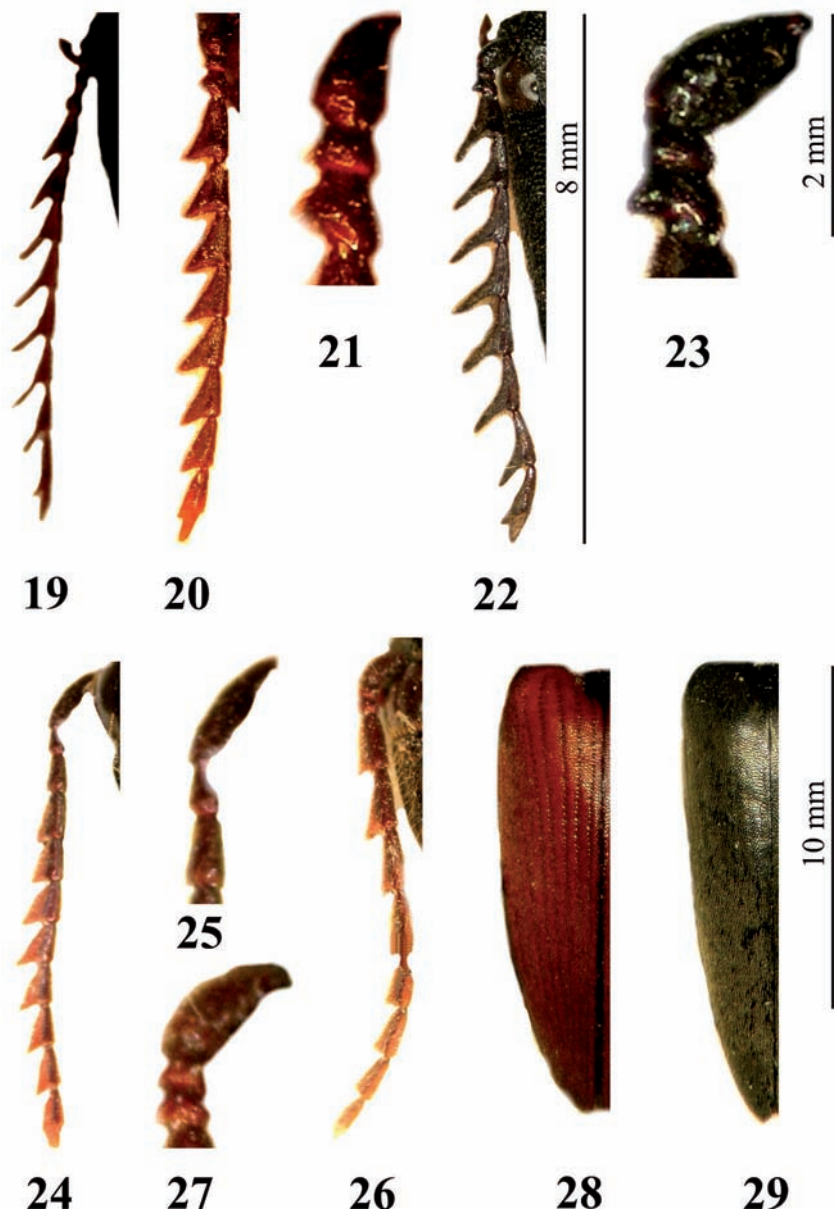
The metacoxal plates are broad laterally, nearly straight inward and conspicuously angulate submedially (*Elater*, *Leptinostethus*, *Nipponoelater, Orthostethus*, *Parallelostethus*, *Taiwanostethus*), or broad or small laterally, bent inward and with or without a semi-radial extension submedially (*Brachyelater*, *Diplostethus*, *Mulsanteus*, *Sericus*, *Pseudagriotes* and *Pittonotus*). The mentioned characters are nearly identical in all species of the groups and can therefore be taken as homologous.



Figs. 7-12. Mesosternal fossa with prosternal apophysis of species of the genera: 7 – *Brachyelater* sp., 8 – *Elater* sp., 9 – *Leptinostethus* sp., 10 – *Nipponoelater* sp., 11 – *Orthostethus* sp., 12 – *Parallelostethus* sp.



Figs. 13-18. Metacoxal plates of species of the subtribe Elaterina: 13 – *Elater* sp., 14 – *Leptinostethus* sp., 15 – *Nipponoelater* sp., 16 – *Orthostethus* sp., 17 – *Parallelostethus* sp., 18 – *Taiwanostethus* sp.



Figs. 19-29. Antennae and antennomere 1-3 and left elytron of species of the genera *Brachyelater* gen. nov., *Elater*, *Leptinostethus* gen. nov., *Nipponoelater* and *Taiwanostethus*: 19 – *Brachyelater phongsalyensis* (Schimmel & Tarnawski, 2007) comb. nov., 20, 21 – *Elater ferrugineus* Linnaeus, 1758, 22, 23 – *Leptinostethus ceylanicus* (Candèze, 1863) comb. nov., 24, 25 – *Nipponoelater kradungensis* sp. nov., 26, 27 – *N. malaysiensis* sp. nov., 28 – *Elater ferrugineus* Linnaeus, 1758, 29 – *Nipponoelater maindroni* (Fleutiaux, 1905) comb. nov.

Outline of pronotum:

The pronotum outline in general is trapezoidal to campaniform with some variations at the subbase of the surface in the different genera. The subbase in some species with campaniform pronotum outline is more or less constricted. The need for having a constricted subbase on pronotum, is most probably in correlation with the functional process of the movement. The form of the pronotum enables to draw conclusions on the behaviour of these species.

Posterior angles of pronotum:

The posterior angles of pronotum in all species possess a carina which is reaching from base up to at least the basal fourth and being clearly visible as an elevated line.

Head:

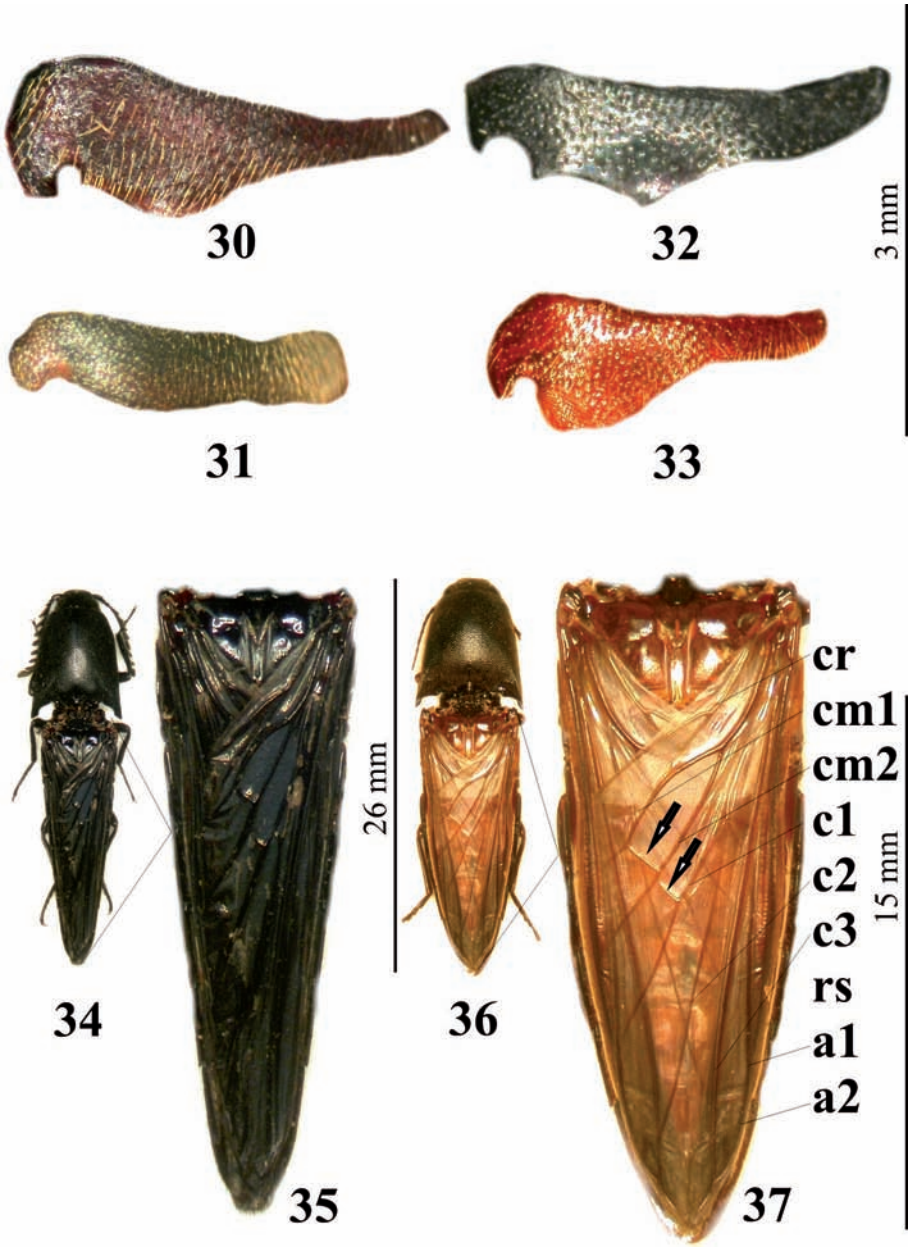
The boundary carina of the frons in most of the species is semi-circular to triangular- infundibuliform and conspicuously visible. The eyes are hemispherical to distinctly prominent and taking together approximately half of the width of the head.

Antennae:

The antennae of the specimen are serrate to dentate or lamellate. The majority of species possess serrate to dentate antennae with the second and the third antennomere being different in the species of the various genera: *Brachyelater* species have a second antennomere which is short, triangular and as long as wide, the third antennomere is slightly longer than the second antennomere, and truncate at apex, both antennomeres combined are slightly shorter than the fourth antennomere and each of the following antennomeres; *Elater* species have a short second antennomere which is triangular and as long as wide, the third antennomere is as long as the second antennomere and both antennomeres combined are clearly shorter than the fourth and each of the following antennomeres; *Nipponoelater* species have a short second antennomere which is triangular and slightly longer than wide; the third antennomere is conspicuously longer than the second antennomere and as long as each of the following antennomere and both antennomeres combined are clearly longer than the fourth and each of the following antennomeres (one exception); *Leptinostethus* species have a second antennomere which is short and triangular and as long as wide; the third antennomere is slightly longer than the second antennomere, truncate apically and both antennomeres combined are conspicuously shorter than the fourth and each of the following antennomeres; the lamellation of the antennae of some of the species of the genera *Brachyelater* (one species of the genus), *Nipponoelater* (one species of the genus) and *Leptinostethus* (all species of the genus) is visible from the fourth to the tenth antennomere.

Surface of scutellum:

The surface of the scutellum is smooth and plain in all species of the genera except for those of the genus *Leptinostethus*. The species of this group have a lingulate scutellum which is slightly convex at base and laterally, the surface is conspicuously raised and clypeate.



Figs. 30-37. Metacoxal plates, alae and flight muscles of some species of the tribe Elaterini: 30-33: metacoxal plates, 30 – *Diplostethus* sp., 31 - *Sericus* sp., 32 – *Leptinostethus* sp., 33 – *Mulsanteus* sp. 34-37: alae and flight muscles, 34, 35 – *Leptinostethus macassariensis* (Candèze, 1863) comb. nov.; 36, 37 – *Nipponoelater rubiginosus* (Candèze, 1889) comb. nov.

Surface of elytra:

The elytra of the species have an apex on each elytron which is fusiform with a distinct thorn at the inner side; only the species of the genus *Elater* possess an apex on each elytron which is orbicular and with a small just visible thorn at the inner side. The surface on the elytra of the species of the genus *Elater* is covered with impressed striae with deeply impressed punctures, while the striae on elytra of the species of all further groups are reduced with punctures being just slightly impressed.

Alae:

The alae are melleous in the species of the mentioned genera, except for the species of the genus *Leptinostethus* which have black ones. The alae are transparent and densely covered with very small brownish bristles; in resting posture the alae being flabelliform placed onto the tergite; the wings have no folding angle, only the radial-segment is longitudinal folded apically; the costa radialis, the costa medialis and the cubitus are completely built, from laterally upper edge of the flight muscle up to the lateral margin; the costa radialis has a parallel-laterally sectional rib medially; the costa media 1 and the costa media 2 are connected subapically by a distinct anastomosis.

Flight muscles:

The flight muscles are quadritubercular with a deep and broad median groove, visible from centre of the flight muscles up to the base of scutellum.

3.3. TABLES OF HOMOLOGOUS CHARACTERS OF THE COMPARED GENERA

The characters set in bold in the following tables are these which are conspicuously different from the majority of the other ones of the genera of the tribe Elaterini

3.3.1. The genus *Leptinostethus* gen. nov.

Body measures: 19-22 mm length; 4.8-5.5 mm width.

Body form: **Wedge-shaped.**

Prosternal apophysis: Proximal to body axis, uncinate medially.

Mesosternal fossa: Gradually declivous throughout length.

Metacoxal plates: Broad laterally, nearly straight inward and conspicuously angulate submedially.

Pronotal outline: Trapezoidal.

Antennae: **Lamellate from fourth antennomere on**.

2nd and 3rd antennomere: 2. antennomere triangular, as long as wide; 3. antennomere slightly longer than 2 antennomere, truncate apically.

Outline of elytra: Cuneate, laterally straight, apically orbicular, apical thorn distinct.

Surface of elytra: Impressed striae reduced, punctures slightly impressed.

Alae: **Black**.

Flight muscles: Quadritubercular with a deep and broad median groove, centrally of the flight muscle up to the base of scutellum.

Head: Boundary carina of the frons semi-circular to triangular- infundibuliform and conspicuously visible.

3.3.2. The genus *Elater* Linnaeus, 1758

Body measures: 18-21 mm length; 5-5.8 mm width.

Body form: **Elliptical.**

Prosternal apophysis: Proximal to body axis, uncinate medially.

Mesosternal fossa: Gradually declivous throughout length.

Metacoxal plates: Broad laterally, nearly straight inward and conspicuously angulate submedially.

Pronotal outline: C**ampaniform.**

Antennae: Serrate from 4. antennomere on.

2nd and 3rd antennomere: 2. antennomere triangular, as long as wide; 3. antennomere as long as 2. antennomere, truncate apically.

Outline of elytra: **Cuneate, laterally bent, apically orbicular, apical thorn small**.

Surface of elytra: **Striate cyclic with impressed punctures.**

Alae: Melleous.

Flight muscles: Quadritubercular with a deep and broad median groove, centrally of the flight muscle up to the base of scutellum.

Head: Boundary carina of the frons semi-circular to triangular- infundibuliform and conspicuously visible.

3.3.3. The genus *Brachyelater* gen. nov.

Body measures: 14-17 mm length; 3.6-3.9 mm width.

Body form: Sub-parallel.

Prosternal apophysis: **Parallel to body axis, emarginated apically**.

Mesosternal fossa: **Declivous, horizontal posterior**.

Metacoxal plates: **Broad or reduced laterally, bent inward and broadly rounded submedially**.

Pronotal outline: **Trapezoidal.**

Antennae: Dentate (exceptionally lamellate) from 4. antennomere on.

2nd and 3rd antennomere: 2. antennomere triangular, as long as wide; 3. antennomere slightly longer than 2. antennomere, truncate apically.

Outline of elytra: Cuneate, laterally straight, apically orbicular, apical thorn distinct.

Surface of elytra: Impressed striae reduced, punctures slightly impressed.

Alae: Melleous.

Flight muscles: Quadritubercular with a deep and broad median groove, centrally of the flight muscle up to the base of scutellum.

Head: Boundary carina of the frons semi-circular to triangular- infundibuliform and conspicuously visible.

3.3.4.. The genus *Nipponoelater* Kishii, 1985

Body measures: 22-30 mm length; 7.6-8.6 mm width.

Body form: Sub-parallel.

Prosternal apophysis: Proximal to body axis, uncinate medially.

Mesosternal fossa: Gradually declivous throughout length.

Metacoxal plates: Broad laterally, nearly straight inward and conspicuously angulate submedially.

Pronotal outline: Trapezoidal; subtrapezoidal to subrectangular.

Antennae: Dentate to sublamellate from 4. antennomere on.

2nd and 3rd antennomere: **2. antennomere slightly longer than wide, 3. antennomere conspicuously longer than 2. antennomere (one exception), truncate apically.**

Outline of elytra: Cuneate, laterally straight, apically orbicular, apical thorn distinct.

Surface of elytra: Impressed striae reduced, punctures slightly impressed.

Alae: Melleous.

Flight muscles: Quadritubercular with a deep and broad median groove, centrally of the flight muscle up to the base of scutellum.

Head: Boundary carina of the frons semi-circular to triangular- infundibuliform and conspicuously visible.

3.3.5. The genus *Taiwanostethus* Kishii, 1994

Body measures: 18-28 mm length; 6.3-7.2 mm width.

Body form: **Wedge-shaped**.

Prosternal apophysis: Proximal to body axis, uncinate medially.

Mesosternal fossa: Horizontal vaulted sides.

Metacoxal plates: Broad laterally, nearly straight inward and conspicuously angulate submedially.

Pronotal outline: Trapezoidal to campaniform.

Antennae: Dentate from 4. antennomere on.

2nd and 3rd antennomere: 2. antennomere triangular, as long as wide; 3. antennomere as long as 2. antennomere, truncate apically.

Outline of elytra: Cuneate, laterally straight, apically orbicular, apical thorn distinct.

Surface of elytra: Impressed striae, punctures impressed.

Alae: Melleous.

Flight muscles: Quadritubercular with a deep and broad median groove, centrally of the flight muscle up to the base of scutellum.

Head: Boundary carina of the frons semi-circular to triangular- infundibuliform and conspicuously visible.

3.3.6. The genus *Orthostethus* Lacordaire, 1857

Body measures: 16-29 mm length; 6.5-7.3 mm width.

Body form: Sub-parallel.

Prosternal apophysis: Proximal to body axis, uncinate medially.

Mesosternal fossa: Horizontal vaulted sides.

Metacoxal plates: Broad laterally, nearly straight inward and conspicuously angulate submedially.

Pronotal outline: Campaniform.

Antennae: Dentate from 4. antennomere on.

2nd and 3rd antennomere: 2. antennomere triangular, as long as wide; 3. antennomere as long as 2. antennomere, truncate apically.

Outline of elytra: Cuneate, laterally straight, apically orbicular, apical thorn distinct.

Surface of elytra: Impressed striae, punctures impressed.
Alae: Melleous.

Flight muscles: Quadritubercular with a deep and broad median groove, centrally of the flight muscle up to the base of scutellum.

Head: Boundary carina of the frons semi-circular to triangular- infundibuliform and conspicuously visible.

3.3.7. The genus *Parallelostethus* Schwarz, 1907

Body measures: 19-31 mm length; 6.8-7.8 mm width.

Body form: Sub-parallel.

Prosternal apophysis: Proximal to body axis, uncinate medially.

Mesosternal fossa: Horizontal vaulted sides.

Metacoxal plates: Broad laterally, nearly straight inward and conspicuously angulate submedially.

Pronotal outline: Campaniform.

Antennae: Dentate from 4. antennomere on.

2nd and 3rd antennomere: 2. antennomere triangular, as long as wide; 3. antennomere as long as 2. antennomere, truncate apically.

Outline of elytra: Cuneate, laterally straight, apically orbicular, apical thorn distinct.

Surface of elytra: Impressed striae, punctures impressed.

Alae: Melleous.

Flight muscles: Quadritubercular with a deep and broad median groove, centrally of the flight muscle up to the base of scutellum.

Head: Boundary carina of the frons semi-circular to triangular- infundibuliform and conspicuously visible.

3.3.8. The genus *Diplostethus* Schwarz, 1906

Body measures: 16-25 mm length; 5.6-6.1 mm width.

Body form: Sub-parallel.

Prosternal apophysis: **Proximal to body axis, rectangular deposition medially**.

Mesosternal fossa: Gradually declivous throughout length.

Metacoxal plates: Broad laterally, bent inward and broadly rounded submedially.

Pronotal outline: Campaniform.

Antennae: Dentate from 4. antennomere on.

2nd and 3rd antennomere: 2. antennomere triangular, as long as wide; 3. antennomere as long as 2. antennomere, truncate apically.

Outline of elytra: Cuneate, laterally straight, apically orbicular, apical thorn distinct.

Surface of elytra: Impressed striae, punctures impressed.

Alae: Melleous.

Flight muscles: Quadritubercular with a deep and broad median groove, centrally of the flight muscle up to the base of scutellum.

Head: Boundary carina of the frons semi-circular to triangular- infundibuliform and conspicuously visible.

3.3.9. The genus *Pittonotus* Kiesenwetter, 1859

Body measures: 16-25 mm length; 5.6-6.1 mm width.

Body form: Sub-parallel.

Prosternal apophysis: **Proximal to body axis with rectangular deposition medially**.

Mesosternal fossa: Gradually declivous throughout length.

Metacoxal plates: Broad laterally, bent inward and broadly rounded submedially.
Pronotal outline: Campaniform.

Antennae: Dentate from 4. antennomere on.

2nd and 3rd antennomere: 2. antennomere triangular, as long as wide; 3. antennomere as long as 2. antennomere, truncate apically.

Outline of elytra: Cuneate, laterally straight, apically orbicular, apical thorn distinct.

Surface of elytra: Impressed striae, punctures impressed.

Alae: Melleous.

Flight muscles: Quadritubercular with a deep and broad median groove, centrally of the flight muscle up to the base of scutellum.

Head: Boundary carina of the frons semi-circular to triangular- infundibuliform and conspicuously visible.

3.3.10. The genus *Mulsanteus* Gozis, 1875

Body measures: 7-18 mm length; 2.8-3.8 mm width.

Body form: Sub-parallel.

Prosternal apophysis: **Parallel to body axis, emarginated apically**.

Mesosternal fossa: **Declivous, horizontal posterior**.

Metacoxal plates: **Broad or reduced laterally, bent inward and broadly rounded submedially**.

Pronotal outline: **Trapezoidal, hind-angles bent downward.**

Antennae: Dentate (exceptionally lamellate) from 4. antennomere on.

2nd and 3rd antennomere: 2. antennomere triangular, as long as wide; 3. antennomere slightly longer than 2. antennomere, truncate apically.

Outline of elytra: Cuneate, laterally straight, apically orbicular, apical thorn distinct.

Surface of elytra: Impressed striae reduced, punctures slightly impressed.

Alae: Melleous.

Flight muscles: Quadritubercular with a deep and broad median groove, centrally of the flight muscle up to the base of scutellum.

Head: Boundary carina of the frons semi-circular to triangular- infundibuliform and conspicuously visible.

3.3.11. The genus *Sericus* Eschscholtz, 1829

Body measures: 8.8-12.2 mm length; 2.2-2.8 mm width.

Body form: Sub-parallel.

Prosternal apophysis: **Parallel to body axis, emarginated apically**.

Mesosternal fossa: **Declivous, horizontal posterior**.

Metacoxal plates: **Broad or reduced laterally, bent inward and broadly rounded submedially**.

Pronotal outline: **Trapezoidal, hind-angles bent downward.**

Antennae: Dentate (exceptionally lamellate) from 4. antennomere on.

2nd and 3rd antennomere: 2. antennomere triangular, as long as wide; 3. antennomere slightly longer than 2. antennomere, truncate apically.

Outline of elytra: Cuneate, laterally straight, apically orbicular, apical thorn distinct.

Surface of elytra: Impressed striae reduced, punctures slightly impressed.

Alae: Melleous.

Flight muscles: Quadritubercular with a deep and broad median groove, centrally of the flight muscle up to the base of scutellum.

Head: Boundary carina of the frons semi-circular to triangular- infundibuliform and conspicuously visible.

3.3.12. The genus *Pseudagriotes* Schwarz, 1896

Body measures: 14-16 mm length; 3.2-3.2 mm width.

Body form: Sub-parallel.

Prosternal apophysis: **Parallel to body axis, emarginated apically**.

Mesosternal fossa: **Declivous, horizontal posterior**.

Metacoxal plates: **Broad or reduced laterally, bent inward and broadly rounded submedially**.

Pronotal outline: **Campaniform with the hind-angles conspicuously divergent.**

Antennae: **Filiform from 4. antennomere on**.

2nd and 3rd antennomere: 2. antennomere triangular, slightly longer than wide; 3. antennomere slightly longer than 2. antennomere, truncate apically.

Outline of elytra: Cuneate, laterally straight, apically orbicular, apical thorn distinct.

Surface of elytra: Impressed striae reduced, punctures slightly impressed.

Alae: Melleous.

Flight muscles: Quadritubercular with a deep and broad median groove, centrally of the flight muscle up to the base of scutellum.

Head: Boundary carina of the frons semi-circular to triangular- infundibuliform and conspicuously visible.

3.4. WEIGHING OF CHARACTERS OF THE GENERA

In the context of the phylogenetic history, the species of the subtribe Elaterina possess various characters which have to be taken as plesiomorphous and as apomorphous. The plesiomorphous characters are these which were overtaken unchanged from an ancestor by the descendants at the time of speciation. The apomorphous characters are these which had changed in the descendants in comparison to the characters of the ancestor at the time of speciation.

All species of the subtribe Elaterina therefore carry the plesiomorphous characters of the family Elateridae, of the subfamily Elaterinae and these of the tribe Elaterini.

Plesiomorphous characters of the adults:

The meso- and prothorax form a jumping mechanism which consist of the mesosternal fossa and the prosternal apophysis; fourth and fifth sternite are connected by a movable membrane; the head is convex, the frons is complete, the mouthparts are ipognathous; the prosternal-pleural sutures are closed anteriorly; the metacoxal plates are broad laterally, nearly straight inward and conspicuously angulate submedially; the mesosternal fossa is gradually declivous throughout length (exceptionally slightly horizontal posterior) or with horizontal vaulted sides.

Homologous characters of various groups within the tribe Elaterini:

1. The size of the species: 19-31 mm in length (*Diplostethus*, *Pittonotus Elater*, *Leptinostethus*, *Nipponoelater*, *Orthostethus*, *Parallelostethus*, *Taiwanostethus*).
2. The size of the species: 8.8-17.0 mm in length (*Brachyelater*, *Mulsanteus*, *Pseudagriotes*, *Sericus*).
3. The metacoxal plates are broad or reduced laterally, bent inward, and broadly rounded submedially (*Diplostethus*, *Pittonotus*, *Brachyelater*, *Mulsanteus*, *and Sericus*).

4. The metacoxal plates are broad laterally, nearly straight inward with conspicuously angulate edge submedially (*Elater*, *Leptinostethus*, *Nipponoelater*, *Orthostethus*, *Parallelostethus*, *Taiwanostethus*).
5. The sides of the mesosternal fossa are horizontal posterior (*Brachyelater*, *Mulsanteus* and *Sericus*).
6. The sides of the mesosternal fossa are gradually declivous throughout its length (*Elater* and *Nipponoelater*).
7. The sides of the mesosternal fossa are gradually declivous throughout its length and nearly sub-parallel to body axis (*Leptinostethus*).
8. The sides of the mesosternal fossa are with horizontal vaulted sides (*Orthostethus*, *Parallelostethus*, *and Taiwanostethus*).

3.5. CONSTITUTION OF PHYLOGENETIC BASIC-GROUPS

Basing on the weighing of characters and the analysis above, the following phylogenetic basic-groups were established and apomorphous and plesiomorphous characters are used in the following as phylogenetically important:

PRESUMABLY MONOPHYLETIC GROUPS

1. A presumed monophylum consisting of groups of species with the mesosternal fossa gradually declivous throughout length: *Nipponoelater*, *Leptinostethus* and *Elater*.
2. A presumed monophylum consisting of groups of species with the mesosternal fossa with horizontal vaulted sides short after coxae: *Orthostethus*, *Taiwanostethus* and *Parallelostethus*.
3. A presumed monophylum consisting of groups of species with metacoxal plates lateral broadly, nearly straight inward and conspicuously angulate submedially: *Nipponoelater*, *Leptinostethus*, *Elater*, *Orthostethus*, *Taiwanostethus* and *Parallelostethus*.
4. A presumed monophylum consisting of groups of species with metacoxal plates broad or reduced laterally bent inward and broadly rounded submedially: *Brachyelater*, *Sericus*, *Mulsanteus*, *Diplostethus*, *Pittonotus* and *Pseudagriotes*.
5. A presumed monophylum consisting of groups of species with the prosternal apophysis proximal to body axis, rectangular deposition medially: *Diplostethus* and *Pittonotus*.
6. A presumed monophylum consisting of groups of species with the prosternal apophysis proximal to body axis, emarginated apically: *Brachyelater*, *Sericus*, *Mulsanteus* and *Pseudagriotes*.
7. A presumed monophylum consisting of groups of species with the prosternal apophysis proximal to body axis, uncinate medially: *Nipponoelater*, *Leptinostethus*, *Elater*, *Orthostethus*, *Taiwanostethus* and *Parallelostethus*.

ADULT CHARACTERS UNIQUE TO EACH GENUS

1. Characters developed in the adults of the genus *Elater*: The body outline is elliptical; the elytra are cuneate, slightly bent laterally, the apexes are orbicular with a small thorn; the striae of the elytra surface are cyclic with impressed punctures.
2. Characters developed in the adults of the genus *Leptinostethus*: The elytra are distinctly cuneate and straight laterally, the apexes are orbicular with a distinct thorn; the prosternal apophysis is slightly bent.
3. Characters developed in the adults of the genus *Brachyelater*: The body outline is sub-parallel, the body size is reduced; the prosternal apophysis is reduced in length, the apexes are emarginated apically.
4. Characters developed in the adults of the genus *Nipponoelater*: The third antennomere is distinctly extended in length, at least twice as long as second antennomere.
5. Characters developed in the adults of the genus *Parallelostethus*: Body outline is sub-parallel; mesosternal fossa with sides distinctly emarginated and sub-parallel.
6. Characters developed in the adults of the genus *Orthostethus*: Body outline is sub-parallel; mesosternal fossa with sides distinctly emarginated and distinctly divergent.

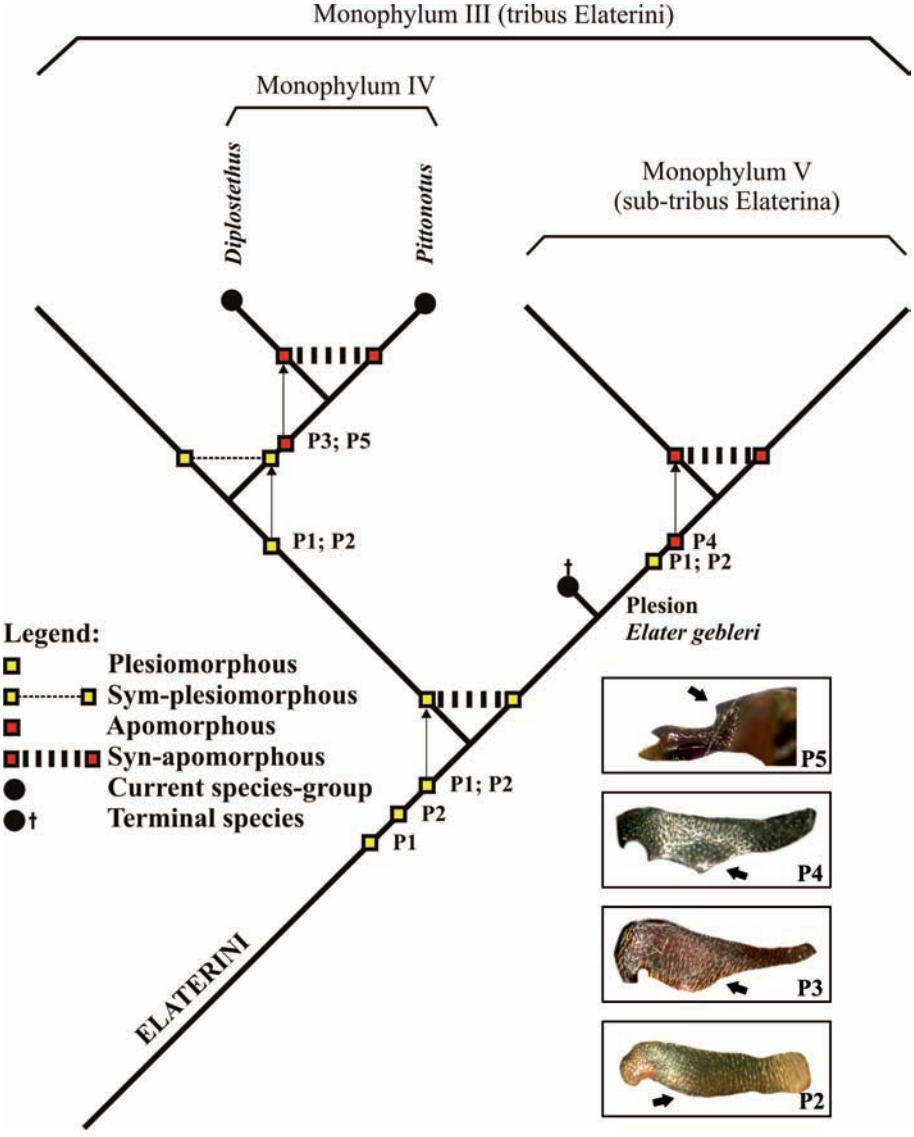
CHARACTERS DEVELOPED IN THE ADULTS OF SOME GENERA

1. Plesiomorphous characters of the adults of the genera *Diplostethus* and *Pittonotus*: The body outline is sub-parallel; the elytra are cuneate, slightly bent laterally, the apexes are orbicular with a distinct thorn; the striae of the elytra surface are cyclic with impressed punctures; metacoxal plates are broad laterally, bent inward and broadly rounded submedially; mesosternal fossa with prosternal apophysis with horizontal vaulted side short after coxae.
2. Plesiomorphous character of the species of the genera *Nipponoelater*, *Leptinostethus*, *Elater*, *Orthostethus*, *Taiwanostethus* and *Parallelostethus*: Metacoxal plates are broad laterally, nearly straight inward and conspicuously angulate submedially.
3. Plesiomorphous character of the species of the genera *Nipponoelater*, *Leptinostethus* and *Elater*: Mesosternal fossa with sides gradually declivous.
4. Plesiomorphous character of the species of the genera *Orthostethus*, *Taiwanostethus* and *Parallelostethus*: Mesosternal fossa with horizontal vaulted sides.

3.6. PHYLOGENETIC HYPOTHESIS ON THE MONOPHYLA OF THE SUBTRIBE ELATERINA
(applies to the given phylogenetic diagrams)

During the phylogenetic history of the monophylum Elaterini, various changes of the species-characters and body transformations had occurred (shown in the ancestral lines of the phylogenetic diagrams). The direction of changes of characters and body transformations used in the following hypothesis are such as:

1. Modification of the metacoxal plates, from broad or reduced laterally, bent inward, without a semi-radial extension submedially, up to broad laterally, nearly straight inward and conspicuously angulate submedially;
2. The modification of the sides of the mesosternal fossa which are gradually declivous throughout its length, up to horizontal vaulted sides;



Phylogenetic diagram of the monophyla III and IV of the tribe Elaterini. The plesiomorphous characters P1, P2 and the apomorphous characters P3-P5 fitting the phylogenetic hypotheses above for the monophyla I-V and IV

3. The modification of the body outline from elliptical to sub-parallel and wedge-shaped form;
4. The modification of the surface of the elytra from impressed striae to a surface with reduced striae, including the reduction of the impression of the punctures on elytra surface;
5. The modification of the antennae from serrate to dentate antennomere and the modification (extension) of the third antennomere;
6. The modification of the prosternal apophysis; the reduction of the body size.

For the hypothesis on the monophyla of the subtribe Elaterina, the works of Ax (1984, 1988) and Hennig (1950, 1953, 1955, 1969, 1974, and 1982) have been particularly used.

Hypothesis for the monophyla I-IX

Monophyla I-V: In the ancestral line of the monophylum I (tribe Elaterini), beside the plesiomorphous characters of the subfamily Elaterinae and the family Elateridae (meso- and prothorax form a jumping mechanism which consists of the mesosternal fossa and the prosternal apophysis; fourth and fifth sternite connected by a movable membrane) new characters (P1-P4) have developed.

P1: Head convex, frons complete, mouthparts ipognathous; prosternal-pleural sutures closed anteriorly.

P2: Metacoxal plates are broad laterally, bent inward, without reduction (monophylum III).

P3: Metacoxal plates are broad laterally, bent inward and broadly rounded submedially (reduction of lateral part of metacoxal plates) (monophylum IV).

P4: Metacoxal plates are broad laterally, nearly straight inward and conspicuously angulate submedially (modification of the formerly rounded part (P3) of the metacoxal plates) (monophylum V).

The characters P1-P4 are present in various compared species-groups of the tribe Elaterini, and can be taken as apomorphous in the ancestral lines of the groups.

The transformation of these characters at the time of speciation is taken as synapomorphously developed in the ancestral line of the monophylum III (Elaterini) and overtaken symplesiomorphous in the descendants of all appertaining genera.

Alternative: Hundredfold separate and convergent genotypic transformation of the characters mentioned above, which results in identical phenotypic organization, would be the alternative to the synapomorphous development (according to the principle of parsimony).

Monophylum IV: In the ancestral line of the monophylum IV (tribe Elaterini), beside the plesiomorphous characters of the subfamily Elaterinae and the family Elateridae (meso- and prothorax forming a jumping mechanism which consists of the mesosternal fossa and the prosternal apophysis; fourth and fifth sternite connected by a movable membrane; head convex, frons complete, mouthparts ipognathous; prosternal-pleural

sutures closed anteriorly), also the plesiomorphous character P3 had already existed, and a new character (P5) has developed apomorphously.

P5: Prosternal apophysis proximal to body axis with a rectangular deposition medially. This character is available in the genus-group with *Pittonotus* and *Diplostethus*.

Direction of character transformation: Character P5 has been transformed from a proximal and simple prosternal apophysis up to a one with a rectangular deposition medially.

The transformation of this character at the time of speciation is taken as synapomorphously developed in the ancestral line of the monophylum IV and overtaken symplesiomorphous in the descendants of the genera *Diplostethus* and *Pittonotus*.

Alternative: Multiple separate and convergent genotypic transformation which results in identical phenotypic organization of the mentioned character would be the alternative to the synapomorphous development (according to the principle of parsimony).

Monophylum V: In the ancestral line of the monophylum V (tribe Elaterini), beside the plesiomorphous characters of the subfamily Elaterinae and the family Elateridae (meso- and prothorax forming a jumping mechanism which consists of the mesosternal fossa and the prosternal apophysis; fourth and fifth sternite connected by a movable membrane; head convex, frons complete, mouthparts ipognathous; prosternal-pleural sutures closed anteriorly), also the plesiomorphous character P3 had already existed, and is modified apomorphously (character P4).

P4: Metacoxal plates are broad laterally, bent nearly straight inward and conspicuously angulate submedially (modification of the inner part of the metacoxal plates from broadly rounded to conspicuously angulate submedially). This character is available in the genus-groups *Orthostethus*, *Taiwanostethus*, *Parallelostethus*, *Nipponoelater*, *Leptinostethus* and *Elater*.

Direction of character transformation: Character P4 has been transformed subparallel sided metacoxal plates to such with the inner part broadly rounded.

The transformation of this character at the time of speciation is somewhat constant in the basic constitution of all species of the mentioned genera and therefore it is taken here as syn-apomorphously developed in the ancestral line of monophylum V and overtaken symplesiomorphous in the descendants of all appertaining genera of the subtribe Elaterina.

Alternative: Multiple separate and convergent genotypic transformation which results in identical phenotypic organization of the mentioned character would be the alternative to the synapomorphous development (according to the principle of parsimony). Also, this character excludes the genus-group from the monophylum IV (outgroup comparison).

Monophylum VI: In the ancestral line of the monophylum VI, beside the plesiomorphous characters of the subfamily Elaterinae and the family Elateridae (meso- and prothorax forming a jumping mechanism which consists of the mesosternal fossa and the prosternal apophysis; fourth and fifth sternite connected by a movable membrane;

head convex, frons complete, mouthparts ipognathous; prosternal-pleural sutures closed anteriorly), and the character P4 (metacoxal plates are broad laterally, bent nearly straight inward and conspicuously angulate submedially), also the plesiomorphous character P6 had existed and is apomorphously modified.

P6: Mesosternal fossa with horizontal vaulted sides (modification of the former gradually declivous sides of the mesosternal fossa, which is available in all further species-groups of the Elaterini). This character is available in the genus-groups *Orthostethus*, *Taiwanostethus* and *Parallelostethus.*

Direction of character transformation: Character P6 has been transformed from declivous sides of mesosternal fossa up to horizontal vaulted sides.

The transformation of this character at the time of speciation is quite constant in the basic constitution of all species of the mentioned genera and therefore it is taken here as synapomorphously developed in the ancestral line of the monophylum VI and overtaken symplesiomorphous in the descendants of the genera *Orthostethus*, *Taiwanostethus* and *Parallelostethus*.

Alternative: Multiple separate and convergent genotypic transformation which results in identical phenotypic organization of the mentioned character would be the alternative to the synapomorphous development (according to the principle of parsimony). Also, this character separates the mentioned genera from the other of the monophylum V (out-group comparison).

Monophylum VII: In the ancestral line of the monophylum VII, beside the plesiomorphous characters of the subfamily Elaterinae and the family Elateridae (Meso- and prothorax forming a jumping mechanism which consists of the mesosternal fossa and the prosternal apophysis; fourth and fifth sternite connected by a movable membrane; head convex, frons complete, mouthparts ipognathous; prosternal-pleural sutures closed anteriorly), and the character P4 (metacoxal plates are broad laterally, bent nearly straight inward and conspicuously angulate submedially), and the mesosternal fossa with horizontal vaulted sides, the plesiomorphous character P7 had existed and is modified apomorphously.

P7: Mesosternal fossa with sides distinctly sub-parallel. This character is available in the genus-groups *Orthostethus* and *Parallelostethus.*

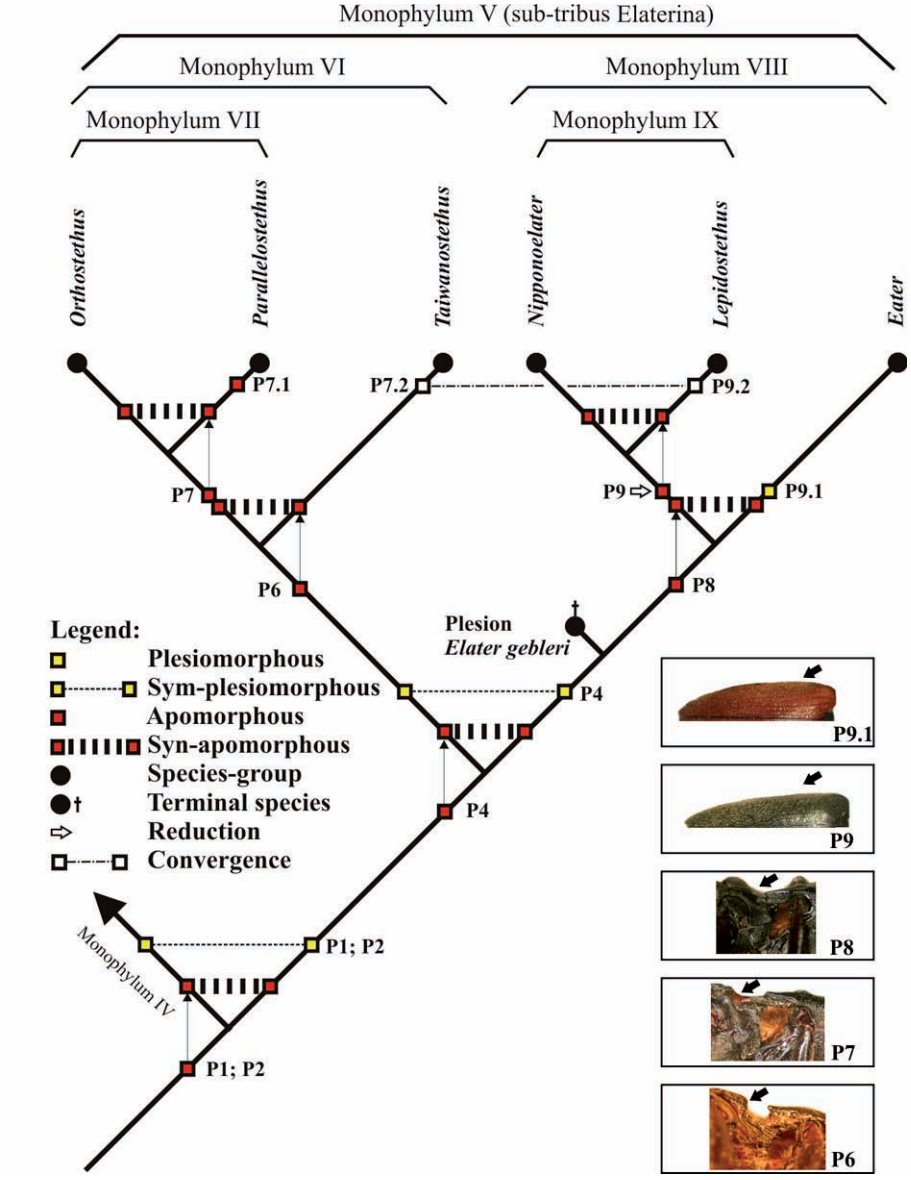
The transformation of this character at the time of speciation is quite constant in the basic constitution of all species of the mentioned genera and therefore it is taken here as synapomorphously developed in the ancestral line of the monophylum VII and overtaken symplesiomorphous in the descendants of the genera *Orthostethus* and *Parallelostethus*.

P7.1: Mesosternal fossa with marginated sides. This character is available in the genus *Parallelostethus* exclusively.

P7.2: The wedge-shaped body in the species of the genus *Taiwanostethus* and in these of *Leptinostethus* (P9.2) has to be rated as convergence, as the further characters (rated here as apomorphous) result in this conclusion.

Direction of character transformation: Character P7 has been transformed from a mesosternal fossa with sides declivous up to vaulted sides.

Alternative: Multiple separate and convergent genotypic transformation which results in identical phenotypic organization of the mentioned characters would be the alternative to the synapomorphous development (according to the principle of parsi-



Phylogenetic diagram of the monophyla V to IX of the tribe Elaterini. The plesiomorphous characters P1, P2, P9.1 and the apomorphous characters P4, P6-P9 fitting the phylogenetic hypotheses above for the mentioned monophyla

mony). Also, this character separates the genera *Orthostethus* and *Taiwanostethus* from the genus *Parallelostethus* of the monophylum VI (out-group comparison). Therefore, the monophylum VII can be taken as a sister group, including the genera *Orthostethus* and *Taiwanostethus*. *Parallelostethus* is accepted here as a single-group without the sister genus known at present.

Monophylum VIII: In the ancestral line of the monophylum VIII, beside the plesiomorphous characters of the subfamily Elaterinae and the family Elateridae (meso- and prothorax forming a jumping mechanism which consists of the mesosternal fossa and the prosternal apophysis; fourth and fifth sternite connected by a movable membrane; head convex, frons complete, mouthparts ipognathous; prosternal-pleural sutures closed anteriorly), and the character P4 (metacoxal plates are broad laterally, bent nearly straight inward and conspicuously angulate submedially), the plesiomorphous character P8 had existed and is overtaken in the ancestral line as plesiomorphous.

P8: Mesosternal fossa gradually declivous throughout length. This character is available in the genus-groups including the genera: *Nipponoelater*, *Leptinostethus* and *Elater*.

The transformation of this character at the time of speciation is quite constant in the basic constitution of all species of the mentioned genera and therefore it is taken here as synapomorphously developed in the ancestral line of the monophylum VI and overtaken symplesiomorphous in the descendants of the genera *Nipponoelater*, *Leptinostethus* and *Elater*.

Alternative: Multiple separate and convergent genotypic transformation which results in identical phenotypic organization of the mentioned character would be the alternative to the synapomorphous development (according to the principle of parsimony). Also, this character separates the genera *Orthostethus*, *Taiwanostethus* and *Parallelostethus* of the monophylum VI (out-group comparison).

Monophylum IX: In the ancestral line of the monophylum IX, beside the plesiomorphous characters of the subfamily Elaterinae and the family Elateridae (meso- and prothorax forming a jumping mechanism which consists of the mesosternal fossa and the prosternal apophysis; fourth and fifth sternite connected by a movable membrane; head convex, frons complete, mouthparts ipognathous; prosternal-pleural sutures closed anteriorly), and the character P4 (metacoxal plates are broad laterally, bent nearly straight inward and conspicuously angulate submedially) and the plesiomorphous character P9, a new character has developed apomorphously.

P9: Impressed striae of the elytra reduced, punctures slightly impressed throughout length. This character is available in the genus-groups including the genera: *Nipponoelater* and *Leptinostethus*.

The transformation of this character at the time of speciation is constant in the basic constitution in all species of the mentioned genera and therefore it is also taken here as syn-apomorphously developed in the ancestral line of the monophylum IX and overtaken symplesiomorphous in the descendants of the genera *Nipponoelater* and *Leptinostethus*.

P9.1: Impressed striae of the elytra and punctures impressed distinctly throughout length. This character is available exclusively in the genus-groups including the genus *Elater*. However, this character is visible in all other species of the tribe Elaterini and therefore treated here a plesiomorphous. As result of this rating, the apomorphous character P9 has to be rated as a reduction of the original condition.

P9.2: The wedge-shaped body in the species of the genus *Leptinostethus* and in these of *Taiwanostethus* (P7.2) has to be rated as convergence, as the further characters (rated here as apomorphous) result in this conclusion.

Alternative: Multiple separate and convergent genotypic transformation which results in identical phenotypic organization of the mentioned character would be the alternative to the synapomorphous development (according to the principle of parsimony). Also, this character distinguishes the genus *Elater* (out-group comparison). Therefore, the monophylum IX can be taken as a sister group, including the genera *Nipponoelater* and *Leptinostethus. Elater* is accepted here as a monogeneric without sister genus known at present.

RESULTS AND DISCUSSIONS

As results of the phylogenetic analysis and hypothesis we received a systematic structure within the tribe Elaterini, which currently includes nine higher monophyletic groups (monophyla I-IX). The monophylum III includes the monophyla VI and VII the genera: *Elater*, *Leptinostethus* and *Nipponoelater* (monophylum VIII) and *Orthostethus*, *Taiwanostethus* and *Parallelostethus* (monophylum VI). Within these monophyla, two genera of each of the monophyla VI and VII include genera which have to be taken as monophyletic sister groups:

7. Genera *Orthostethus* and *Parallelostethus.*

2. Genera *Nipponoelater* and *Leptinostethus.*

The genera *Elater* and *Taiwanostethus* are currently accepted as single-groups without hypothetical sister-genera, as the characters P7 (mesosternal fossa with sides distinctly and finely marginate in the genera *Orthostethus* and *Parallelostethus*) and P9 (impressed striae of the elytra reduced, punctures slightly impressed throughout length in the genera *Leptinostethus* and *Nipponoelater*) are available in these sister groups only.

The following modifications of characters in the various monophyletic groups are especially evident:

1. The metacoxal plates change from broad laterally, bent inward, without reduction (all species of further Elaterini, except for monophylum V) up to nearly straight inward and conspicuously angulate submedially (in all species of monophylum V).
2. The modification of the mesosternal fossa with sides gradually declivous (in all species of the tribe Elaterini, except for monophylum VI), up to a mesosternal fossa with the posterior sides strongly declivous (in all species of the monophylum VI).

3. The modification of the surface of elytra from cyclic and conspicuous striate with impressed punctures (in all species of the tribe Elaterini, except for these of the monophylum IX) up to reduced and just visible striate with reduced impressions of punctures (all species of monophylum IX).
4. The prosternal process with strongly angulate declivity immediately posterior of the coxae is visible in the species of the monophylum IV (*Pittonotus* and *Diplostethus*) exclusively. The reduction of the prosternal apophysis and the emargination on its apex is built in all species of the further groups of Elaterini, except these of the monophylum V. This character separates the species of the monophyla IV and V systematically.

The monophylum V, which includes the species-groups of the genera *Elater*, *Leptinostethus* and *Nipponoelater* (monophylum VIII) and *Orthostethus*, *Taiwanostethus* and *Parallelostethus* (monophylum VI) are combined in the following in a new subtribe of the tribe Elaterina. All of the species of the abovementioned genera possess a common character which separates them from the rest of the species-groups of the tribe: the metacoxal plates sharply angulate submedially.

3.6.1. Terminal taxa and historical dating

Terminal taxa

Very little is known generally about plesia and terminal taxa of the Coleoptera, especially of the tribe Elaterini and also of the new subtribe Elaterina. A few petrous fossil species have been described so far from the lower Perminan period and from the Jurassic period. Amber-inclused species are known from the Baltic amber from Eocene and from Chiapas in Mexico from the Oligocene and Miocene.

Hennig (1969) mentioned the oldest coleopteran fossils from lower Permian and is referred to the work of Rohdendorf (1962): "Die ältesten sicher zu den Coleoptera gehörenden Fossilien sind aus dem unteren Perm von Süd-Sibirien und dem Ural bekannt" ["The oldest fossils which surely belong to the Coleoptera are known from the lower Permian of Southern-Siberia and from the Ural"]. In the work of Rohdendorf (1962) eight lower Permian and seven upper Permian species have been described which the author has considered to belong to the family Cupedidae.

Dolin (1980) described *Alaodima grandis*, a fossil Elaterid of the subfamily Elaterinae from the Karatau Mountain in Middle Asia. This fossil insect has been placed in the upper Jurassic epoch of the Mesozoic era.

Tröster (1992) described fossil insects from the fossil deposit Messel near Darmstadt, Germany and included two Coleoptera: a *Lanelater*-species and *Macropunctum eocaenicum*.

Schimmel (2005) published species of the tribe Megapenthini from the Baltic amber which have been placed into the Eocene epoch: *Abelater succineus*, *Megapenthes groehni* and *M. voigti*.

Becker (1963) published a paper on the amber fossils from Chiapas in Mexico and included three Elateridae: *Minonelater planatus*, *Agriotes succiniferus* and *Glyphonyx*

punctatus. The author dated the fossil insects between the late Oligocene and the early Miocene.

Also, Jablokoff-Khnzorian (1961) described some species from Baltic amber and a species of the genus *Elater*: *E.* (*Octamenogonoides*) *gebleri*. In the description, the author of the *E. gebleri* also mentioned plesiomorphous characters which allow the inclusion of the taxon into the ancestral line of the tribe Elaterini. Also, the given picture of the *E. gebleri* clearly classifies this species as a member of the monophylum Elaterina. However, as plesia cannot be compared with current living species, we place the *E. gebleri* as a terminal taxon (a plesion) into the ancestral line of the Elaterini, without an explicit assigned relation status. But the dating of the *E. gebleri* into the Eocene epoch has settled the time after which the speciation of an ancestor of the tribe Elaterini couldn't have taken place. Therefore, the "terminus post quem non" shall be the Eocene epoch. Regarding the phylogeny history of the subfamily Elaterinae, there is a continuous ancestral time line currently being proved which covers 180 million years, from the Upper Jurassic up to the Holocene.

Palaeontology and terminal species:

Geological Division	**Period**	**Epoch**	**Mio. J.**	**Terminal species of the subfamily Elaterinae (in bold)**
Cenozoic	Quarternary	Holocene		
		Pleistocene	1.6	
	Tertiary	Pliocene	5	
		Miocene	25	
		Oligocene	40	
		Eocene	55	***Elater gebleri* (Tpqn)** (Baltic amber)
		Palaeocene	67	
Mesozoic	Cretaceous	Upper Cretaceous	100	
		Lower Cretaceous	140	
	Jurassic	Upper Jurassic	180	***Alaodima grandis*** (Karatau Mountain)
		Middle Jurassic	195	
		Lower Jurassic	210	
	Triassic	Upper Triassic	220	
		Middle Triassic	235	
		Lower Triassic	250	
Paleozoic	Permian	Upper Permian	265	
		Lower Permian	290	Cupedae (Kusnezk basin)

As regards the ancestral time line of the Elaterinae in the Earth history, KISHII (1987) is referring to DOLIN (1975) and STIBICK (1979): "More recently DOLIN (1975) and STIBICK (1979) have changed the presumptive time of the origin to the lower Jurassic." This Earth-historical time frame is also corresponds with the one given by SCHIMMEL (2005) for the tribe Megapenthini.

3.6.2. The present distribution of the species in the context of the Pangaea theory

General aspects

The present distribution of the species of the subtribe Elaterina is zoogeographically limited to the Nearctic, the Neotropical, the Palaearctic, the Oriental and the Australis region as well as to the Wallacea. The populations of the species today are geographically separated and their distributions are disjunctive. These disjunctions are due to geological and climate barriers such as: the Pacific and Atlantic Ocean, the South-Chinese Sea and the high mountains of the Himalaya. Also, the adaptation of the species to the microhabitats in which they live results in dependency from the constitution of the whole biocenosis and limits the species' ability to actively spread. Furthermore, these species are only adapted to certain altitudinal zones and therefore their habitat partitioning is limited vertically too. Considering all the mentioned dependencies, barriers and constrictions of the species, their present distribution pattern can't be logically explained basing on active spreading. Therefore, a theory which explains the mentioned disjunctions basing on passive drifting seems to be the most logical. And considering the Pangaea theory we are in the position to explain the mentioned disjunctions logically basing on passive drifting. This theory also constitutes useful help in determining the time frames of the origin of the ancestors of the various species groups conclusively from their phylogenetic relations.

The Pangaea theory

In accordance with many scientific and generally accepted paleontological and geophysical facts (see THENIUS 1977), the present continental plates were connected as one big continent until the Triassic epoch (220 million years ago). This big continent consisted of the Laurasia landmass in the north and the Gondwana landmass in the south. Then, in the Lower Jurassic epoch (210 million years ago), the drift of the various continental parts started: the Tethys Sea separated Laurasia from Gondwana into a northern and a southern part of Pangaea and in the Upper Jurassic epoch (180 million years ago) the Turgai-strait opened the south of the Northern Atlantic which separates Laurentia from the landmass of Fenno-Sarmatia. Finally, in the Eocene epoch (55 million years ago) Australia was separated from the Antarctic and the Indian subcontinental plate was separated from Africa. Also in the Tertiary period (40 million years ago) the Indian subcontinental plate collided with the Eurasian landmass, which started the orogenesis of the Himalaya and the lifting up of the Tibetan plateau.

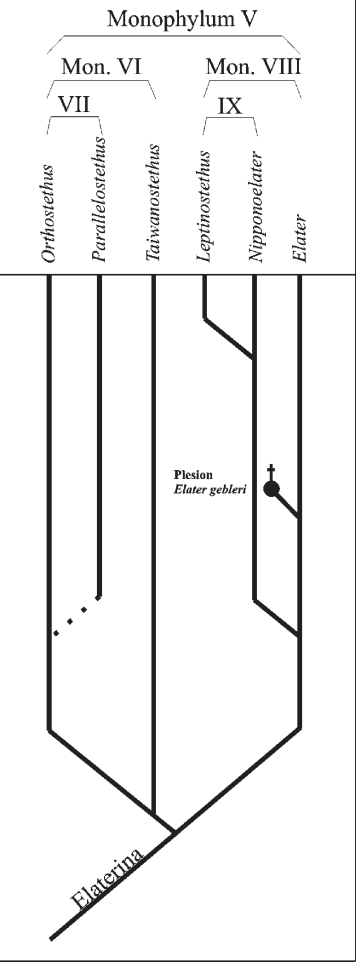
Since the Cretaceous epoch (140 million years ago), the various continental plates which we know today have already been separated from each other.

The present distribution of the populations

The present distribution pattern of the species of the subtribe Elaterina is disjunctive. The species have populations in North, Central and South America, in Europe and Asia, in the Sunda Archipelago, in the Moluccas and in the Australian region. Zoogeographically, the species occupy various regions: the genus *Elater* is distributed in the Palaearctic Region, in the Oriental Region, in the Australian Region, in the Nearctic and in the Neotropical Region. *Leptinostethus* occurs in the Oriental Region and in the Wallacea exclusively, while the genus *Nipponoelater* is distributed in the Palaearctic and in the Oriental Region. *Taiwanostethus* is known from the Oriental

A phylogenetical tree of the sub-tribe Elaterina in the context with the Pangaea theory

Earth historical sections				Phylogenetical tree
Geological Division	**Period**	**Epoch**	**Mill. Years**	
Cenozoic	Quarternary	Holocene		
		Pleistocene	1.6	
	Tertiary	Pliocene	5	
		Miocene	25	
		Ologocene	40	
		Eocene	55	
		Paleocene	67	
Mesozoic	Cretaceous	Upper Creta.	100	
		Lower Creta.	140	
	Jurassic	Upper Juras.	180	
		Middle Juras.	195	
		Lower Juras.	210	
	Triassic	Upper Trias.	220	
		Middle Trias.	235	
		Lower Trias.	250	
Paleozoic	Permian	Upper Perm.	265	
		Lower Perm.	290	



Region exclusively and the genera *Orthostethus* and *Parallelostethus* are distributed in the Nearctic Region only.

CONCLUSIONS AND DISCUSSION

In accordance with the Pangaea theory and the results of the phylogenetic analysis in this paper, as well as basing on the assumption that an ancestral population of the subtribe Elaterina has already existed on Pangaea, this subtribe consists of species-groups (genera) which have been passively spread with the drifting plates of Pangaea after the disintegration of the old continent had started.

In this context the genus *Elater* seems to be the oldest of the whole subtribe. The origin of the genus can be placed prior to the Lower Jurassic epoch (210 million years ago) of the Mesozoic division and into the Earth-historical time frame of when Pangaea was still existent.

Nipponoelater and *Leptinostethus* are distributed in the Oriental and in the Palaearctic Region as well as in the Wallacea exclusively. The origin of the genus *Nipponoelater* can be placed in the Upper Jurassic (180 million years ago) and after the disintegration of the Fenno-Sarmatian plate, as the species of this genus occur in the Palaearctic and the Oriental Region exclusively. *Leptinostethus* is distributed in the Sunda Archipelago only (one species is known from the Wallacea) which leads to the presumption that the origin of this genus is in close correlation with the Pleistocene glaciations (1.6 million years ago) and the availability of spreading corridors in the Sunda Archipelago at those times.

The monophylum which includes the genera *Taiwanostethus*, *Orthostethus* and *Parallelostethus* has disjunctive distributions in America and in the Oriental Region. Concerning the origin of this species-group a time frame prior to the Lower Jurassic epoch (210 million years ago) when Pangaea was still existent can be presumed. However, in accordance with the sympatric distribution pattern of the genera *Parallelostethus* and *Orthostethus*, these species-groups most probably have to be based on genetic segregation. The appertaining species of both genera today live in the same habitat in Arizona of North America. Therefore, the determination of the original time frame for the genus *Parallelostethus* is currently not possible basing on distribution.

3.7. THE SYSTEMATIC POSITION OF THE SUBTRIBE ELATERINA IN THE ANIMAL KINGDOM

KINGDOM ANIMALIA

1. Regnum:	Animalia
1.1 Subregnum:	Eumetazoa
2. Cladus:	Bilateria
2.2 Subcladus:	Protostomia
3. Superphylum:	Ecdysozoa
3.1. Phylum:	Arthropoda
3.2. Section:	Mandibulata
3.3. Subphylum:	Hexapoda
4. Classis:	Insecta
4.1. Subclassis:	Pterygota
5. Divisio:	Neoptera
5.1. Subdivisio:	Endopterygota
6. Superordo:	**Coleopterida**
6.1. Ordo:	Coleoptera
6.2. Subordo:	Polyphaga
7. Superfamilia:	Elateriformia
7.1. Familia:	Elateridae
7.2. Subfamilia:	Elaterinae
8. Tribus:	Elaterini
8.1. Subtribus:	**Elaterina**
8.1.1.	Genus *Elater*
8.1.2.	Genus *Leptinostethus*
8.1.3.	Genus *Taiwanostethus*
8.1.4.	Genus *Nipponoelater*
8.1.5.	Genus *Orthostethus*
8.1.6.	Genus *Parallelostethus*

The species of the subtribe Elaterina are included into the Family Elateridae and are part of the subfamily Elaterinae. The positions of the subtribe Elaterina and the accessory genera in the system of the regnum animalia are given as linear sectioning in the abovementioned list. The sectioning is especially based on works of Hentschel and Wagner (1996), Kaestner (1967, 1969, 1972, and 1973), Kükenthal et all (1971), and Remane et all (1974).

4. THE SUBTRIBE ELATERINA SUBTRIBUS NOVUM

4.1. DIAGNOSIS OF THE SUBTRIBE ELATERINAE AND THE DIFFERENTIAL CHARACTERS OF THE APPERTAINING GENERA

Elaterina subtribus novum

Type genus

Elater Linnaeus, 1758: 405.

Diagnosis

The appertaining species of the subtribe Elaterina have the following common Characters: Body length approximately 18-30 mm; habitus sub-parallel to wedge-shaped; elytra elliptical, sub-parallel or cuneate; caput convex, with mouthparts ipognathous; prosternal sutures closed anteriorly; antennae elongate and conspicuously serrate from fourth antennomere on (in some species lamellate), not reaching to slightly outreaching the posterior angles of pronotum, second antennomere semi-globular, as long as wide or slightly longer than wide apically, third antennomere subcylindrical and as long or slightly longer than wide apically; fourth to tenth antennomere as long as wide, serrate to dentate, sometimes apically conspicuously extended (in some cases lamellate), last antennomere oblong-elliptic, subapically bevelled; scutellum nearly rectangular, anteriorly and posterior slightly orbicular, edged anterior, sometimes declined posterior, evenly raised laterally; mesosternal fossa gradually declivous throughout its length or with horizontal vaulted sides short after coxae; prosternal apophysis slightly proximal to body axis or straight and with an uncinate deposition medially. Metacoxal plates are broad laterally, nearly straight inward and conspicuously angulate submedially.

Appertaining genera of the subtribe Elaterina and their differential characters

In accordance with the phylogenetic analysis above, the form of the metacoxal plates which are broad laterally, nearly straight inward and conspicuously angulate submedially, is the character which is available in all species of the following genera. Therefore, this character separates the members of the new subtribe from others of the tribe Elaterini.

Genus *Elater* Linnaeus, 1758

Type species

Elater ferrugineus Linnaeus, 1758: 405 (by subsequent designation of Latreille, 1810: 426); *E. ferrugineus* Fabricius, 1801 (sic!).

Differential characters

Body length approximately 18-20 mm; habitus elliptical; elytra wedge-shaped, apex of each elytron orbicular with a small just visible thorn at the inner side (fig. 2); sides of mesosternal fossa gradually declivous throughout its length; prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medial-

ly; metacoxal plates sharply angulate submedially (fig. 13); integument covered with punctures with flat and shiny interstices; pubescence bristly and declivous; antennae serrate to dentate from fourth antennomere on (fig. 20), second antennomere globular, third antennomere extended apically and slightly longer than second antennomere (fig 21); apexes of elytra orbicular with a small just visible thorn at the inner side; the elytra striae are conspicuously and cyclic built, the punctures are deeply impressed.

The species of the genus are in close relation to these of the genera *Leptinostethus* and *Nipponoelater.* The most usable differential character is the surface of the elytra which is covered with cyclic striae with impressed punctures. The species of the genera *Nipponoelater* and *Leptinostethus* have reduced striae on the surface of elytra, covered with just slightly impressed punctures.

Genus *Leptinostethus* gen. nov.

Type species

Elater ceylanicus Candèze, 1863: 300 (by present designation).

Differential characters

Body length approximately 19-23 mm; habitus elongate wedge-shaped; elytra distinctly wedge-shaped, apex of each elytron fusiform with a distinct thorn at the inner side (fig 3); scutellum lingulate and slightly convex at base, laterally convex, surface conspicuously raised and clypeate; sides of mesosternal fossa gradually declivous throughout its length, nearly sub-parallel to body axis; prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially (fig. 9); metacoxal plates sharply angulated centrally (fig. 14); integument covered with punctures, with flat and mat interstices; pubescence bristly and declivous; antennae lamellate from fourth antennomere on (fig. 22), second antennomere globular, third antennomere extended apically and slightly longer than second antennomere (fig. 23); apexes of elytra fusiform with an distinct thorn at the inner side; elytra striae reduced on the surface of elytra and having also reduced, just slightly impressed punctures.

The species of the genus are in close relation to these of the genus *Nipponoelater.* The most usable differential character is the wedge-shaped form of the body which is always sub-parallel in the species of the genus *Leptinostethus.* Furthermore, the antennae of the species of the genus *Leptinostethus* are lamellate, while these of the genus *Nipponoelater* are dentate to sublamellate from fourth antennomere on.

Genus *Nipponoelater* Kishii, 1985

Type species

Elater sieboldi Candèze, 1873 (by original designation).

Differential characters

Body length approximately 18-30 mm; habitus sub-parallel; elytra sub-parallel, apex of each elytra fusiform with a distinct thorn at the inner side (fig. 4); sides of mesosternal

fossa gradually declivous throughout its length; prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially (fig. 10); metacoxal plates sharply angulated centrally (fig. 15); integument covered with punctures, with flat and shiny interstices; pubescence bristly and declivous; antennae serrate to dentate (one exception: *N. ceylanicus* with lamellate antennomere 4-10) from fourth antennomere on (fig. 24), second antennomere triangular, fourth antennomere trapeziform (fig. 25) and twice as long as second antennomere (one exception: *N. malaysiensis* with second antennomere globular, third antennomere extended apically and slightly longer than second antennomere (fig. 26, 27)); apexes of elytra fusiform with an distinct thorn at the inner side; elytra striae reduced, punctures just slightly impressed.

The species of the genus are in close relation to these of the genus *Leptinostethus*. The most usable differential character is the sub-parallel form of the body which is always wedge-shaped in the species of the genus *Leptinostethus*. Furthermore, the antennae of the species of the genus *Nipponoelater* are dentate to sublamellate, while these of the genus *Leptinostethus* are lamellate from fourth antennomere on.

Genus *Orthostethus* Lacordaire, 1857

Type species

Aphanobius infuscatus Germar, 1844 (by original designation).

Differential characters

Body length approximately 16-29 mm; habitus sub-parallel; elytra cuneate, apex of each elytra fusiform with a distinct thorn at the inner side (fig. 5); mesosternal fossa with horizontal vaulted sides short after coxae and distinctly divergent (ventral view); prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially (fig 11); metacoxal plates sharply angulate submedially (fig. 16); integument covered with impressed punctures, with flat and shiny interstices; pubescence bristly and declivous; antennae dentate from fourth antennomere on (more rarely lamellate in the males of *Orthostethus pectinicornis* Champion from Mexico and Arizona in North America), second antennomere triangular, as long as wide, third antennomere as long as second, truncate apically; apexes of elytra orbicular with an distinct thorn at the inner side; elytra striae distinct on surface of elytra and with deeply impressed punctures, interstices flat and shiny.

The species of the genus are in close relation to these of the genus *Taiwanostethus*. The most usable differential character is the sub-parallel body outline, while the species of the genus *Taiwanostethus* have a conspicuously wedge-shaped habitus.

Genus *Parallelostethus* Schwarz, 1907

Type species

P. attenuatus Say, 1825 (by subsequently type designation in Hyslop (1921)).

Differential characters

Body length approximately 19-31 mm; habitus sub-parallel; elytra cuneate, apex of each elytra orbicular with a distinct thorn at the inner side (fig. 6); mesosternal fossa with horizontal vaulted sides short after coxae and sub-parallel (ventral view); prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially (fig. 12); metacoxal plates sharply angulate submedially (fig. 17); integument covered with impressed punctures, with flat and shiny interstices; pubescence bristly and declivous; antennae dentate from fourth antennomere on, second antennomere triangular, as long as wide, third antennomere as long as second, truncate apically; apexes of elytra orbicular with an distinct thorn at the inner side; elytra striae distinct on surface of elytra and with deeply impressed punctures, interstices flat and shiny.

The species of the genus are in close relation to these of the genus *Orthostethus*. The most usable differential character is the sub-parallel mesosternal fossa (ventral view).

Genus *Taiwanostethus* Kishii, 1994

Type species

T. tanidai Kishii, 1994 (original designation).

Differential characters

Body length approximately 18-28 mm; habitus wedge-shaped; elytra cuneate, apex of each elytra orbicular with a distinct thorn at the inner side (fig. 1); mesosternal fossa with horizontal vaulted sides short after coxae and sub-parallel (ventral view); prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially; metacoxal plates sharply angulate submedially (fig. 18); integument covered with impressed punctures, with flat and shiny interstices; pubescence bristly and declivous; antennae dentate from fourth antennomere on, second antennomere triangular, as long as wide, third antennomere as long as second, truncate apically; apexes of elytra orbicular with an distinct thorn at the inner side; elytra striae distinct on surface of elytra and with deeply impressed punctures, interstices flat and shiny.

The species of the genus are in close relation to these of the genus *Orthostethus*. The most usable differential character is the conspicuously wedge-shaped body outline, while the species of the genus *Orthostethus* have a sub-parallel habitus.

4.2. ETYMOLOGY OF THE SUBTRIBE ELATERINA

4.2.1. Requirements of the ICZN and selection of the Etymon

The name of the new subtribe is derived from the name *Elater*, the first name for a genus described by Linnaeus, 1758 (selected in accordance with ICZN, articles 63 and 64 (Kraus O. 2000: 109)). The name *Elater* today is used as the etymon for the infraorder Elateriformia, for the family Elateridae, for the subfamily Elaterinae and for the tribe Elaterini. Therefore, the name *Elater* can be taken as to be well-known

and the appertaining species of the genus as characteristic for the family-group (see recommendations of the ICZN, article 64A (Kraus O. 2000: 109)).

Article 29.1 of the ICZN regulates the procedure of the naming of a new subtribe: "Namen der Familiengruppen werden durch Anfügen einer Endung gemäß Artikel 29.3 an den Stamm des Namens der Typusgattung (Art. 29.3) oder an den vollständigen Namen der Typusgattung (Art. 55.3) gebildet". [The name of a family-group has to be built by adding a suffix in accordance with article 29.3 to the etymon of the type-genus or from the complete name of the type-genus (article 55.3 (Kraus O. 2000: 100-101)]. For the naming of the new subtribe, the complete name of the type-genus (*Elater*) is used as stem, in accordance with the recommendations of the ICZN, article 29A (Kraus O. 2000: 74). The ICZN, article 29.2 (Kraus O. 2000: 72) regulates that [… the suffix on the subtribe level has to be the INA]. The selected etymon combined with the suffix results in the name of the new subtribe. Therefore, the etymology of the name of the new subtribe is as follows.

4.2.2. Designation of the name

As mentioned above, the name *Elater* is already used as etymon for several categorical groups such as: infraorder Elateriformia, family Elateridae, subfamily Elaterinae and tribe Elaterini. For this reason, the decision has been made to apply it for the new subtribe without constrictions or deletions. The name of the new subtribe therefore has been composed as follows:

Elater (designated stem) + INA (suffix on subtribe level) = **ELATERINA**.

4.3. A KEY TO THE GENERA OF THE SUBTRIBE ELATERINA

The following key to genera applies for species-groups of the tribe Elaterini with metacoxal plates broad laterally, nearly straight inward and conspicuously angulate submedially.

1. Mesosternal fossa with sides horizontal vaulted short after procoxae ….....… **2.**
–. Mesosternal fossa with sides gradually declivous ……..…….. **4.**
2. Mesosternal fossa with sides not marginate (best visible by ventral view); body distinctly cuneate …..……...…….. ***Taiwanostethus* Kishii, 1994.**
–. Mesosternal fossa with sides distinctly and finally marginate (best visible by ventral view); body sub-parallel ….....……..... **3.**
3. Mesosternal fossa with sides sub-parallel (best visible by ventral view) …..... ....……..……....…… ***Parallelostethus* Schwarz, 1906.**
–. Mesosternal fossa with sides distinctly divergent …..... ..... ***Orthostethus* Lacordaire, 1857.**
4. Elytra striae conspicuously and cyclic throughout length, punctures of striae distinctly impressed …..……...……. ***Elater* Linnaeus, 1758**.
–. Elytra striae reduced, punctures of striae rudiments just slightly impressed …. **5.**

5. Habitus sub-parallel; antennae dentate to sublamellate from fourth antennomere on; scutellum flat ..…….....…….. ***Nipponoelater*** **Kishii, 1985.**
–. Habitus conspicuously wedge-shaped; antennae lamellate from fourth antennomere on; Scutellum vaulted and clypeate …….....….. ***Leptinostethus*** **gen. nov.**

5. THE SPECIES OF THE SUBTRIBE ELATERINA

The following lists of the species of the subtribe Elaterina include the ones of the following zoogeographical zones: The Palaearctic, the Oriental, the Nearctic, the Neotropical, the Australian Region and the Wallacea. The species from Himalaya (belong to the Palaearctic Region) are listed in this paper together with these from the Ceylonese and from the Indian Subregion.

5.1. THE SPECIES OF THE GENUS *ELATER* LINNAEUS, 1758

The species of the genus *Elater* have distributions in the Palaearctic Region, in the Oriental Region, in the Australian Region, in the Nearctic Region and in the Neotropical Region.

Genus *Elater* Linnaeus, 1758

Elater Linnaeus, 1758: 404.

Typus Generis
Elater ferrugineus Linnaeus, 1758: 405.

Redescription

The following description of the adult species is based on specimens collected from Germany: Rheinland-Pfalz, Eppenbrunn, ex. larva.

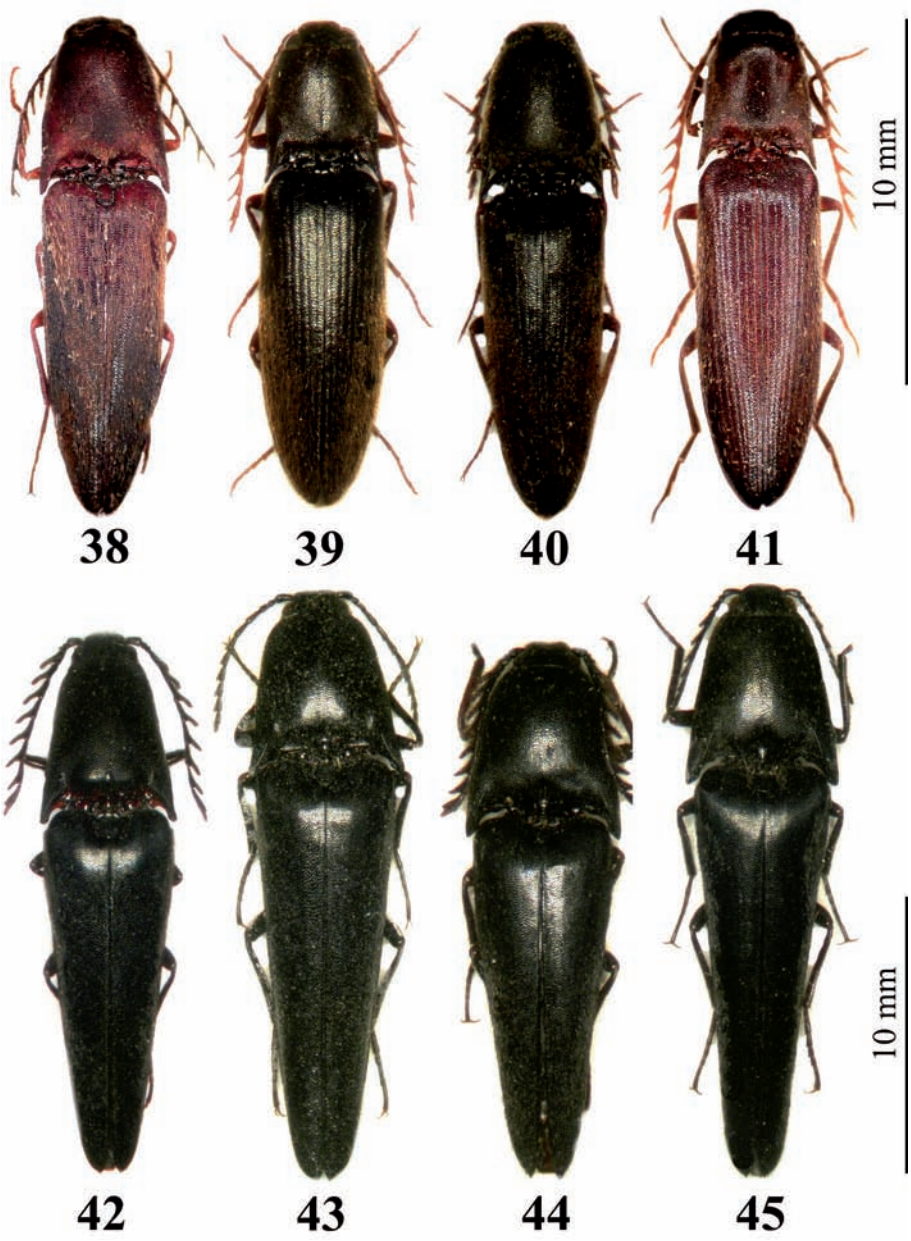
Diagnosis

♂: Elliptical, slightly raised, and shiny species; length: 18.0–21.0 mm, width: 5.0-5.8 mm. Blackish-brown, pronotum reddish-brown (sometimes pronotum totally black) with blackish hind-angles, elytra uncoloured reddish-brown; pubescence reddish-brown, semi-erect, long, bristly and dense, on pronotum declined to base and to lateral sides, on elytra declined to apex.

Description

Head declined from centre to apex; frons slightly raised above the base of antennae, with dense and umbilici punctures, interstices half to once their diameter; pubescence short and declined to apex; eyes small and spherical.

Antennae dentate from fourth antennomere on, just reaching posterior angles of pronotum; second antennomere short, triangular, as long as wide; third antennomere as long as second antennomere and truncate apically, both combined conspicuously shorter than fourth and each of the following antennomere; last antennomere oval, apically constricted.



Figs. 38-45. Habitus of *Brachyelater*- and *Leptinostethus*-species: 38 – *Brachyelater hoabinhus* (Fleutiaux, 1936) comb. nov., 39 – *B. phongsalyensis* (Schimmel & Tarnawski, 2007) comb. nov., 40 – *B. strbai* (Schimmel, 2003) n. comb, 41 – *B. vitalisi* (Fleutiaux, 1918) comb. nov., 42 – *Leptinostethus ceylanicus* (Candèze, 1863) comb. nov., 43 – *L. conicipennis* (Schwarz, 1902) comb. nov., 44 – *L. javanensis* sp. nov., 45 – *L. macassariensis* (Candèze, 1863) comb. nov.

Pronotum campaniform, along median line slightly shorter or as long as wide at the posterior angles (length/width ratio 1.00:1.03) and just slightly and regularly raised; slightly bent laterally and with a prominent, abrupt dropping at base; pronotum with or without a short median mould or furrow; punctures less dense, umbilici and irregularly rounded with interstices half to once their diameter.

Pro-, meso- and metathorax with dense and rough punctures, their interstices raised and shiny; pubescence short and decumbent.

Sides of mesosternal fossa gradually declivous throughout length.

Prosternal apophysis proximal to body axis, uncinate medially.

Sternite fine but densely punctured (interstices of punctures once their diameter) and covered with bristly and decumbent hairs.

Scutellum wedge-shaped and slightly convex at base; laterally straight and sharp at apex; surface slightly raised, punctures dense, coarse, and umbilici, interstices reduced to small and raised wrinkles, pubescence dense, fine, and just visible, pointed from base to apex.

Elytra cuneate, laterally bent, after midway narrowed to apex, apexes orbicular, apical thorn fine and small; base slightly smaller than that of pronotum, slightly depressed at scutellum, margins raised, shoulders prominent (winged species); striae on elytra reduced with punctures being just slightly impressed, interstices of striae finely punctures, little shiny, and flat; pubescence short, bristly, and declined to apex.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long and thin, tarsomeres up to claws of decreasing length, ventrally with hardly visible, fine pubescence, and fine upholstery, tibia covered with longer and protruding bristles.

Aedeagus with a sub-parallel, in midway thickened and excavated apical slightly narrowed and sharp, the paramere noticeably extending median lobe; parameres crescent-shaped, with long apical hairs.

Females are a little larger and broader than males, the antennae are slightly shorter.

Morphology of the larvae is known from the *E. ferrugineus* exclusively.

Differential diagnosis

The species of the new genus *Elater* are closely allied to these of the monophylum IX of this paper, which includes the genera *Leptinostethus* and *Nipponoelater*, but may be easily distinguished from them by the elliptical body and by the striae on elytra which are cyclic and have dense and impressed punctures.

Distribution

Palaearctic, Oriental, Nearctic, Neotropical, Australian Regions.

Appertaining species

Elater abruptus Say, 1825, *E. acutus* (Candèze, 1863), *E. asmodaius* Wurst, 1994, *E. ater* (Candèze, 1865), *E. decorus* (Germar, 1843), *E. dilaticollis* (Fairmaire, 1883), *E. ferrugineus* Linnaeus, 1758, *E. georgelewisi* (Suzuki, 1985), *E. lineaticollis* (Schwarz, 1898), *E. magnicollis* (Fleutiaux, 1918) comb. nov., *E. niponensis* (Lewis, 1894), *E. penicillatus* (Gerstaecker, 1871), *E. pinguis* (Horn, 1884), *E. riesei* Schimmel, 2007, *E. ruficollis* (Solier, 1851), *E. sakishimensis* Ôhira, 1967, *E. solskyi* (Suzuki, 1985), *E. splendens* Gurjeva, 1974, *E. tauricus* (Schwarz, 1897), *E. thoracicus* (Fleutiaux, 1918) comb. nov.

5.1.1. The species of the genus *Elater* Linnaeus, 1758 from Palaearctic Region

Currently there are eight species known from Palaearctic Region. A key to the Palaearctic species of the genus *Elater* is given by Wurst (1994).

Elater asmodaius Wurst, 1994

Elater asmodaius Wurst, 1994: 118.

Type locality

Greece: Asprovalta.

Material

Holotype: Greece: Asprovalta, 24.V.1982 (SMNS), leg. Epping.

Distribution

Greece.

Remarks

The holotype is preserved in the collection of the SMNS. There is no new data available on this species.

Elater ferrugineus Linnaeus, 1758

(Fig. 47)

Elater ferrugineus Linnaeus, 1758: 405.
Elater ferrugineus ssp. *Lenkoranus* Gurjeva, 1974: 70-71.
Elater ruber Geoffroy in Fourcroy, 1785: 35.
Elater ferrugineus ab. *Occitanicus* Villers, 1789: 319.
Ludius ferrugineus, Schenkling, 1927: 425.
Ludius ferrugineus ab. *Morio* Schilsky, 1888: 187.
Ludius ferruginosus (sic!) F. (sic!), Spada, 1891: 56.
Steatoderus ferrugineus, Halbherr, 1893: 23; Bertolini, 1891: 200; 1898: 97.
Steatoderus ferrugineus F. (sic!), Villa, 1844: 31; Ghiliani, 1847: 90; 1887: 97.

Type locality

Sweden (Svezia, Linnaeus, 1758: 405).

New material

Germany: Hessen, Groß-Gerau, 8.XII.1980, 3 spm. (CSV), leg. R. & I. Schimmel; Rheinland-Pfalz, Eppenbrunn, 24.IV.1984, 260 m, 4 spm. (CSV), leg. R. & I. Schimmel; Eppenbrunn, 22.XII.1980, 1 spm., leg. R. Schimmel; same place, 24.IV.1984, 340 m, 1 spm., leg. R. Schimmel; Sachsen: Moritzburg, 22.VI.1989, 1 spm., leg. Janke; France: Ardeche, Bois de Paiolive, 7.-15.VII.1989, 1 spm., leg. Anton; Italy: Emilia Romagna, Piacenza, 15.VII.1990, Tagliaferri; leg. S. Giorgio (PC), 22.VIII.1983; Noceto, Podere Ronchetti (PR), 10.VII.1994, leg. E. Felce; Campegine (RE), 12.VII.1986; Paderno (BO), 6.VI.1983, leg. L. Alberghini; Lugo, 30.V.1982, leg. G. Campadelli; Bagnacavallo, 26.VI.1983, leg. W. Pagliacci; 23.VI.1984, 7.VII.1984, G. Perazzini; Faenza, VII.1985, L. Bassetti, ex-Tilia sp.; S. Angelo (Gatteo), 24.XI.1990 et 30.VII.1992, leg. G. Platia; Lazio, Roma, Villa Borghese, VII.1987, leg. D. Guidi. Calabria, Sibari (CS), 17.VII.1973. France: Ezi-Eure, 5.VII.1965, Monguillon; La Ferté, VIII.1943, VII.1959; Samatan, Gars, leg. G. Clermont; Grenoble; Var, Roquebrune, VII.1989. Croatia: Krk Is, VII.1987, leg. L. Bassetti; Krk Is., Nivjice, VI.1974, Del Fabbro; Velebit, S Karlobag, m 400, leg. Padovani & Malmusi; Krk Is, Punat, 9.16.VII.2002, 24.VI.2003, leg. P. Rapuzzi; Krk Isl., 25.V.2005, leg. Padovani & Malmusi. Bosnia- Erzegovina: Mostar-Velez, VIII.1980, leg. Falletti. Albania: Durres, Bizë, 15-24.VI.2007, leg. P. Rapuzzi & G. Sama, wine trap. Greece: Kastanea, m 800, VI.1990; Mti Pindos, Aj Paraskevi, m 1500, 20.VII.1985, leg. E. Giacomazzo; Stomio, Mt Ossa, Larissa, 3.VII.2001, 4.VII.2003, leg. C. Cocquempot; Ioanina, Vrosina, 8.V.2003, leg. C. Cocquempot.

Distribution

Europe, Caucasus.

Remarks

The species has originally been described by Linnaeus (1758) basing on material from Sweden: "*Elater* corpore toto ferrugineo. Reliquis nostratibus major, thorace obscure ferrugineo. Antennae serrate, thorace Paulo longiores."

However, specimens of *Elater ferrugineus* sometimes have a black pronotum with ferruginous elytra or are totally black (ssp. *Lenkoranus* Gurjeva, 1974).

Elater georgelewisi (Suzuki, 1985)

Ludius candezei Lewis, 1894: 265, nec. *Ludius candezei* Fauvel, 1867.
Diplostethus candezei, Schwarz: 1907: 258.
Ludius candezei, Miwa, 1934: 20.
Ludius (*Parallelostethus*) *candezei*, Ôhira, 1971: 20.
Ludius georgelewisi Suzuki, 1985 nom. Nov. for *Ludius candezei* Lewis, 1894.
Ludius (*Parallelostethus*) *georgelewisi*, Kishii, 1987.

TYPE LOCALITY
Honshu.

MATERIAL
There is no new material known.

DISTRIBUTION
Japan: Honshu, Kyushu, Kummari-jima and Okino-shima Is. (in accordance with KISHII, 1987).

Elater niponensis (LEWIS, 1894)
(Fig. 50)

Ludius niponensis LEWIS, 1894: 264-265.

TYPE LOCALITY
Hokkaidộ.

MATERIAL
Japan: Kitamoshiri, Hookaido, 15.VIII.1987, 1 spm., leg. K. Ishida; Aomori Pref., Towada, 8.VIII.1957, 1 spm. (CPG), leg. Shimoyama (det. ÔHIRA).

DISTRIBUTION
Japan: Hokkaidộ, Honshu, (Shikokử and Kyushu questionably in accordance with KISHII, 1987).

REMARKS
A black species, which is closely allied to *E. solskyi*, but has blackish-brown antennae and legs.

Elater sakishimensis ÔHIRA, 1967

Elater (*Parallelostethus*) *luctuosus* ssp. *sakishimensis*, ÔHIRA, 1967: 30.
Elater (*Parallelostethus*) *sakishimensis*, KUROSAWA et al., 1985: 85.

TYPE LOCALITY
Ishigaki-jima Is.

NEW MATERIAL
Japan: Ishigaki-jima, (loc. In Japanese), 9.X.1998, 1 spm. (CPG), leg. T. FUKAISHI (det. H. ÔHIRA).

DISTRIBUTION
Japan: Ishigaki-jima and Iriomote Isl. (in accordance with KISHII, 1987).

Elater solskyi (Suzuki, 1985)
(Fig. 48)

Ludius luctuosus Solsky, 1870: 364-366.
Elater luctuosus, Gurjeva, 1979: 288-289, nec. *Elater luctuosus* Leconte, 1853.
Elater solskyi Suzuki, 1985: 88, nom. nov. for *E. luctuosus.*

Type locality
Siberia.

New material
Russia: SU Usuri reg., Novovarvarovka, VII.1989, 1 spm. (CPG), leg. S. Becvar; China: Liaoning, Mt. Quianshan, Anshan City, 2.-20.VI.2006, 1 spm., leg. L. Jingke. Korea: Jotan, Tachack Kanewon, 7.VIII.1999, 1 spm. (CPG).

Distribution
Russia: Siberia; China: Anshan.

Remarks
The mentioned records are the first of specimens of *E. solskyi* collected in China and Korea.

Elater splendens Gurjeva, 1974
(Fig. 528)

Elater splendens Gurjeva, 1974: 70-71.

Type locality
Azerbaijan: Tallish.

New material
USSR: Usury, Kazan, 1.-2.VIII.1991, 1 spm., leg. S. Kurbatov.

Distribution
Russia: Tallish, Ussuri.

Remarks
The species is near the *Elater solskyi* (Suzuki, 1985) but is easy to be distinguished from this species by the shiny pronotum. The beetle has been described from Tallish in the Caucasian Region, but in accordance with the record of the new material it seems the population is extended up to the Ussuri Region.

Elater tauricus (Schwarz, 1897)
(Fig. 53)

Ludius tauricus Schwarz, 1897: 400.

Type locality
Turkey: Taurus mts.

New material
Turkey: Namrun province, Icel, 7.-8.VIII.1988, 1 spm. (CSV), leg. M. Niehuis; Elmali, VIII.1992, 1 spm. (CPG), leg. Falletti.

Distribution
Greece, Turkey.

Remarks
A black species with blackish-brown legs, and densely punctured on pronotum.

5.1.1.1 Geographical check-list of the distribution of the *Elater*-species in the Palaearctic Region

Genus *Elater*	**General distribution** (political pattern)						
Species	Greece	Europe	Japan	Siberia	China	Russia	Turkey
asmodaius	X						
ferrugineus		X					
georgelewisi			X				
niponensis			X				
sakishimensis			X				
solskyi				X	X		
splendens						X	
tauricus							X

5.1.2 .The species of the genus *Elater* Linnaeus, 1758 from the Oriental Region

Elater acutus (Candèze, 1863)
(Fig. 46)

Ludius acutus Candèze, 1863: 299.
Parallelostethus acutus, Schwarz, 1907: 258; Schenkling, 1927: 436.
Elater acutus (Candèze, 1863): Ôhira (1977: 64).

Type locality
Java.

Distribution
Java; India: Darjeeling, Assam, Sikkim (in accordance with Schwarz (1907)): These localities have been overtaken by Schenkling (1927) in the Coleopterorum Catalogus, but seem to be doubtful (see Remarks).

Material
Indonesia: Java: Occ., Toegoe, 1 spm., 1902, without further data (CSV, ex. coll. Oberthür).

Remarks
The species is easy to determine by its flat and conspicuously punctures pronotum.

The species was described by Candèze (1863) basing on specimens (at least one male and one female) from Java. After the description he (Candèze, 1863) remarks that "Un exemplaire femelle de la collection de M. Guérin-Méneville est indiqué comme originaire de l'Assam." [One female specimen is preserved in the East Indian collection of M. Guérin-Méneville which originally was collected from Assam]. The mentioned records of the female of *E. acutus* from Assam, and these from Darjeeling and from Sikkim seem to be doubtful and are marked accordingly in the maps of distribution of this paper.

Elater magnicollis (Fleutiaux, 1918) comb. nov.
(Fig. 49)

Ludius magnicollis Fleutiaux, 1918: 253.

Type locality
Laos: Vientiane.

Distribution
Laos; Vietnam.

New material
Annam, Vinh, 1910, without further data 1 spm. (CSV).

Remarks
An easy to determine black species with a conspicuously formed pronotum: length ratio of pronotum and elytra = 8:16.

Elater riesei Schimmel, 2007
(Fig. 51, 93)

Elater riesei Schimmel, 2007: 186-187.

Type locality
Vietnam.

Distribution
Vietnam.

Material
There is no further material known.

Remarks
The species has a similar appearance than the European *E. ferrugineus*: reddish-brown elytra and black pronotum and head, but is easy to be distinguished by the bigger size and pronotum which is slightly longer medially than wide at base.

Elater thoracicus (Fleutiaux, 1918) comb. nov.

Ludius thoracicus Fleutiaux, 1918: 256.
Elater businskyi Schimmel, 2003: 287-288; **syn. nov.**

Type locality
Vietnam: Tonkin.

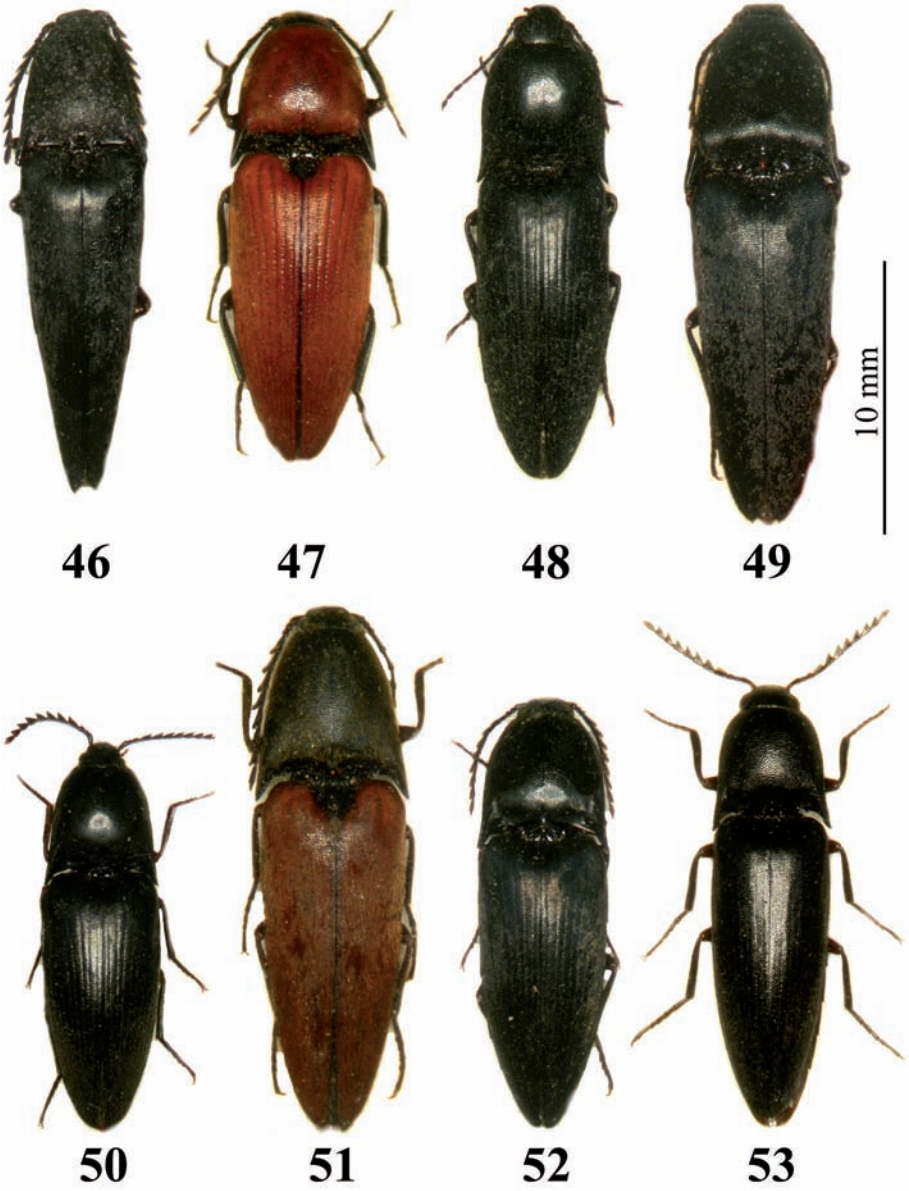
Distribution
Vietnam: Tonkin; China: Hubei province.

Material
No new material is known.

Remarks
The species is easy to determine by its red pronotum with black posterior angles.

5.1.2.1. A key to the species of the genus ***Elater*** Linnaeus, 1758 from Oriental Region

1. Body unicoloured ……. **2.**
–. Body bicoloured ……. **3.**
2. Pronotum applanate, apexes of posterior angles orbicular ……. ……. ***E. acutus* (Candèze, 1863).**
–. Pronotum conspicuously elevated, apexes of its posterior angles cuspidate …… …….. ***E. magnicollis* (Fleutiaux, 1918).**



Figs. 46-53. Habitus of *Elater*-species: 46 – *Elater acutus* (Candèze, 1863) comb. nov., 47 – *E. ferrugineus* Linnaeus, 1758, 48 – *E. solskyi* (Suzuki, 1985), 49 – *E. magnicollis* (Fleutiaux, 1918), 50 – *E. niponensis* (Lewis, 1894), 51 – *E. riesei* (Schimmel, 2001), 52 – *E. splendens* Gurjeva, 1974, 53 – *E. tauricus* (Schwarz, 1897)

3. Pronotum red, its posterior angles and elytra black …..... .... ***E. thoracicus* (Fleutiaux, 1918).**
–. Pronotum black, elytra reddish-brown ……..…….. ***E. riesei* (Schimmel, 2007).**

5.1.1.2. Geographical check-list of the distribution of the *Elater*-species in the Oriental Region

Genus *Elater*	**General distribution** (political pattern)			
Species	Laos	China	Vietnam	Java
acutus				X
magnicollis	X		X	
riesei			X	
thoracicus		X	X	

5.1.3. The species of the genus *Elater* Linnaeus, 1758 from the Australian Region

The following list of species of the genus *Elater* from the Australian Region has been overtaken from the Schenkling catalogue (1927). However, *E.* (*Ludius*) *variegates* Candèze, 1878, which has been published from the Aru Islands and which was overtaken by Schenkling (1927) as to belong to the genus *Elater* (*Ludius*), was already transferred to the genus *Procraerus* by Ôhira (1974) and overtaken by Schimmel (1999). *Ludius hydropicus* (Candèze, 1882) was placed with status incertae sedis by Calder (1996: 384). *Ludius erubescens* Candèze, 1878, *L. exutus* Candèze, 1863 and *L. lineatus* Candèze, 1863 are not overtaken in the following list and are placed with status incertae sedis. The only species of the genus *Elater* from the Australian Region which is overtaken in this paper is the *E. dilaticollis* from New Britain.

***Elater dilaticollis* (Fairmaire, 1883)**

Ludius dilaticollis Fairmaire, 1883: 239.

Type locality
New Britain.

Distribution
New Britain.

5.1.4. The species of the genus *Elater* Linnaeus, 1758 from the Nearctic Region

The following list of species of the genus *Elater* from the Nearctic Region has been overtaken from the Schenkling catalogue (1927). However, the species *Ludius serraticornis* Motschulsky, 1859 has not been overtaken here and is placed with status incertae sedis.

Elater abruptus Say, 1825

Elater abruptus Say, 1825: 253; Roache, 1960: 288.
Ludius abruptus (Candèze, 1863: 306).
Ludius coracinus Germar, 1843: 47.

Type locality
"Boreal America".

Distribution
Northern America. Canada: Ontario; USA: 16 states in accordance with Roache (1960).

Elater ater (Candèze, 1865)

Ludius ater Candèze, 1865: 55.
Elater ater (Candèze, 1865); Roache, 1960: 281.

Type locality
California.

New material
USA: California: Stanislaus Co., La Grange, 27.IV.1968, 13.V.1975, 14.IV.1978, 1 spm. each date (CPG), leg. R. P. Allen.

Distribution
North America: California, Arizona.

Elater lecontei (Horn, 1871) comb. nov.

Ludius lecontei Horn, 1871: 313.
Elater lecontei (Horn, 1871) Roache, 1960: 283.

Type Locality
California.

New material
California: La Crescenta, VI.1967, 1 spm. (CPG), leg. Evers (det. M. Zeising).

Distribution
California.

Elater pinguis (Horn, 1884)

Ludius pinguis Horn, 1884: 46-47.
Elater pinguis (Horn, 1884); Roache, 1960: 286.

Type locality
Oregon.

Distribution
Northern America: Oregon; California.

5.1.5. The species of the genus *Elater* Linnaeus, 1758 from the Neotropical Region

The only species of the genus *Elater* which we currently know from the Neotropical Region are the following: *E. decorus* and *E. ruficollis*. Both species are transferred here with new name combinations to the genus *Elater*. The further species of the genus *Ludius* (*Elater*) published by Schenkling (1927) belong to different species groups, such as *Physorhinus* and Agrypninae.

Elater decorus (Germar, 1843)

Ludius decorus Germar, 1843: 48.
Elater decorus (Germar, 1843); Quezada, 1974: 199; Golbach, 1994: 38.

Type locality
Chile.

New material
Chile: Las Trancas, Nuble, 1.III.1984, 2 spm. (CPG), without further data; Chile: V'ches Alto, 1992, 2 spm. (CSV), without further data.

Distribution
Southern America: Chile; Argentina.

Elater ruficollis (Solier, 1851)

Genomecus decorus ab. *Ruficollis* Solier, 1851: 30.
Ludius decorus ab. *Ruficollis* (Candèze, 1863: 311).
Elater ruficollis (Solier, 1851); Golbach, 1994: 38.

Type locality
Chile.

New material
Chile: Cantillana, XII.1981, 1 spm., without further data; Chile: Q. La Goyana, S.E. Acuelo, 1800 m, XI.1981, 5 spm. (CSV), leg. Onore.

Distribution
South America: Chile.

5.2. THE SPECIES OF THE GENUS *LEPTINOSTETHUS* GEN. NOV. (known from Oriental Region exclusively)

The species of the genus *Leptinostethus* gen. nov. are currently known from Sri Lanka (*L. ceylanicus* (Candèze, 1863), from the Philippines (*L. conicipennis* Schwarz, 1902), from Indonesia: Java and Western Malaysia (*L. javanensis* sp. nov.), from Sulawesi, Sumatra and Isl. Nias (*L. macassariensis* Candèze, 1863). All of the abovementioned species, except for *L. javanensis* which is described in this paper as new to sciences, have been grouped by Schwarz (1906) as to belong to the genus *Parallelostethus.* As the characters of these species don't concur with these of the type species of *Parallelostethus* (designated by Hyslop, 1921), *P. attenuatus*, they have been transferred in this paper to the new genus *Leptinostethus. Parallelostethus acutus* (Candèze, 1863) is transferred to the genus *Elater* Linnaeus, 1758.

***Leptinostethus* gen. nov.**

Typus Generis
Elater ceylanicus Candèze, 1863: 300.

Diagnosis
♂: Elongate, wedge-shaped, slightly raised, and mat species. Length: 19-23 mm, width: 4.8-5.5 mm; blackish, legs and antennae as well as base of pronotum blackish to reddish-brown; pubescence reddish-brown, semi-erect, short, bristly and dense, on pronotum declined to base and to lateral sides, on elytra declined to apex.

Description
Head declined from centre to apex, disk with a transverse impression; frons slightly raised above the base of antennae, with dense and umbilici punctures; pubescence short and declined to apex; eyes small and spherical.

Antennae long and dentate sometimes lamellate from fourth antennomere on, which are reaching or outreaching posterior angles of pronotum by the length of the last two antennomere; second antennomere short, triangular, as long as wide; third antennomere slightly longer than second antennomere and truncate at apex, both combined conspi-

cuously shorter than fourth and each of the following antennomere; these are dentate or having an extended lamellae at apex; last antennomere oval, apically constricted.

Pronotum trapezoidal, along median line as long as wide or clearly longer than wide at the posterior angles (length/width ratio 1.16:1.00), just slightly and regularly vaulted; arcuate laterally and with a flat dropping at base; pronotum without any median mould or furrow; punctures dense, fine, umbilici and regularly rounded with interstices half to once their diameter, sometimes reduced to small wrinkles basally.

Pro-, meso- and metathorax with dense and rugose punctures their interstices raised and shiny; pubescence short and decumbent; metacoxal plates conspicuously angulate submedially.

Sides of mesosternal fossa gradually declivous throughout its length, nearly subparallel to body axis.

Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.

Sternite fine but densely punctured (interstices of punctures twice their diameter) and covered with bristly and decumbent hairs.

Scutellum lingulate and slightly convex at base; laterally convex; surface conspicuously raised and clypeate; punctures of surface dense, coarse, and rough; pubescence dense, fine, and just visible, pointed from base to apex.

Elytra conspicuously cuneate and elongate, after apical third narrowed to apex, the latter curved and with a distinct thorn; base as wide as than that of pronotum, slightly depressed at scutellum, margins raised, shoulders prominent (winged species); elytra without striae, simple punctures with interstices little shiny, and flat; pubescence short, bristly, and declined to apex.

Alae blackish, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long and thin, tarsomeres up to claws of decreasing length, ventrally with hardly visible, fine pubescence, tibia covered with longer and protruding bristles.

Aedeagus with a sub-parallel median lobe, slightly extending parameres, in middle slightly thickened, apically sharp; parameres bent inwards apically and with long apical hairs.

The females are a little larger than males (length: 21-25 mm, width: 4.9-5.6 mm) and vaulted, their antennomere are serrate, not dentate or lamellate.

Morphology of the larvae is unknown.

Differential diagnosis

The species of the new genus *Leptinostethus* are closely allied to that of the monophylum IV which includes the genera *Brachyelater* and *Nipponoelater*, but may be

easily distinguished from them by the lamellate antennae, the clypeate scutellum and by the cuneate form of elytra.

Distribution

South-Eastern Asia: Sri Lanka; Java, Malaysia; Sumatra; Isl. Nias; Sulawesi; Philippines.

Appertaining species

Leptinostethus acutus (Candèze, 1863) comb. nov., *L. ceylanicus* (Candèze, 1863) comb. nov., *L. conicipennis* (Schwarz, 1902) comb. nov., *L. javanensis* sp. nov., *L. macassariensis* (Candèze, 1863) comb. nov.

Leptinostethus ceylanicus (Candèze, 1863) comb. nov.

(Figs. 42)

Ludius ceylanicus Candèze, 1863: 300.
Parallelostethus ceylanicus, Schwarz, 1907: 258; Schenkling, 1927: 436.

Type locality

Ceylon (Sri Lanka).

Distribution

Sri Lanka.

Material

Ceylon (Sri Lanka): 2 spm., without further data (CSV, ex. coll. Oberthür).

Remarks

The species is easy to determine by the lamellate antennae.

Leptinostethus conicipennis (Schwarz, 1902) comb. nov.

(Fig. 43)

Steatoderus conicipennis Schwarz, 1902: 296.
Parallelostethus conicipennis, Schwarz, 1907: 258; Schenkling, 1927: 436.

Type locality

Philippines.

New material

Philippines: Mindanao, 30 km west of Maramag, 1600 m, 28.-30.XII.1990, 1 spm. (CSV), leg. Bolm; S Palawan, Brooks Point, VII.1990, 1 spm. (CPG).

Distribution

Philippines; Palawan.

Leptinostethus javanensis sp. nov.
(Fig. 44)

Type locality
Java.

Type material
Holotype ♂ (CSV): Java: Udjung Kulon, III.-IV.1970, leg. R. Schenkel.
Paratype ♀ (CPG): Malaysia: Cameron highlands, Tanah Rata, without further data.

Diagnosis
♂: Elongate, wedge-shaped, slightly raised, and mat species. Length: 19.6 mm, width: 5.7 mm; blackish, legs and antennae blackish to reddish-brown; pubescence blackish-brown, semi-erect, short, bristly and dense, on pronotum declined to base and to lateral sides, on elytra declined to apex.

Description
Head declined from centre to apex, disk with a transverse impression; frons slightly raised above the base of antennae, with dense and umbilici punctures; pubescence short and declined to apex; eyes small and spherical.

Antennae long and lamellate from fourth antennomere on which are not reaching posterior angles of pronotum by the length of half of last antennomere; second antennomere short, triangular, as long as wide; third antennomere slightly longer than second antennomere and truncate apically, both combined conspicuously shorter than fourth and each of the following antennomere; last antennomere oval, apically constricted.

Pronotum trapezoidal, along median line clearly longer than wide at the posterior angles (length/width ratio 6.5:5.7) and regularly vaulted; carina of posterior angles bent inward, pronotum arcuate laterally and with a flat dropping at base; pronotum with a short median mould basally; punctures dense, fine, umbilici and regularly rounded with interstices half to once their diameter, sometimes reduced to small wrinkles basally.

Pro-, meso- and metathorax with dense and rugose punctures their interstices raised and shiny; pubescence short and decumbent; metacoxal plates conspicuously angulate submedially.

Sides of mesosternal fossa gradually declivous throughout length and nearly subparallel to body axis.

Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.

Sternite fine but densely punctured (interstices of punctures twice their diameter) and covered with bristly and decumbent hairs.

Scutellum wedge-shaped and slightly convex at base; laterally convex; surface slightly raised and clypeate apically, and with a mould medially; punctures dense, coarse, and rough, pubescence dense, fine, and just visible, pointed from base to apex.

Elytra conspicuously cuneate and elongate, after apical third narrowed to apex, the latter curved and with a distinct thorn; base as wide as than that of pronotum, slightly depressed at scutellum, margins raised, shoulders prominent (winged species). Elytra without striae, with simple punctures and interstices little shiny and flat; pubescence short, bristly, and declined to apex.

Alae blackish, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long and thin, tarsomeres up to claws of decreasing length, ventrally with hardly visible, fine pubescence, and fine upholstery, tibia covered with longer and protruding bristles.

Aedeagus with a sub-parallel, apically sharp, the paramere just slightly extending median lobe; parameres cochleariform apically and with long apical hairs.

Female (paratype) is slightly larger and broader, the fourth antennomere is sublamellate, while it is lamellate in the male (holotype).

Morphology of the larvae is unknown.

Differential diagnosis

The new species *Leptinostethus javanensis* is closely allied to *L. ceylanicus*, but may be easily distinguished from them by the shorter antennae and by the dense punctures and the short mould of pronotum base.

Etymology

Named after the type locality.

Distribution

Java.

Leptinostethus macassariensis (Candèze, 1863) comb. nov.

(Fig. 45)

Ludius macassariensis Candèze, 1863: 301.
Parallelostethus macassariensis, Schwarz, 1907: 258; Schenkling, 1927: 436.

Type locality

Sulawesi.

Distribution

Indonesia: Sulawesi, Sumatra, Isl. Nias; Malaysia: West Johor.

New material

Sumatra: Utara Kotacane, 1.VI.1994, without further data, 1 spm. (CSV); Isl. Nias, 5.XII.1994, without further data, 1 spm. (CSV); Malaysia: West Johor, 15 km NW of Kota Tinggi, Muntahak mts., 200 m, 7.-13.III.2002, 1 spm. (CPG), leg. P. Cechovsky.

5.2.1. A key to the species of the genus ***Leptinostethus*** **gen. nov.**

1. Pronotum medially conspicuously longer than wide across posterior angles …… ***L. ceylanicus*** **(Candèze, 1863).**
–. Pronotum as long as wide …..…… **2.**
2. Antennae shorter, not reaching posterior angles of pronotum by the length of the last three antennomere; punctures on pronotum hind-angles rugose, interstices reduced to small wrinkles ……..…….. ***L. macassariensis*** **(Candèze, 1863).**
–. Antennae longer, not reaching posterior angles of pronotum by the length of the half of the last antennomere; punctures on pronotum hind angles fine, interstices half to once their diameter ..... **3.**
3. Antennomere 4-10 lamellate, carina of hind angle of pronotum bent inward (dorsal view)……..…..…….……..…… ***L. javanensis*** **sp. nov.**
–. Antennomere 4-10 dentate, carina of hind angle of pronotum bent outward (dorsal view) ……..……... ***L. conicipennis*** **(Schwarz, 1902).**

5.2.2. Geographical check-list of the distribution of the *Leptinostethus*-species in the Oriental Region

Genus *Leptinostethus*	**General distribution** (political pattern)				
Species	Sri Lanka	Philippines	Java	Sumatra	Sulawesi
ceylanicus	X				
conicipennis		X			
javanensis			X		
macassariensis				X	X

5.3. THE SPECIES OF THE GENUS *NIPPONOELATER* KISHII, 1985

Species of the genus *Nipponoelater* are known from the Palaearctic and from the Oriental Regions exclusively. Appertaining species: *N. amami* (Kishii, 1987), *N. babai* (Kishii, 1987), *N. kometsuki* (Kishii, 1985), *N. sieboldi* (Candèze, 1873), *N. ullongensis* sp. nov., *N. brancuccii* (Schimmel, 1996) comb. nov., *N. maindroni* (Fleutiaux, 1905) comb. nov., *N. uhligi* (Schimmel, 1996) comb. nov., *N. werneri* (Schimmel, 1996) comb. nov., *N. cinnamomeus* (Schimmel, 1996) comb. nov., *N. heilongjiangensis* sp. nov.,

N. henscheli (Schimmel, 2007) comb. nov., *N. indosinensis* sp. nov., *N. juttae* Schimmel, 2007) comb. nov., *N. kradungensis* sp. nov., *N. rufopilosus* (Candèze, 1893) comb. nov., *N. sinensis* (Candèze, 1881) comb. nov., *N. vietnamensis* (Schimmel, 1996) comb. nov., *N. cameronensis* sp. nov., *N. fraterulus* sp. nov., *N. gorodinskii* sp. nov., *N. malaysiensis* sp. nov., *N. meratensis* sp. nov., *N. palawanensis* (Ôhira, 1974) comb. nov., *N. philippinensis* sp. nov., *N. rubellus* sp. nov., *N. rubiginosus* (Candèze, 1889) comb. nov., *N. taiwanus* Kishii, 1989, *N. tenebrosus* (Schwarz, 1889) comb. nov.

Nipponoelater Kishii, 1985

Elater (*Nipponoelater*) Kishii, 1985: 23.
Orthostethus Lacordaire, 1857 (Ôhira, 1997: 37).

Type species
Elater sieboldi Candèze, 1873: 27 (by original designation).

Distribution
Palaearctic and Oriental Regions.

Remarks
The species *Elater sieboldi* and *E. kometsuki* have been placed by Kishii (1985) as members of a group of species he named *Nipponoelater* and which he has originally taken as a subgenus of *Elater.* However, the subgenus was synonymised by Ôhira (1997) with the genus *Orthostethus* Lacordiaire, 1857. In 1998 the author of the subgenus *Nipponoelater* (Kishii) raised the subgenus up to generic status.

For the reason mentioned before, we believe that *Nipponoelater* represent a group of species which has to be separated from *Elater* and from *Orthostethus* as well. The characters of *Nipponoelater* given by Kishii (1985) in our opinion justify the treatment as a monophyletic group. The morphological differences between *Nipponoelater*, *Elater* and the further groups of species treated in this study are evident. Therefore we are going to place *Nipponoelater* beside the genera *Elater* and *Leptinostethus* as a separate species-group (a genus) phylogenetically into the monophylum IX of this study.

5.3.1. The species of the genus *Nipponoelater* Kishii, 1985 from Palaearctic Region

The following list includs species from Japan including Amami-Ôshima, the Ishigaki-jima and the Irimote Is., as well as from South Korea. The species from Himalaya are listed together with these from the Ceylonese and the Indian Subregion.

Nipponoelater amami (Kishii, 1987)

Elater (*Nipponoelater*) *sieboldi amami* Kishii, 1987: 12.
Orthostethus amami (Kishii, 1987): Ôhira, 1997.
Nipponoelater amami (Kishii, 1987): Kishii, 1998.

Type locality
Amami-Ôshima.

material
There is no new material known.

Distribution
Japan: Amami-Ôshima Is., Tokuno-shima Is., Okinawa-honto Is., (in accordance with Ôhira, 1997).

Remarks
The species was described as a subspecies by Kishii, 1987, and placed with species status into *Orthostethus* by Ôhira, 1997. We are treating the species *N. amami* as bona species but as a member of the genus *Nipponoelater*.

Nipponoelater babai (Kishii, 1987)
(Fig. 54)

Elater (*Nipponoelater*) *babai* Kishii, 1987: 14.
Orthostethus babai (Kishii, 1987): Ôhira, 1997.
Nipponoelater babai (Kishii, 1987): Kishii, 1998.

Type locality
Ishigaki-jima Is.

New material
Japan: Iriomote Isl., Ootomi-Rindo, 21.VII.1998, 1 spm. (CPG), leg. H. Ôhira (det. Ôhira); Ishigaki Isl., Kabira, 1.VI.1991, 1 spm. (CPG), leg. T. Fukaishi. (det. Ôhira).

Distribution
Japan: Ishigaki-jima Is., Iriomote Is. (in accordance with Ôhira, 1997).

Remarks
Kishii (1987) described a subspecies of *N. babai*: *N. babai seinoi* from the Amami-oshima Is.

Nipponoelater kometsuki (Kishii, 1985)

Elater (*Nipponoelater*) *kometsuki* Kishii, 1985: 23.
Orthostethus kometsuki (Kishii, 1985): Ôhira, 1997.
Nipponoelater kometsuki (Kishii, 1985): Kishii, 1998.

Type locality
Japan: Ami-machi, Ibagari prefecture.

New material
Japan: Mt Takao (Tokyo), 5.VIII.1956, 1 spm. (CPG), leg. S. Kudo (det. Ôhira).

Distribution
Japan.

Nipponoelater sieboldi (Candèze, 1873)
(Fig. 72)

Ludius sieboldi Candèze, 1873: 27.
Elater sieboldi, Nakane and Kishii, 1956.
Elater (*Nipponoelater*) *sieboldi*, Kishii, 1987.
Orthostethus sieboldi, Ôhira, 1997.
Nipponoelater sieboldi, Kishii, 1998: 3.

Type locality
Japan.

New material
Japan: Kanmuri (Kyoto) 29.VII.1952, 1 spm. (CPG), leg. K. Tsukamoto (det. T. Kishii, 1985); Izuhara, Tushima, 1975, 2 spm. (CPG) (det. H. Arimoto, 1989). Korea: Pyo se young, 30.VII.2000, 1 spm. (CPG); Simwon Mt Jiri, 28.VII.1997, 1 spm. (CPG).

Distribution
Japan; Taiwan; Korea.

Remarks
Elongate and black species with subparallel body sides and legs, antennae and pubescence reddish-brown. The type has been described by Candèze (1873) based on material from Japan. But this species has been published subsequently from Taiwan by Miwa (1928, 1930, 1931, 1934), by Kishii & Seino (1985) and by Kishii (1989). The abovementioned records are the first of *N. sieboldi* from Korea.

Nipponoelater ullongensis sp. nov.
(Figs. 77, 94)

Type locality
South Korea: Ullong Isl.

Type material
Holotype ♂ (CRG): South Korea: Ullong Isl., Mt. Songin, 948 m, 9.-18.VII.2008, leg. L. Jingke.
Paratypes 2 ♂♂, 7 ♀♀ (CRG, CSV): Same data as holotype.

Diagnosis

Holotype ♂: Elongate and sub-parallel species, surface of pronotum and elytra regularly vaulted, shiny, and covered with pileous, reddish, fine hairs; black, antennae and legs dark reddish-brown; integument punctured, pubescence declined, semi-erected apically on pronotum and stellate on head; dimensions: length: 23.61 mm, width: 6.01 mm.

Description

Head with dense, fine, circular and umbilici punctures, interstices half to once their diameter; pubescence fine, short and stellate from centre to lateral sides; eyes semi-spherical, prominent; frons infundibuliform, declivous from gena to apex and separated from clypeus by a complete and distinct boundary carina; last segment of palpus maxillarius dolabriform; mandible falcate and lanceolate apically; labrum protruding, penicillate apically. .

Antennae elongate, dentate to sublamellate from fourth antennomere on, not reaching the posterior angles of pronotum by the length of the last antennomere; second antennomere as long as wide apically, third antennomere subcylindrical and twice as long as wide apically; fourth to tenth antennomere as long as wide, apically conspicuously extended, last antennomere oblong-elliptic, subapically bevelled.

Pronotum trapezoidal, along median line slightly longer than wide at posterior angles (length-width ratio: 6.51:6.01), regularly raised on centre, sub-parallel laterally and with a relatively precipitous slope posterior; posterior angles of pronotum divergent, and with a distinctly raised carina which is reaching basal third of pronotum; apices of basal angles acute; punctures on pronotum dense, circular and umbilici, interstices half to once their diameter, subbasally reduced to small wrinkles and semi-matt on whole surface; pubescence declivous from apex to base and to lateral sides, semi-erected apically.

Lateral sides of mesosternal fossa gradually declivous throughout its length, nearly sub-parallel to body axis.

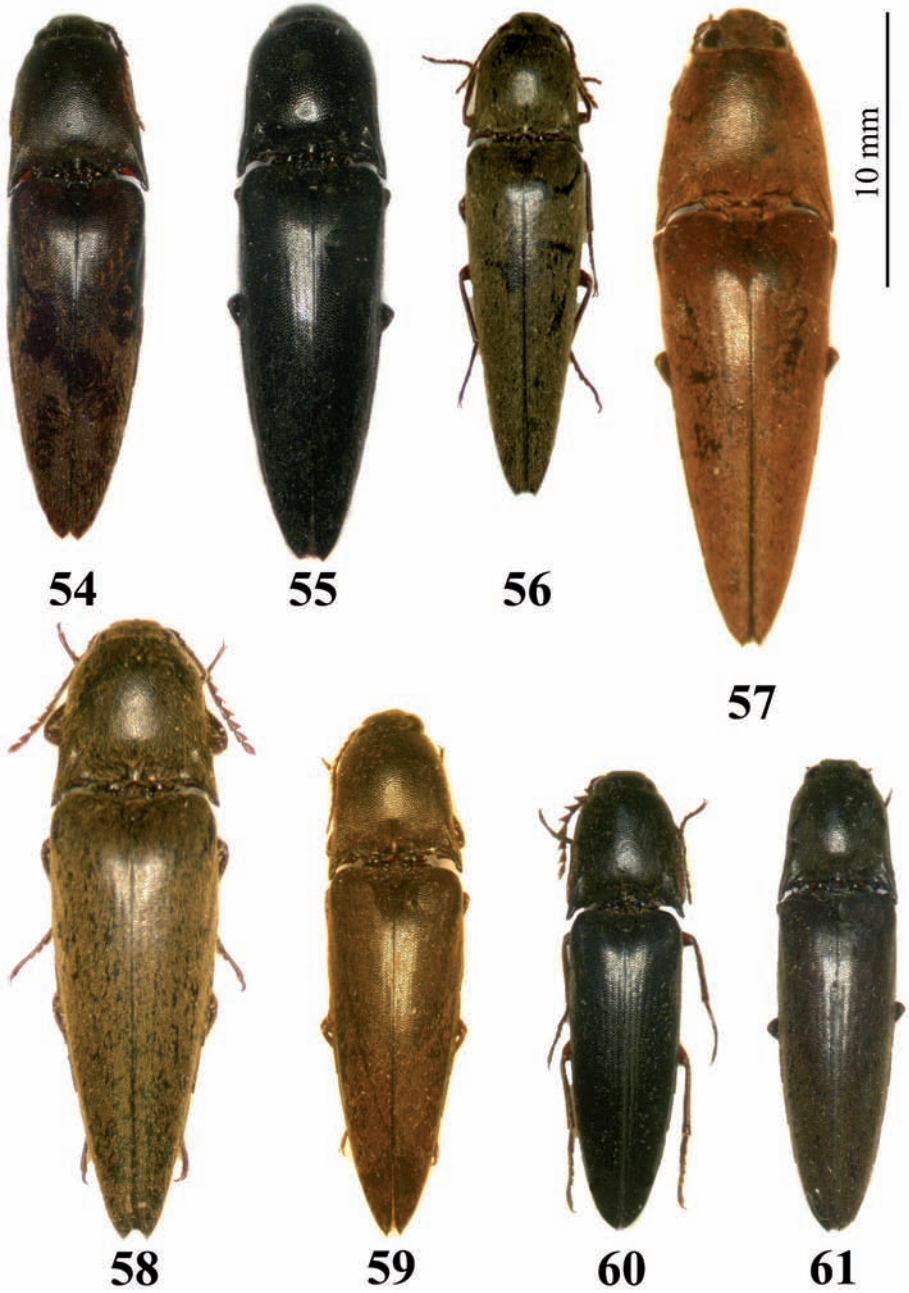
Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.

Pro-, meso- and metathorax with distant and fine punctures, interstices flat and semi-matt; pubescence short and declivous; episternum of prothorax without any punctures and shiny; metacoxal plates conspicuously angulate submedially.

Sternite fine but densely punctured, interstices of punctures once to twice their diameter and micro-reticulate covered with bristly and decumbent hairs.

Scutellum lingulate, basally and apically conspicuously bent; surface flat and aspirate; punctures densely and umbilici; pubescence fine, and just visible, declivous from base to apex.

Elytra sub-parallel, long and cuneate, after midway narrowed to apex; latter arcuate and sharply toothed apically; base of elytra as wide as that of pronotum and slightly depressed at scutellum, shoulders prominent (winged species); elytra striae reduced and with just slightly impressed, distant fine and simple punctures, interstices of striae slightly raised and shiny; pubescence short, and declivous to apex and to lateral sides.



Figs. 54-61. Habitus of *Nipponoelater*-species: 54 – *N. babai* (Kishii, 1987) comb. nov., 55 – *N. brancuccii* (Schimmel, 1996) comb. nov., 56 – *N. cameronensis* sp. nov., 57 – *N. cinnamomeus* (Schimmel, 1989) comb. nov., 58 – *N. fraterulus* sp. nov., 59 – *N. gorodinskii* sp. nov., 60 – *N. heilongjiangensis* sp. nov., 61 – *N. henscheli* (Schimmel, 2997) comb. nov.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long, tarsomeres up to claws of decreasing length, ventrally with fine pubescence, tibia covered with semi-protruding bristly thorns.

Aedeagus trilobate, median lobe acute apically, extending apices of paramere conspicuously, the latter slightly bent apically, and with a tuft of long and bent hairs.

Females (paratypes) have slightly longer and wider body the antennae are slightly shorter than of the males, not reaching apices of pronotal hind angles by the length of the last two antennomere.

Larvae are unknown.

Differential diagnosis

Nipponoelater ullongensis is closely allied to *N. sinensis*, but may be easily distinguished from this species by the smaller and shiny body, the less dense punctures on pronotum, their wrinkled interstices subbasally, by the divergent posterior angles of pronotum and by the different form of aedeagus. From the similar *N. heilongjiangensis* the new species may be distinguished by the shiny body and by the dentate to sublamellate antennae, and by the different male genitalia.

Etymology

Named after the type locality.

Distribution

South Korea: Ullong Isl.

5.3.2. The species of the genus *Nipponoelater* Kishii, 1985 from Himalaya, from the Ceylonese Subregion and from the Indian Subregion

The Indian and the Ceylonese Subregions are parts of the Oriental Region. As the possibility exists, that species which occur in the high mountains of the Himalaya have also populations in Northern India, the species from these Subregions will be combined in the following.

Nipponoelater brancuccii (Schimmel, 1996) comb. nov.

(Fig. 55)

Elater brancuccii Schimmel, 1996: 122.

Type locality

India: Darjeeling district.

New material

India: Darjeeling, Kalimpong, Bombusty, 900 m, 18.V.1987, 1 spm., leg. N. Dangal; same locality but Khanny Busty, 1200 m, 15.VI.-2.VII.1989, 2 spm., leg. N. Dangal; Dharamsala, 2000-3400 m , VIII.1986, 1 spm. (CPG), leg. K. Werner. Nepal: Syangia distr., 2-10 km E Syangia, m 1200-1600, 22.26.VII.1995, 1 spm. (CPG), leg. G. Csorba; Annapurna Himal, betw. Ghorepani–Geirigan m 1300-2600, 25.27.VII.1995, 1 spm. (CPG), leg . G. M. Laszlo, G. Ronkay & G. Csorba.

Distribution

Nepal; India: Darjeeling; Thailand; Myanmar.

Remarks

The species is easy to recognize by the subrectangular pronotum and its distinctly divergent posterior angles.

Nipponoelater maindroni (Fleutiaux, 1905) comb. nov.

(Fig. 65)

Ludius maindroni Fleutiaux, 1905: 329.
Elater karikalensis Schimmel, 1996: 123; **syn. nov.**

Type locality

India: Pondicherry, Karikal.

New material

South India: Kerala, Cardamom Hills, Idikki distr., V.2003, 1 spm. (CRG), leg. A. A. Surender; Kerala, Pondicherry, 1 spm. (CSV); Kerala, Idikki distr., Devikulam, Cardomom hills, 5500 ft., V.2008, 1 spm. (CSV), leg. S. A. Surender; Kerala, Muna env., 25.-28.V.1994, 2 spm. (CSV), leg. Sauer.

Distribution

South India.

Remarks

The species is easily distinguished from all other species of the genus by the lamellate antennae and the dense punctures on pronotum. As a result of a careful examination on more material of *E. maindroni*, the species *E. karikalensis*, which has been described by the first author of this paper in 1996, is proposed here as a junior synonym of *E. maindroni.*

Nipponoelater uhligi (Schimmel, 1996) comb. nov.

(Fig. 76)

Elater uhligi Schimmel, 1996: 124.

Type locality
India: Pondicherry, Karikal.

material
There is no new material of this species known.

Distribution
India: Pondicherry.

Remarks
The species is closely related to *N. vietnamensis* but easily distinguished by the distinctly serrate antennae, which don't reach the posterior angles of pronotum by the length of the last three antennomeres.

Nipponoelater werneri (Schimmel, 1996) comb. nov.
(Fig. 79)

Elater werneri Schimmel, 1996: 126.

Type locality
India: Assam.

material
There is no new material of this species known.

Distribution
India: Assam; Meghalaya.

Remarks
The species is closely related to *N. brancuccii* but easily distinguished by the subrectangular pronotum with posterior angles directed backward and the short antennae which don't reach the posterior angles of pronotum by the length of the last three antennomeres.

5.3.2.1. A key to the species of the genus ***Nipponoelater*** Kishii, 1985 from Himalaya and from the Ceylonese and from the Indian Subregion

1. Antennomere 4-10 lamellate …….. ***N. maindroni*** **(Fleutiaux, 1905).**
–. Antennomere 4-10 dentate ……..……..……. **2.**
2. Pubescence fine and gray, pronotum trapezoidal .... ***N. uhligi*** **(Schimmel, 1996).**
–. Pubescence setose and reddish, pronotum subrectangular …..... **3.**
3. Posterior angles of pronotum conspicuously divergent ….....
.....……. ***N. brancuccii*** **(Schimmel, 1996).**
–. Posterior angles of pronotum directed backward ….. ***N. werneri*** **(Schimmel, 1996).**

5.3.2.2. Geographical check-list of the distribution of the *Nipponoelater*-species in the Himalaya, in the Ceylonese and the Indian Subregion

Genus *Leptinostethus*	**General distribution** (political pattern)					
Species	Darjeeling	Thailand	Myanmar	South India	Assam	Meghalaya
brancuccii	X	X	X			
maindroni				X		
uhligi				X		
werneri					X	X

5.3.3. The species of the genus ***Nipponoelater*** Kishii, 1985 from Oriental Region

The species from the Indian and from the Ceylonese Subregion are included together with the *Nipponoelater*-species from Himalaya in section 5.4.2.

5.3.3.1. The species of the genus *Nipponoelater* Kishii, 1985 from the Indochinese Subregion

The following list of species of the genus *Nipponoelater* includes these from Myanmar, China, Thailand, Laos and Vietnam.

***Nipponoelater brancuccii* (Schimmel, 1996) comb. nov.**
(Fig. 55)

Elater brancuccii Schimmel, 1996: 122.

Type locality
India: Darjeeling district.

New material
Thailand: Chiang Mai, VII.1985, 2 spm. (CRG, CSV), leg. E. Steinke; same data but 25.IV.1985, 1 spm. (CRG), leg. E. Steinke; Myanmar: Shan state, Taunggyi, 9.-27.VI.2006, 1 spm. (CSV), leg. L. Jingke.

Distribution
Nepal; India: Darjeeling; Thailand; Myanmar.

Remarks

The species is easy to recognize by the subrectangular pronotum and its distinctly divergent posterior angles.

Nipponoelater cinnamomeus (Schimmel, 1998) comb. nov.

(Fig. 57)

Elater cinnamomeus Schimmel, 1998: 236.

Type locality

Myanmar.

material

No new material is known.

Distribution

Myanmar.

Remarks

The species is easy to recognize by the long and cinnamon-brownish pubescence of the body.

Nipponoelater heilongjiangensis sp. nov.

(Figs. 60, 85)

Type locality

China: Heilongjiang province.

Type material

Holotype ♂ (CRG): China: Heilongjiang province, Mt. Maoershan, Shangzhi City, 1.-20.VII.2006, leg. L. Jingke.

Paratypes 1 ♂, 1 ♀ (CRG, CSV): Same data as holotype.

Diagnosis

Holotype ♂: Elongate and sub-parallel species, surface of pronotum and elytra regularly raised, semi-matt, and covered with pileous, reddish, fine hairs; black, antennae and legs dark reddish-brown; integument punctured, pubescence declined, semi-erected apically on pronotum and elytra; dimensions: length: 24.02 mm, width: 5.97 mm.

Description

Head with dense, fine, circular and umbilici punctures, interstices half to once their diameter; pubescence fine, short and directed to apex, and to lateral sides; eyes semi-spherical, prominent; frons infundibuliform, declivous from gena to apex, and separated from clypeus by a complete and distinct boundary carina; last segment of

palpus maxillarius dolabriform; mandible falcate and lanceolate apically; labrum protruding, penicillate apically.

Antennae elongate, conspicuously dentate from fourth antennomere on, not reaching posterior angles of pronotum by length of half of last antennomere; second antennomere as long as wide apically, third antennomere subcylindrical and twice as long as wide apically; fourth to tenth antennomere as long as wide, apically conspicuously extended, last antennomere oblong-elliptic, subapically bevelled.

Pronotum subrectangular, along median line slightly longer than wide at the posterior angles (length-width ratio: 6.51:5.97), regularly raised on centre, sub-parallel laterally, and with a relatively precipitous slope posterior; posterior angles of pronotum divergent, and with a distinctly raised carina which is reaching basal third of pronotum; apices of basal angles acute; pronotum with a just visible flat mould basally; punctures on pronotum dense, circular, and umbilici, interstices half to once their diameter, subbasally reduced to small wrinkles, and semi-matt on whole surface; pubescence declivous from apex to base and to lateral sides, semi-erected apically.

Lateral sides of mesosternal fossa gradually declivous throughout its length, nearly sub-parallel to body axis.

Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.

Pro-, meso- and metathorax with distant and fine punctures, interstices flat and semi-matt; pubescence short and declivous; episternum of prothorax without any punctures and shiny; metacoxal plates conspicuously angulate submedially.

Sternite fine but densely punctured, interstices of punctures once to twice their diameter and micro-reticulate covered with bristly and decumbent hairs.

Scutellum lingulate, basally and apically conspicuously bent; surface flat and aspirate; punctures densely and umbilici; pubescence fine, and just visible, declivous from base to apex.

Elytra sub-parallel and long, after midway narrowed to apex; the latter arcuate and sharply toothed apically; base of elytra as wide as that of pronotum and slightly depressed at scutellum, shoulders prominent (winged species); elytra striae reduced, punctures less impressed, distant fine and simple, interstices of striae slightly raised and shiny; pubescence short, and declivous to apex and to lateral sides.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long, tarsomeres up to claws of decreasing length, ventrally with fine pubescence, and fine upholstery, tibia covered with semi-protruding bristly thorns.

Aedeagus trilobate, median lobe acute apically, extending apices of the paramere very slightly, the latter falcate apically, and with a tuft of long and bent hairs.

Female (paratype) has a slightly longer and wider body (length: 27.01 mm, width: 7.02 mm), antennae are slightly shorter than in the males, not reaching apices of pronotal hind angles by the length of the last two antennomere.

Larvae are unknown.

Differential diagnosis

Nipponoelater heilongjiangensis is closely allied to *N. sinensis*, but may be easily distinguished by smaller body, less dense punctures on pronotum, their wrinkled interstices subbasally, by the divergent posterior angles of pronotum and by the different form of aedeagus.

Etymology

Named after the type locality.

Distribution

China: Heilongjiang province.

Nipponoelater henscheli (Schimmel, 2007) comb. nov.

(Fig. 61, 86)

Elater henscheli Schimmel, 2007: 185-186.

Type locality

Thailand: Chiang Mai province, Pua.

New material

Laos: Luangphrabang province, Mt. Phov Phakhao, Namtap village, 7.-20.VI.2009, 1 spm. (CRG), leg. S. Khanphilavong; Vietnam: 40 km west of An Khe, Buon Luoi, 620-750 m, 28.III.-12.IV.1995, 1 spm. (CSV), leg. Pacholatko & Dembicky.

Distribution

Thailand; Laos; Vietnam.

Remarks

The species is closely related to *N. rubiginosus* but may be easily distinguished by the much smaller body, and by the longer antennae which reaching posterior angles of pronotum. The abovementioned specimen from Laos and from Vietnam, are the first of the species which has been collected from these countries.

Nipponoelater indosinensis sp. nov.

(Figs. 62, 87)

Type locality

Laos: Louangnamtha province.

Type material

Holotype ♂ (CSV): Laos: Luangnamtha province, from Namtha to Muang Sing, 900-1200 m, 5.-31.V.1997, leg. V. Kubáň.

Paratypes 12 ♂♂, 7 ♀♀ (CRG, CSV, TICB): Same data as holotype, 1 spm., leg. V. Kubáň; same province, Louang Namtha, 600 m, 31.V.1997, 1 spm., leg. V. Kubáň; Laos: Luang Phrabang province, 5 km west of Ban Song Cha, 1200 m, 24.IV.-16.V.1999, 3 spm., leg. V. Kubáň; Laos, Hua Phan province, Phu Phan mts., 1500-1900 m, 17.V.-3.VI.2007, 2 spm., leg. V. Kubáň; Bolikhamsay province, Phou Khao Khouay NBCA, Tad Leuk waterfall, 280 m, at light, 11.-12.IV.1998, 1 spm., leg. O. Merkl & G. Csorba; Vietnam: Tam Dao, VI.1993, 1 spm. Without further data; Vietnam: 40 km north-west of An Khe, Buon Luoi, 620-750 m, 28.III.-12.IV.1995, 2 spm., leg. Pacholátko & Dembický; Thailand: Corat, V.1989, 2 spm., leg. C. C. Chua; Chiangmai province, Doi Pui, 21.V.1985, 1 spm., leg. Steinke; same province, San Pakia, 1400 m, 25.IV.-7.V.1996, 3 spm., leg. L. Hovorka; Mae Hong Son province, Soppong, 1500 m, 7.-12.V.1996, 1 spm., leg. V. Kubáň; China: Yunnan, Jiangchoeng Co., Haiming Shimao, 20.-29.VI.2005, 1 spm., without further data.

Diagnosis

Holotype ♂: Elongate species with conspicuously cuneate elytra, surface of pronotum and elytra regularly raised, shiny, and covered with pileous, reddish, short and fine hairs; black, antennae and legs dark reddish-brown; integument punctured on pronotum and elytra, pubescence declined, semi-erected apically on pronotum and stellate on head; dimensions: length: 25.51 mm, width: 6.51 mm.

Description

Head with dense, fine, circular and umbilici punctures, interstices half their diameter, centrally reduced to small wrinkles; pubescence fine, short and stellate from centre to lateral sides; eyes semi-spherical, prominent; frons infundibuliform, declivous from gena to apex, and separated from clypeus by a complete and distinct boundary carina; last segment of palpus maxillarius dolabriform; mandible falcate and lanceolate apically; labrum protruding, penicillate apically.

Antennae elongate, dentate from fourth antennomere on, not reaching posterior angles of pronotum by length of last two antennomere; second antennomere as long as wide apically, third antennomere subcylindrical and twice as long as wide apically; fourth to tenth antennomere slightly longer than wide apically, last antennomere oblong-elliptic, subapically bevelled.

Pronotum subtrapezoidal, along median line slightly longer than wide at posterior angles (length-width ratio: 6.81:6.51), regularly raised on centre, sub-parallel laterally, and with a relatively precipitous slope posterior, which has a very flat and short, but shiny furrow; posterior angles of pronotum very slightly divergent apically, and with a distinctly raised carina which is reaching basal fourth of pronotum; apices of basal angles acute; punctures on pronotum dense, circular and umbilici, interstices half to once their diameter and conspicuously shiny, subbasally little wrinkling; pubescence

declivous from apex to base and to lateral sides, semi-erected apically, the short posterior furrow without hairs.

Lateral sides of mesosternal fossa gradually declivous throughout its length, nearly sub-parallel to body axis.

Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.

Pro-, meso- and metathorax with distant and fine punctures, interstices flat and semi-matt; pubescence short and declivous; episternum of prothorax without any punctures and shiny; metacoxal plates conspicuously angulate submedially.

Sternite fine but densely punctured, interstices of punctures once to twice their diameter and micro-reticulate covered with bristly and decumbent hairs.

Scutellum lingulate, basally and apically conspicuously bent; surface flat and aspirate; punctures densely and umbilici; pubescence fine, and just visible, declivous from base to apex.

Elytra conspicuously cuneate and elongate, after base narrowed to apex; the latter arcuate and sharply toothed apically; base of elytra as wide as that of pronotum and slightly depressed at scutellum, shoulders prominent (winged species); elytra striae reduced, punctures distant fine and simple, interstices of striae slightly raised and shiny; pubescence short and declivous to apex and to lateral sides.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long, tarsomeres up to claws of decreasing length, ventrally with fine pubescence, tibia covered with semi-protruding bristly thorns.

Aedeagus trilobate, median lobe acute apically, extending apices of the paramere conspicuously, the latter falcate apically, and with a tuft of long and bent hairs.

Females have a slightly broader and larger body than males.

Larvae are unknown.

Differential diagnosis

Nipponoelater indosinensis is closely allied to *N. rubiginosus*, but may be easily distinguished from this species by the subtrapezoidal form of pronotum, by the shorter hairs, and by the form of aedeagus. From the similar *N. henscheli* the new species may be easily distinguished by the form of pronotum and by the shorter antennae. This new species is also in close relation to *N. kradungensis*, but may be easily distinguished from this species by smaller body, the dense pubescence, by the subtrapezoidal pronotum outline and by the conspicuously toothed apices of the elytra.

Etymology

Named according to the distribution.

Distribution

Laos: Luangnamtha province; Luang Phrabang; Hua Phan province; Bolikhamsay province; Thailand: Chiangmai province; Mae Hong Son province; Vietnam: Tam Dao; Buon Luoi; China: Yunnan.

Nipponoelater juttae (Schimmel, 2007) comb. nov.

(Fig. 63, 88)

Elater juttae Schimmel, 2007: 186.

Type locality

Myanmar: Dana Hills.

Material

There is no new material known.

Distribution

Myanmar.

Remarks

The species is closely related to *N. rufopilosus* but is easily distinguished from it by the longer antennae which don't reach the posterior angles of pronotum by the length of half of last antennomere and by the dense punctures on pronotum.

Nipponoelater kradungensis sp. nov.

(Figs. 64, 89)

Type locality

Thailand: Loei province.

Type material

Holotype ♂ (CRG): Thailand: Loei province, Phu Kradung, 1600 m, 16.-17.V.1999, 3 spm., leg. M. Riha.

Paratypes 2 ♂♂ (CRG, CSV): Same data as holotype, leg. M. Riha.

Diagnosis

Holotype ♂: Sub-parallel species with trapezoidal pronotum, surface of pronotum and elytra conspicuously raised, semi-matt, and covered with pileous, reddish, but fine, thin and short, just visible hairs, black, antennae and legs dark-brownish; integument punctured, pubescence declined, semi-erected apically on pronotum and stellate on head; dimensions: length: 30.72 mm, width: 8.49 mm.

Description

Head with dense, fine, circular and umbilici punctures, interstices less than half their diameter; pubescence fine, short and stellate from centre to lateral sides; eyes

semi-spherical, prominent; frons infundibuliform, declivous from gena to apex and separated from clypeus by a complete and distinct boundary carina; last segment of palpus maxillarius dolabriform; mandible falcate and lanceolate apically; labrum protruding, penicillate apically.

Antennae elongate, dentate to semi-lamellate from fourth antennomere on, not reaching the posterior angles of pronotum by the length of the last two antennomere; second antennomere as long as wide apically, third antennomere subcylindrical and two and a half times as long as wide apically (almost as long as the following antennomere); fourth to tenth antennomere slightly longer than wide apically, last antennomere oblong-elliptic, subapically bevelled.

Pronotum trapezoidal, along median line nearly as long as wide at the posterior angles (length-width ratio: 8.31:8.49), regularly raised on centre, sub-parallel laterally and with a relatively precipitous slope posterior; posterior angles of pronotum distinctly divergent, and with a distinctly raised carina which is reaching basal fourth of pronotum; apices of basal angles acute; punctures on pronotum dense, circular and umbilici, interstices half to once their diameter and semi-matt, subbasally little wrinkling; pubescence declivous from apex to base and to lateral sides, semi-erected apically.

Lateral sides of mesosternal fossa gradually declivous throughout its length, nearly sub-parallel to body axis.

Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.

Pro-, meso- and metathorax with distant and fine punctures, interstices flat and semi-matt; pubescence short and declivous; episternum of prothorax without any punctures and shiny; metacoxal plates conspicuously angulate submedially.

Sternite fine but densely punctured, interstices of punctures once to twice their diameter and micro-reticulate covered with bristly and decumbent hairs.

Scutellum lingulate, basally and apically conspicuously bent; surface flat and aspirate; punctures densely and umbilici; pubescence fine, and just visible, declivous from base to apex.

Elytra conspicuously cuneate and elongate, after midway narrowed to apex; the latter arcuate and toothed apically; base of elytra as wide as that of pronotum and slightly depressed at scutellum, shoulders prominent (winged species); elytra covered with distant fine and simple punctures, interstices of striae slightly raised and shiny; pubescence short, and declivous to apex and to lateral sides.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long, tarsomeres up to claws of decreasing length, ventrally with fine pubescence, and fine upholstery, tibia covered with semi-protruding bristly thorns.

Aedeagus trilobate, median lobe acute apically, extending apices of the paramere conspicuously, the latter falcate apically, and with a tuft of long and bent hairs.

Females are unknown.

Larvae are unknown.

Differential diagnosis

Nipponoelater kradungensis is closely allied to *N. indosinensis*, but may be easily distinguished from this species by the bigger body, the less dense pubescence, by the trapezoidal pronotum outline, by the toothed apices of the elytra, and by form of aedeagus.

Etymology

Named after the type locality.

Distribution

Thailand: Loei province.

Nipponoelater rufopilosus (Candèze, 1893) comb. nov.

(Fig. 71)

Ludius rufopilosus Candèze, 1893: 56.
Steatoderus rufopilosus (Schwarz, 1906: 257).

Type locality

Java: "montagnes de l'Est et du Centre" [western and central mountains].

New material

Indonesia: Java: Mount Baluran, IV.1991, 2 spm. (TICB, CSV), leg. Kuban; Java: Mount Argopuro, 4.III.1999, 1 spm. (CRG); Java: from Meru to Betini, 400 m, Sukamade, 15.IX.-15.X.1997, 1 spm. (CSV), leg. Gounod Kab, 1900, without further data, 1 spm. (CSV), leg. Jakl; Thailand: Doi Pui, Chiangmai, 2.V.1985, 1 spm. (CSV), leg. Steinke.

Distribution

Malaysia: Malay Peninsula, Borneo; Indonesia: Java; Thailand.

Nipponoelater sinensis (Candèze, 1881) comb. nov.

(Fig. 73)

Ludius sinensis Candèze, 1881: 103.
Parallelostethus sinensis (Schenkling, 1927: 436).

Type locality

China.

New material

China: Shaanxi province, Lueyang, 18.VII.-27.VII.2001, 1 spm. (CSV), leg. E. Kucera; same locality but 15.-22.VII.2005, 8 spm., leg. E. Kucera; same locality but 26.VI.-6.VII.2009, 6 spm. (CSV), leg. E. Kucera; Fujian province, Jianlin, Tonguzhaw-shan, 1500 m, VII.2005, 1 spm., leg. J. Jingke; Yunnan, Canyuan county, Nan-Gum-We, Elepnas Maximus res. Reg., 5.-20.VI.2009, 1 spm. (CRG), leg. L. Jingke.

Distribution

China.

Remarks

Elongate and sub-parallel, reddish-brown species closely allied to *N. sieboldi*.

Nipponoelater vietnamensis (Schimmel, 1996) comb. nov.

(Fig. 78, 95)

Elater vietnamensis Schimmel, 2007: 187-188.

Type locality

Vietnam: Vinh Yen province, Tam Dao.

New material

Vietnam: Tam Dao, Vinh Yen province, 12.-21.V.1998, 2 spm. (CRG, CSV), leg. Strnad; Myanmar: Kachin province, Sikaw, 5.-28.V.2009, 2 spm. (CRG, CSV), leg. L. Jingke; Mandalay province, Kyaukpadanng, 6.-28.VI.2009, 1 spm. (CRG), leg. L. Jingke.

Distribution

Vietnam; Myanmar.

Remarks

The species is closely related to *N. uhligi* but is easily distinguished by the just slightly serrate antennae, which don't reach the posterior angles of pronotum, and by the length of the last two antennomere. The abovementioned specimen from Myanmar, are the first records of this species from this country.

5.3.3.1.1. A key to the species of the genus ***Nipponoelater*** Kishii, 1985 from the Indochinese Subregion

1. Pronotum subrectangular, posterior angles divergent ……..…..... **2.**
–. Pronotum trapezoidal, posterior angles directed backward ….....…. **3.**
2. Punctures on pronotum fine, interstices once to twice their diameter; bigger species with a length of approximately 30 mm …..… ***N. brancuccii*** **(Schimmel, 1996).**
–. Punctures on pronotum rough, interstices half their diameter, smaller species with a length of 23 mm at best….....……..... ***N. henscheli*** **(Schimmel, 2007).**
3. Elytra, pronotum and head of species dark reddish-brown …….....…… **4.**
–. Elytra, pronotum and head of species black …….....…….. **5.**
4. Antennae dentate, not reaching the posterior angles of pronotum by the length of the last antennomere ……..…….. ***N. sinensis*** **(Candèze, 1881).**
–. Antennae dentate, not reaching the posterior angles of pronotum by the length of the last three antennomeres ….....……... ***N. vietnamensis*** **(Schimmel, 1996).**
5. Elytra sub-parallel, antennae conspicuously dentate from fourth antennomere on, not reaching the posterior angles of pronotum by the length of half of the last antennomere …….....……..…….. ***N. heilongjiangensis*** **sp. nov.**
–. Elytra cuneate, antennae serrate or dentate …….....…… **6.**
6. Pubescence of integument conspicuously short, setose and cinnamon-brownish …….....…… ***N. cinnamomeus*** **(Schimmel, 1998).**
–. Pubescence of integument fine, capillaceous and reddish …….....…… **7.**
7. Surface of pronotum and elytra conspicuously vaulted, pubescence very fine and just visible (species appearing to be black coloured) …….....
.....…… ***N. kradungensis*** **sp. nov.**
–. Surface of pronotum and elytra flattened to slightly vaulted, pubescence rough (species appearing to be brownish to reddish coloured) …….....…… **8.**
8. Punctures on pronotum very dense, interstices basally reduced to small wrinkles, antennae not reaching posterior angles of pronotum by the length of the half of the last antennomere …….....……. ***N. juttae*** **(schimmel, 2007).**
–. Punctures on pronotum with interstices half to once their diameter basally, antennae shorter ..... **9.**
9. Antennae elongate, dentate from fourth antennomere on, not reaching the posterior angles of pronotum by the length of the last two antennomeres …….....
.....…… ***N. indosinensis*** **sp. nov.**
–. Antennae shorter, serrate from fourth antennomere on, not reaching the posterior angles of pronotum by the length of the last four antennomeres ….....
..... ***N. rufopilosus*** **(Candèze, 1893).**

5.3.3.1.2. Geographical check-list of the distribution of the *Nipponoelater*-species in the Indochinese Subregion

Genus *Nipponoelater*	**General distribution** (political pattern)							
Species	Darjeeling	Thailand	Myanmar	China	Laos	Vietnam	Malaysia	Indonesia
brancuccii	X	X	X					
cinnamomeus			X					
heilongjiangensis				X				
henscheli		X			X	X		
indosinensis		X		X		X		
juttae			X					
kradungensis		X						
rufopilosus		X					X	X
sinensis				X				
vietnamensis			X			X		

5.3.3.2. The species of the genus *Nipponoelater* Kishii, 1985 from Malayan Subregion

The following list species of the genus *Nipponoelater* from the Malayan Subregion includes these from Malaysia Peninsula, Borneo, Sumatra and Java, from the Philippines, Palawan and from Taiwan.

***Nipponoelater cameronensis* sp. nov.**

(Figs. 56, 82)

Type locality

Malaysia: Pahang: Cameron highlands.

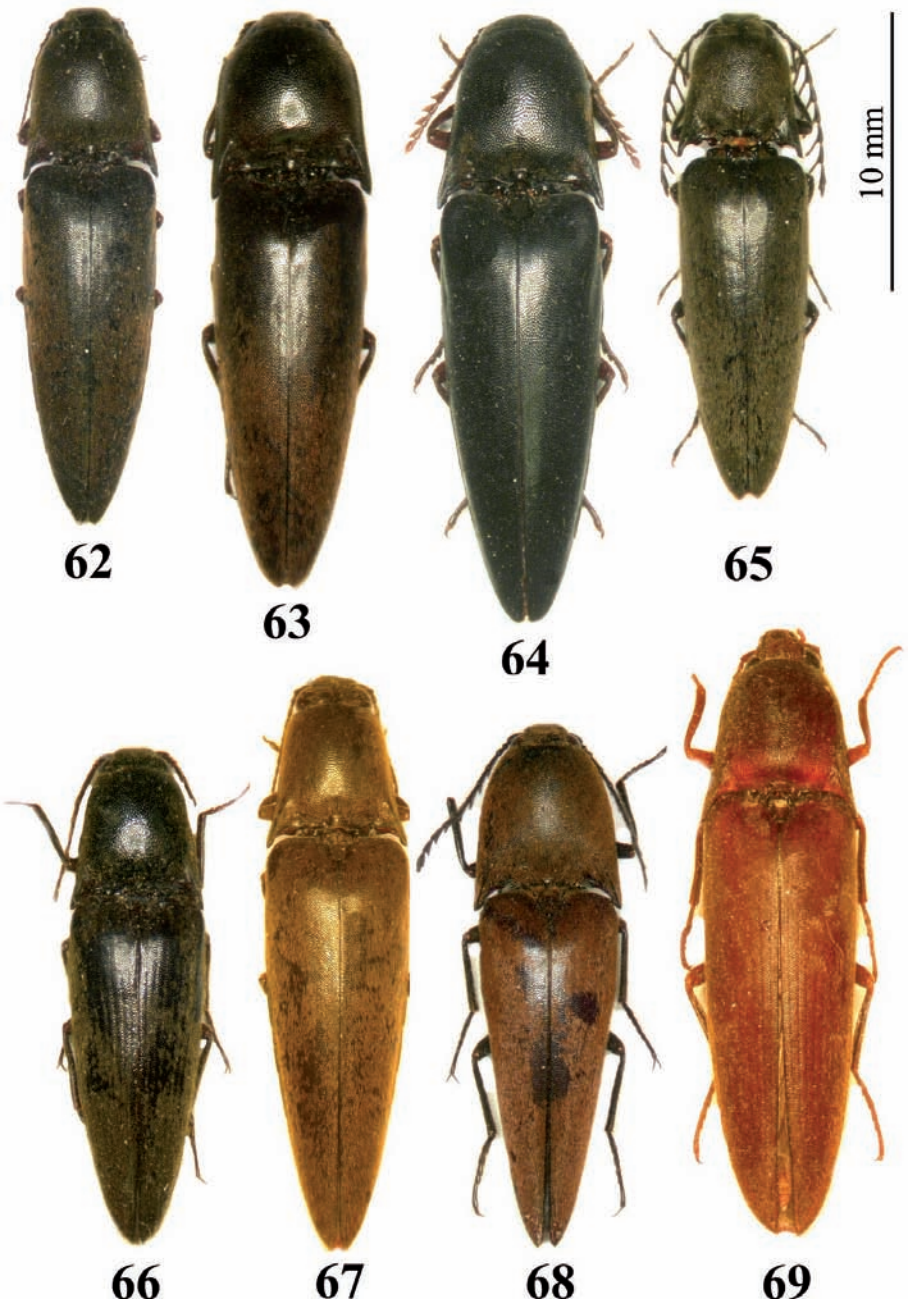
Type material

Holotype ♂ (CSV): Malaysia: Pahang, Cameron highlands, Tanah Rata, 1600 m, 1.-10.II.2000, leg. P. Pacholatko.

Paratypes 2 ♂♂, 2 ♀♀: Malaysia, ex. coll. P. Bleuzen, without further data, 1 spm. (CRG); Malaysia: Tanah Rata, 12.-30.IV.2007, 2 spm. (CRG, CSV), leg. Kremitovskŷ; Malaysia: Sabah, Crocker Range, 3.VI.2003, 1 spm., leg. local collector.

Diagnosis

Holotype ♂: Conspicuously wedge-shaped species with subrectangular pronotum; surface of pronotum and elytra regularly vaulted, semi-matt, and covered with pileous,



Figs. 62-69. Habitus of *Nipponoelater*-species: 62 – *N. indosinensis* sp. nov., 63 – *N. juttae* (Schimmel, 2007) comb. nov., 64 – *N. kradungensis* sp. nov., 65 – *N. maindroni* (Fleutiaux, 1905) comb. nov., 66 – *N. malaysiensis* sp. nov., 67 – *N. meratensis* sp. nov., 68 – *N. philippinensis* sp. nov., 69 – *N. rubellus* sp. nov.

yellow, fine hairs; dark reddish-brown, antennae and legs reddish-brown; integument punctured and micro-reticulate, pubescence declined on pronotum and elytra and stellate on head; dimensions: length: 24.42 mm, width: 5.91 mm.

Description

Head with distant, circular and umbilici punctures, interstices half to once their diameter and distinctly shiny; pubescence rough and stellate from centre to lateral sides; eyes semi-spherical, prominent; frons infundibuliform, declivous from gena to apex, and separated from clypeus by a distinct boundary carina which is vague apically; last segment of palpus maxillarius dolabriform; mandible falcate and lanceolate apically; labrum protruding, penicillate apically.

Antennae elongate, dentate to sublamellate from fourth antennomere on, not reaching posterior angles of pronotum by length of last two antennomere; second antennomere as long as wide apically and semi-globular, third antennomere conspicuously longer than second, fourth antennomere and following antennomere of same length, as long as wide apically, triangular and serrate, last antennomere oblong-elliptic, subapically bevelled; antennae with conspicuously erected, fine pubescence.

Pronotum subrectangular, along median line slightly shorter than wide at the posterior angles (length-width ratio: 5.41:5.91), slightly raised on centre, straight laterally and with a relatively precipitous slope posterior; posterior angles of pronotum divergent apically, very slightly bent downward, and with a distinctly raised carina which is reaching basal fourth of pronotum; apices of basal angles acute; punctures on pronotum distant and umbilici, interstices half to once their diameter and conspicuously shiny; pubescence declivous from apex to base and to lateral sides, semi-erected apically.

Lateral sides of mesosternal fossa gradually declivous throughout its length, nearly sub-parallel to body axis.

Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.

Pro-, meso- and metathorax with distant and fine punctures, interstices flat and semi-matt; pubescence short and declivous; episternum of prothorax without any punctures and shiny; metacoxal plates conspicuously angulate submedially.

Sternite fine but densely punctured, interstices of punctures once to twice their diameter and micro-reticulate covered with bristly and decumbent hairs.

Scutellum lingulate, basally and apically conspicuously bent; surface flat and aspirate; punctures densely and umbilici; pubescence fine, and just visible, declivous from base to apex.

Elytra conspicuously cuneate and elongate, after basal fifth distinctly narrowed to apex; the latter arcuate and sharply toothed apically; base of elytra as wide as that of pronotum and slightly depressed at scutellum, shoulders prominent (winged species); elytra striae reduced, punctures distant fine and simple, interstices of striae slightly raised and shiny; pubescence short, and declivous to apex and to lateral sides.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight

muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long, tarsomeres up to claws of decreasing length, ventrally with fine pubescence, and fine upholstery, tibia covered with semi-protruding bristly thorns.

Aedeagus trilobate, long and elongate, median lobe acute apically, extending apices of the paramere slightly, the latter falcate apically, and with a tuft of long and bent hairs.

Females are slightly longer than males their antennae are shorter, not reaching the posterior angles of pronotum by length of last four antennomere.

Larvae are unknown.

Differential diagnosis

Nipponoelater cameronensis is closely allied to *N. fraterulus*, but may be easily distinguished from this species by the smaller body, the straight lateral sides of pronotum, the dense punctures of the latter, by the longer antennae with third antennomere conspicuously longer than wide apically, and by the form of aedeagus.

Etymology

Named after the type locality.

Distribution

Malaysia.

Nipponoelater fraterulus sp. nov.

(Figs. 83)

Type locality

Malaysia: Taiping.

Type material

Holotype ♂ (CRG): Malaysia: Taiping, III.1978, without further data.

Paratypes 3 ♂♂, 20 ♀♀ (CRG, CSV, CTW): Same locality as holotype but 23.V.1981, 2 spm.; same locality but 10.V.1981, 6 spm.; same locality but 6.V.1981, 3 spm.; same locality but 1.V.1981, 1 spm., same locality but 10.VI.1981, 1 spm.; same locality but 2.VII.1981, 1 spm.; same locality but 16.V.1981, 1 spm.; same locality but 19.VI.1981, 1 spm.; same locality but 11.III.1981, 2 spm.; Tanah Rata, IV.1989, 1 spm., leg. Richter; Pahang, Banjaran Benom mts, 20 km south of Kampong Ulu Dong, 1500-1900 m, 17.-23.IV.1997, 1 spm., leg. P. Cechovsky; Malaysia: Tanah Rata, 12.-30.IV.2007, 2 spm., leg. Kremitovskÿ; West Malaysia, Cameron highlands, 2500 m, VI.1984, without further data, 1 spm.

Diagnosis

Holotype ♂: Conspicuously wedge-shaped species with subtrapezoidal pronotum; surface of pronotum and elytra regularly raised, semi-matt and covered with pileous, yellow, fine hairs; dark reddish-brown, antennae and legs reddish-brown; integument punctured on pronotum and elytra and micro-reticulate, pubescence declined and stellate on head; dimensions: length: 30.02 mm, width: 8.61 mm.

Description

Head with dense, circular and umbilici punctures, interstices reduced to small and shiny wrinkles; pubescence rough and stellate from centre to lateral sides; eyes semi-spherical, prominent; frons infundibuliform, declivous from gena to apex, and separated from clypeus by a distinct boundary carina which is slightly vague apically; last segment of palpus maxillarius dolabriform; mandible falcate and lanceolate apically; labrum protruding, penicillate apically.

Antennae dentate to sublamellate from fourth antennomere on, not reaching the posterior angles of pronotum by length of last three antennomere; second antennomere as long as wide apically and semi-globular, third antennomere slightly longer than second, fourth antennomere and following antennomere of same length, as long as wide apically, triangular and serrate, last antennomere oblong-elliptic, subapically bevelled; antennae with conspicuously erected, fine pubescence.

Pronotum subtrapezoidal, along median line slightly shorter than wide at the posterior angles (length-width ratio: 8.21:8.61), slightly raised on centre, little bent laterally, and with a relatively precipitous slope posterior; posterior angles of pronotum slightly divergent apically, very slightly bent downward, and with a distinctly raised carina which is reaching basal fourth of pronotum; apices of basal angles acute; punctures on pronotum dense and umbilici, interstices reduced to small wrinkles and shiny; pubescence declivous from apex to base and to lateral sides, semi-erected apically.

Lateral sides of mesosternal fossa gradually declivous throughout its length, nearly sub-parallel to body axis.

Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.

Pro-, meso- and metathorax with distant and fine punctures, interstices flat and semi-matt; pubescence short and declivous; episternum of prothorax without any punctures and shiny; metacoxal plates conspicuously angulate submedially.

Sternite fine but densely punctured, interstices of punctures once to twice their diameter and micro-reticulate covered with bristly and decumbent hairs.

Scutellum lingulate, basally and apically conspicuously bent; surface flat and aspirate; punctures dense and umbilici; pubescence fine, and just visible, declivous from base to apex.

Elytra conspicuously cuneate and elongate, after basal fifth distinctly narrowed to apex; the latter arcuate and sharply toothed apically; base of elytra as wide as that of pronotum and slightly depressed at scutellum, shoulders prominent (winged species); elytra striae reduced, punctures distant fine and simple, interstices of striae slightly raised and shiny; pubescence short, and declivous to apex and to lateral sides.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long, tarsomeres up to claws of decreasing length, ventrally with fine pubescence, tibia covered with semi-protruding bristly thorns.

Aedeagus trilobate, long and elongate, median lobe acute apically, extending apices of the paramere slightly, the latter spine-form apically, and with a tuft of long and bent hairs.

Females are slightly longer than males their antennae are shorter, not reaching the posterior angles of pronotum by the length of the last four antennomere.

Larvae are unknown.

Differential diagnosis

Nipponoelater fraterulus is closely allied to *N. meratensis*, but may be easily distinguished from this species by the campaniform pronotum, the bigger body and by the form of aedeagus.

Etymology

Named after the close similarity to further *Nipponoelater*-species with yellow pubescence.

Distribution

Malaysia.

Nipponoelater gorodinskii sp. nov.

(Figs. 84)

Type locality

Malaysia: Borneo, Sabah.

Type material

Holotype ♂ (CRG): Malaysia: Borneo, Sabah, Trusmadi mts., 1500 m, 5.V.2008, leg. A. Gorodinski.

Paratypes 6 ♂♂ (CRG, CSV): Same data as holotype, 3 spm., leg. A. Gorodinski; same place but 18.VI.2005, 2 spm., leg. unknown; Borneo, Sabah, 50 km south of Tomani, 4.V.1999, 1 spm., leg. R. Smarz.

Diagnosis

Holotype ♂: Sub-parallel species with trapezoidal pronotum, surface of pronotum and elytra regularly raised, semi-matt and covered with pileous, reddish, fine hairs; black, antennae and legs dark reddish-brown; integument punctured, pubescence

declined, semi-erected apically on pronotum and stellate on head; dimensions: length: 24.22 mm, width: 6.43 mm.

Description

Head with dense, fine, circular and umbilici punctures, interstices half their diameter; pubescence fine, short and stellate from centre to lateral sides; eyes semi-spherical, prominent; frons infundibuliform, declivous from gena to apex, and separated from clypeus by a complete and distinct boundary carina; last segment of palpus maxillarius dolabriform; mandible falcate and lanceolate apically; labrum protruding, penicillate apically.

Antennae elongate, dentate to sublamellate from fourth antennomere on, not reaching the posterior angles of pronotum by the length of the last three antennomere; second antennomere as long as wide apically, third antennomere subcylindrical and two and a half times as long as wide apically (almost like the following antennomere); fourth to tenth antennomere slightly longer than wide apically, last antennomere oblong-elliptic, subapically bevelled.

Pronotum trapezoidal, along median line clearly longer than wide at the posterior angles (length-width ratio: 7.01:6.51), regularly raised on centre, sub-parallel laterally, and with a relatively precipitous slope posterior; posterior angles of pronotum distinctly divergent apically, and with a distinctly raised carina which is reaching basal fourth of pronotum; apices of basal angles acute; punctures on pronotum dense, circular and umbilici, interstices half to once their diameter and semi-matt, subbasally little wrinkling; pubescence declivous from apex to base and to lateral sides, semi-erected apically.

Lateral sides of mesosternal fossa gradually declivous throughout its length, nearly sub-parallel to body axis.

Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.

Pro-, meso- and metathorax with distant and fine punctures, interstices flat and semi-matt; pubescence short and declivous; episternum of prothorax without any punctures and shiny; metacoxal plates conspicuously angulate submedially.

Sternite fine but densely punctured, interstices of punctures once to twice their diameter and micro-reticulate covered with bristly and decumbent hairs.

Scutellum lingulate, basally and apically conspicuously bent; surface flat and aspirate; punctures densely and umbilici; pubescence fine, and just visible, declivous from base to apex.

Elytra conspicuously cuneate, after midway narrowed to apex; the latter arcuate and sharply toothed apically; base of elytra as wide as that of pronotum and slightly depressed at scutellum, shoulders prominent (winged species); elytra striae reduced, punctures distant fine and simple, interstices of striae slightly raised and shiny; pubescence short, and declivous to apex and to lateral sides.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long, tarsomeres up to claws of decreasing length, ventrally with fine pubescence, and fine upholstery, tibia covered with semi-protruding bristly thorns.

Aedeagus trilobate, median lobe acute apically, extending apices of the paramere conspicuously, the latter falcate apically, and with a tuft of long and bent hairs.

Females are unknown.

Larvae are unknown.

Differential diagnosis

Nipponoelater gorodinskii is closely allied to *N. rubiginosus*, but may be easily distinguished from this species by the conspicuously cuneate form of the elytra, by the trapezoidal form of pronotum, by the shorter pubescence (specimen of the new species appearing darker than these of *N. rubiginosus*) and by the different form of aedeagus.

Etymology

Named after the collector of the new species, Mr. A. Gorodinski.

Distribution

Malaysia: Borneo, Sabah.

Nipponoelater malaysiensis sp. nov.

(Figs. 66, 90)

Type locality

Malaysia: Taiping.

Type material

Holotype ♂ (CRG): Malaysia: Taiping, 16.V.1981, without further data.

Paratypes 2 ♂♂, 2 ♀♀ (CPG, CRG, CSV): Same locality as holotype but IV.1980, 1 spm.; same locality but III.1978, 1 spm.; same locality but 15.VII.1977, 1 spm.; Malaysia: Pahang, Bukit Fraser, 1000 m, X.-XI.1987.

Diagnosis

Holotype ♂: Sub-parallel species with wedge-shaped elytra and subtrapezoidal pronotum; surface of pronotum and elytra regularly raised, semi-matt, and covered with pileous, yellow, fine hairs; blackish-brown, antennae and legs dark reddish-brown; integument punctured, pubescence declined, semi-erected apically on pronotum, stellate on head, and conspicuously erected on antennae; dimensions: length: 35.02 mm, width: 6.82 mm.

Description

Head with dense, circular and umbilici punctures, interstices half to less than half their diameter; pubescence fine and stellate from centre to lateral sides; eyes semi-spherical, prominent; frons infundibuliform, declivous from gena to apex, and separated from clypeus by a distinct boundary carina which is slightly vague apically; last segment of palpus maxillarius dolabriform; mandible falcate and lanceolate apically; labrum protruding, penicillate apically.

Antennae elongate, dentate to sublamellate from fourth antennomere on, outreaching posterior angles of pronotum by length of last three antennomere; second and third antennomere as long as wide apically and semi-globular, forth antennomere and the following antennomere of same length, one and a half time as long as wide apically, triangular and dentate, last antennomere oblong-elliptic, subapically bevelled; antennae with conspicuously erected, fine pubescence.

Pronotum subtrapezoidal, along median line slightly longer than wide at posterior angles (length-width ratio: 7.10:8.82), slightly raised on centre, little bent laterally, and with a relatively precipitous slope posterior; posterior angles of pronotum just little divergent apically, slightly bent downward, and with a distinctly raised carina which is reaching basal fourth of pronotum; apices of basal angles acute; punctures on pronotum distant, circular and simple, not umbilici, interstices once their diameter and semi-matt; pubescence declivous from apex to base and to lateral sides, semi-erected apically, at the apices of the hind angles with a tuft of long erect hairs.

Lateral sides of mesosternal fossa gradually declivous throughout its length, nearly sub-parallel to body axis.

Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.

Pro-, meso- and metathorax with distant and fine punctures, interstices flat and semi-matt; pubescence short and declivous; episternum of prothorax without any punctures and shiny; metacoxal plates conspicuously angulate submedially.

Sternite fine but densely punctured, interstices of punctures once to twice their diameter and micro-reticulate covered with bristly and decumbent hairs.

Scutellum lingulate, basally and apically conspicuously bent; surface flat and aspirate; punctures densely and umbilici; pubescence fine, and just visible, declivous from base to apex.

Elytra conspicuously cuneate, after midway narrowed to apex; the latter arcuate and sharply toothed apically; base of elytra as wide as that of pronotum and slightly depressed at scutellum, shoulders prominent (winged species); elytra striae reduced, punctures distant fine and simple, interstices of striae slightly raised and shiny; pubescence short, and declivous to apex and to lateral sides.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long, tarsomeres up to claws of decreasing length, ventrally with fine pubescence, and fine upholstery, tibia covered with semi-protruding bristly thorns.

Aedeagus trilobate, long and elongate, median lobe acute apically, extending apices of the paramere slightly, the latter acute apically, and with a tuft of long and bent hairs.

Female (paratype) has shorter antennae than the male (holotype), not reaching apices of hind angles of pronotum by the length of the last four antennomere.

Larvae are unknown.

Differential diagnosis

Nipponoelater malaysiensis is closely allied to *N. fraterulus*, but may be easily distinguished from this species by the smaller body and by the short semi-globular third antennomere, by the erect pubescence of the antennae and by the form of aedeagus.

Etymology

Named after the type locality.

Distribution

Malaysia.

Remarks

The specimens of the new species *N. malaysiensis*, have some characters which are unique in the genus *Nipponoelater* and known from species of the genus *Mulsanteus*, another group of the tribus Elaterini: the erect pubescence of antennae, the down-bent apices of hind angles of pronotum and their long tuft of hairs. Without doubt, the mentioned characters have to be taken as as convergent with respect to the genus *Mulsanteus.*

***Nipponoelater meratensis* sp. nov.**

(Figs. 67, 91)

Type locality

Indonesia: Borneo, South Kalimantan.

Type material

Holotype ♂ (CSV): Indonesia: Borneo, Kalimantan province, Meratsu mts., 900 m, Loksado, 15.XI.1997-15.I.1998, leg. S. Jákl.

Paratype ♀ (TIBC): Same data as holotype, leg. S. Jákl.

Diagnosis

Holotype ♂: Sub-parallel species with a conspicuously trapezoidal pronotum, surface of pronotum and elytra regularly raised, semi-matt, and covered with pileous, yellow, fine hairs; black, antennae and legs dark reddish-brown; integument punctured,

pubescence declined, semi-erected apically of pronotum and stellate on head; dimensions: length: 30.02 mm, width: 7.31 mm.

Description

Head with dense, fine, circular and umbilici punctures, interstices half to once their diameter; pubescence fine and stellate from centre to lateral sides; eyes semi-spherical, prominent; frons infundibuliform, declivous from gena to apex, and separated from clypeus by a complete and distinct boundary carina; last segment of palpus maxillarius dolabriform; mandible falcate and lanceolate apically; labrum protruding, penicillate apically.

Antennae elongate, dentate to sublamellate from fourth antennomere on, not reaching posterior angles of pronotum by length of last three antennomere; second antennomere as long as wide apically, third antennomere subcylindrical and three times as long as wide apically (third antennomere is the longest of the whole antennae); fourth to tenth antennomere as long as wide apically, last antennomere oblong-elliptic, subapically bevelled.

Pronotum trapezoidal, along median line slightly shorter than wide at posterior angles (length-width ratio: 7.11:7.31), very slightly raised on centre, straight laterally, and with a relatively precipitous slope posterior; posterior angles of pronotum just little divergent apically, and with a distinctly raised carina which is reaching basal fourth of pronotum; apices of basal angles acute; punctures on pronotum distant, circular and simple, not umbilici, interstices once to twice their diameter and semi-matt; pubescence declivous from apex to base and to lateral sides, semi-erected apically.

Lateral sides of mesosternal fossa gradually declivous throughout its length, nearly sub-parallel to body axis.

Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.

Pro-, meso- and metathorax with distant and fine punctures, interstices flat and semi-matt; pubescence short and declivous; episternum of prothorax without any punctures and shiny; metacoxal plates conspicuously angulate submedially.

Sternite fine but densely punctured, interstices of punctures once to twice their diameter and micro-reticulate covered with bristly and decumbent hairs.

Scutellum lingulate, basally and apically conspicuously bent; surface flat and aspirate; punctures densely and umbilici; pubescence fine, and just visible, declivous from base to apex.

Elytra conspicuously cuneate, after midway narrowed to apex; the latter arcuate and sharply toothed apically; base of elytra as wide as that of pronotum and slightly depressed at scutellum, shoulders prominent (winged species); elytra striae reduced, punctures distant fine and simple, interstices of striae slightly raised and shiny; pubescence short, and declivous to apex and to lateral sides.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long, tarsomeres up to claws of decreasing length, ventrally with fine pubescence, and fine upholstery, tibia covered with semi-protruding bristly thorns.

Aedeagus trilobate, long and elongate, median lobe acute apically, extending apices of the paramere slightly, the latter acute apically, and with a tuft of long and bent hairs.

Female (paratype) has shorter antennae than the male (holotype), not reaching apices of hind angles of pronotum by the length of the last four antennomere.

Larvae are unknown.

Differential diagnosis

Nipponoelater meratensis is closely allied to *N. rubiginosus*, but may be easily distinguished from this species by the yellow pubescence, by the trapezoidal form of the very slightly raised pronotum and by the different form of aedeagus. From the similar *N. fraterulus* the new species may be easy distinguished by the smaller body, the trapezoidal form of pronotum, the long third antennomere, and by the form of aedeagus

Etymology

Named after the type locality.

Distribution

Indonesia: Borneo, Kalimantan.

Nipponoelater palawanensis (Ôhira, 1974) comb. nov.

Elater palawanensis Ôhira, 1974: 170.

Type locality

Palawan: Pinigisan.

material

There is no new material of this species known.

Distribution

Palawan.

Remarks

The species has been described as to be closely allied to *Nipponoelater sieboldi* with "… more acutely serrate antennae and the more trapezoid pronotum" (Ôhira, 1974).

In accordance with the description and the figures given in the original publication, this species undoubtedly belongs to *Nipponoelater*.

Nipponoelater philippinensis sp. nov.

(Figs. 68, 92)

Type locality

Philippines: Luzon.

Type material

Holotype ♂ (CSV): Philippines: Luzon, II.1982, without further data.
Paratype ♂ (CRG): Philippines: North-Surigao, VIII.1995, leg. J. L. Bovuant.

Diagnosis

Holotype ♂: Elongate, conspicuously wedge-shaped species with subtrapezoidal pronotum; surface of pronotum and elytra regularly raised, semi-matt, and covered with pileous, reddish, rough hairs; reddish-brown, antennae and legs dark-brown; integument punctured, pubescence declined, semi-erected apically on pronotum, stellate on head; dimensions: length: 27.82 mm, width: 7.31 mm.

Description

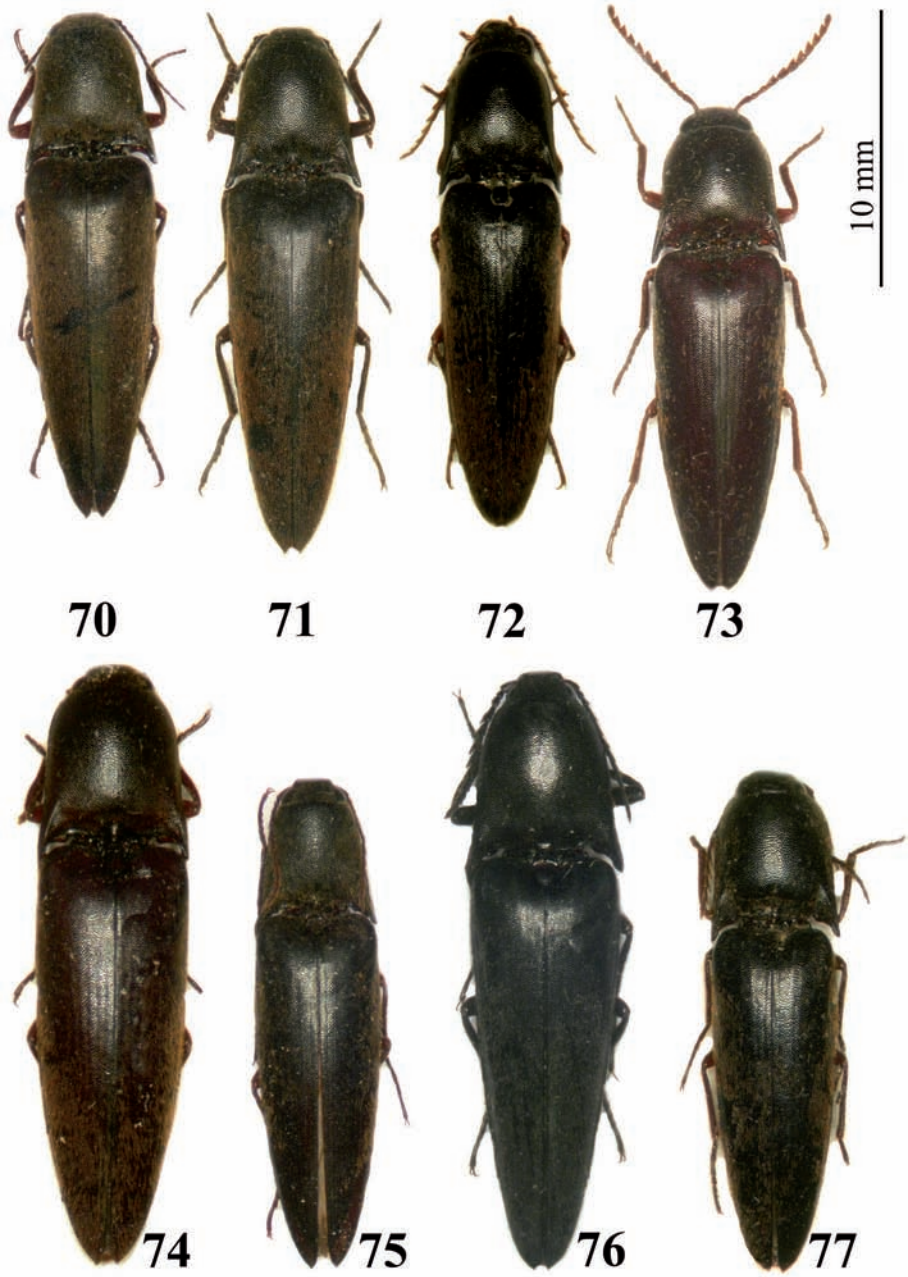
Head with dense, circular and umbilici punctures, interstices reduced to small and shiny wrinkles; pubescence rough and stellate from centre to lateral sides; eyes semi-spherical, prominent; frons infundibuliform, declivous from gena to apex, and separated from clypeus by a distinct boundary carina which is slightly vague apically; last segment of palpus maxillarius dolabriform; mandible falcate and lanceolate apically; labrum protruding, penicillate apically.

Antennae elongate, dentate to sublamellate from fourth antennomere on, not reaching the posterior angles of pronotum by length of half of last antennomere; second antennomere as long as wide apically and semi-globular, third antennomere slightly longer than second, fourth antennomere and the following antennomere of the same length, one and a half time as long as wide apically, dentate to sublamellate, last antennomere oblong-elliptic, subapically bevelled; antennae with conspicuously erected, fine pubescence.

Pronotum subtrapezoidal, along median line slightly longer than wide at posterior angles (length-width ratio: 7.90:7.31), slightly raised on centre, little bent laterally, and with a relatively precipitous slope posterior; posterior angles of pronotum straight, not divergent apically, very slightly bent downward, and with a distinctly raised carina which is reaching basal fourth of pronotum; apices of basal angles acute; punctures on pronotum dense and umbilici, interstices reduced to small wrinkles and shiny; pubescence declivous from apex to base and to lateral sides, semi-erected apically.

Lateral sides of mesosternal fossa gradually declivous throughout its length, nearly sub-parallel to body axis.

Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.



Figs. 70-77. Habitus of *Nipponoelater*-species: 70 – *N. rubiginosus* (Candèze, 1889) comb. nov., 71 – *N. rufopilosus* (Candèze, 1893) comb. nov., 72 – *N. sieboldi* (Candèze, 1873) comb. nov., 73 – *N. sinensis* (Candèze, 1881) comb. nov., 74 – *N. taiwanus* (Kishii, 1989), 75 – *N. tenebrosus* (Schwarz, 1889) comb. nov., 76 – *N. uhligi* (Schimmel, 1996) comb. nov., 77 – *N. ullongensis* sp. nov.

Pro-, meso- and metathorax with distant and fine punctures, interstices flat and semi-matt; pubescence short and declivous; episternum of prothorax without any punctures and shiny; metacoxal plates conspicuously angulate submedially.

Sternite fine but densely punctured, interstices of punctures once to twice their diameter and micro-reticulate covered with bristly and decumbent hairs.

Scutellum lingulate, basally and apically conspicuously bent; surface flat and aspirate; punctures densely and umbilici; pubescence fine, and just visible, declivous from base to apex.

Elytra conspicuously cuneate and elongate, after basal fifth distinctly narrowed to apex; the latter arcuate and sharply toothed apically; base of elytra as wide as that of pronotum and slightly depressed at scutellum, shoulders prominent (winged species); elytra striae reduced, punctures distant fine and simple, interstices of striae slightly raised and shiny; pubescence short, and declivous to apex and to lateral sides.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long, tarsomeres up to claws of decreasing length, ventrally with fine pubescence, and fine upholstery, tibia covered with semi-protruding bristly thorns.

Aedeagus trilobate, long and elongate, median lobe acute apically, extending apices of the paramere slightly, the latter cochleariform apically, and with a tuft of long and bent hairs.

Females are unknown.

Larvae are unknown.

Differential diagnosis

Nipponoelater philippinensis is closely allied to *N. ullongensis*, but may be easily distinguished from this species by the conspicuously wedge-shaped form and the reddish rough pubescence of the body, the dentate to sublamellate form of antennae and by the form of aedeagus.

Etymology

Named after the type locality.

Distribution

Philippines.

Nipponoelater rubellus sp. nov.
(Fig. 69)

Type locality
Taiwan: Puli.

Type material
Holotype ♀ (CSV): Taiwan: Puli, ex coll. Winkler, without further data.
Paratype ♀ (CSV): Same data as holotype.

Diagnosis
Holotype ♀: Elongate, sub-parallel species with subtrapezoidal pronotum; surface of pronotum and elytra regularly raised, semi-matt, and covered with pileous, reddish, fine hairs; reddish, base of pronotum red; integument punctured and micro-reticulate, pubescence declined on pronotum and elytra, stellate on head; dimensions: length: 28.80 mm, width: 7.61 mm.

Description
Head with dense, circular and umbilici punctures, interstices reduced to small and shiny wrinkles; pubescence rough and stellate from centre to lateral sides; eyes semi-spherical, prominent; frons infundibuliform, declivous from gena to apex, and separated from clypeus by a distinct boundary carina which is slightly vague apically; last segment of palpus maxillarius dolabriform; mandible falcate and lanceolate apically; labrum protruding, penicillate apically.

Antennae elongate, dentate to sublamellate from fourth antennomere on, not reaching posterior angles of pronotum by length of the last three antennomere; second antennomere just little longer than wide apically and semi-trapezoidal, third antennomere conspicuously longer than second, fourth antennomere and the following antennomere of the same length, one and a half times longer than wide apically, triangular, dentate to sublamellate, last antennomere oblong-elliptic, subapically bevelled; antennae with conspicuously erected, fine pubescence.

Pronotum subtrapezoidal, along median line slightly longer than wide at posterior angles (length-width ratio: 7.83:7.61), slightly raised on centre, straight laterally, and with a relatively precipitous slope posterior; posterior angles of pronotum straight, very slightly divergent apically, and with a distinctly raised carina which is reaching basal fourth of pronotum; apices of basal angles acute; punctures on pronotum dense and umbilici, interstices reduced to small and shiny wrinkles; pubescence declivous from apex to base and to lateral sides, semi-erected apically.

Lateral sides of mesosternal fossa gradually declivous throughout its length, nearly sub-parallel to body axis.

Prosternal apophysis slightly proximal to body axis and with a conspicuously uncinate deposition medially.

Pro-, meso- and metathorax with distant and fine punctures, interstices flat and semi-matt; pubescence short and declivous; episternum of prothorax without any punctures and shiny; metacoxal plates conspicuously angulate submedially.

Sternite fine but densely punctured, interstices of punctures once to twice their diameter and micro-reticulate covered with bristly and decumbent hairs.

Scutellum lingulate, basally and apically conspicuously bent; surface flat and aspirate; punctures densely and umbilici; pubescence fine, and just visible, declivous from base to apex.

Elytra sub-parallel and elongate, after midway slightly narrowed to apex; the latter arcuate and sharply toothed apically; base of elytra as wide as that of pronotum and slightly depressed at scutellum, shoulders prominent (winged species); elytra striae reduced, punctures distant fine and simple, interstices of striae slightly raised and shiny; pubescence short, and declivous to apex and to lateral sides.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long, tarsomeres up to claws of decreasing length, ventrally with fine pubescence, and fine upholstery, tibia covered with semi-protruding bristly thorns.

Males are unknown.

Larvae are unknown.

Differential diagnosis

Nipponoelater rubellus is closely allied to *Nipponoelater* species with reddish pubescence, but may be easily distinguished from these species by the sub-parallel body, and by the reddish colour with red base of pronotum.

Etymology

Named after the colour of the new species.

Distribution

Taiwan.

Nipponoelater rubiginosus (Candèze, 1889) comb. nov.

(Fig. 70)

Ludius rubiginosus Candèze, 1889: 96.
Steatoderus rubiginosus (Schwarz, 1906: 257).
Ludius brunneus Fleutiaux, 1924: 144.

Type locality
Sumatra: Serdang.

New material
Indonesia: Sumatra: Anai Valley, 350 m, VI.1992, 1 spm. (CSV); Dolok, Korangir, III.1984, 1 spm. (CSV); 28 km south-west of Pematang, Siantar, road to Prabat, 1100-1200 m, 19.IV.1993, 1 spm. (CSV), leg. E. W. Diehl; same locality but 25.V.1993, 1 spm. (CSV), leg. E.W. Diehl; Utara, Brastagi, 20.IX.1994, 1 spm. (CSV); Maoaysia: Malaysia Peninsula, Taiping, III.1978, 4 spm. (CRG, CSV); Sumatra: Brastagi, IV.1994, 3 spm., without further data; Malaysia: Sabah, Crocker Range, 5.IV.2008, 2 spm. (CRG), leg. local collector; same locality but Konngau, 1500 m, 23.VIII.1997, 1 spm. (CRG), without further data; Sabah, Ranua, 2.VI.2008, 1 spm. (CSV), leg. local collector; Pahang, Bukit Fraser, m 1000, X.XI.1987, 1 spm. (CPG); Pahang, Cameron Highlands, Tanah Rata, 21.III.2.IV.1995, 2 spm. (CPG), leg. O. Merkl.

Distribution
Malaysia: Malaysia Peninsula; Borneo.
Indonesia: Sumatra.

Distribution
Malaysia: Malaysia Peninsula; Borneo.
Indonesia: Sumatra.

Remarks
Fleutiaux (1936: 294) mentioned *Ludius rufopilosus* Candèze, 1893 as a synonym of *L. rubiginosus* Candèze, 1889, and also the *L. brunneus* which he (Fleutiaux) published in 1924. In the same paper Fleutiaux (1936) published *L. rufopilosus* from Cambodia and Vietnam. All species of *Nipponoelater rubiginosus* we have seen so far have been collected from Malaysia Peninsula, from Borneo and from Sumatra. *N. rubiginosus* Candèze, 1889 is in close relation to *N. rufopilosus* Candèze, 1893, but may be easily distinguished by the shorter antennae which don't reach the posterior angles of pronotum by the length of the last four antennomeres. *N. rubiginosus* (Candèze, 1889) has longer antennae, not reaching the posterior angles of pronotum by the length of the last two antennomere. Very probably Fleutiaux (1936) did not consider the differences in the two species which he had taken as one. Therefore, we do not consider the occurrence of *N. rubiginosus* in Indo-China as to be scientifically proved.

Nipponoelater rufopilosus (Candèze, 1893) comb. nov.
(Fig. 71)

Ludius rufopilosus Candèze, 1893: 56.
Steatoderus rufopilosus (Schwarz, 1906: 257).

Type locality
Java: "montagnes de l'Est et du Centre" [western and central mountains].

New material
Malaysia: Tanah Rata, 12.-30.IV.2007, 3 spm., leg. Kremitovskŷ; Kelantan, 30 km NE Tanah Rata, m 800, 17-19.IV.1999, 1 spm. (CPG), leg. A. Ballerio. Indonesia: Java: Mount Baluran, IV.1991, 2 spm. (TICB, CSV), leg. Kuban; Java: Mount Argopuro, 4.III.1999, 1 spm. (CRG); Java: from Meru to Betini, 400 m, Sukamade, 15.IX.-15.X.1997, 1 spm. (CSV), without further data; Gounod Kab, 1900, without further data, 1 spm. (CSV), leg. Jakl; Thailand: Doi Pui, Chiangmai, 2.V.1985, 1 spm. (CSV), leg. Steinke; 100 km NE of Nan Doi Phu Kha N. P., 20-25.IV.2004, 1 spm. (CPG), leg. F. Pavel (det. R. Schimmel).

Distribution
Malaysia: Borneo; Indonesia: Java; Thailand.

Remarks
The species is in close relation to *N. rubiginosus* Candèze, 1889, but may be easily distinguished by the longer antennae not reaching the posterior angles of pronotum by the length of the last two antennomeres. *N. rubiginosus* Candèze, 1889 has shorter antennae, not reaching the posterior angles of pronotum by the length of the last four antennomeres.

Nipponoelater sieboldi (Candèze, 1873)
(Fig. 72)

Ludius sieboldi Candèze, 1873: 27.
Elater sieboldi, Nakane & Kishii, 1956.
Elater (*Nipponoelater*) *sieboldi*, Kishii, 1987.
Orthostethus sieboldi, Ôhira, 1997.
Nipponoelater sieboldi, Kishii, 1998: 3.

Type locality
Japan.

New material
Taiwan: without locality, 1 spm. (CPG).

Distribution
Japan; Korea; Taiwan.

Remarks
See remarks at *N. sieboldi* under paragraph 5.3.1.

Nipponoelater taiwanus Kishii, 1989
(Fig. 74)

Elater (*Nipponoelater*) *babai taiwanus* Kishii, 1989 : 37.
Orthostethus babai taiwanus Suzuki, 1999: 203; Platia & Schimmel, 2007: 70.
Elater (*Nipponoelater*) *taiwanus* Kishii, 1989: 49.

Type locality
Taiwan: Puli.

New material
Taiwan: Sun Moon Laer, 2.-13.VII.1994, 2 spm. (CSV), leg. Dalihop; Ilan County, Chihtuan, Ming-Chyr For. Recreation Area, 24°39'26"N, 121°28'78"E, 1250 km, 3.VIII.1999, 2 spm. (TM), leg. A. Kun; Ilan County, Fu Shan Botanical Garden, LTER site, 24°45'47"N, 121°35'75"E, 700 m, 4–7.VIII.1999, 5 spm. (TM), leg. A. Kun; Pingtung County, 5 km NW Sulin, 350 m, 120°46'E, 22°05'N, 11.VIII.1996, 1 spm. (TM), leg. T. Csõvári & L. Mikus; Taitung County, 4 km N of Tupan, 120°52'E, 22°28'N, 390 m, 17. VIII. 1996, 2 spm. (CPG; TM), leg. T. Csõvári & L. Mikus; Taitung County, Chihpen, 390 m, at light, 9–11.VI.1997, 5 spm. (TM), leg. B. Herczig & L. Ronkay; Lishan, V.1985, 1 spm. (CPG).

Distribution
Taiwan.

Remarks
The species was originally described by Kishii (1989) as a subspecies of *Elater* (*Nipponoelater*) *babai* from Japan, but clearly differs from this species by the much smaller antennal segments and smaller size of body. For this reason we take *N. taiwanus* as a valid species known so only far from Taiwan.

Nipponoelater tenebrosus (Schwarz, 1898) comb. nov.
(Fig. 75)

Ludius tenebrosus Schwarz, 1898: 411.
Steatoderus tenebrosus (Schwarz, 1906: 257).

Type locality
Java: Mont Kawie, Pasoeroean.

New material
Indonesia: Java, Gounod Kab, 1900, 1 spm., without further data; Sumatra: Sibo Langit, IV.1994, 1 spm., without further data.

Distribution
Indonesia: Sumatra, Java.

Remarks

The species is closely related to *N. rufopilosus* but easily distinguished by the dense punctures on pronotum with interstices reduced to small wrinkles and the longer antennae.

The species has been described by Schwarz (1898) based on material from Java. The same author (Schwarz, 1906) published the species in the Genera Insectorum from Japan (sic!). The abovementioned record of *N. tenebrosus* is the first of this species from Sumatra.

5.3.3.2.1. A key to the species of the genus ***Nipponoelater*** Kishii, 1985 from the Malayan Subregion

1. Pronotum subrectangular, lateral sides straight …..... ***N. cameronensis* sp. nov.**
–. Pronotum trapezoidal or subtrapezoidal ….....…… **2.**
2. Pronotum trapezoidal ….....…….…… **3.**
–. Pronotum subtrapezoidal …..…….....…….…….. **6.**
3. Reddish species with base of pronotum red …..... ***N. rubellus* sp. nov.**
–. Dark brownish or black species …….....…….……. **4.**
4. Black species …….....…… ***N. palawanensis* (Ôhira, 1974).**
–. Dark brownish species …….....……..…… **5.**
5. Posterior angles of pronotum distinctly divergent apically, punctures on pronotum dense, circular and umbilici, interstices half to once their diameter ……..... .....…… ***N. gorodinskii* sp. nov.**
–. Posterior angles of pronotum straight, punctures on pronotum dense, circular and simple, not umbilici …….....…….……..…… ***N. meratensis* sp. nov.**
6. Third antennomere as long as second antennomere ….. ***N. malaysiensis* sp. nov.**
–. Third antennomere conspicuously longer than second …….....…….. **7.**
7. Pronotum along median line slightly shorter than wide at the posterior angles …….....…….... ***N. fraterulus* sp. nov.**
–. Pronotum along median line slightly or conspicuously longer than wide at the posterior angles ….....…….……. **8.**
8. Pronotum along median line slightly longer than wide at the posterior angles …….. **9.**
–. Pronotum along median line conspicuously longer than wide at the posterior angles ….....…….. **11.**
9. Antennae shorter, serrate from fourth antennomere on, not reaching the posterior angles of pronotum by the length of the last four antennomere .... ***N. rubiginosus* (Candèze, 1889).**
–. Antennae longer ……....……..… **10.**
10. Antennae dentate from fourth antennomere on, not reaching the posterior angles of pronotum by the length of the last two antennomere ……..... .....…. ***N. rufopilosus* (Candèze, 1893).**
–. Antennae dentate from fourth antennomere on, not reaching the posterior angles of pronotum by the length of the half of the last antennomere ……..... .....…….... ***N. philippinensis* sp. nov.**

11. Elongate species, antennae sublamellate from fourth antennomere on, reaching the posterior angles of pronotum ……..……..…… ***N. sieboldi*** **(Candèze, 1873).**
–. Sub-parallel species, antennae serrate from fourth antennomere on, not reaching the posterior angles of pronotum …..…....……..…… **12.**
12. Pronotum with conspicuously divergent posterior angles, antennae not reaching the posterior angles of pronotum by the length of the last antennomere ……..... .....……. ***N. tenebrosus*** **(Candèze, 1898).**
–. Pronotum with slightly divergent posterior angles, antennae not reaching the posterior angles of pronotum by the length of the last three antennomere …… ……..…… ***N. taiwanus*** **(Kishii, 1989).**

5.3.3.2.2. Geographical check-list of the distribution of the *Nipponoelater*-species in the Malayan Subregion

Genus *Nipponoelater*	**General distribution** (political pattern)				
Species	Malaysia	Indonesia	Palawan	Philippines	Taiwan
cameronensis	X				
fraterulus	X				
gorodinskii	X				
malaysiensis	X				
meratensis		X			
palawanensis			X		
philippinensis				X	
rubellus					X
rubiginosus	X	X			
rufopilosus	X	X			
sieboldi					X
taiwanus					X
tenebrosus		X			

5.4. THE SPECIES OF THE GENUS *ORTHOSTETHUS* LACORDAIRE, 1857

The species of the genus *Orthostethus* have populations in North and Central America, in Mexico and in the Neotropical Region. Appertaining species: *O. caviceps* SCHAEFFER, 1916, *O. cavifrons* CHAMPION, 1895, *O. corvinus* (GERMAR, 1844), *O. glabratus* CHAMPION, 1895, *O. hepaticus* (GERMAR, 1824), *O. infuscatus* (GERMAR, 1844), *O. landolti* STEINHEIL, 1877, *O. pectinicornis* CHAMPION, 1859 and *O. piceus* CANDÈZE, 1863.

Orthostethus LACORDAIRE, 1857

TYPE SPECIES
Aphanobius infuscatus GERMAR, 1844: 183 (by original designation).

5.4.1. The species of the genus *Orthostetht*s LACORDAIRE, 1857 from the Nearctic Region

Orthostethus caviceps SCHAEFFER, 1916

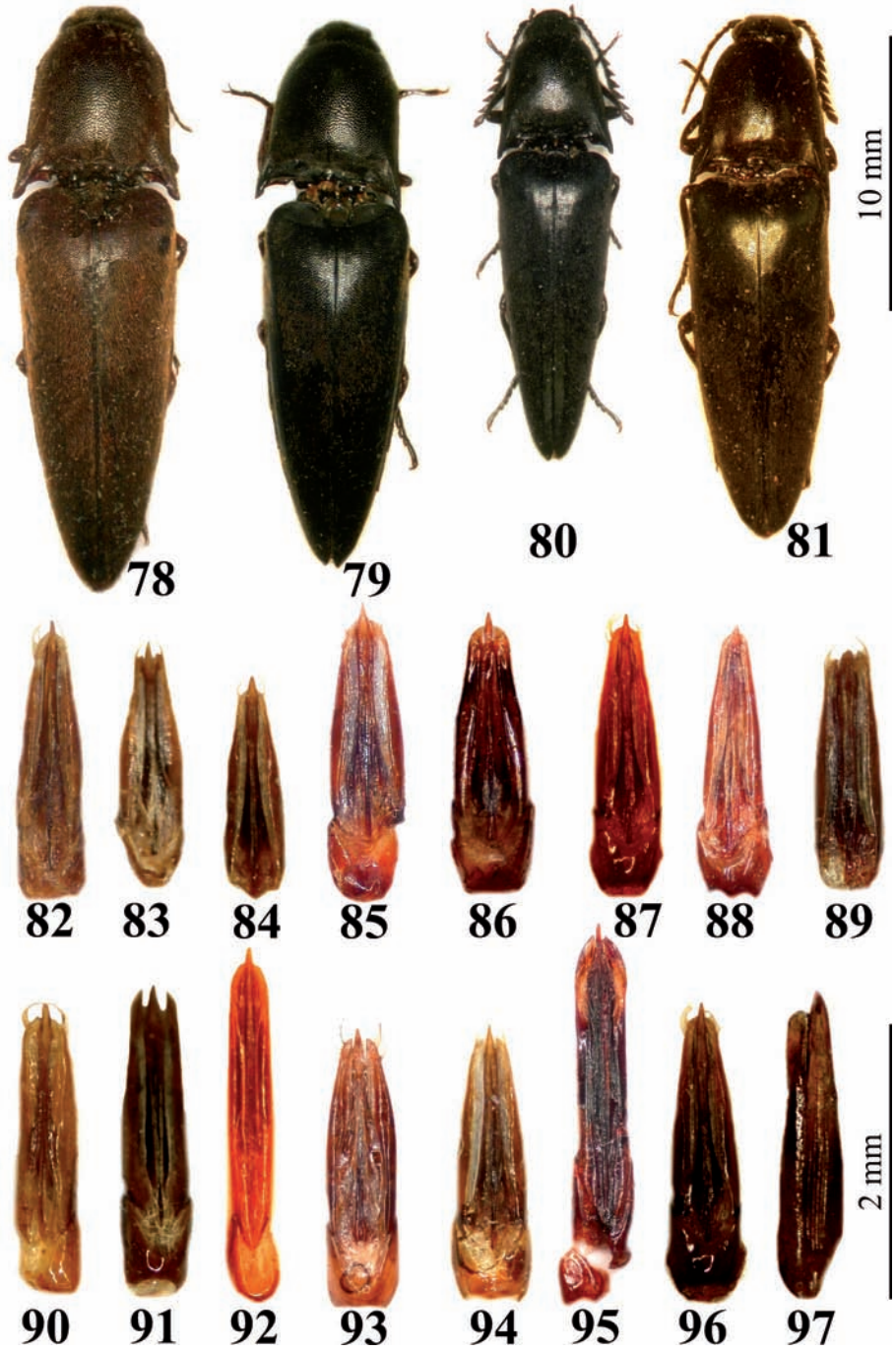
Orthostethus caviceps SCHAEFFER, 1916: 263; ROACHE, 1960: 307.

TYPE LOCALITY
Arizona.

NEW MATERIAL
North America: Arizona, Pajerito Mts., Pena Blanca, 13.VII.1970, 1 spm., leg. STEPHAN; Arizona, Carr Canyon, 15 mi south of Sierra Vista, Huachuca Mts., 27.VIII.1964, 2 spm., leg. R. F. STERNIZKY.

DISTRIBUTION
North America: Arizona.

Figs. 78-97 (see next page). Habitus and aedeagus of Elaterina- and of *Taiwanostethus*-species: 78-81, habitus, 82-97 aedeagus. 78 – *Nipponoelater vietnamensis* (SCHIMMEL, 1996) comb. nov., 79 – *N. werneri* (SCHIMMEL, 1996) comb. nov., 80 – *Taiwanostethus sihleticus* (CANDÈZE, 1881) comb. nov., 81 – *T. tanidai* KISHII, 1994, 82 – *N. cameronensis* sp. nov., 83 – *N. fraterulus* sp. nov., 84 – *N. gorodinskii* sp. nov., 85 – *N. heilongjiangensis* sp. nov., 86 – *N. henscheli* (SCHIMMEL, 2007) comb. nov., 87 – *N. indosinensis* sp. nov., 88 – *N. juttae* (SCHIMMEL, 2007) comb. nov., 89 – *N. kradungensis* sp. nov., 90 – *N. malaysiensis* sp. nov., 91 – *N. meratensis* sp. nov., 92 – *N. philippinensis* sp. nov., 93 – *Elater riesei* SCHIMMEL, 2007, 94 – *Nipponoelater ullongensis* sp. nov., 95 – *N. vietnamensis* (SCHIMMEL, 1996) comb. nov., 96 – *Leptinostethus javanensis* sp. nov., 97 – *Taiwanostethus sihleticus* (CANDÈZE, 1881) comb. nov.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84
85
86
87
88
89
2 mm
90
91
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93
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95
96
97

Orthostethus infuscatus (Germar, 1844)

Aphanobius infuscatus Germar, 1844: 183; Roache, 1960: 308.
Orthostethus praefectus Candèze, 1863 (Brazil); Roache, 1960: 398.

Type locality
"Boreal America".

New material
North America: Texas, Harris Co., VII.1983, 1 spm., without further data; Georgia, Okefenokee, 6.VII.1988, 2 spm., leg. V. Assing; Georgia, Black Mtn. Tower Stephens Co., 27.VIII.1964, L. A. Combre; Florida, , Bradford Co., SR 100, 8 km W of Starke, 23.25.VI.1980, leg. A. Wilkening; Mississipi, Oxford, Lafayette Co., 18.VII.1984, leg. P. K. Lago. (det. Fuller); Kentucky, Mammoth Cave Nat. Park, 1.4.VII.1982, leg. C. Cook (CPG).

Distribution
North America: USA: from Maryland southward to Florida and westward up to Texas and Arizona.

Orthostethus pectinicornis Champion, 1859

Orthostethus pectinicornis Champion, 1859: 510; Schenkling, 1927: 434.

Type locality
Mexico.

New material
USA: Arizona, VII.1978, 1 spm. (CPG).

Distribution
North America: Arizona; Mexico.

Remarks
The abovementioned record from Arizona of the USA is the first for North America.

5.4.2. The species of the genus *Orthostethus* Lacordaire, 1857 from the Neotropical Region

Orthostethus cavifrons Champion, 1895

Orthostethus cavifrons Champion, 1895: 510; Schenkling, 1927: 434.

Type locality
Panama.

Distribution
Central America: Panama.

Orthostethus glabratus Champion, 1895

Orthostethus glabratus Champion, 1895: 509; Schenkling, 1927: 434.

Type locality
Mexico.

Distribution
Mexico.

Orthostethus hepaticus (Germar, 1824)

Elater hepaticus Germar, 1824: 43.
Aphanobius hepaticus (Germar, 1824) Germar, 1844: 184.
Ludius hepaticus (Germar, 1824) Candèze, 1863: 307; Horn, 1884: 46, 48.
Orthostethus hepaticus (Germar, 1824) Schwarz, 1906: 261; Schenkling, 1927: 434.

Type locality
Florida.

Distribution
North America: Florida up to Texas (not in Brazil in accordance with Schenkling 1927).

Orthostethus corvinus (Germar, 1844)

Aphanobius corvinus Germar, 1844: 183; Lacordaire, 1857: 207.
Orthostethus corvinus (Germar, 1844); Candèze, 1863: 316; Steinheil, 1875: 139; Champion, 1895: 509; Schenkling, 1927: 434.

Type locality
"Boreal America".

New material
Costa Rica: Guanacaste prov., Estacion Biologica Maritza, m 600, 13-19.V.2004, 3 spm. (CPG), leg. Barries, Cate & Nagy (det. P. Cate).

Distribution
Mexico; Central America: Guatemala; Nicaragua; Costa Rica; South America: Colombia.

Orthostethus infuscatus (Germar, 1844)

Aphanobius infuscatus Germar, 1844: 183; Roache, 1960: 308.
Orthostethus praefectus Candèze, 1863 (Brazil); Roache, 1960: 398.

Type locality
"Boreal America".

New material
Columbia: Boone Co., VIII.1980, 1 spm., without further data.

Distribution
Central America; South America: Columbia; Brazil.

Orthostethus landolti Steinheil, 1877

Orthostethus landolti Steinheil, 1877: 84; Roache, 1960: 308; Schenkling, 1927: 434.

Type locality
Columbia.

New material
Columbia: Boone Co., VIII.1980, 1 spm., without further data.

Distribution
Columbia.

Orthostethus pectinicornis Champion, 1859

Orthostethus pectinicornis Champion, 1859: 510; Schenkling, 1927: 434.

Type locality
Mexico.

Distribution
North America: Arizona; Mexico.

Orthostethus piceus Candèze, 1863

Orthostethus piceus Candèze, 1863: 315; Schenkling, 1927: 434.

Type locality
Mexico.

New material

Mexico: Chiapas, La Violeta, X.1980, Enrique. Equador: Puerto Quito, III.1982, 7 spm. (CPG), leg. G. Onore.

Distribution

Mexico; Central America: Panama; Honduras; Guatemala; South America: Equador.

5.5. THE SPECIES OF THE GENUS *PARALLELOSTETHUS* SCHWARZ, 1906

Only one species of the genus *Parallelostethus* is known. *P. attenuatus* (Say, 1825) has populations in North America exclusively. The further species listed by Schwarz (1906) as to belong to *Parallelostethus* are transferred in this paper to the genus *Leptinostethus* and *Elater.*

Parallelostethus Schwarz, 1906

Type species

Elater attenuatus Say, 1825 (by subsequent designation of Hyslop, 1921: 662).

Parallelostethus attenuatus Say, 1825

Elater attenuatus Say, 1825: 257.
Ludius fuscatus Castelnau, 1840: 240.
Parallelostethus attenuatus (Say, 1825) Roache, 1960: 293.

Type locality

USA.

New material

North America: Arizona, Madera Canyon, Pima Co., VII.1982, 12 spm., without further data.

Distribution

USA.

5.6. THE SPECIES OF THE GENUS *TAIWANOSTETHUS* KISHII, 1994

Two species of the genus *Taiwanostethus* Kishii, 1994 are known so far: *T. sihleticus* (Candèze, 1881) (transferred in this paper with new name combination) and *T. tanidai* Kishii, 1994.

Taiwanostethus Kishii, 1994

Type species
Taiwanostethus tanidai Kishii, 1994: 9-11 (by original designation).

Type locality
Taiwan: Kaohsiung.

Distribution
Bangladesh; Taiwan; Thailand.

Remarks
Beside the *T. taindai* one further already known species has been transferred to this genus in this paper: *E. silheticus* (Candèze, 1881).

Taiwanostethus tanidai Kishii, 1994
(Fig. 81)

Type locality
Taiwan: Kaohsiung.

New material
Taiwan: Kosempo, VIII.IX. (year ?), 1 spm. (CSV), without further data.

Distribution
Taiwan.

Remarks
The species *T. tanidai* is closely allied to *T. sihleticus* but easily distinguished by the longer third antennomere.

Taiwanostethus sihleticus (Candèze, 1881) comb. nov.
(Figs. 80, 97)

Ludius sihleticus Candèze, 1881: 103.
Steatoderus syhleticus (Candèze, 1881: 103), Schwarz (1906: 257 sic!).
Ludius sihleticus Candèze, 1881: 103, Schenkling (1927: 428).
Ludius subnitidus Fleutiaux, 1918: 254-255; **syn. nov.**

Type locality
Bangladesh.

New material
Thailand: Nan, IX.1992, 2 spm. (CSV), leg. S. Steinke.

Distribution
Bangladesh; Thailand; Vietnam.

Remarks
The species *T. sihleticus* from Bangladesh is closely allied to *T. tanidai* from Taiwan but easily distinguished by the longer third antennomere. Fleutiaux (1918: 254-255; 1936: 294) recorded this species from Tonkin in Vietnam as *Elater* (*Ludius*) *subnitidus*. The abovementioned record is the first one of this species from Thailand.

5.7. A TERMINAL TAXON OF THE TRIBE ELATERINI FROM BALTIC AMBER

Only one species which has been included as a plesion into the ancestral line of the tribe Elaterini is known so far from Baltic amber: *Elater* (*Octamenogonoides*) *gebleri* Jablokoff-Khnzorian, 1961.

Elater (*Octamenogonoides*) *gebleri* Jablokoff-Khnzorian, 1961

Elater (*Octamenogonoides*) *gebleri* Jablokoff-Khnzorian, 1961: 88.

Type locality
Baltic amber.

Remarks
The species has been described basing on material from Baltic amber. Currently this is the only known plesion of the genus *Elater*. The author of the terminal taxon (Jablokoff-Khnzorian) mentioned characters in his description of the treated specimen which clearly belong to the tribe Elaterini. However, there is no further specific character given in the description which would justify the comparison with currently known and living species.

For the reason mentioned above, we accept *Elater* (*Octamenogonoides*) *gebleri* as terminal taxon which possesses plesiomorphous characters of the ancestral line of the tribe Elaterini.

6. GENERA NOT INCLUDED INTO THE SUBTRIBE ELATERINA

6.1. THE SPECIES OF THE GENUS *BRACHYELATER* **GEN. NOV.**
(known from Indonesia: Laos, Myanmar and Vietnam)

***Brachyelater* gen. nov.**

Typus Generis
Elater phongsalyensis Schimmel et Tarnawski, 2007: 164.

Diagnosis
♂: Elongate, sub-parallel, slightly raised, and shiny species; length: 14.2–15.4 mm, width: 3.6-3.9 mm. Blackish-brown, legs and antennae reddish-brown; pubescence reddish-brown, semi-erect, long, bristly and dense, on pronotum declined to base and to lateral sides, on elytra declined to apex.

Description
Head declined from centre to apex, disk with a transverse impression; frons slightly raised above the base of antennae, with dense and umbilici punctures; pubescence short and declined to apex; eyes small and spherical.

Antennae long and dentate, sometimes lamellate from fourth antennomere on, which are just reaching or outreaching posterior angles of pronotum by the length of the last two antennomere; second antennomere short, triangular, as long as wide; third antennomere slightly longer than second antennomere and truncate at apex, both combined slightly shorter than fourth and each of the following antennomere; fourth to tenth antennomere with an extended lamellae at apex; last antennomere oval, apically constricted.

Pronotum trapezoidal, along median line slightly longer than wide at the posterior angles (length/width ratio 1.02:1.00) and just slightly and regularly raised; arcuate laterally and with a prominent, abrupt dropping at base; pronotum without any median mould or furrow; punctures dense, coarse, umbilici and regularly rounded with interstices half to once their diameter, sometimes reduced to small wrinkles basally.

Pro-, meso- and metathorax with dense and rugose punctures, their interstices raised and shiny; pubescence short and decumbent.

Sides of mesosternal fossa horizontal posterior, anteriorly strongly declivous and distinctly divergent.

Prosternal apophysis proximal to body axis, emarginated apically.

Sternite fine but dense punctured (interstices of punctures once their diameter) and covered with bristly and decumbent hairs.

Scutellum wedge-shaped and slightly convex at base; laterally straight and sharp at apex; surface slightly raised, punctures dense, coarse, and umbilici, pubescence dense, fine, and just visible, pointed from base to apex.

Elytra sub-parallel, elongate and wedge-shaped, after midway narrowed to apex, the latter curved, base slightly smaller than that of pronotum, slightly depressed at scu-

tellum, margins raised, shoulders prominent (winged species); striae on elytra reduced with punctures being just slightly impressed, interstices of striae finely punctures, little shiny, and flat; pubescence short, bristly, and declined to apex.

Alae melleous, transparent and densely covered with very small brownish bristles; costa radialis, costa medialis and cubitus completely, from laterally upper edge of flight muscle up to lateral margin; costa radialis with parallel-laterally sectional rib medially; costa media 1 and costa media 2 connected subapically by an anastomosis.

Flight muscles quadritubercular with deep and broad median groove from centrally of muscle up to base of scutellum.

Legs elongate, moderately long and thin, tarsomeres up to claws of decreasing length, ventrally with hardly visible, fine pubescence, and fine upholstery, tibia covered with longer and protruding bristles.

Aedeagus with a sub-parallel, in midway thickened and excavated apical slightly narrowed and sharp, the paramere noticeably extending median lobe; parameres crescent-shaped, with long apical hairs.

Females are a little larger than males (length: 19.3-10.2 mm, width: 4.2-4.6 mm) and more vaulted than males, the antennomere of the antennae are serrate, not dentate.

Differential diagnosis

The species of the new genus *Brachyelater* are closely allied to these of the genus *Mulsanteus*, but may be easily distinguished from them by the smaller body, the dentate and sometimes lamellate antennae of the males, by the flat, just little raised pronotum and by its straight, not bent downwards, posterior angles.

Etymology

Named after the short body (in relation to the genus *Elater*).

Distribution

Laos; Vietnam; Myanmar.

Appertaining species

Brachyelater hoabinhus (Fleutiaux, 1936) comb. nov., *B. phongsalyensis* (Schimmel et Tarnawski, 2008) comb. nov., *B. strbai* (Schimmel, 2003) comb. nov. and *B. vitalisi* (Fleutiaux, 1918).

Brachyelater hoabinhus (Fleutiaux, 1936) comb. nov.

(Fig. 38)

Neotrichophorus hoabinhus Fleutiaux, 1936: 295-297.
Elater hoabinhus (Fleutiaux, 1936): Schimmel & Tarnawski (2007: 164).

Type locality

Tonkin: Hoa-Binh.

New material

Indo-Chine: Song-Chay, 1908, ex. coll. Dussault, 1 spm. (CSV).

Distribution

Vietnam.

Remarks

As mentioned above, the straight prosternal apophysis which is bifid emarginated apically separates this species from these of the new subtribe Elaterina. The species also differs from all species of the genus *Mulsanteus* by the flat pronotum and especially by its straight and acute apices. For the reason mentioned we transfer the species to the new genus *Brachyelater*.

Brachyelater phongsalyensis **(Schimmel et Tarnawski, 2007) comb. nov.**

(Fig. 39)

Elater phongsalyensis Schimmel et Tarnawski, 2007: 164.

Type locality

Laos: Phongsaly province.

New material

Laos: Hua Phan province, Hua Phan mts., 1500-1900 m, 17.V.-3.VI.2007, 1 spm., leg. V. Kuban; Oudomxai province, Oudom Xai, 1100 m, 1.-9.V.2002, 1 spm., leg. V. Kuban.

Distribution

Laos.

Remarks

See remarks at *B. hoabinhus*.

Brachyelater strbai **(Schimmel, 2003) comb. nov.**

(Fig. 40)

Elater strbai Schimmel, 2003: 288.

Type locality

Laos: Bolikhamsay province.

New material

Laos: Bolikhamsay province, Ban Nape, 600 m, 1.-18.V.2001, 8 spm., leg. V. Kuban.

Distribution
Laos.

Remarks
See remarks at *B. hoabinhus*.

Brachyelater vitalisi (Fleutiaux, 1918) comb. nov.
(Fig. 41)

Agonischius vitalisi Fleutiaux, 1918: 264.
Neotrichophorus vitalisi (Fleutiaux, 1918): Fleutiaux, 1939: 148.
Neotrichophorus chapensis Fleutiaux, 1936: 295-296; 1939 : 148.
Elater vitalisi (Fleutiaux, 1918): Schimmel & Tarnawski, 2007: 165.

Type locality
Tonkin: Chapa.

New material
Vietnam: Hoang Lien Son, Sa Pa, 11.15.V.1990, 1 spm. (CPG), leg. P. Pacholatko; Laos: Hua Phan province, Hua Phan mts., 1500-1900 m, 17.V.-3.VI.2007, 1 spm., leg. V. Kuban.

Distribution
Laos; Vietnam; Myanmar.

Remarks
This is the first record of this species from Laos. See also remarks at *B. hoabinhus*.

6.1.1. A key to the species of the genus ***Brachyelater*** **gen. nov.** from the Indochinese Subregion
(applies to the males of the species exclusively, females are not to be determined by using this key)

1. Antennomere 4-10 dentate ……..……. ***B. strbai*** **(Schimmel, 2003).**
–. Antennomere 4-10 lamellate ……..……..…… **2.**
2. Pronotum trapezoidal, centrally vaulted …... ***B. hoabinhus*** **(Fleutiaux, 1936).**
–. Pronotum trapezoidal, centrally flat ……..……..…… **3.**
3. Apexes of pronotum hind-angles pointed backward ……..
.....……. ***B. vitalisi*** **(Fleutiaux, 1918).**
–. Apexes of pronotum divergent ….
.....… ***B. phongsalyensis*** **(Schimmel et Tarnawski, 2007).**

6.1.2. Geographical check-list of the distribution of the species of the genus *Brachyelater* gen nov.

Genus *Brachyelater*	**General distribution** (political pattern)		
Species	Laos	Myanmar	Vietnam
hoabinhus			x
phongsalyensis	x		
strbai	x		
vitalisi	x	x	x

6.2. THE SPECIES OF THE GENUS *DIPLOSTETHUS* SCHWARZ, 1906

The species of the genus *Diplostethus* occur in the Nearctic Region and in the Neotropical Region exclusively. The genus *Diplostethus* has been published by Schwarz (1907). However, the characters which have been used by the author to separate this genus are very vague and close to that of the genus *Pittonotus*. The differences between the species of both genera are subtle and we have good reason to believe that both genera constitute a monophyletic sister group. The following list of species of the genus *Diplostethus* from the Nearctic Region has been overtaken from the Schenkling catalogue (1927). However, the species *Neotrichophorus carolinensis* Schaeffer, 1916 and *N. texanus* Leconte, 1853 are transferred here with new name combinations to the genus *Diplostethus*. Appertaining species of the genus: *D. carolinensis* (Schaeffer, 1916), *D. meridianus* (Champion, 1895), *D. opacicollis* Schaeffer, 1916, *D. peninsularis* (Champion, 1895), *D. setosus* (Germar, 1844) and *D. texanus* (Leconte, 1853).

Diplostethus carolinensis (Schaeffer, 1916) comb. nov.

Neotrichophorus carolinensis Schaeffer, 1916: 261; Roache, 1960: 301.

Type locality

Northern Carolina.

New material

Florida, Bradford Co., SR 100, 8 km W of Starke, 23.30.VI.1980 3 spm. (CPG), leg. A. Wilkening (det. Fuller); Florida, Dade Co., key largo, 10.11.VI.1990, 1 spm. (CPG), leg. Archangelsky (det. Wells); Arizona: Pina Co., Madera Canyon, VII.1982, 1 spm. (CSV), leg. R. Lenczy.

Distribution

USA: Southeastern USA from Virginia southward to Florida and westward to Texas.

Remarks

The species *Neotrichophorus carolinensis* is transferred here with new name combination to the genus *Diplostethus* as it possesses characters typical for this genus.

Diplostethus meridianus (Champion, 1895)

Ludius meridianus Champion, 1895: 507.
Diplostethus meridianus (Schwarz, 1907: 258).

Type locality

Mexico.

Distribution

Mexico.

Diplostethus opacicollis Schaeffer, 1916

Diplostethus opacicollis Schaeffer, 1916: 260; Roache, 1960: 297.

Type locality

Arizona.

New material

California, Bard, Imperial Co., 11.VII.1966, 4 spm. (CPG), leg. Ratcliff; Arizona, Santa Cruz Co., Pena Blanca Lake, 20.VII.1985, 1 spm. (CPG), leg. P. K. Lago. (det. Johnson); Arizona: Pajarito mts., Pena Blanca Canyon, 13.VII.1970, 1 spm. (CSV), leg. K. Stephan.

Distribution

North America: Arizona; Texas; California.

Diplostethus peninsularis (Champion, 1895)

Ludius peninsularis Champion, 1895: 506.
Diplostethus peninsularis (Schwarz, 1907: 258) Roache, 1960: 296.

Type locality

Mexico.

New material

Arizona: Florida Canyon, Pima Co., VII.1982, 3 spm. (CSV), leg. R. Lenczy; Arizona: Pina Co., Madera Canyon, VII.1982, 1 spm. (CSV), leg. R. Lenczy.

Distribution

Mexico; North America: Arizona; California.

Diplostethus setosus Germar, 1844

Aphanobius setosus Germar, 1844: 185.
Probotrium setosus (Candèze, 1863: 294).
Ludius setosus (Champignon, 1895: 505).
Diplostethus setosus (Schwarz, 1907: 258).

Type locality
Mexico.

New material
Mexico: Quintana Roo, Nuevo X-Can, VII.1992, 2 spm. (CPG, CSV), without further data.

Distribution
Mexico; Central America: Yucatan; Honduras; Guatemala; Panama; South America: Columbia; Venezuela; Chile.

Diplostethus texanus (Leconte, 1853) comb. nov.

Crigmus texanus Leconte, 1853: 454.
Ludius texanus (Candèze, 1863: 308).
Neotrichophorus texanus (Leconte, 1853); Roache, 1960: 300.

Type locality
Texas.

Distribution
North America: Texas; Oklahoma.

New material
USA: Oklahoma, Kingston, VIII.1979, 1 spm. (CPG), without further data; Texas: Parker Co., Dennis/Barazos Rv., 24.VII.1981, 1 spm. (CSV), leg. C. S. Wolfe.

Remarks
The species *Crigmus texanus* is transferred here with new name combination to the genus *Diplostethus* as it possesses characters typical for this genus.

6.3. THE SPECIES OF THE GENUS *PITTONOTUS* KIESENWETTER, 1859

Only two species of the genus *Pittonotus* are known until today: *P. simoni* (Stirlin, 1877) and *P. theseus* (Germar, 1817). The species occur in the Palaearctic Region exclusively and we have good reason to believe these species constitute a monophyletic sister group. Furthermore, the species of the genus *Pittonotus* is in close relation to

that of the genus *Diplostethus* from the Nearctic and the Neotropical Region, and both genera constitute also a monophyletic sister group.

Pittonotus Kiesenwetter, 1859

Type species
Elater theseus Germar, 1817: 218 (by original designation).

Pittonotus simoni (Stierlin, 1877)

Ectinus theseus var. *simoni* Stierlin, 1877: 80.
Pittonotus theseus var. *simoni* (Buysson, 1892: 119); Schenkling, 1927: 431.

Type locality
Syria.

New material
Syria (syntype series, 7 spm.); Jordan: Az Zarqa', 5.VII.1992; Wadi As Sir, 6.IV.1985. Israel: Mt. Carmel, Zomet Oren, 1.VIII.1995, leg. B. Orbach; Mt. Meron, 1000 m, 30.V.2008, leg. G. Sabatinelli (CPG).

Distribution
Syria; Israel; Jordan.

Pittonotus theseus (Germar, 1817)

Elater theseus Germar, 1817: 218.
Ludius theseus (Germar, 1843: 47).
Corymbites theseus (Kiesenwetter, 1859: 19).
Ectinus theseus (Candèze, 1863: 456).
Pittonotus theseus (Schenkling, 1927: 431).

Type locality
Dalmatia.

New material
23 spm. (CPG): Croatia: Rovinj, Istrien, 4.VIII.1969, leg. M. Zeising; Greece: Kreat is., Chania, Kasteli, Kisamos, 1.VII.1987, G. Sama; Turkey: vil. Antalya, 300 m, 12.VII.1984, Cavazzuti; Fetiye, 12.VII.1984, Cavazzuti; Namrun, 31.V.1981, leg. G. Sama; Akpinar Forest (Samsun), 13.VII.1979, Cavazzuti; vil. Içel, Camliyayla, 1200 m, 24.VIII.1990, leg. M. Pavesi; Bingol, Morucu, 1200 m, 1.VII.1990, Cavazzuti; Lebanon: caza Jbayl, El Laqlouq, 1300-1400 m, leg. A. Kairouz; Beiruth città, 6.VI.1999, leg. G. Sama; Iran: Lorestan, 10 km N Korramabad Kaldar Park, 1310 m, 22.V.2006, leg. H. Nasserzadeh & Nematian.

Distribution
Croatia; Montenegro; Greece; Turkey; Lebanon; Iran.

6.4. THE SPECIES OF THE GENUS *PSEUDAGRIOTES* SCHWARZ, 1896

The species of the genus *Pseudagriotes* occur in the Palaearctic Region exclusively: Asia Minor and Taurus mts. There is just one species of this genus currently known which is in close relation to the species of the genus *Brachyelater* and *Mulsanteus*.

Pseudagriotes holtzi Schwarz, 1896

Pseudagriotes holtzi Schwarz, 1896: 104; Platia & Gudenzi, 1996: 249.

Type locality
Taurus.

New material
Turkey: Camliyayla, 7.VI.1984, leg. G. Curletti, 3 spm. (CPG); Adana.

Distribution
Turkey.

6.5. SPECIES INCERTAE SEDIS

For the following four species (*Ludius erubescens*, *L. exutus*, *L. lineatus*, and *L. serraticornis*) we were unable find and study the type material. The original descriptions of these species are vague and do not allow determination of material basing on the published data.

Ludius erubescens Candèze, 1878 sp. incertae sedis

Ludius erubescens Candèze, 1878: 46.

Type locality
New Guinea.

Distribution
New Guinea.

Remarks
The type of the species has not been studied. Basing on the description given by Candèze (1878: 46) we consider this species as most probably not belonging to the genus *Elater* (*Ludius*). Therefore, *Ludius erubescens* is considered here as a member of the genus *Elater* and is placed with status incertae sedis.

Ludius exutus Candèze, 1863 sp. incertae sedis

Ludius exutus Candèze, 1863: 304; Calder, 1996: 384.

Type locality
Australia: Victoria.

Distribution
Australia.

Remarks
The type of the species has not been studied. Basing on the description given by Candèze (1863: 304) we consider this species as most probably do not belonging to the genus *Elater* (*Ludius*). Therefore, *Ludius exutus* is considered here as a member of the genus *Elater* and is placed with status incertae sedis.

Ludius lineatus Candèze, 1863 sp. incertae sedis

Ludius lineatus Candèze, 1863: 304; Calder, 1996: 384.

Type locality
Queensland.

Distribution
Queensland.

Remarks
The type of the species has not been studied. Basing on the description given by Candèze (1878: 304-305) we consider this species as most probably not belonging to the genus *Elater* (*Ludius*). Therefore, *Ludius lineatus* is considered here as a member of the genus *Elater* and is placed with status incertae sedis.

Ludius serraticornis Motschulsky, 1859 sp. incertae sedis

Ludius serraticornis Motschulsky, 1859: 378.

Type locality
California.

Distribution
California.

Remarks
The type of the species has not been studied. Basing on the description given by Motschulsky (1859: 378) we consider this species as most probably not belonging

to the genus *Elater* (*Ludius*). Therefore, *Ludius serraticornis* is considered here as a member of the genus *Elater* and is placed with status incertae sedis.

Elater hydropicus (Candèze, 1881) sp. incertae sedis

Ludius hydropicus Candèze, 1881: 104, sp. incertae sedis (Calder, 1996: 384).

Type Locality
Australia: Queensland.

Distribution
Australia.

7. THE ZOOGEOGRAPHICAL SPREADING AND THE DISTRIBUTION OF THE SPECIES OF THE SUBTRIBE ELATERINA

7.1. SPREADING MECHANISMS AND BARRIERS

The creation of new species and their spreading capability as well as the resulting distribution pattern in the Nearctic, the Neotropical, the Palaearctic, the Oriental and in the Australian Region as well as in the Wallacea have generally been dependent on various paleontological occurrences:

1. The drifting of the continental plates after the disintegration of the Pangaea continent in the Middle Triassic epoch.
2. The transgression of the Turgai-strait in the Upper Jurassic.
3. The orogenesis of the high mountains in South-Eastern Asia during the Tertiary epoch.
4. Volcanism in the Ceylonese Subregion during the Tertiary epoch.
5. The glaciations of the landmass of the northern hemisphere in the Pleistocene period.

Beside the abovementioned occurrences which were of constitutive external influence to the species distributions and their ability to spread, further but inherent specific mechanisms were relevant: the adaptation of the species to the climate conditions, their biocenosis interactions and their tropic level efficiency constitute the frame where the species were able to spread.

The disintegration of the Pangaea continent

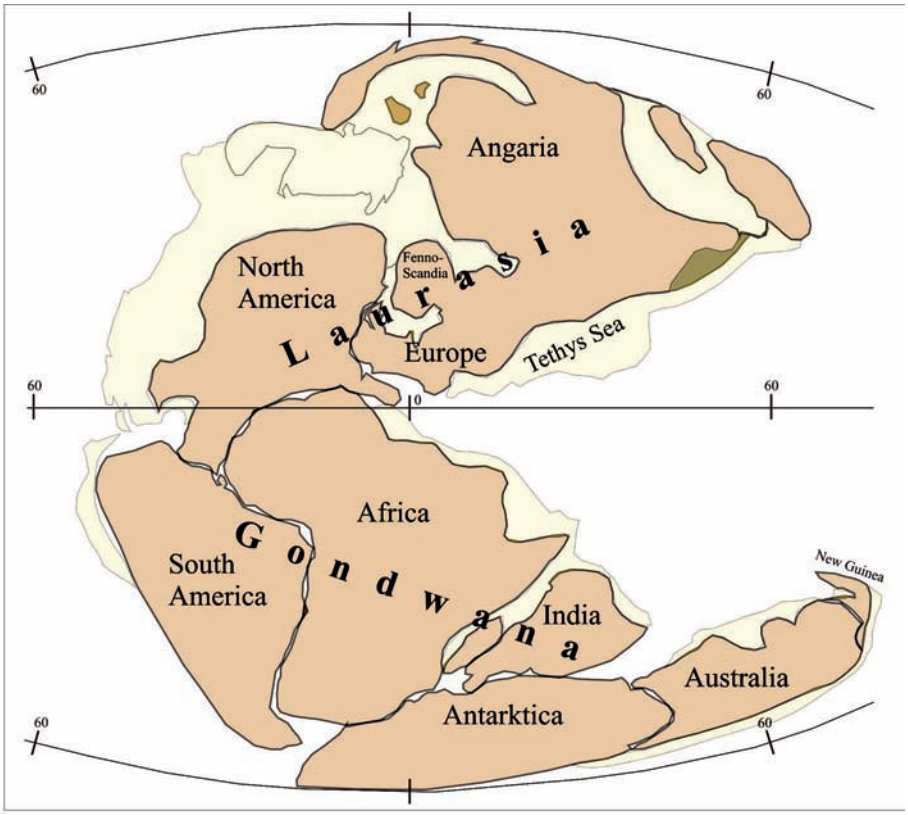
The disintegration of the Pangaea continent since the Middle Triassic epoch has been of important influence on the creation of new species and to the faunal history. At the time when the Pangaea continent has been splitting into the various parts of the Laurasia and the Gondwana continents, the drifting plates separated the faunal associations into various faunal complexes, which also resulted in the formation of new populations. The boundaries of the zoogeographic regions which we know today generally constitute mirror image of the splitting parts of the former Pangaea continent (map. 1) and of the new faunal associations which have been built as a result of the disintegration. In the following time especially the Ceylonese subcontinental plate has preserved the species of the old Gondwana continent and separated them from the populations of the neighbouring regions. “Die ceylonische Subregion hat zweifellos einen erheblichen Grundstock (von Arten) der alten Landmasse des alten Gondwanakontinents bis in die Gegenwart bewahrt. Eine Zuwanderung palaearkischer Elemente duerfte fuer die ceylonische Subregion nicht stattgefunden haben, sie war offenbar auch waehrend des Pleistozäns nicht moeglich” [The Ceylonese Subregion undoubtedly has preserved a considerable stock (of species) of the old landmass of the Gondwana continent up to present. A migration of Palaearctic elements into the Ceylonese Subregion most probably didn’t happen and wasn’t possible also during the Pleistocene Epoch] (Franz & Beier, 1970: 46).

The transgression of the Turgai strait in the upper Jurassic

The transgression of the Turgai strait in the Upper Jurassic, has separated the populations of the animals of the old Eurasian plate in their habitats and also in relation to their genetic constitutions. This separation finally resulted into the formation of various faunal divisions and created new species and species-groups. That this mechanism is of importance for the creation of new species and of big influence to the constitution of species-groups is also mentioned by Thenius (1977): "… dass die Separierung, also die räumliche Trennung, wie sie fuer Landtiere vor allem durch Meerstrassen gebildet wird, zur verstaerkten Artbildung und damit rascher zur Diversität einer Gruppe führt." […that the separation related to the territory of animals, especially created by sea straits, leads to an increase of speciation and consequently to further diversity of a group].

The orogenesis of the high mountains in the tertiary epoch

The drift of the Indian subcontinental plate was initiated in the Liassic epoch and the contact of the plate with the Eurasian landmass in the Tertiary epoch was the releasing mechanism for the orogenesis of the high mountains in the Himalaya, as well as of the



Map 1: Pangaea continent in the middle Triassic epoch

high mountains in Southern China and in the Sunda archipelago. The orogenesis created new niches for the species as the vertical habitat template has been increased and the climate spectrum in the mountains was conspicuously enriched. The enormous vertical zonation, especially in the Himalaya offered a number of various habitat conditions for Palaearctic species, but also for Oriental ones: the high mountains for the Palaearctic species and the lowlands for the Oriental species. Today, the fauna of the Himalaya seems to be Palaearctic, while the fauna in the decumbent lowlands is Oriental.

As the Oriental species of the lowlands constantly had possibilities to move through the meridional river valleys, the Palaearctic species of the high mountains were relatively constricted concerning their spreading ability as the geological structures function as effective barriers.

The orogenesis of the high mountains and the mentioned barriers created sympatric splitting of the existing species populations. Additionally, the isolated species of the high mountains are also adapted to the periodicity of the Palaearctic climate. Therefore, the genetic constitution of the high mountain-species and their adaptation to the Palaearctic climate also prevented the spreading of the specimen into the Oriental lowlands.

A relative part of the Palaearctic species which live today in the high mountains of the Himalaya and in Southern China has to be taken as mountain endemics. Concerning their speciation, these species can be based on the orogenesis mechanisms initiated in the Tertiary epoch.

Volcanism in the Ceylonese Subregion during the tertiary epoch

Long-range volcanic activities in the Ceylonese Subregion, especially during the Tertiary epoch, resulted in the extinction of species and also in the territorial separation of populations. Wide depositions of tuff functioned as spreading barriers and prevented the dispersal of the species strongly and for a long time. India and Sri Lanka are parts of the old Gondwana continent from which they have been separated in the Mesozoic epoch. The populations of the species we know from this zoogeographical subregion today are those preserved until the disintegration of the Pangaea continent in the Middle Triassic epoch. As of the mentioned barriers, migrations from the neighbouring territories to the Ceylonese Subregion were hardly possible.

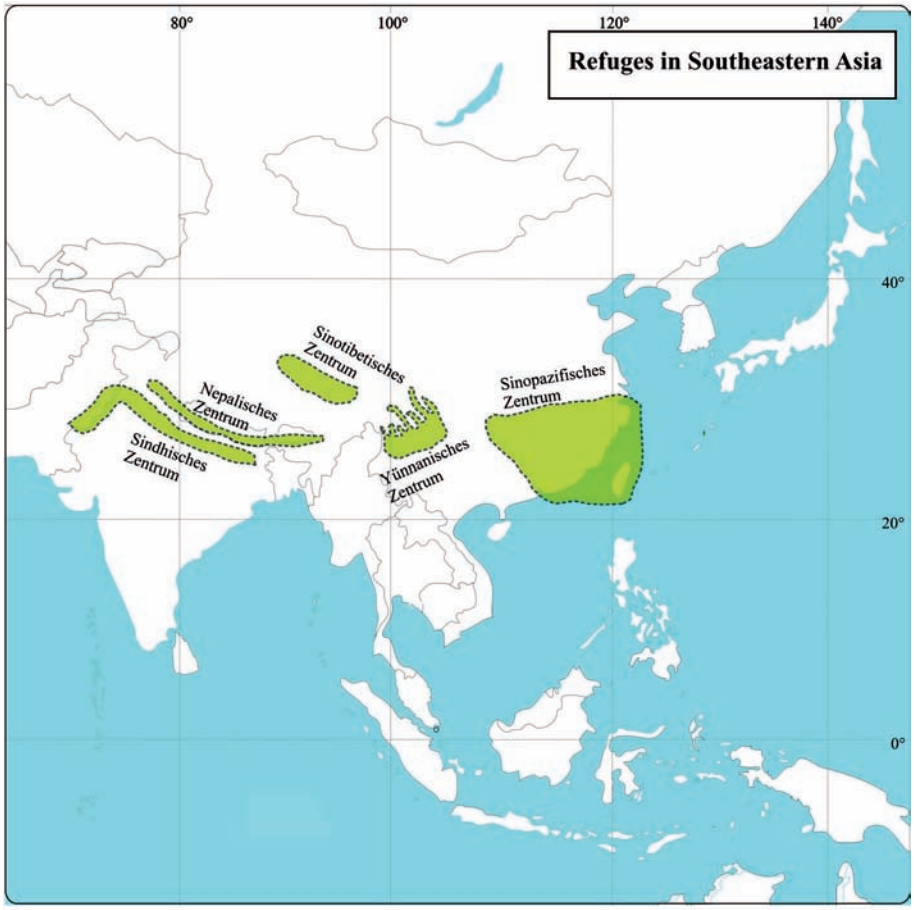
The Pleistocene glaciations

Due to the climate conditions in the Pleistocene period and the transformation of the water into ice, as spacious glaciations of the northern hemisphere has been created, and as a consequence, the down-sinking of the sea level. The icing of the landmass had the after-effect of a replacement reaction of the Palaearctic faunal elements southwards into refuges, which were free of ice during this period, and which therefore provided suboptimal habitat conditions for the replaced species. The various faunal centres in South-Eastern Asia (see map 2), and especially the Hengduan mountains in Southern China were free of ice and offered occupation for the Palaearctic species during the Pleistocene glaciations. After the thawing period and the withdrawal of the ice, the return of the species has been initiated from these centres. However, the moving back was only possible within an favourable association of environment and climate situation.

Therefore, many species which emigrated in the Pleistocene period never had a real possibility for moving back though the Oriental lowlands to their original Palaearctic habitats at the end of the glaciations.

The down-sinking of the sea level during the glaciations period also caused desiccation of the coast shelf in the Sunda archipelago, and therefore, formation of spreading corridors for the species which were able to spread actively (see map 2). But the migration of the species of the subtribe Elaterina through the spreading corridors has undoubtedly been in close dependency of the vegetation dynamics and the diversity of the whole biocenosis in which the species live.

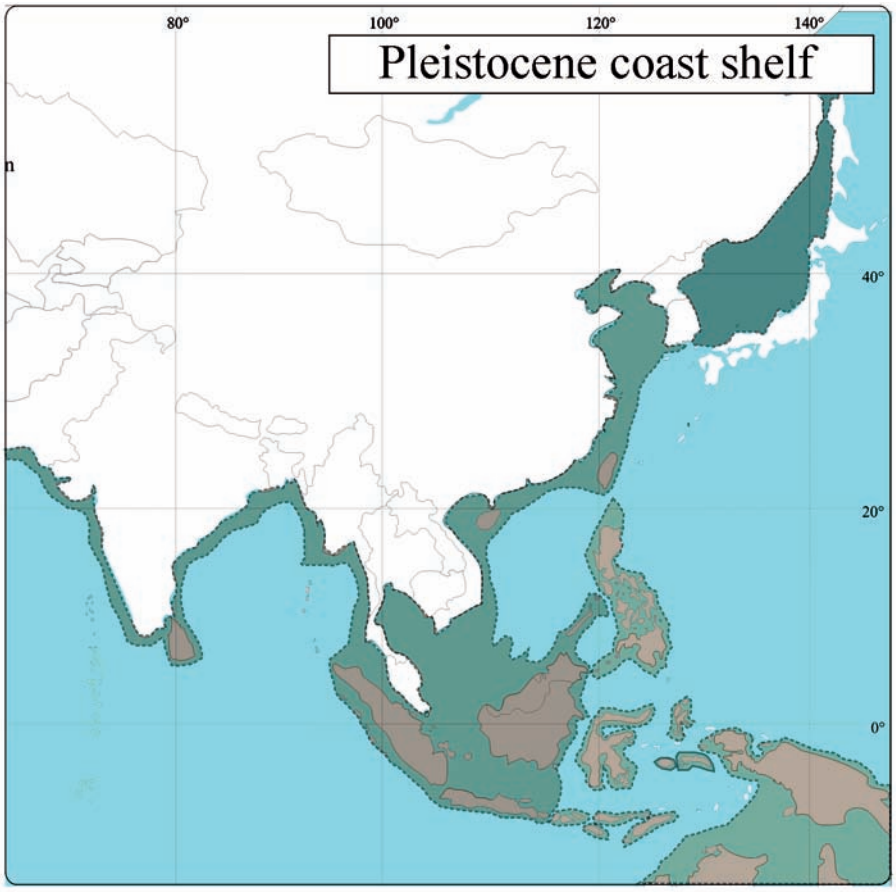
The species of the subtribe Elaterina, as secondary consumers are in close dependency on the trophic level efficiency of their microhabitat. Therefore, during the Pleistocene period these species would only have been able to migrate through the



Map 2: Refuges in Southeastern Asia during the glaciation in the Pleistocene epoch

spreading corridors in the Sunda archipelago within the whole biocenosis association in which they lived.

Then, after the drawing period, the spreading corridors have been flooded and the migrated species populations were isolated. This allopatric splitting of existing populations again created the isolation between the separated population parts and new species on the islands of the Sunda Archipelago. Therefore, the isolated populations on these islands today can be taken as endemics, which is based on the migration dynamics in the Pleistocene, and the isolation of populations after this period.



Map 3: Coast shelf in the Sunda Archipelago during the Plaistocene glaciation

However, the mentioned mechanisms which created migration and speciation processes in the Sunda Archipelago aren't applicable for the islands in the Wallacea. Due to the sea-depth of the Makassar-strait and the Celebes-sea, spreading corridors were never available in the Wallacea during the Pleistocene period. Therefore, the emigration of species to the islands in the Wallacea during this period is impossible to explain by active spreading movements. The current occurrence of species of the subgenus Elaterina in the Wallacea needs to be analysed basing on passive drifting.

7.2. THE GENERAL DISTRIBUTION OF THE SPECIES

The species of the subtribe Elaterina are distributed in the Nearctic Region (*Elater*, *Orthostethus*, *Parallelostethus*), in the Palaearctic Region (*Elater*, *Nipponoelater*) in the Oriental Region (*Elater*, *Leptinostethus*, *Nipponoelater*, *Taiwanostethus*), in the Australian Region (*Elater*), and in the Neotropical Region (*Elater*, *Orthostethus*, *Diplostethus*).

The Palaearctic populations are distributed in the Euro-Siberian and in the Mediterranean Subregion including Europe, the Balkan, Asia Minor, Caucasia, China, North Korea, the Himalaya and Japan.

The Oriental populations of the subtribe have distributions in the Indian and Ceylonese Subregion, in the Indo-Chinese Subregion, in the Malayan Subregion and in the Wallacea, as well as in the Papuan Subregion (only one record of a single species). No species are currently known from the Melanesian, the Polynesian, from the Hawaiian and from the Seychelles Subregions. The species of the subtribe Elaterina have been in the position to spread over the North American, the Eurasian, the Australian and the Oriental landmass and the islands of the Sunda Archipelago, from 120° western to 140° eastern longitude and from 20° southern to 60° northern latitude (Greenwich). The geographical distribution patterns of the populations of the genus *Elater* are generally almost identical with those of the whole subtribe Elaterina. Species of the genus *Elater* are spreading within the boundary of the populations of the subtribe.

The distribution pattern of the genus *Elater* in the Palaearctic and in the Oriental Region is mostly disjunctive. There are also isolated populations of species of the genus from Europe, from Caucasia, from Siberia (Ussuriland) and from Japan. In the Oriental Region, the species of the genus occupy environments in Southern China and Vietnam, and one species is known from the Sunda Archipelago (Java). The records of *E. acutus* (Candèze, 1863) from Assam and these from Darjeeling and from Sikkim in India are doubtful and are marked here accordingly. However, the mentioned record was published by Schwarz (1907), and has been integrated into the catalogue of Schenkling (1927).

Species of the genus *Leptinostethus* are currently known from the Oriental Region exclusively, where the species have populations in the Ceylonese and in the Malayan Subregion, as well as in the Wallacea. Today, the populations of species of the genera *Leptinostethus* occurring in South India (the Ceylonese Subregion) are geographically isolated. The population boundaries of the species of the subtribe Elaterina in this Sub-

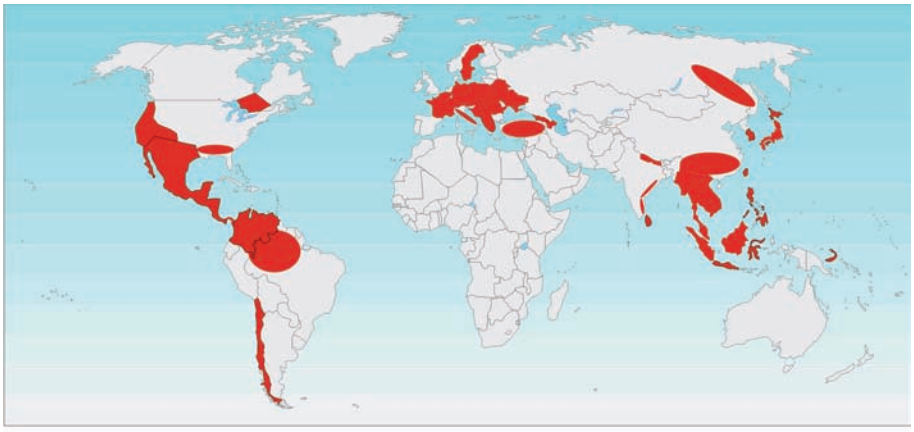
region are similar to these we know from many other insect groups of the Ceylonese Subregion. The populations of the species are limited to the south part of India and to Sri Lanka. The isolation mechanisms which resulted from volcanic eruptions and the deposition of tuff at the beginning of the Tertiary epoch have separated the populations of the Northern- and Southern territories of India until today.

Nipponoelater is known from eastern Palaearctic Region and from the Oriental Region. The species have occupations in the Ceylonese, in the Indochinese and in the Malayan Subregion. The populations distribution of the species of the genus *Nipponoelater* shows a homogeneous pattern which includes the whole landmass decumbent to the Gulf of Bengal and the South-Chinese Sea, from Southern India up to South Korea, as well as to the Islands in the Indian and in the Pacific ocean, from Sunda Archipelago, Palawan, the Philippines, Taiwan and Japan. The populations of the species of the islands today are geographically isolated. For the populations in the Ceylonese Subregion, the same population isolation mechanism seems to be decisive as we know for the species of the genus *Leptinostethus*. A similar spatial pattern as that which we know for the species from Southern-India is also given for the populations of the genus *Nipponoelater* which occur in the Himalaya. No species of this genus is known so far from Wallacea.

7.2.1. The distribution of the genus *Elater* Linnaeus, 1758

The Palaearctic Region

Elater ferrugineus, the type species of the genus was originally described basing on material from Sweden. Today, this species is known from whole Europe, from Caucasia and from Asia Minor. New records of specimen of *E. ferrugineus* are published in this paper from Germany and from France: Germany: Hessen, Rheinland-Pfalz and Sachsen; France: Ardeche.



Map 4: The general distribution of the species of the subtribe Elaterina

E. asmodaius Wurst, 1994 was described from Greece. There is no new material of this species known. *E. tauricus* (Schwarz, 1897) is described from Taurus Mountains in Turkey. A new record of this species is given in this paper from the Namrun province in Turkey.

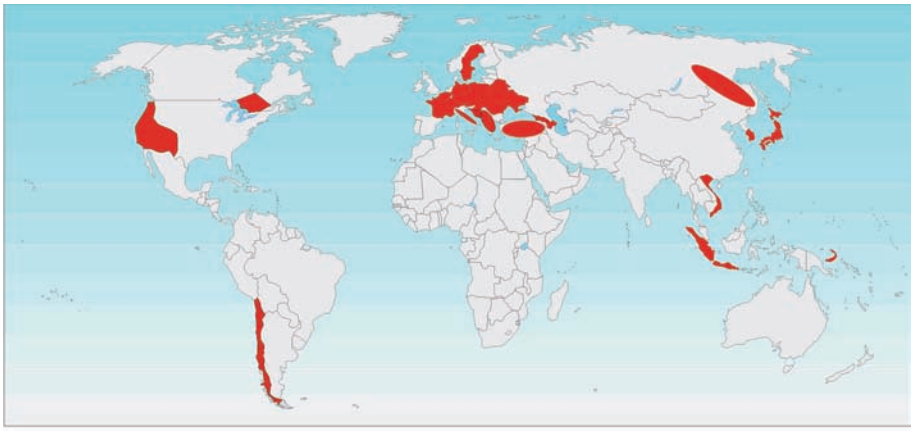
E. georgelewisi (Suzuki, 1985), *E. niponensis* (Lewis, 1894) and *E. sakishimensis* Ôhira, 1967 are known from Japan, while *E. solskyi* (Suzuki, 1985) is recorded from Siberia and *E. splendens* Gurjeva, 1974 is known from Caucasus and from Ussuriland. *E. georgelewisi* was described from Honshu in Japan, but has been recorded also from Kyushu, Kummari-jima and Okino-shima Is. (in accordance with Kishii, 1987). *E. niponensis* was described from Hokkaido in Japan and has been recorded from Honshu, (Shikokŭ and Kyushu questionably in accordance with Kishii, 1987). *E. sakishimensis* was originally described from Ishigaki-jima, but was recorded also from Iriomote Isl. (in accordance with Kishii, 1987).

The Baltic amber

Elater gebleri Jablokoff-Khnzorian, 1961 has been published basing on an inclusion from the Baltic amber. This forest has been existent during the Eocene period in the Tertiary epoch in the territory of the present Baltic Sea. As a multiple regrouping of the amber was ongoing especially during the Eocene and the Oligocene (see Weitschad & Wichard, 1998), the primeval habitats of the species found in the Baltic amber inclusions today are impossible to determine exactly.

The oriental Region

Elater acutus (Candèze, 1863) was originally described from Java and a new record of this species from Java is given in this paper, while three species of the genus *Elater* have been published from Vietnam and Laos: *E. magnicollis* Fleutiaux, 1918, *E. riesei* Schimmel, 2007 and *E. thoracicus* (Fleutiaux, 1918). The latter is also known from Hubei province in China. *E. magnicollis* was originally described from Vientiane in Laos and is published in this paper from Annam. *E. riesei* has been described basing



Map 5: The general distribution of the species of the genus *Elater*

on material from Vietnam. Currently, no further material of this species is known. *E. thoracicus* was described basing on material from Tonkin in Vietnam and is also known from the Hubei province in China.

The Australian Region

Only one species of the genus *Elater* from the Australian region has been published and is still accepted as to belong to this genus today: *Elater dilaticollis* (Fairmaire, 1883) from New Britain. *E. atripennis* (Maclay, 1869) and *E. hydropicus* (Candèze, 1863) from Queensland of Australia and from New Britain of the Papuan Subregion are placed with status incertae sedis.

The Nearctic Region

From the Nearctic Region four species of the genus *Elater* have been described so far: *E. abruptus* Say, 1825, *E. ater* (Candèze, 1865), *Elater lecontei* (Horn, 1871) and *E. pinguis* (Horn, 1884), all from North America: USA: Arizona, California, Oregon; Canada: Ontario.

The Neotropical Region

Two species of the genus *Elater* are known until today from the Neotropical Region: *E. decorus* (Germar, 1843) and *E. ruficollis* (Solier, 1851), both described from Chile of South America.

7.2.2. The distribution of the genus *Leptinostethus* gen. nov. in the Oriental Region

The oriental Region

Leptinostethus ceylanicus (Candèze, 1863) was published from Ceylon (Sri Lanka), and a new record of this species is given in this paper from the type locality. *L. coni-*

Map 6: The general distribution of the species of the genus *Leptinostethus*

cipennis (Schwarz, 1902) was originally described from the Philippines. This species was collected again from Mindanao in 1990 and from Palawan in 1990. *L. javanensis* sp. nov. is described in this paper from Java and from the Cameron highlands in Malaysia Peninsula. *L. macassariensis* (Candèze, 1963) was described from Sulawesi, but is published here also from Utara Kotacane in Sumatra and is known from the Nias Islands.

The distribution of the species of the genus *Leptinostethus* comprises the main islands of the Sunda archipelago, Sulawesi and the Philippines, Malaysian Peninsula as well as Sri Lanka. A single record of a species of the genus *Leptinostethus* from the Malayan peninsula is the only one of the whole genus which is published so far from the Oriental landmass.

7.2.3. The distribution of the genus *Nipponoelater* Kishii, 1985 in the Palaearctic and in the Oriental Region

The Palaearctic Region

Until today, five species of the genus *Nipponoelater* are known from Palaearctic Region. Four species of the genus are published from Japan: *N. amami* (Kishii, 1987), *N. babai* (Kishii, 1987), *N. kometsuki* (Kishii, 1985) and *N. sieboldi* (Candèze, 1873). The latter is also recorded from Taiwan. *N. sieboldi* and *N. ullongensis* sp. nov. are published here as the first species of the genus recorded from South Korea. Two species are known from Himalaya: *N. brancuccii* (Schimmel, 1996) is recorded from Darjeeling of India and from Nepal and *N. werneri* (Schimmel, 1996) is published from Assam and from Meghalaya of India.

The oriental Region

N. cinnamomeus (Schimmel, 1998) and *N. juttae* (Schimmel, 2007) are known from Myanmar. *N. heilongshanensis* sp. nov. and *N. sinensis* (Candèze, 1881) are recorded

Map 7: The general distribution of the species of the genus *Nipponelater*

from China. *N. henscheli* (Schimmel, 2007) and *N. kradungensis* sp. nov. are published from Thailand and *N. indosinensis* sp. nov. has populations in Laos, Vietnam and Thailand. *N. rufopilosus* (Candèze, 1893) and *N. tenebrosus* (Schwarz, 1898) have populations in Java and in Thailand and *N. vietnamensis* (Schimmel, 1996) is known from Vietnam and from Myanmar. *N. cameronensis* sp. nov., *N. fraterulus* sp. nov., *N. gorodinskii* sp. nov. and *N. malaysiensis* sp. nov. are published from Malaysia, while *N. meratensis* sp. nov., *N. rubellus* sp. nov. and *N. rubiginosus* (Candèze, 1889) are recorded from Indonesia and *N. sieboldi* (Candèze, 1873) and *N. taiwanus* are published from Taiwan. *N. maindroni* (Fleutiaux, 1905) and *N. uhligi* (Schimmel, 1996) are recorded from India, *N. palawanensis* (Ôhira, 1974) is known from Palawan, and *N. philippinensis* sp. nov. from the Philippines.

7.2.4. The distribution of the genus *Taiwanostethus* Kishii, 1994 in the Oriental Region

Until today, two species of the genus *Taiwanostethus* are known from the Oriental Region: *Taiwanostethus tanidai* Kishii, 1994 was described from Taiwan and *Taiwanostethus sihleticus* (Candèze, 1881) is known from Bangladesh, from Thailand and from Vietnam.

Map 8: The general distribution of the species of the genus *Taiwanostethus*

7.2.5. The distribution of the genus *Orthostethus* in the Nearctic and the Neotropical Region

Species of the genus *Orthostethus* occupy the Nearctic and in the Neotropical Region exclusively. Until today, nine species of this genus are described: *O. caviceps* Schaeffer, 1916, *O. cavifrons* Champion, 1895, *O. corvinus* (Germar, 1844), *O. glabratus* Champion, 1895, *O. hepaticus* (Germar, 1824), *O. infuscatus* (Germar, 1844), *O. landolti* Steinheil, 1877, *O. pectinicornis* Champion, 1859 and *O. piceus* Candèze, 1863.

Orthostethus caviceps Schaeffer, 1916 is known from Arizona and *Orthostethus infuscatus* Germar, 1844 seems to have a relatively widespread distribution: the species is known from North America: USA: Southward from Maryland to Florida and westward up to Texas and Arizona. In the Nearctic Region this species is known from Columbia and from Brazil. *O. cavifrons* Champion, 1895 is distributed in Central America: Panama, exclusively. *O. corvinus* (Germar, 1844) has populations in

Map 9: The general distribution of the species of the genus *Orthostethus*

Central America: Guatemala, Nicaragua and Costa Rica, and is known from South America: Columbia. *O. glabratus* Champion, 1895 is known from Mexico only. *O. hepaticus* (Germar, 1824) has populations in North America: from Florida up to Texas. *O. landolti* Steinheil, 1877 is known from Columbia of South America exclusively. *O. pectinicornis* Champion, 1859 has a population in Mexico and *O. piceus* Candèze, 1863 is known from Mexico, from Central America: Panama, Honduras, Guatemala and from South America: Ecuador.

Map 10: The general distribution of the species of the genus *Parallelostethus*

7.2.6. The distribution of the genus *Parallelostethus* in the Nearctic Region

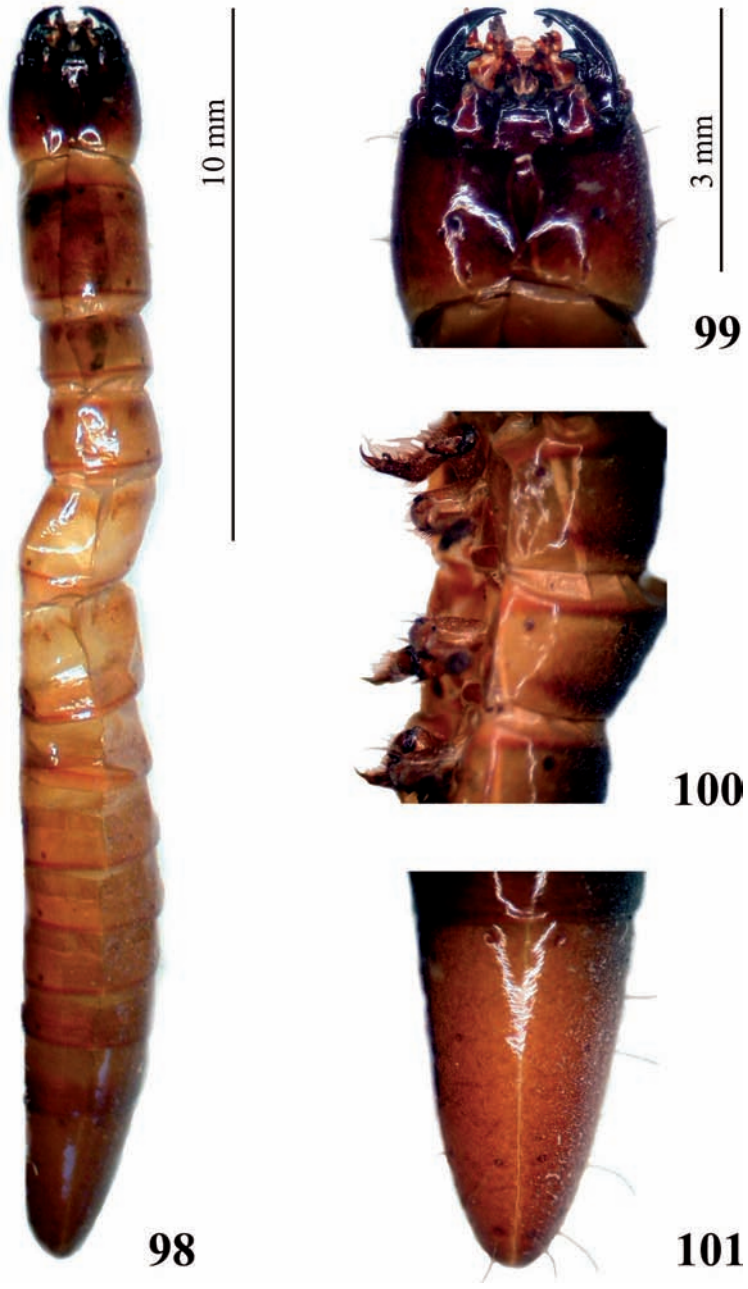
Only one species of the genus *Parallelostethus* is known so far: *P. attenuates* (SAY 1825). This species occupies the Nearctic Region exclusively and is recorded from Arizona of North America. The species is in close relationship to the *Orthostethus caviceps* and seems to live beside this species in the same habitat of Arizona of North America.

8. ECOLOGICAL FACTS AND CHOROLOGICAL DISTRIBUTIONS

8.1. ECOLOGICAL FACTS

There is very little known concerning the ecological adaptation of the species of the subtribe Elaterina. Only for the European species *Elater ferrugineus* some remarkable facts have been published regarding the bionomy of the larva and the biocenosis in which the species lives (ref. to Schimmel, 1982). The description of the larva of *E. ferrugineus* and a key to genera of the European Elaterinae is given by Klausnitzer (1994: 139). The larva has a cylindrical body (fig. 98) with a prognathous cranium with a three-dentate nasal, falcate mandibles without retinaculum and the second antennomere with some receptor papilla (fig. 99), three pairs of legs which caring falcate claws (fig. 100), a parable forming abdomen without terminal projections but canaliculated

Photo 1: Thee hollow, a microhabitat for *Elater ferrugineus* in an old oak tree



Figs. 98-101. Exuvia of last instar of *Elater ferrugineus*: 98 – habitus (dorsal view), 99 – head (dorsal view), 100 – legs (lateral view), 101 – abdomen (dorsal view)

medially (fig. 191). The adult larva has a yellowish-brown colour and a body length of approximately 30 mm. The larvae of the species is live in rotten wood substrate inside of deciduous trees like oak and beech, which have been damaged by primary consumers like the xylophagous larva of *Osmoderma*, *Cetonia*, *Dorcus* and *Potosia*.

Additionally, the larva of *E. ferrugineus* occasionally acts as a carnivore by eating the larvae of the abovementioned primary consumers. The abovementioned characters of the larval body, especially the prognathous cranium with the falcate mandibles, the legs with falcate claws and the cylindrical body classify the juvenile species as a predatory insect. Also, the receptor papilla on the second antennomere also point to such a mode of life. Considering the characters of the larval body and the mode of life of *E. ferrugineus*, the species has to be taken as modified to a certain condition of the microhabitat where it lives. The species also live in dependency of the availability of forests and inquilines which prepare the habitats and from which they occasionally feed. The larva of *E. ferrugineus* has a life cycle of five years. During this time the larva moults at least seven or eight times. After the adult lava has built a cocoon from the wooden substrate in which the species lives, the process of nymphosis goes on for approximately eight days. The pupa stage of the species continues for some weeks and the adult imago stays in the cocoon from autumn until spring of the following year. After the imago leaves the cocoon, the live cycle of the *E. ferrugineus* is short: the adults live for approximately four to six weeks the males die shortly after the copulation, the females shortly after the oviposition.

Photo 2: Nepal, valley of Myagdi Khola near Dobang, 2000-2400 m. Photo W. Schawaller, 1995

8.2. CHOROLOGICAL DISTRIBUTIONS

The chorological data given with the collected species classify them as adapted to certain altitudinal zones. The following tables show the distributional patterns for the various groups of the subtribe Elaterina, divided into various altitudinal zones: submountain zone (500-1000 m); montage zone (1000-1600 m); sub-alpine zone (1600-2000 m); alpine zone (2000-3000 m); nival zone (above 3000 m).

8.2.1. Chorological distribution pattern for *Leptinostethus* gen. nov. divided into altitudinal zones

Concerning the chorological distribution of the species of the genus *Leptinostethus* there are just two records available for a single specimen of *L. conicipennis*: Philippines: Mindanao, 30 km west of Maramag, 1600 m; Southern Palawan: Brooks Point, VII.1990. The specimens from the Philippines have been collected in the subalpine zone.

8.2.2 Chorological distribution pattern for *Elater* Linnaeus, 1758 divided into altitudinal zones

Only for *E. ferrugineus* there are chorological data available which classify this species as an occupant of a zonation from the colline up to the mountain zone, as the species has been found from 260 up to 1500 m a.s.l.

8.2.3. Chorological distribution pattern for *Nipponoelater* Kishii, 1985 divided into altitudinal zones

Species	**Altitudinal zones**				
Nipponoelater	submountain 500-1000 m	mountain 1000-1600 m	subalpine 1600-2000	alpine 2000-3000 m	nival above 3000 m
ullongensis	■				
brancuccii	■	■			
indosinensis	■	■	■		
kradungensis		■	■		
rufopilosus	■				
sinensis		■			
cameronensis		■			
fraterulus		■	■		
gorodinskii		■			
malaysiensis	■	■			
meratensis	■				
rubiginosus	■				

Results

The *Nipponoelater* species occupy an altitudinal zonation from the submontain to the subalpine zone. The chorological distribution pattern shows a preference for the submountain and mountain zone (see Photo 2 with a typical primeval forest as habitat for *Nipponoelater* species).

9. DISCUSSION

Basing on the described adaptation of *E. ferrugineus* to special habitat conditions, it can be presumed that the possibilities for this species for active spreading are relatively constricted. The species lives in dependency of the availability of old trees with hollows which are prepared by primary consumers and from which *E. ferrugineus* occasionally feed. As the mentioned habitat conditions are available the adults of *E. ferrugineus* as insects with capacity to fly will be able to spread actively within the boundaries of the microhabitats.

Economically, the *E. ferrugineus* is of no importance as this species occurs exclusively in microhabitats which have already been prepared by primary consumers. Neither the larvae of the species nor the adults are in the position to inflict any damage on trees or other goods which are of human interest. But as a secondary consumer and predator of the xylophagous primary consumers, *E. ferrugineus* has a big influence and importance for the ecological stability of the habitats in which the species lives and, in consequence, to the whole biocenosis. There is no doubt that *E. ferrugineus* as an occupant of old tree hollows and as a secondary consumer and predatory insect has also to be seen as an indicator of the ecological stability and of the quality of the environment in which the species lives.

Similar inherent spreading barriers may also exist for *E. ferrugineus* and various further species of the subtribe Elaterina due to their adaptation to the different altitudinal zones in which they live and to the resulting different climate conditions.

The current distributional pattern of the species of the subtribe Elaterina seems to be generally influenced by historical events such as: the drifting of the continental plates after the disintegration of the Pangaea continent in the Triassic epoch; the transgression of the Turgai strait in the Upper Jurassic; the orogenesis of the high mountains in South-Eastern Asia during the Tertiary period and volcanic activities in the Ceylonese Subregion during these times; the glaciations of the landmass of the northern hemisphere in the Pleistocene epoch, the down-sinking of the Sea level and the resulting creation of spreading corridors on the islands in the Sunda Archipelago during these times.

With the orogenesis of the high mountains in the Himalaya, in Indo-Chinese Subregion and in Southern China, many niches have been created for species in various altitudinal zones in the mountains. According to the climate adaptation of the species their habitats just had to be rearranged vertically.

As a result of the climate conditions in the Pleistocene epoch, many species had to move out from their habitats to refuges which were free of ice these times. As result of this movement the faunal centres have been rearranged and their compositions have changed. The returnable movement at the end of the glaciations was starting from these centres again, but was restricted by the adaptation of the species to the cold climate conditions. Palaearctic species which had to move out from their habitats at the beginning of the glaciations were not in the position to return through the oriental lowlands when the icing ended. The faunal complexity and the distribution pattern of the species in the South-Eastern part of the Palaearctic Region and in the Oriental Region is the direct result of the mentioned mechanisms.

However, the distribution of the Elaterina-species in the Wallacea generally needs to be analysed separately, as the coast shelf in the Wallacea had never fallen dry during the Pleistocene epoch because of the depth of the Maluku Sea and the Makassar-strait. Therefore, there were no spreading corridors available for the species to actively move into the Wallacea during that time. Passive drifting, perhaps inside rotten wood, is the most probable reason for the current distribution pattern of the species of the subtribe Elaterina on the islands in the Wallacea.

10. RESULTS

In this paper the new subtribe Elaterina subtribus novum is phylogenetically justified and systematically established. The species of the genera *Brachyelater* gen. nov., *Diplostethus* Schwarz, 1907, *Elater* Linnaeus, 1758, *Leptinostethus* gen. nov., *Mulsanteus* Gozis, 1875, *Nipponoelater* Kishii, 1985, *Sericus* Eschscholtz, 1829, *Taiwanostethus* Kishii, 1994, *Orthostethus* Lacordaire, 1857, *Parallelostethus* Schwarz, 1906, *Pittonotus* Kiesenwetter, 1859 and *Pseudagriotes* Schwarz, 1898 are revised concerning their phylogenetically important characters. Beside the new subtribe, two new genera are established, 12 new species are described, 26 new nomenclatural combinations, three new synonymies and five species incertae sedis are proposed. Records of known species are given and keys to genera and species are provided. New subtribe: Elaterina subtribus novum. New genera: *Leptinostethus* gen. nov., *Brachyelater* gen. nov. New species: *Leptinostethus javanensis* sp. nov., *Nipponoelater cameronensis* sp. nov., *N. fraterulus* sp. nov., *N. gorodinskii* sp. nov., *N. indosinensis* sp. nov., *N. heilongjiangensis* sp. nov., *N. kradungensis* sp. nov., *N. malaysiensis* sp. nov., *N. meratensis* sp. nov., *N. philippinensis* sp. nov., *N. rubellus* sp. nov., *N. ullongensis* sp. nov. New nomenclatural combinations proposed: *Diplostethus carolinensis* (Schaeffer, 1916) comb. nov., *D. texanus* (Leconte, 1853) comb. nov., *Elater magnicollis* (Fleutiaux, 1918) comb. nov., *E. thoracicus* (Fleutiaux, 1918) comb. nov., *Leptinostethus macassariensis* (Candèze, 1863) comb. nov., *L. ceylanicus* (Candèze, 1863) comb. nov., *L. conicipennis* (Schwarz, 1902) comb. nov., *Nipponoelater brancuccii* (Schimmel, 1996) comb. nov., *N. werneri* (Schimmel, 1996) comb. nov., *N. cinnamomeus* (Schimmel, 1998) comb. nov., *N. henscheli* (Schimmel, 2007) comb. nov., *N. juttae* (Schimmel, 2007) comb. nov., *N. rufopilosus* (Candèze, 1893) comb. nov., *N. sinensis* (Candèze, 1881) comb. nov., *N. vietnamensis* (Schimmel, 1996) comb. nov., *N. rubiginosus* (Candèze, 1889) comb. nov., *N. tenebrosus* (Schwarz, 1898) comb. nov., *N. uhligi* (Schimmel, 1996) comb. nov., *N. maindroni* (Fleutiaux, 1905) comb. nov., *N. palawanensis* (Ôhira, 1974) comb. nov., *Taiwanostethus sihleticus* (Candèze, 1881) comb. nov., *Brachyelater phongsalyensis* (Schimmel et Tarnawski, 2007) comb. nov., *B. strbai* (Schimmel, 2003) comb. nov., *B. vitalisi* (Fleutiaux, 1918) comb. nov. New synonymies: *Elater businskyi* Schimmel, 2003 syn. nov., *E. karikalensis* Schimmel, 1996 syn. nov., *Ludius subnitidus* Fleutiaux, 1918 syn. nov. Species incertae sedis: *Ludius erubescens* Candèze, 1878, *L. exutus* Candèze, 1863, *L. lineatus* Candèze, 1863, *L. serraticornis* Motschulsky, 1859, *L. hydropicus* Candèze, 1881. *Brachyelater vitalisi* (Fleutiaux, 1918) is recorded in this paper for the first time from Laos, *Elater solskyi* (Suzuki, 1985) is recorded here for the first time from China and Korea, *Nipponoelater henscheli* (Schimmel, 2007) is recorded here for the first time from Laos and from Vietnam, *N. vietnamensis* (Schimmel, 1996) for the first time from Myanmar, *N. sieboldi* (Candèze, 1873) is recorded for the first time from Korea, *N. tenebrosus* (Schwarz, 1898) is recorded for the first time from Sumatra and *Taiwanostethus sihleticus* (Candèze, 1881) is recorded for the first time from Thailand. *Nipponoelater ullongensis* sp. nov. is the first species of the genus which is recorded from Korea.

As a result of the phylogenetic hypothesis the systematic structure of the subtribe Elaterina includes six higher monophyletic groups (genera): *Orthostethus*, *Taiwanostethus*, *Parallelostethus*, *Nipponoelater*, *Leptinostethus*, and *Elater*. Within this group, two of the monophyla include genera which have to be taken as monophyletic sister groups:

1. *Orthostethus* and *Parallelostethus*;
2. *Nipponoelater* and *Leptinostethus.*

The genus *Elater* is currently accepted as a single group without any hypothetical sister group. Also, the genus *Taiwanostethus* is currently accepted as a single group of species without a hypothetical sister group. The change of characters in the ancestral line of the subtribe Elaterina especially applies to:

1. The modification of the form of the body outline from a elliptical body form up to a sub-parallel and wedge-shaped one.
2. The modification of the surface of the elytra from cyclic and conspicuously striate ones with impressed punctures, up to a surface with reduced and just visible striae with slightly impressed punctures.
3. The modification of the antennae from serrate antennomere up to dentate and lamellate ones (from fourth antennomere on).
4. The extension of the third antennomere in one group of the monophylum IV.
5. The reduction of the prosternal apophysis and the emargination on the apex in one group of the monophylum IV.

Species of the genus *Elater* are known from Palaearctic and from the Oriental Region, where they occupy the Indo-Chinese and the Malayan Subregion. The distribution pattern of the genus *Elater* in the Palaearctic and in the Oriental Region is mostly disjunctive. In this Region, the species of the genus occupy environments in Southern China and Vietnam, and one species is known from the Sunda Archipelago (Java). The records of *Elater acutus* (Candèze, 1863) from Assam and these from Darjeeling and from Sikkim in India seem to be doubtful. There are also isolated populations known for species of the genus from Europe, from Caucasia, from Siberia (Ussuriland) and from Japan. Species of the genus *Leptinostethus* are currently known exclusively from the Oriental Region, where the species have populations in the Ceylonese and in the Malayan Subregion. Today, the populations of species of the genera *Leptinostethus*, which occur in South India (the Ceylonese Subregion) are geographically isolated. *Nipponoelater* is known from eastern Palaearctic Region and from the Oriental Region where its species have occupations in the Ceylonese, in the Indo-Chinese and in the Malayan Subregion. The populations distribution of the species of the genus *Nipponoelater* shows a homogeneous pattern which includes the whole landmass decumbent to the Gulf of Bengal, the South-Chinese Sea, from Southern India up to South Korea, as well as the Islands on the Indian and on the Pacific ocean, from Sunda Archipelago, Palawan, the Philippines, Taiwan and Japan. There is no species of this genus known so far from Wallacea.

As regards chorological distribution of the species of the genus *Leptinostethus* there is just one record given for a single specimen of *L. conicipennis*: Philippines: Mindanao, 30 km west of Maramag, 1600 m. This species has been collected in the subalpine zone. For the species *E. ferrugineus* there are chorological data given which classify it as an occupant of habitats from the colline up to the mountain zone, as the species has been found from 260 up to 1500 m a.s.l. The *Nipponoelater*-species occupy an altitudinal zonation from the submountain to the subalpine zone. Their chorological distribution pattern shows a preference for the submountain and mountain zone.

The species of the genus *Brachyelater* seem to be strictly geographically isolated: the species of the genus are currently known from Laos, Myanmar and from Vietnam exclusively. These species occupy an altitudinal zonation from the submountain to the subnival zone.

Considering the Pangaea theory, the origin of the genus *Elater* can be placed prior to the Lower Jurassic epoch (210 million years ago) of the Mesozoic division and into e Earth-historical time frame of when Pangaea was still existent.

Nipponoelater and *Leptinostethus* are exclusively distributed in the Oriental and in the Palaearctic Region as well as in the Wallacea. The origin of the genus *Nipponoelater* can be placed in Upper Jurassic (180 million years ago) and after the disintegration of the Fenno-Sarmatia plate as the species of this genus exclusively occur in the Palaearctic and the Oriental Region. *Leptinostethus* is distributed in the Sunda Archipelago only (one species is known from the Wallacea) which leads to the presumption that the origin of this genus is in close correlation with the Pleistocene glaciations (1.6 million years ago) and the availability of spreading corridors in the Sunda Archipelago at that time.

The monophylum which includes the genera *Taiwanostethus*, *Orthostethus* and *Parallelostethus* has disjunctive distributions in America and in the Oriental Region. Concerning the origin of this genera-group, a time frame prior to the Lower Jurassic epoch (210 million years ago) when Pangaea was still existent can be presumed. However, in accordance with the distribution of the genus *Parallelostethus* this species-group most probably has to be based on sympatric creation with the genus *Orthostethus* as the appertaining species today live in the same habitat in Arizona of North America. Therefore, the determination of the original time frame for the genus *Parallelostethus* is currently not possible basing on historical occurrences.

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13. INDEX OF LATINE NAMES

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