

## ELMIDAE: 2. Notes on Macronychini, with descriptions of four new genera from China (Coleoptera)

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### Abstract

Four new genera and four new species of Elmidae (Macronychini) are described: *Cuspidevia* gen.n. *velaris* sp.n., *Eonychus* gen.n. *dudgeoni* sp.n., *Jilanzhunychus* gen.n. *costatus* sp.n., *Sinonychus* gen.n. *lantau* sp.n. *Indosolus* BOLLOW, originally described as a subgenus of *Esolus* MULSANT & REY, is elevated to generic rank. All genera of Macronychini described so far are briefly characterized and depicted in colour.

**Key words:** Coleoptera, Elmidae, Macronychini, new genera, new species, China

### Introduction

In the years 1992 - 1994 about 7000 specimens of Elmidae were collected by the China Water Beetle Survey (CWBS). While most of these 7000 specimens are still unidentified we are so far able to conclude that the material includes at least four genera new to science which are described in this paper.

The four genera belong to the tribe Macronychini (type genus: *Macronychus* MÜLLER). This tribe was erected by MULSANT & REY (1872) by using the name "Macronychaires". STEFFAN (1961) formally described the tribe and provided a diagnosis which, in the absence of any non-European material, remained fragmentary.

### Methods

Specimens were examined with Wild M5A stereoscopic microscope with direct lighting and Wild M10 stereoscopic microscope with diffuse lighting. Aedeagi, ovipositors, mouth parts, antennae, hind wings and elytra were also examined with an Olympus BH-2 transmitted light microscope and illustrated with the aid of a drawing tube attached to the Olympus BH-2. The SEM photographs were made with a Jeol 6400 at 15 kv.

Male genitalia, ovipositors, mouth parts, antennae, hind wings and elytra were placed in concentrated lactic acid in a cavity slide for at least several days before they were examined and illustrated.

### Acronyms & CWBS localities:

BML	The Natural History Museum, London [formerly: British Museum (Natural History)]
CASS	Chinese Academy of Sciences, Institute of Applied Ecology, Shenyang
CBB	Boukal collection, České Budějovice
CSUS	California State University, Sacramento (Shepard collection)
CWBS	China Water Beetle Survey

NMW Naturhistorisches Museum, Wien

NRS Naturhistoriska Riksmuseet, Stockholm (P. Lindskog)

CWBS loc. 4: **Hong Kong**; New Territories; a) stream, ca. 2 m wide, with pebbles and cobbles, only partly shaded by riparian shrubs, small trees and bamboo, near Wu Kau Tang Village, ca. 125 m a.s.l., b) lower course of same stream, ca. 10 - 15 m wide, with large volcanic boulders, partly shaded by secondary forest, between Bride's Pool and Plover Cove Reservoir, ca. 50 m a.s.l.; 25.VI.1992; leg. Jäch

CWBS loc. 7: **Hong Kong**; Lantau Island; stream between Mui Wo and Ngau Kwu Long, ca. 3 m wide, only partly shaded, unpolluted, ca. 50 m a.s.l.; 26.VI.1992; leg. Jäch

CWBS loc. 8: **Hong Kong**; New Territories; Tai Po Kau Forest Nature Reserve near Tai Po New Town; stream, ca. 3 m wide, flowing through secondary forest, ca. 150 - 200 m a.s.l.; 27.VI.1992; leg. Jäch

CWBS loc. 42: **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan (Sixty-thousand Mountains); 30 km SW Yülin City; several streams in the vicinity of Liuwan Forest Station, 0.5 - 1.0 m wide, rather sandy, rich riverside vegetation (original), slopes covered with planted forest of mainly *Cunninghamia lanceolata*, crystalline rock, 350 - 400 m a.s.l.; 16.XI.1993; leg. Schönmann, Schillhammer & Ji

CWBS loc. 43: **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan; small, steep mountain streams on the S slope of Kui Shan Ding (Helmet Mountain), cataracts, large crystalline boulders, coarse sand, dense vegetation, slopes covered with planted forest, 600 - 700 m a.s.l.; 17.XI.1993; leg. Schönmann, Schillhammer & Ji

CWBS loc. 44: **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan; stream W of Kui Shan Ding, 2 - 3 m wide, large crystalline boulders, gravel, coarse sand, surrounded by agricultural area, slightly polluted, 300 m a.s.l., lower reaches (150 m a.s.l.) already severely polluted; 17.XI.1993; leg. Schönmann, Schillhammer & Ji

CWBS loc. 45: **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan, 20 km E of Liuwan Forest Station; foot hills of Kui Shan Ding; upstream of Zhongxin Substation; small, steep stream, large crystalline boulders, 0.3 - 0.4 m wide, rich riverside vegetation, ca. 300 m a.s.l.; 18.XI.1993; leg. Schönmann, Schillhammer & Ji

CWBS loc. 48: **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan; shallow stream, 0.4 - 0.5 m wide, downstream Zhongxin Substation, 120 m a.s.l.; 18.XI.1993; leg. Schönmann, Schillhammer & Ji

CWBS loc. 49: **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan; ca. 2 km upstream of loc. 42, 0.3 - 0.5 m wide, rather sandy, flowing through rather flat area, ca. 500 m a.s.l.; 20.XI.1993; leg. Schönmann, Schillhammer & Ji

## Taxonomy

The Macronychini, as defined herein, are characterized by the following features: antenna with 7 - 10 segments, aedeagus long and cylindrical, ejaculatory duct expulsive in most (or all) genera, parameres very small, slender and inconspicuous, or lacking. However, as long as the phylogeny of the Elmidae is not sufficiently understood, the term Macronychini should be regarded only as a working unit.

Examination of the female holotype of *Esolus* (*Indosolus*) *nitidus* BOLLOW (deposited in the NRS) revealed that *Indosolus* BOLLOW is a valid genus belonging to the Macronychini.

Including the 4 new genera described herein, the tribe now is comprised of 11 genera: *Cuspidevia* gen.n., *Eonychus* gen.n., *Indosolus*, *Jilanzhunyichus* gen.n., *Macronychus*, *Paramacronychus* NOMURA, *Sinonychus* gen.n., *Urumaelmis* SATÔ, *Vietelmis* DELÈVE, *Zaitzevia* CHAMPION (= *Awadoronus* KÔNO), *Zaitzeviaria* NOMURA. Numerous new genera, mainly from southeast Asia, will be described in forthcoming revisions.

### *Cuspidevia* gen.n.

TYPE SPECIES: *Cuspidevia* gen.n. *velaris* sp.n.

**DESCRIPTION:** Habitus (Fig. 61). Body form elongate; scarcely punctate and scarcely pubescent, glabrous; plastron on: vertex and lateral parts of frons, elytra between lateral margin and sublateral carina (seventh interval), hypomeron, prosternum except middle, epipleura, lateral parts of meso-, metasternum and coxae, lateral parts of abdominal sternites, and femora.

Head (Figs. 40, 41) partly retractable, labrum, clypeus and frons moderately densely covered with adpressed, whitish hairs; labrum short, distinctly wider than long; clypeus distinctly broader and distinctly longer than labrum, lateral margin arcuate; fronto-clypeal suture slightly arched; antenna (Fig. 2) eight-segmented, segments 3 - 7 small, last segment large and elongate; mandible (Fig. 1) with 3 apical teeth, antero-lateral margin moderately deeply excised, prosthema large and apically densely spinose; maxillary palpi moderately long, four-segmented, last segment relatively long and slender, palpifer well-developed, galea two-segmented, basal segment short and thin, apical segment distinctly longer and wider than basal segment, apically setose; labium (Fig. 3), labial palpus three-segmented, basal segment very short, ligula very wide, ca. 2 times as wide as mentum, umbrella-shaped, lateral extensions long and narrowly acuminate.

Pronotum slightly wider than long, widest in basal third or fourth; lateral margin only moderately widely explanate; posterior angles acute, anterior angles strongly acuminately produced anteriorly; posterior margin with indistinct sublateral grooves which are usually very short and inconspicuous or more or less obsolete in certain specimens and only rarely reach the middle of the pronotum, and with a pair of small, inconspicuous granules in front of anterior angles of scutellum; disc more or less regularly convex, usually with a short, shallow, longitudinal, median groove.

Scutellum subtriangular. Elytra (Figs. 4, 42) elongate, widest near middle; elytral apices (Fig. 42) densely granulate, separately acuminately produced and curved laterad in most species, however, at least one species without trace of apical projections; elytral striae almost obsolete, with a prominent, granulate carina on the seventh interval, traces of additional carinae may be present on the elytral apex and between the seventh interval and the lateral margin; epipleura wide, not narrowing apically. Hind wing (Fig. 5); cubito-anal crossvein absent; medial vein faintly developed before junction with radio-medial crossvein; anal veins reduced, second anal vein not connected with third anal vein, second anal vein with two branches only.

Prosternum (Fig. 43) distinctly produced anteriorly; prosternal process distinctly longer than broad, its lateral margin more or less distinctly rimmed, its apex acuminately rounded; mesosternum (Fig. 43), middle of mesosternum deeply grooved for reception of prosternal process; metasternum (Fig. 43) with a row of punctures along margin of mesocoxae, median longitudinal suture moderately deeply impressed.

Legs moderately long; femora with golden setae on inner surface, especially pro- and metafemora somewhat enlarged, club-shaped; tibiae with cleaning fringes; claws simple.

Abdomen (Fig. 44) with five ventrites; first ventrite without carina; apical ventrite slightly produced apically; third ventrite distinctly produced postero-laterally.

Aedeagus (Figs. 7, 8): Long and slender; fibula and corona absent; ejaculatory duct with distinct sclerotizations; ventral sac well-developed, apically with a pair of admedian, sclerotized teeth; parameres fused to penis, their apices discernible, bearing some setae; phallobasis shorter than penis, cylindrical.

Ovipositor (Fig. 6): Terminal segment long and slender, almost straight. Preterminal segment long and slender; apico-lateral angle dilated, with several blunt spines; distal sclerite approximately twice as long as proximal sclerite, mesally pubescent. Basal segment twice as long as preterminal segment.

**DIFFERENTIAL DIAGNOSIS:** *Cuspidevia* gen.n. resembles *Urumaelmis* and some species of *Zaitzevia* in its general appearance. However, these two genera can be distinguished from *Cuspidevia* by the fifth elytral interval being strongly carinate. Due to the smooth elytral surface and the lack of distinct striae it is somewhat difficult to count the elytral intervals in *Cuspidevia* and *Urumaelmis*. To make the intervals visible, the elytra should be placed in lactic acid for several hours to make them transparent and to make the punctures underneath the cuticle visible (see Figs. 4, 39).

**DISTRIBUTION:** Known only from southeast China (Hong Kong, Guangxi, Hunan) where six species were collected by the CWBS.

**ETYMOLOGY:** Cuspis- (Latin, tooth, projection), referring to the acuminate projecting elytral apices of the type species and most other species of this genus; and -evia, referring to the genus *Zaitzevia* to which the new genus is closely related.

### *Cuspidevia* gen.n. *velaris* sp.n.

**TYPE LOCALITY:** CWBS loc. 8.

**TYPE MATERIAL:** **Holotype** ♂ (NMW): "HONGKONG Tai Po Kau 3.8.1978 leg. Dudgeon (5)". **Paratypes** (NMW): 1 ♀ [elytral apices broken]: "HONGKONG Tai Po Kau 22.2.1979 leg. Dudgeon (K)"; 1 ♀: "HONGKONG Tai Po Kau 5.1.1978 leg. Dudgeon (K)"; 1 ♀: "HONGKONG (3) 1992 N.T.-Plover C. Res. 25.VI. leg. Jäch" [= CWBS loc. 4].

**DIAGNOSIS:** Length (pronotum + elytra), 2.0 - 2.1 mm; width, 0.9 - 1.0 mm.

Colour dark brown or almost black; labrum, mouthparts and antennae usually paler yellowish brown.

Frons conspicuously impressed behind insertion of antennae.

Pronotum only sparsely or very sparsely punctate, punctures small, separated by several puncture diameters; sublateral grooves almost obsolete; lateral margin sinuous.

Elytra long, distinctly acuminate apically; elytral apices moderately long. First elytral stria extending from scutellum to elytral 0.5, its punctures small, separated by 1 - 2 puncture diameters; second stria almost obsolete, even shorter than first, extending from elytral 0.2 - 0.4, consisting of ca. 3 - 6 very small punctures; intervals 1 - 6 flat and glabrous; short, granulate carina(e) visible on apical 0.2. All specimens fully winged.

Aedeagus (Figs. 7, 8): Spines of ejaculatory duct well-sclerotized; in repose, a short distal and a long, proximal spinose area can be distinguished; penis more than twice as long as phallobasis.

Ovipositor as in Fig. 6.

**VARIABILITY:** 41 specimens collected by the CWBS in Guangxi (6 exs. CWBS loc. 42; 4 exs. CWBS loc. 43; 2 exs. CWBS loc. 44; 6 exs. CWBS loc. 45; 10 exs. CWBS loc. 48; 14 exs. CWBS loc. 49) agree in all essential characters with the Hong Kong material. However, they differ in the slightly larger and slightly more elongate aedeagus, in the generally more distinctly produced elytral apices (the length of the elytral apices is slightly variable in both the Guangxi and the Hong Kong material) and in the second elytral stria usually being totally obsolete, at most one very faint puncture being discernible. At present we are unable to decide whether the Guangxi specimens belong to *C. velaris* or if they represent a distinct species or a subspecies.

**DISTRIBUTION:** Hong Kong, ? Guangxi.

**ETYMOLOGY:** *velaris* (Latin, hidden), referring to the obvious scarcity of this species in Hong Kong where it is seemingly very rare. And although the species is winged, it obviously does not fly to light as most other Hong Kong species do.



***Eonychus* gen.n.**

TYPE SPECIES: *Eonychus* gen.n. *dudgeoni* sp.n.

DESCRIPTION: Habitus (Fig. 63). Body form elongate, subparallel; surface moderately densely covered with whitish, semi-erect hairs; plastron on: head around eyes, hypomeron, prosternum medio-laterally, epipleura, lateral parts of meso-, metasternum and coxae, lateral parts of abdominal sternites, femora.

Head partly retractable; labrum short, distinctly wider than long; clypeus distinctly broader and distinctly longer than labrum, explanate and arcuately produced laterad; fronto-clypeal suture slightly arched; eyes small and widely separated, with ca. 30 facets; antenna (Fig. 11) ten-segmented, last 2 - 3 segments forming a solid club, suture between segments 9 and 10 feeble; mandible (Fig. 12) with 3 apical teeth, antero-lateral margin with shallow emargination, prostheca large and apically densely spinose; maxilla (Fig. 10), maxillary palpi moderately long, four-segmented, second segment broad, last segment relatively long and slender, palpifer well developed, galea two-segmented, basal segment short and thin, apical segment distinctly longer and wider than basal segment, apically setose; labium (Fig. 9), labial palpus three-segmented, basal segment very short, second segment almost twice as wide as basal segment, ligula wide, trapezoidal.

Pronotum slightly wider than long, widest in basal third, slightly constricted towards base, more distinctly and sinuously constricted towards apex; lateral margin not explanate; posterior angles rectangular, anterior angles distinctly acuminate produced anteriorly; sublateral grooves bordered by a sublateral carina, surpassing pronotal middle; disc more or less regularly convex, with a moderately deeply impressed, longitudinal, median groove extending from the base to about apical 0.25.

Scutellum oval, subtriangular. Elytra elongate, subparallel, evenly constricted in apical third; distinctly striate in basal half; punctures deeply impressed; granulate carinae reaching the apical third are present on intervals 5, 7 and 8; a few raised granules may be present on the fourth interval near the base; epipleura well-developed, progressively narrowing from base to apex. Hind wings absent.

Prosternum (Fig. 53) distinctly produced anteriorly; prosternal process distinctly longer than broad, lateral margin more or less distinctly rimmed, apex truncate rounded; mesosternum (Fig. 53), middle of mesosternum deeply grooved for reception of prosternal process; metasternum (Fig. 53) densely and coarsely punctate, punctures large, middle of metasternum deeply impressed in posterior 0.6.

Legs moderately long; femora with golden setae on inner surface; tibiae with cleaning fringes; claws simple.

Abdomen (Fig. 54) with five ventrites; admedian carinae of first ventrite compact and complete; first ventrite with a row of coarse punctures along anterior margin; second and third ventrite distinctly produced postero-laterad, fourth ventrite only feebly produced postero-laterad.

Aedeagus (Figs. 14, 15): Long and slender, acuminate rounded apically; fibula and corona absent; ventral sac well-developed in the apical third of the penis, sclerotizations of ventral sac and ejaculatory duct faint; parameres tightly fused to penis, their apices marked by the presence of a group of setae; phallobasis short and cylindrical.

Ovipositor (Fig. 13): Terminal segment moderately long and curved. Preterminal segment rather short; apico-lateral angle strongly produced laterad, with several short, blunt spines; distal sclerite approximately twice as long as proximal sclerite, mesally pubescent. Basal segment almost twice as long as preterminal segment.

DIFFERENTIAL DIAGNOSIS: *Eonychus* gen.n. is related to *Vietelmis* due to the 10-segmented

antenna. It differs from the latter in the general appearance, in the male and female genitalia (see DELEVE 1968, Figs. 57, 58) and in several other characters. All other Macronychini genera described so far differ in the number of antennal segments.

**DISTRIBUTION:** *Eonychus* is known only from Hong Kong on the easternmost fringe of the Eurasian land mass (see etymology).

**ETYMOLOGY:** Eos (in Latin: Aurora) is the ancient Greek goddess of the dawn, referring to the distribution of the genus; and -onychus (Latin, claw), referring to the type genus of the tribe (*Macronychus*). Freely translated: "claw of the dawn".

### *Eonychus* gen.n. *dudgeoni* sp.n.

**TYPE LOCALITY:** CWBS loc. 8.

**TYPE MATERIAL:** **Holotype** ♂ (NMW): "HONGKONG (7) 1992 N.T.-Tai Po N. Res. 27.VI. leg. Jäch". **Paratypes** (NMW, BML, CASS, CBB, CSUS): 5 exs. labelled as holotype; 13 exs.: "HONGKONG, 1977-1979 Benthic Coll. Tai Po Kau leg. Dudgeon"; 1 ex.: "HONGKONG Tai Po Kau 11.11.1977 leg. Dudgeon (K5)", 1 ex.: "HONGKONG Tai Po Kau 24.11.1977 leg. Dudgeon (2); 1 ex.: "HONGKONG Tai Po Kau 5.1.1978 leg. Dudgeon (K)"; 2 exs. (one partly damaged): "HONGKONG Tai Po Kau 16.2.1978 leg. Dudgeon (K)"; 2 exs.: "HONGKONG Tai Po Kau 2.1.1979 leg. Dudgeon (K)"; 2 exs.: "HONGKONG Tai Po Kau 18.1.1979 leg. Dudgeon (K)"; 1 ex.: "HONGKONG Tai Po Kau 18.1.1979 leg. Dudgeon (3)"; 2 exs.: "HONGKONG Tai Po Kau 19.1.1979 leg. Dudgeon (K)"; 3 exs.: "HONGKONG Tai Po Kau 8.3.1979 leg. Dudgeon (K)"; 2 exs.: "HONGKONG Tai Po Kau 30.3.1979 leg. Dudgeon (K)".

**DIAGNOSIS:** Length (pronotum + clytra), 1.8 - 1.9 mm; width, 0.8 mm.

Colour reddish brown to dark brown; labrum, mouthparts and antennae usually paler yellowish brown.

Pronotum moderately densely punctate, punctures small, separated by one or two puncture diameters, interstices smooth and glabrous; sublateral carina sharply ridged.

Scutellum coarsely reticulate. Elytra long, evenly convex in cross section; elytral striae straight, punctures large and coarse, separated by 0.5 puncture diameters; intervals flat and glabrous, a few small granules may be present near the basal margin.

Fifth abdominal ventrite slightly emarginate apically.

Aedeagus (Fig. 14, 15): Penis more than twice as long as phallobasis.

Ovipositor as in Fig. 13.

**DISTRIBUTION:** Known only from Hong Kong.

**ETYMOLOGY:** Named for Dr. David Dudgeon (University of Hong Kong), for his cordial and generous support.

### *Jilanzhunychus* gen.n.

**TYPE SPECIES:** *Jilanzhunychus* gen.n. *costatus* sp.n.

**DESCRIPTION:** Habitus (Fig. 68). Body form obovate; surface more or less glabrous, only very sparsely covered with minute, whitish, adpressed hairs; plastron (partly very fine !) on: vertex and lateral parts of frons, clytra between lateral margin and sublateral carina (seventh interval), hypomerion, prosternum except middle and anterior margin, epipleura, lateral parts of meso-, metasternum and coxae, lateral parts of abdominal sternites.

Head (Figs. 55, 56) partly retractable; labrum short, distinctly wider than long; clypeus distinctly broader and distinctly longer than labrum, distinctly arcuately produced laterad; fronto-clypeal

suture straight; eyes small, oblique, with ca. 30 facets; anterior margin of frons slightly produced in front of eyes; antenna (Fig. 18) eight-segmented, segments 3 - 7 small, last segment large and elongate; mandible (Fig. 19x) with 3 apical teeth, antero-lateral margin moderately deeply excised, prosthema large and apically densely spinose; maxilla (Fig. 17), maxillary palpi moderately long, four-segmented, last segment relatively long and slender, palpifer well-developed, galea two-segmented, basal segment short and thin, apical segment distinctly longer and wider than basal segment, apically setose; labium (Fig. 16) labial palpus three-segmented, basal segment very short, ligula very wide, more than 2 times as wide as mentum, umbrella-shaped, lateral extensions long and narrowly acuminate.

Pronotum slightly wider than long, widest in basal third, slightly constricted towards base, more distinctly constricted towards apex; lateral margin rimmed, not explanate; posterior angles rectangular, anterior angles acute and somewhat produced anteriorly; sublateral grooves bordered by a sublateral carina, surpassing pronotal middle; disc more or less regularly convex, with a shallowly impressed, moderately wide, longitudinal, median groove extending from the base to about apical 0.25; posterior margin with a few small, inconspicuous granules in front of anterior angles of scutellum which may form very short, admedian carinae.

Scutellum oval or subtriangular. Elytra obovate, evenly constricted in posterior half; distinctly striate in basal half, striae effaced in posterior half; punctures moderately large, only shallowly impressed; carinae present on intervals 3, 5, 7 and 8; all carinae granulate; carina on third interval reaching the apical third (beginning of declivity), carinae on intervals 5 and 7 almost reaching apex, carina on interval 8 slightly shorter than those on intervals 5 and 7; lateral margin more or less concealed by carina of interval 8 in dorsal aspect; epipleura well-developed and wide, abruptly narrowing before apex. Hind wings absent.

Prosternum distinctly produced anteriorly; prosternal process slightly longer than broad, lateral margin more or less broadly rimmed, apex broadly rounded; mesosternum (Fig. 58), middle of mesosternum deeply grooved for reception of prosternal process; metasternum (Fig. 58) with rows of coarse punctures behind mesocoxae and in front of metacoxae, median groove deeply impressed.

Legs moderately long; femora with golden setae on inner surface; tibiae with cleaning fringes; claws simple.

Abdomen (Fig. 58) with five ventrites; admedian carinae of first ventrite compact and complete; first ventrite with a row of coarse punctures along anterior margin; second and third ventrite distinctly produced postero-laterad, fourth ventrite only feebly produced postero-laterad.

Aedeagus (Fig. 21, 22): Long and slender; penis with lateral projections and a group of short setae near parameral apex; fibula and corona absent; ventral sac well-developed in the apical half of the penis, apically with a pair of admedian sclerotized teeth; ejaculatory duct with distinct sclerotizations; parameres not clearly discernible basally, tightly fused to penis, their apices projecting; phallobasis short and cylindrical.

Ovipositor (Fig. 20): Terminal segment long and slender, almost straight. Preterminal segment long and slender; apico-lateral angle dilated, with several blunt, short spines; distal sclerite approximately twice as long as proximal sclerite, mesally pubescent. Basal segment about as long as preterminal segment.

**DIFFERENTIAL DIAGNOSIS:** *Jilanzhunychnus* gen.n. can be distinguished from any other genus with 8-segmented antenna by the combination of the following characters: 1) plastron of elytra developed between the seventh interval and the lateral margin; 2) eyes small and oblique; 3) clypeus distinctly produced laterad; 4) median groove and sublateral carinae of pronotum distinct; 5) elytral carinae on intervals 3, 5, 7 and 8; 6) area between interval 8 and lateral margin steeply declivous, thus lateral margin not visible in strictly dorsal aspect; 7) epipleura wide, abruptly narrowed before apex; 8) rows of punctures on metasternum; 9) admedian carinae of first ventrite

compact and complete; 10) abdominal ventrites 2 - 4 produced postero-laterad; 11) terminal segment of ovipositor long and slender, almost straight; 12) femora without plastron; 13) preterminal segment of ovipositor long and slender, apico-lateral angle dilated. From *Paramacronychus* and *Zaitzevia* it can be distinguished by the shorter, more ovoid body form, the lateral margin of the elytra being invisible in dorsal aspect, by the small eyes and by the aedeagus: parameres of *Paramacronychus* and *Zaitzevia* clearly discernible in apical half in lateral view, tightly attached to penis, never projecting; penis lacking projections.

**DISTRIBUTION:** Only one species from Guangxi is known.

**ETYMOLOGY:** Named for Prof. Lanzhu Ji, Chinese Academy of Sciences. Without his organizational and diplomatic skills the China Water Beetle Survey would have never been realized.

### *Jilanzhunychus* gen.n. *costatus* sp.n.

**TYPE LOCALITY:** CWBS loc. 49.

**TYPE MATERIAL:** **Holotype** ♂ (CASS): "CHINA, SE-Guangxi Distr. Yulin Liuwan Mts. SW Yulin \ 20.11.1993 500 m, (26) leg. Schönmann". **Paratypes** (NMW, CBB): 1 ♂ + 1 ♀: "CHINA, SE-Guangxi Distr. Yulin Liuwan Mts. SW Yulin \ 16.11.1993 350-400m leg. Schönmann (20)" [= CWBS loc 42]; 1 ♂: "CHINA, SE-Guangxi Distr. Yulin Liuwan Mts. SW Yulin \ 18.11.1993 300m leg. L. Ji (23)" [= CWBS loc 45]; 1 ♀: "CHINA, SE-Guangxi Distr. Yulin Liuwan Mts. SW Yulin \ 20.11.1993 500m leg. L. Ji (26)" [= CWBS loc 49]; 2 ♀♀: "CHINA, SE-Guangxi Distr. Yulin Liuwan Mts. SW Yulin \ 2011.1993 500m (26) leg. Schillhammer" [= CWBS loc 49].

**DIAGNOSIS:** Length (pronotum + elytra), ca. 1.4 mm; width, ca. 0.75 mm.

Colour brown to dark brown; labrum, mouthparts and antennae usually paler yellowish brown.

Pronotum faintly and superficially punctate, punctures small, separated by two or more puncture diameters, interstices smooth and glabrous; sublateral carina compact, sharply ridged medially.

Scutellum impunctate, glabrous. Elytra obovate, evenly convex between eighth intervals in cross section, then abruptly constricted; lateral margin not explanate; elytral striae straight, punctures separated by approximately one puncture diameter; intervals flat and glabrous.

Abdominal ventrites 1 - 4 and anterior half of ventrite 5 smooth and glabrous; posterior half of fifth ventrite densely granulate in male, less densely granulate in female; apical margin of fifth ventrite evenly, widely rounded in female, more acuminate rounded in male.

Aedeagus (Fig. 21, 22): Penis about three times as long as phallobasis.

Ovipositor as in Fig. 20.

**DISTRIBUTION:** Known only from Guangxi, southeastern China.

**ETYMOLOGY:** *costatus* (Latin, costate, ribbed), referring to the costate elytra.

### *Sinonychus* gen.n.

**TYPE SPECIES:** *Sinonychus* gen.n. *lantau* sp.n.

**DESCRIPTION:** **Habitus** (Fig. 64). Body form obovate; surface very sparsely covered with whitish, semi-erect hairs; plastron on: head, except labrum and anterior margin of clypeus, antero-lateral parts of pronotum, elytra between carina on fifth interval and lateral margin, elytral suture (at least anteriorly), hypomeron, prosternum except middle, epipleura, lateral parts of meso-, metasternum and coxae, lateral parts of abdominal sternites.

Head (Figs. 45 - 47) partly retractable, moderately densely covered with small granules; labrum short, distinctly wider than long; clypeus distinctly broader and distinctly longer than labrum,

arcuately produced laterad; fronto-clypeal suture straight; eyes large, with ca. 40 facets; antenna (Fig. 25) 7-segmented, segments 3 - 6 small, last segment large and elongate; mandible (Fig. 24) with 3 (type species) or 2 (one undescribed species) apical teeth, antero-lateral margin moderately deeply excised, prosthema large and apically densely spinose; maxillary palpi moderately long, four-segmented, last segment relatively long and slender, palpifer well-developed, galea two-segmented, basal segment short and thin, apical segment distinctly longer and wider than basal segment, apically setose; labium (Fig. 23), labial palpus three-segmented, basal segment very short, ligula wide, mushroom-shaped, lateral extensions directed posteriad.

Pronotum (Fig. 48) wider than long, widest at base, arcuately constricted towards apex; lateral margin not distinctly rimmed, not explanate; posterior angles rectangular or somewhat acute, anterior angles rounded or slightly produced anteriorly; sublateral grooves present, externally bordered by a sharp ridge, distinctly surpassing pronotal middle; disc more or less regularly convex, with a moderately deeply impressed, moderately wide, longitudinal, median groove extending from the base almost to the anterior margin.

Scutellum oval or subtriangular. Elytra obovate, evenly constricted in posterior half; disc more or less roof-like in cross section; lateral margin not distinctly explanate; distinctly striate, striae more or less effaced in posterior third; punctures moderately large, usually well impressed in anterior two thirds; carinae are present on intervals 3 (only one undescribed species from Guangxi), 5, 6 and 7; all carinae granulate; carinae on third and fifth interval distinctly shorter than those of intervals 6 and 7; epipleura well-developed and wide, abruptly narrowing before apex. Hind wings absent.

Prosternum distinctly produced anteriorly; prosternal process triangular, lateral margin rimmed; mesosternum (Fig. 49), middle of mesosternum deeply grooved for reception of prosternal process; metasternum (Fig. 49) with rows of coarse punctures behind mesocoxae and along posterior margin, median groove distinctly impressed.

Legs moderately long; femora with golden setae on inner surface; tibiae with cleaning fringes; claws simple.

Abdomen (Fig. 50) with five ventrites; admedian carinae of first ventrite sharply ridged, complete; first ventrite with a row of shallowly impressed punctures along anterior margin; ventrites 2 - 4 distinctly produced postero-laterad, ventrite 5 feebly produced antero-laterad.

Aedeagus (Figs. 27, 28, 51, 52): Long and slender; fibula and corona absent; ventral sac well-developed in the apical half of the penis; ejaculatory duct with distinct sclerotizations; parameres short and thin, basally covered with numerous, very short spines; phallobasis short and cylindrical.

Ovipositor (Figs. 26, 50): Terminal segment short and curved. Preterminal segment rather short; apico-lateral angle strongly produced laterad, with very short, blunt spines; distal sclerite approximately twice as long as proximal sclerite, mesally pubescent. Basal segment distinctly longer than preterminal segment.

**DIFFERENTIAL DIAGNOSIS:** A distinctive genus with 7-segmented antenna. However, the habitus, the plastron pattern and the peculiar distribution of the elytral carinae distinguish *Sinonychus* gen.n. from any other genus of Macronychini.

**DISTRIBUTION:** The genus is obviously confined to southeast China (Hong Kong, Guangxi, Hunan). Three species were collected by the CWBS.

**ETYMOLOGY:** Sino- (Latin, Chinese) and -nychus, referring to the type genus of the tribe (*Macronychus*).

*Sinonychus* gen.n. *lantau* sp.n.

TYPE LOCALITY: CWBS loc. 7.

TYPE MATERIAL: **Holotype** ♂ (NMW): "HONGKONG (6) 1992 Lantau Island 26.VI.leg. Jäch". **Paratypes** (NMW, CBB): 4 ♂♂ + 1 ♀, same data as holotype.

**DIAGNOSIS:** Length (pronotum + elytra), ca. 1.1 mm; width, ca. 0.6 mm.

Bicoloured; ground colour black or dark brown; labrum, mouthparts, antennae, pronotum (entirely or partly), elytra (except tomentose areas), knees and tarsi (including claws) usually paler honey-coloured.

Frons and tomentose areas of pronotum finely granulate.

Pronotal disc smooth and glabrous or superficially microreticulate; lateral margin of pronotum usually more distinctly reticulate; sublateral carina distinct, sharply ridged medially.

Scutellum impunctate. Elytral striae 1 - 4 straight, punctures large, moderately deeply impressed, separated by less than puncture diameter; intervals flat, glabrous or superficially reticulate; elytral intervals 5, 6 and 7 with carinae; carina of fifth interval slightly surpassing elytral middle; carinae of intervals 6 and 7 almost reaching elytral apex; carinae not parallel, carina of interval 6 approaching fifth interval in apical two thirds.

Ventral surface distinctly microreticulate. Fifth ventrite with a short, median, longitudinal carina.

Aedeagus (Figs. 27, 28): Penis about four times as long as phallobasis.

Ovipositor as in Fig. 26.

Variability: The colouration pattern (especially on the pronotum) and the surface structure is moderately variable.

**DISTRIBUTION:** Known only from the type locality.

**ETYMOLOGY:** The epithet refers to the type locality (Lantau Island).

*Indosolus* BOLLOW stat.n.

TYPE SPECIES: *Esolus* (*Indosolus*) *nitidus* BOLLOW, 1940

**DIAGNOSIS:** Habitus (Fig. 67). Antenna (Fig. 31) eight-segmented, segments 3 - 7 small, last segment large and elongate; mandible (Fig. 30) with 2 apical teeth, antero-lateral margin deeply excised, prosthema large and apically densely spinose; maxillary palpi moderately long, four-segmented, last segment relatively long and slender, palpifer well-developed, galea two-segmented, basal segment short and thin, apical segment distinctly longer and wider than basal segment, apically setose; labium (Fig. 29), labial palpus two-segmented, ligula wide, umbrella-shaped. Pronotal front angles strongly produced and acute. Elytral intervals 5, 6 and 7 carinate; carina on sixth interval distinctly shorter than those on intervals 5 and 7; elytral plastron restricted to area between lateral margin and seventh interval. Hind wing (Fig. 32); cubito-anal crossvein absent; anal veins reduced, second anal vein not distinctly connected with third anal vein, second anal vein with only two short branches.

Aedeagus (Figs. 34, 35): Long and slender; fibula and corona absent; ventral sac developed in apical half of the penis; ejaculatory duct laterally bordered by a sclerotized band, sclerotizations of ejaculatory duct consisting of small spines; parameres obviously absent; phallobasis short, cylindrical.

Ovipositor (Fig. 33): Terminal segment moderately long, slender, almost straight. Preterminal segment long and slender; apico-lateral angle with blunt spines; distal sclerite distinctly longer than proximal sclerite, mesally pubescent. Basal segment ca. twice as long as preterminal.

**DIFFERENTIAL DIAGNOSIS:** *Indosolus* is similar to *Zaitzevia* and *Zaitzeviaria*. It differs from *Zaitzevia*, among other characters, in the general appearance, in the 2-segmented labial palpi and in the male and female genitalia. It can be distinguished from *Zaitzeviaria* by the elytral carinae and the labial palpi.

**DISTRIBUTION:** North India to China and Malaysia. Numerous Chinese species, including the type species, were collected by the CWBS.

### ***Macronychus* MÜLLER**

**TYPE SPECIES:** *Macronychus quadrituberculatus* Ph.MÜLLER, 1806

**DIAGNOSIS:** Habitus (Fig. 66). This genus is easily distinguished from the remaining genera of the tribe by the 7-segmented antenna in combination with the habitus and the elytral carinae. Ninth elytral interval always strongly carinate; elytral intervals 3, 5 and 7 sometimes more strongly elevated than neighbouring ones, but never carinate as interval 9; third interval frequently tuberculate in anterior third; elytral plastron restricted to area between lateral margin and sublateral carina (ninth interval). Aedeagus obviously without parameres. Apico-lateral angle of preterminal segment of ovipositor dilated.

**DISTRIBUTION:** North India to China, Russian Far East and Vietnam; Europe, U.S.A.

### ***Paramacronychus* NOMURA**

**TYPE SPECIES:** *Paramacronychus granulatus* NOMURA, 1958

**DIAGNOSIS:** Habitus (Fig. 62). Obviously very closely related to *Zaitzevia* of which it might even be a synonym, *Paramacronychus granulatus* differs from *Zaitzevia* only in the presence of widely spaced granules on the pronotal disc, and in the third elytral interval bearing a row of granules. Elytral plastron restricted to area between lateral margin and seventh interval. Genitalia as in *Zaitzevia*.

**DISTRIBUTION:** Known only from Japan.

### ***Urumaelmis* SATÔ**

**TYPE SPECIES:** *Zaitzevia uenoi* NOMURA, 1961

**DIAGNOSIS:** Habitus (Fig. 60). Related with *Zaitzevia*, but differing from the latter in a number of characters. Pronotum smooth and glabrous; impressions very faint; anterior angles strongly produced. Elytral punctures effaced; fifth elytral interval strongly carinate, sixth interval raised only anteriorly, remaining sublateral carinae lacking. Profemur clavate. Aedeagus as figured by SATÔ (1965), parameres almost completely fused to penis, without apical setae; ventral sac without teeth.

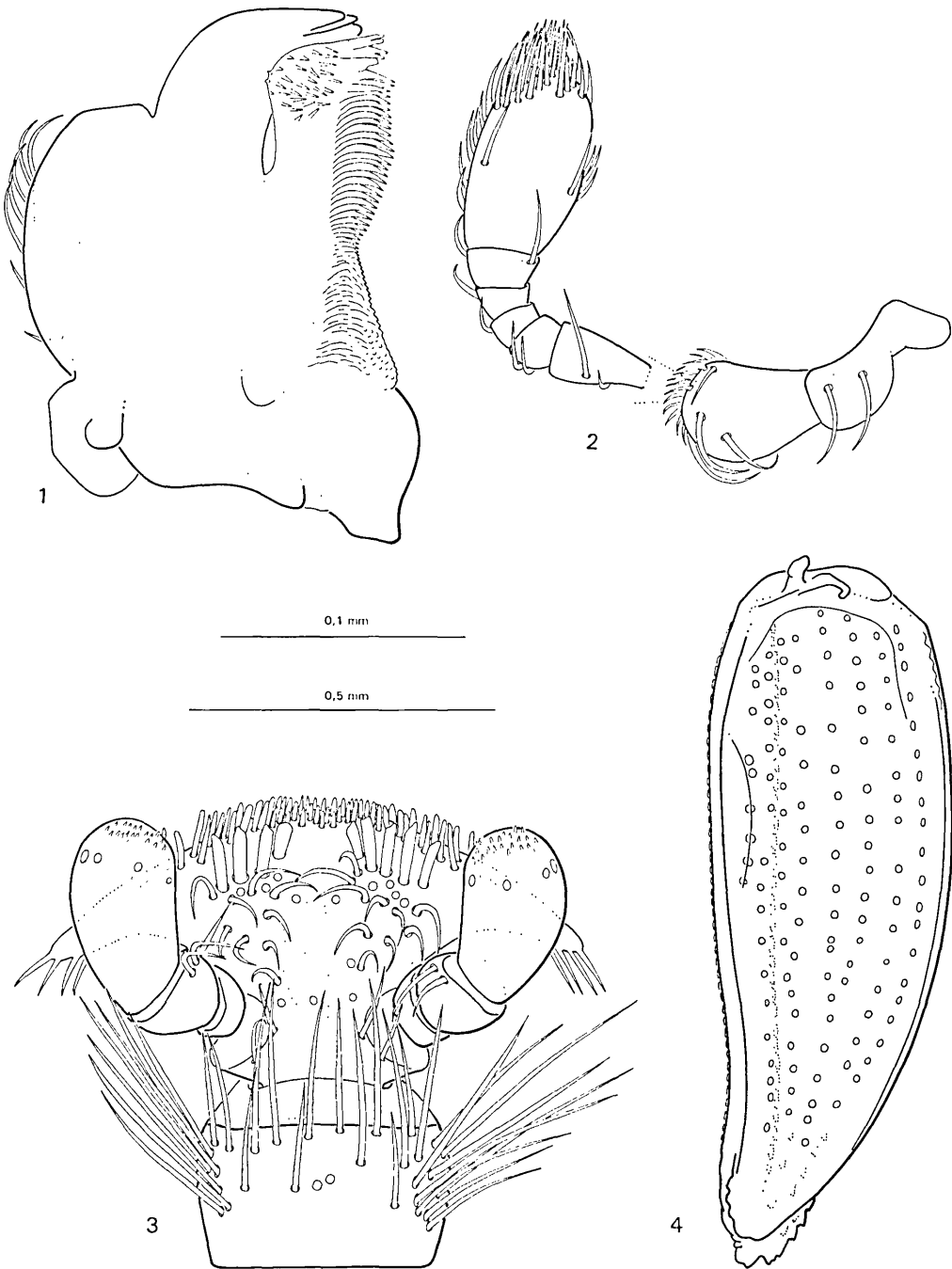
**DISTRIBUTION:** Known only from Japan.

### ***Vietelmis* DELEVE**

**TYPE SPECIES:** *Vietelmis brevicornis* DELEVE, 1968

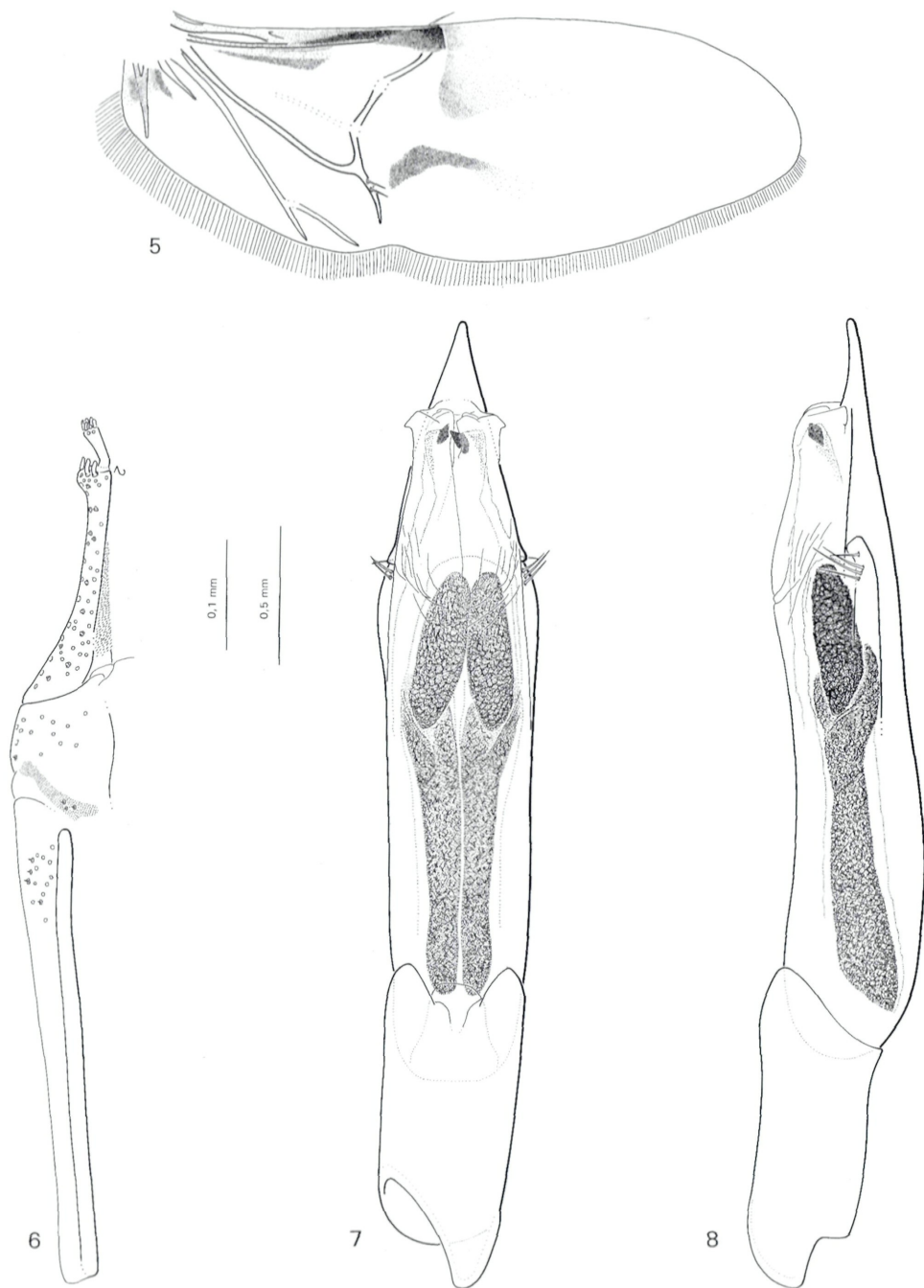
**DIAGNOSIS:** Habitus (Fig. 65). Antenna 10-segmented. Median groove of pronotum rather wide. Elytral carinae on intervals 5 and 7 always distinct; eighth interval carinate in 2 of the 3 species examined by us; third interval slightly convex in anterior third. Parameral apices distinctly separated from the penis.

**DISTRIBUTION:** Vietnam, southeast China, Borneo.

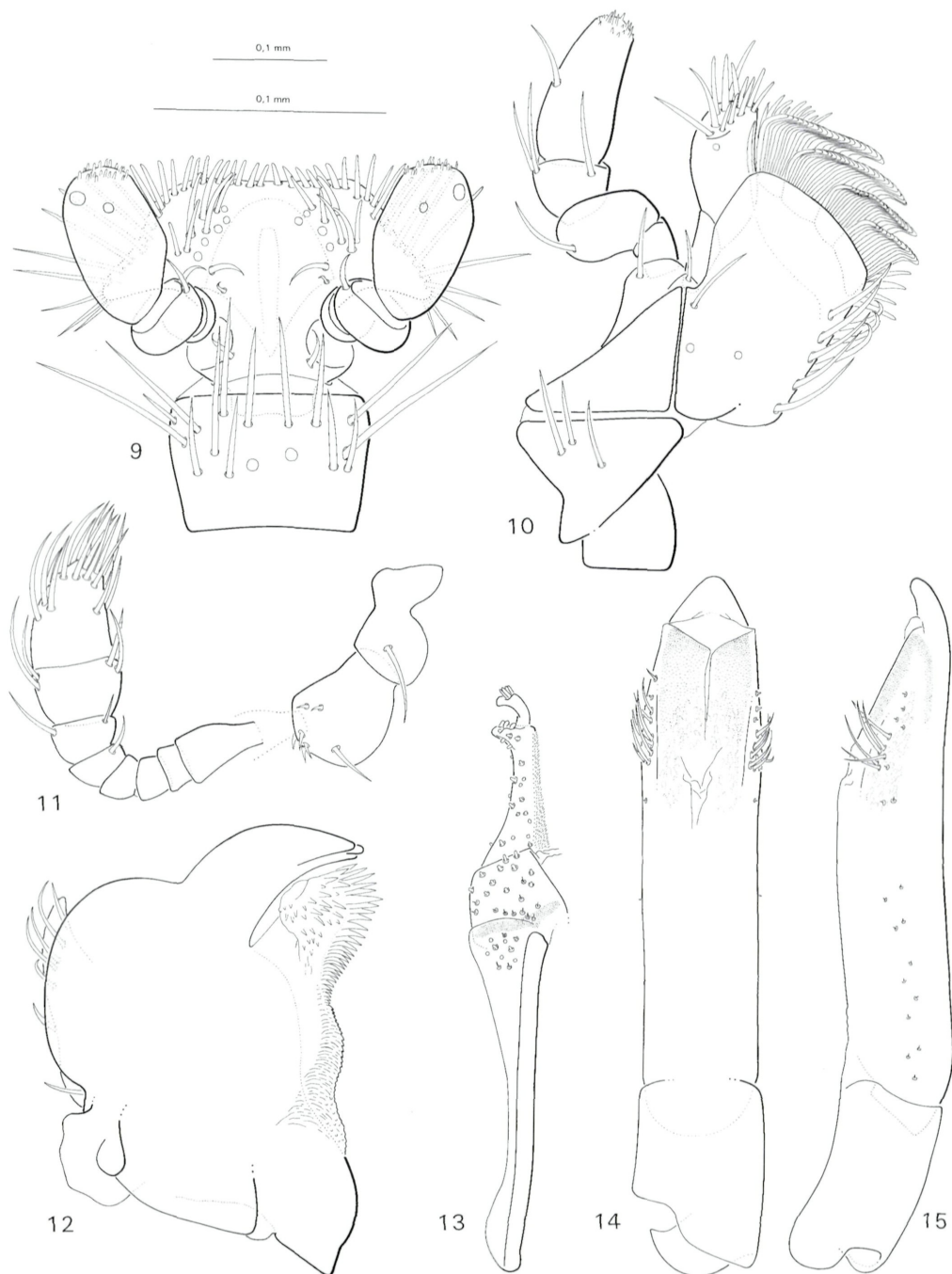


Figs. 1 - 4: *Cuspidevia velaris* sp.n., 1) mandible, 2) antenna, 3) labium, 4) clytron, ventral aspect. Short scale = Figs. 1-3, long scale = Fig. 4.

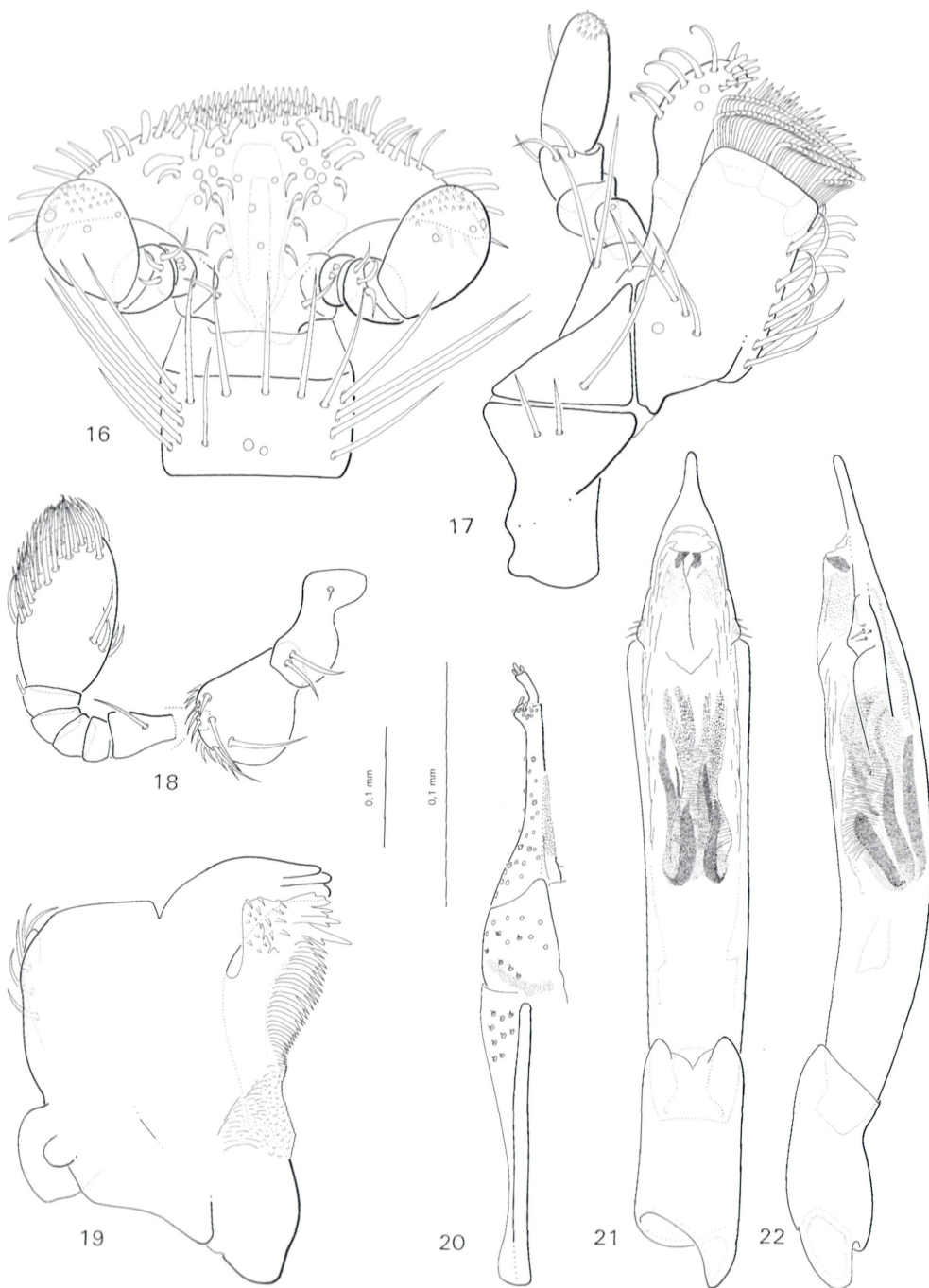




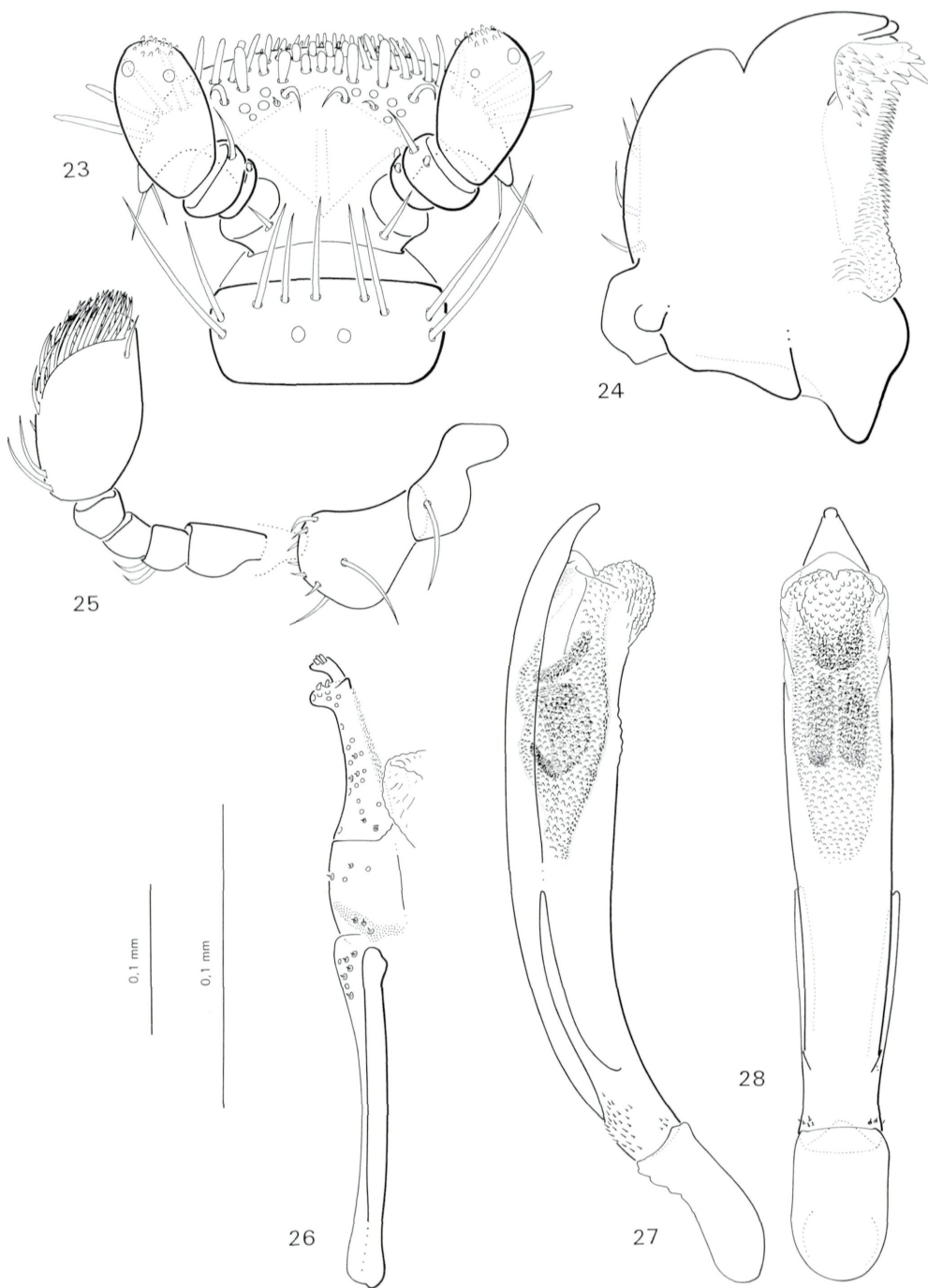
Figs. 5 - 8: *Cuspidevia velaris* sp.n., 5) metathoracic wing, 6) ovipositor, 7) aedeagus, ventral aspect, 8) same, lateral aspect. Long scale = Fig. 5, short scale = Figs. 6 - 8.



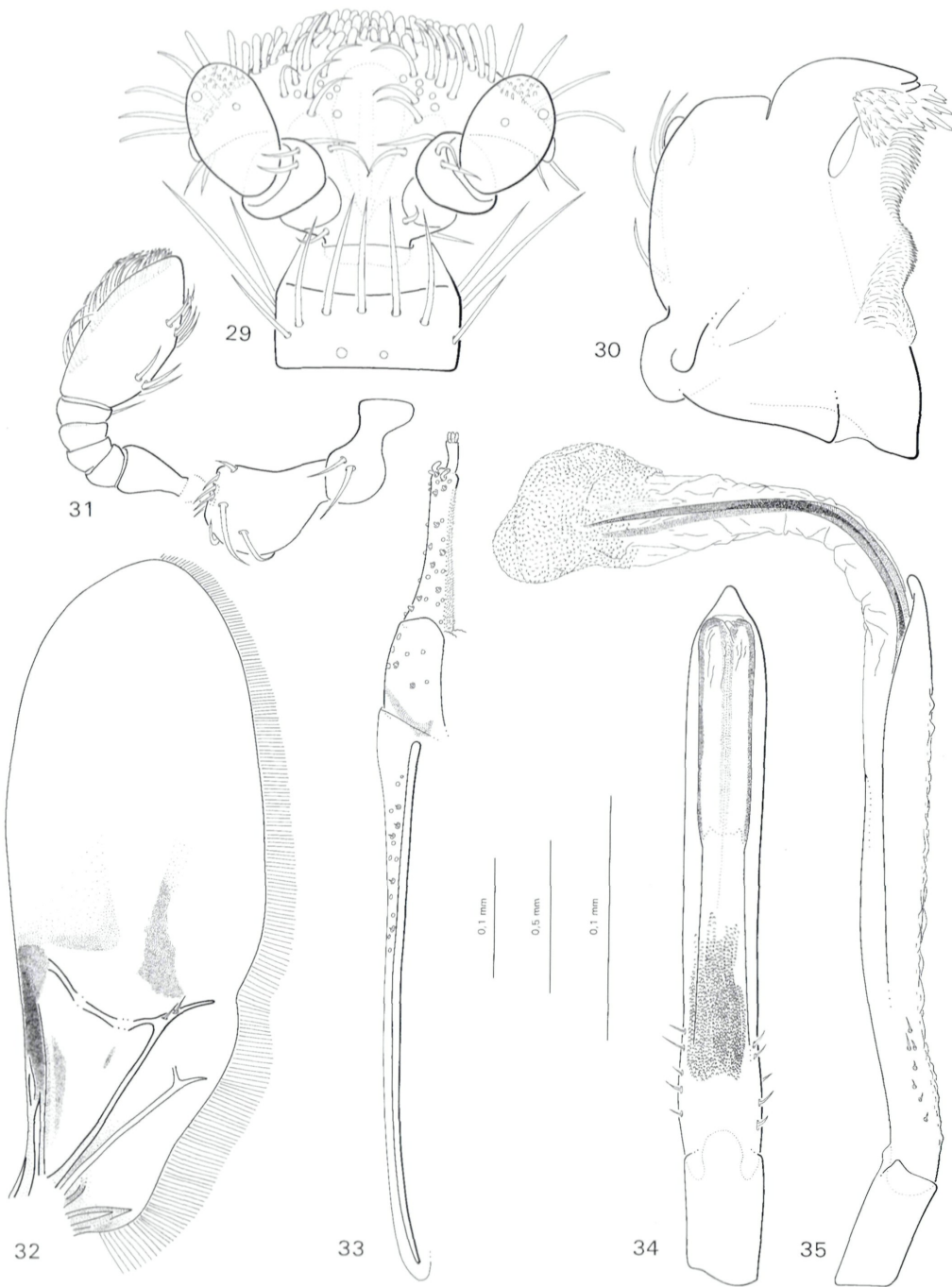
Figs. 9 - 15: *Eonychus dudgeoni* sp.n., 9) labium, 10) maxilla, 11) antenna, 12) mandible, 13) ovipositor, 14) aedeagus, ventral aspect, 15) same, lateral aspect. Long scale = Figs. 9 - 12, short scale = Figs. 13 - 15.



Figs. 16 - 22: *Jilanzhunchus costatus* sp.n., 16) labium, 17) maxilla, 18) antenna, 19) mandible, 20) ovipositor, 21) aedeagus, ventral aspect, 22) same, lateral aspect. Long scale = Figs. 16 - 19, short scale = Figs. 20 - 22.

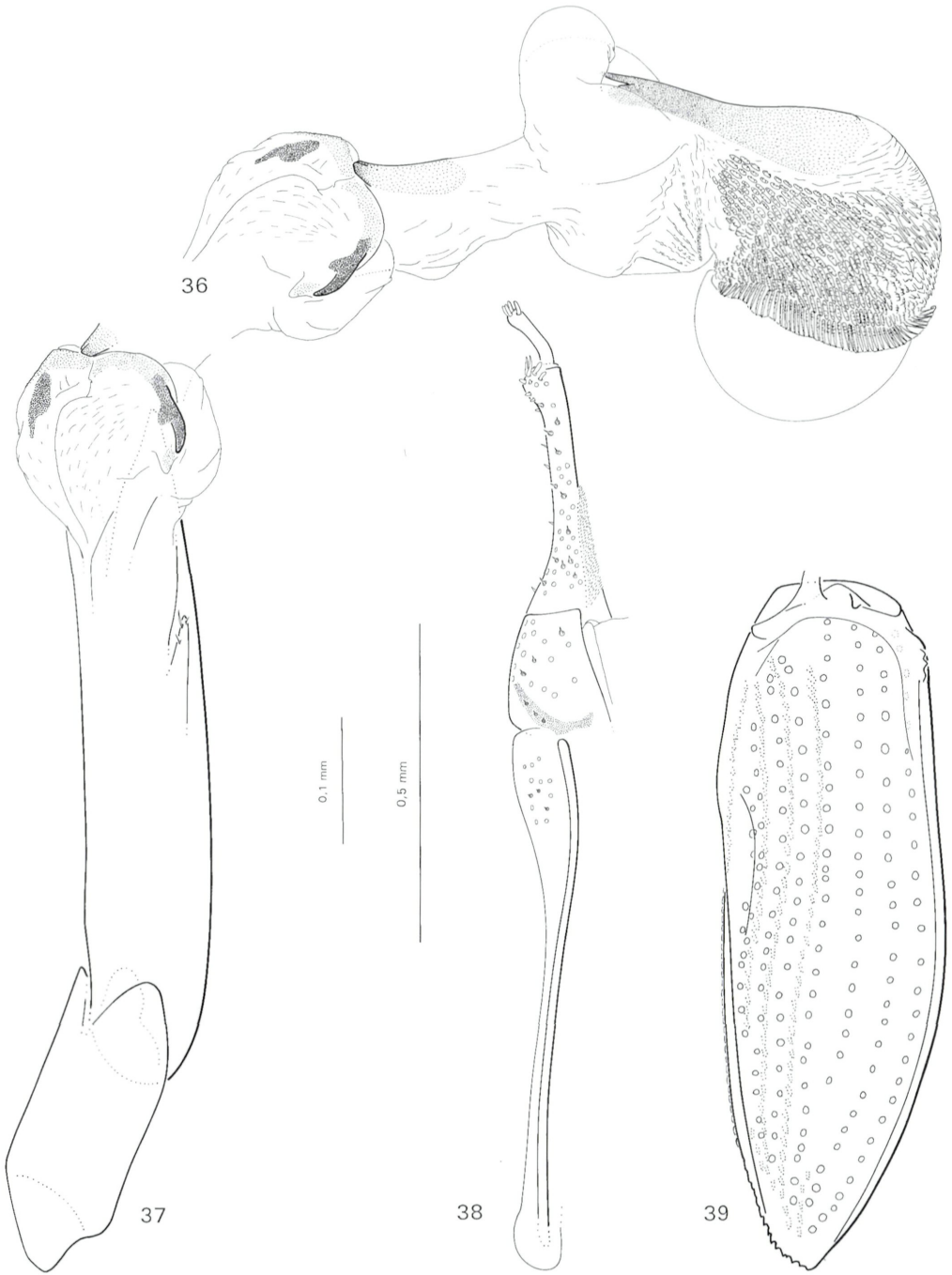


Figs. 23 - 28: *Sinonychus lantau* sp.n., 23) labium, 24) mandible, 25) antenna, 26) ovipositor, 27) aedeagus, lateral aspect, 28) same, ventral aspect. Long scale = Figs. 23 - 25, short scale = Figs. 26 - 28.



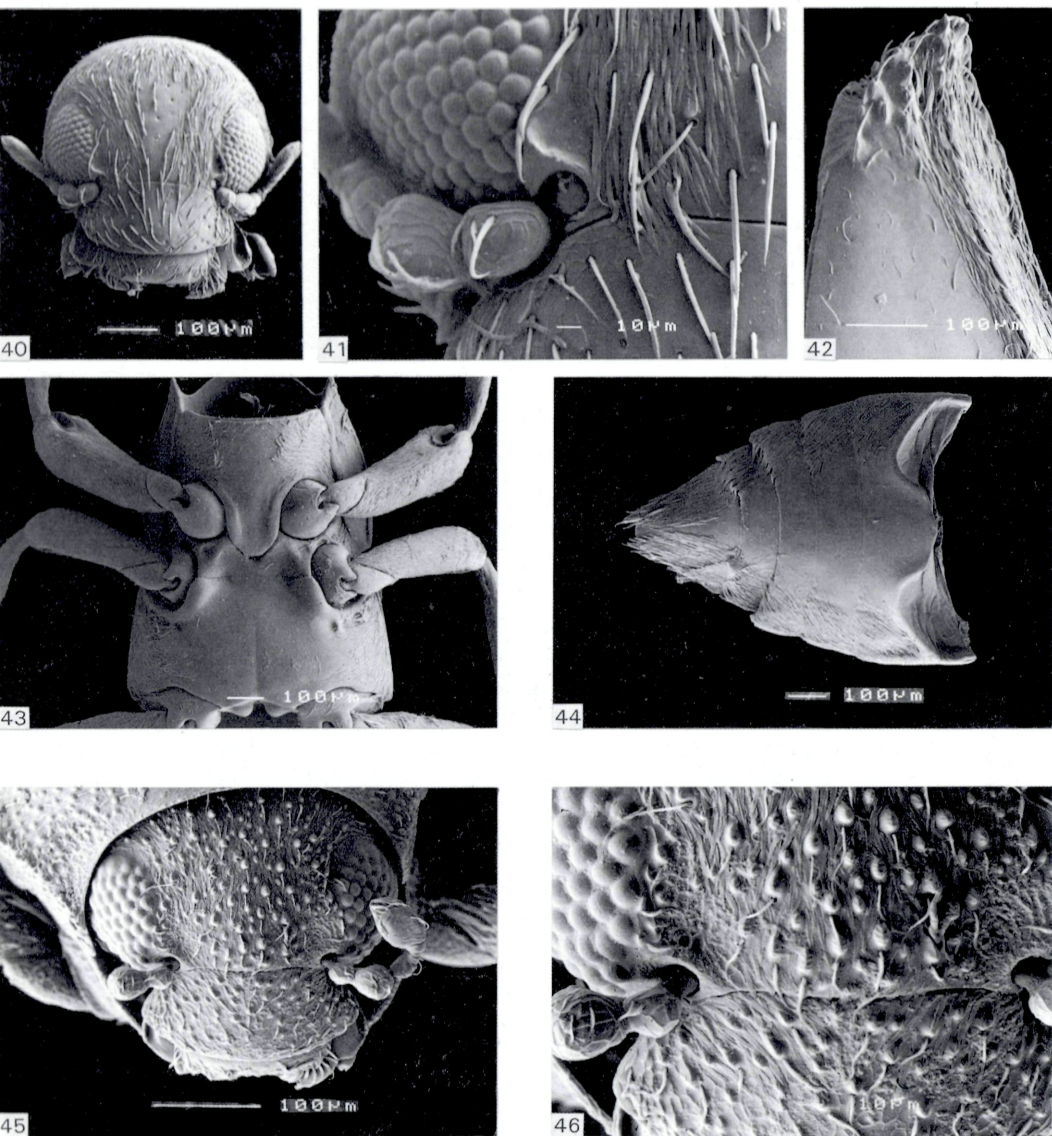
Figs. 29 - 35: *Indosolus nitidus*, 29) labium, 30) mandible, 31) antenna, 32) metathoracic wing, 33) ovipositor, 34) aedeagus, ventral aspect, 35) aedeagus with endophallus extended, lateral aspect. Long scale = Figs. 29 - 31, intermediate scale = Fig. 32, short scale = Figs. 33 - 35.





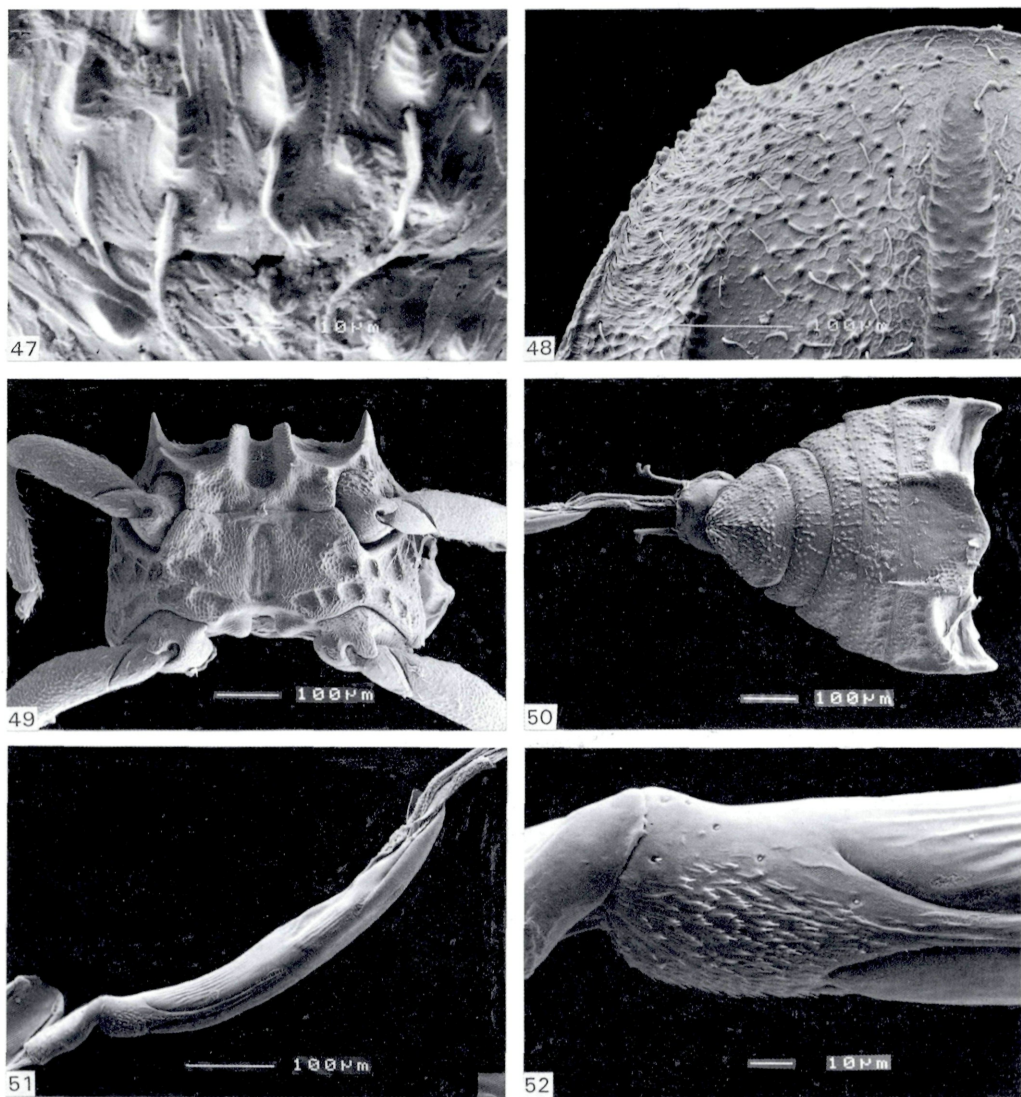
Figs. 36 - 37: *Zaitzevia* sp. from Hunan, 36) endophallus, extended, 37) aedeagus with basal part of extended endophallus, ventrolateral aspect.

Figs. 38 - 39: *Zaitzevia nitida* from Japan, 38) ovipositor, 39) elytron, ventral aspect. Long scale = Figs. 36 - 37, 39, short scale = Fig. 38.



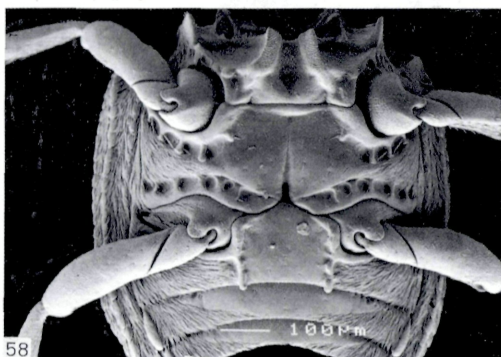
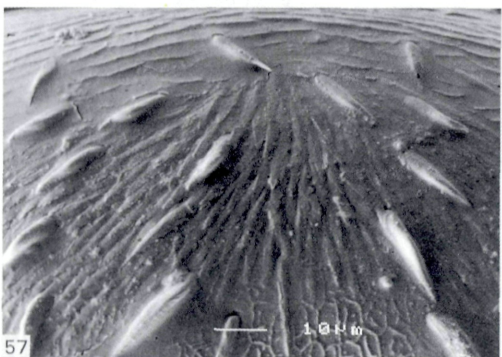
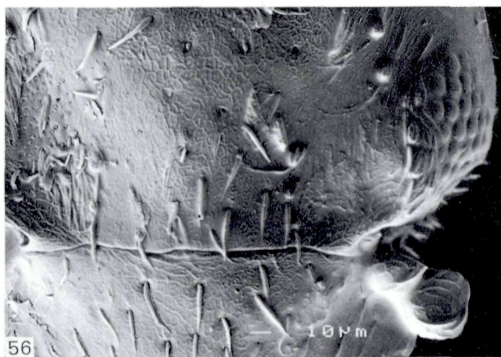
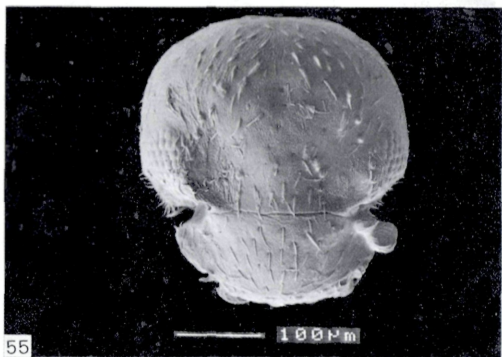
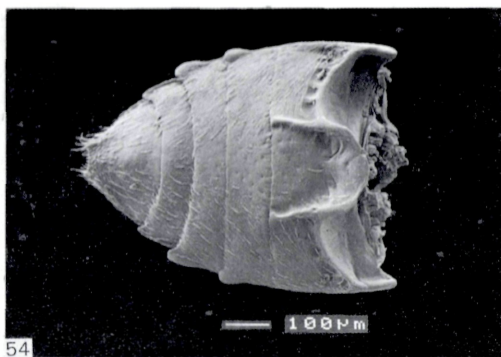
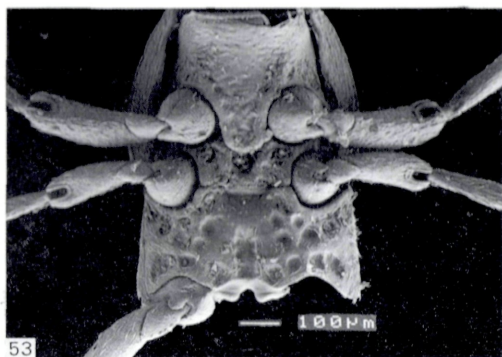
Figs. 40 - 44: Scanning electron photographs of *Zaitzevia velaris* sp.n. from Guangxi, 40) head, dorsal aspect, 41) same, enlarged, 42) elytral apex, 43) thorax, ventral aspect, 44) abdomen, ventral aspect.

Figs. 45 - 46: Scanning electron photographs of *Sinonychus* sp. (undescribed species from Guangxi), 45) head, dorsal aspect, 46) same, enlarged.



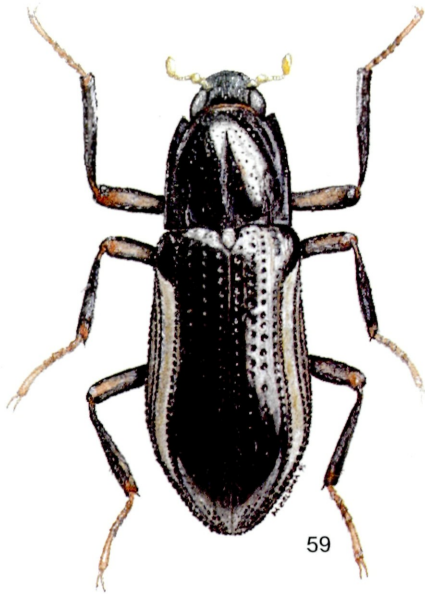
Figs. 47 - 52: Scanning electron photographs of *Sinonychus* sp. (undescribed species from Guangxi), 47) area of fronto-clypeal suture, 48) pronotum, 49) meso- and metasternum, 50) female abdomen, in copula, 51) aedeagus, lateral view, 52) same, basis of paramera, enlarged.



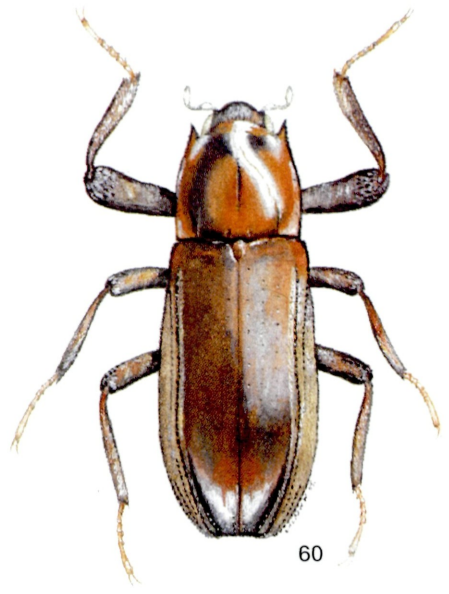


Figs. 53 - 54: Scanning electron photographs of *Eonychus dudgeoni* sp.n., paratype, 53) thorax, ventral aspect, 54) abdomen, ventral aspect.

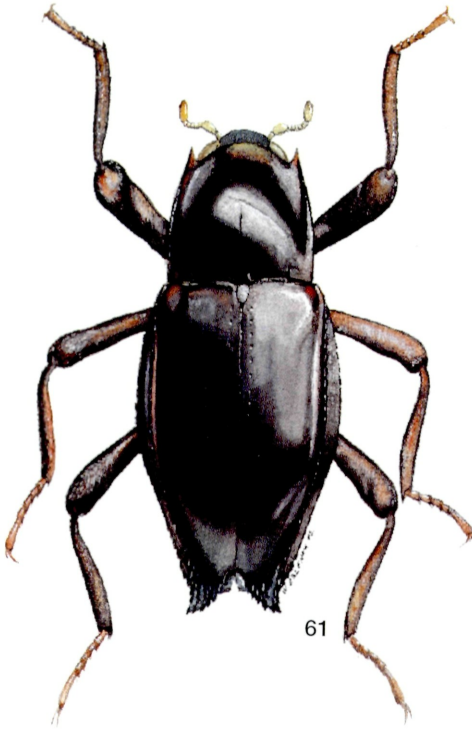
Figs. 55 - 58: Scanning electron photographs of *Jilanzhunyichus costatus* sp.n., paratype, 55) head, dorsal view, 56) same, area of fronto-clypeal suture, enlarged, 57) same, vertex, enlarged, 58) meso- and metasternum and basis of abdomen, ventral view.



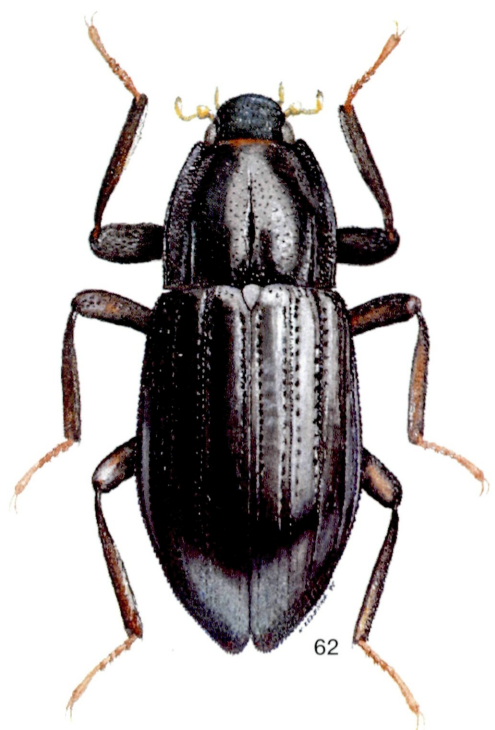
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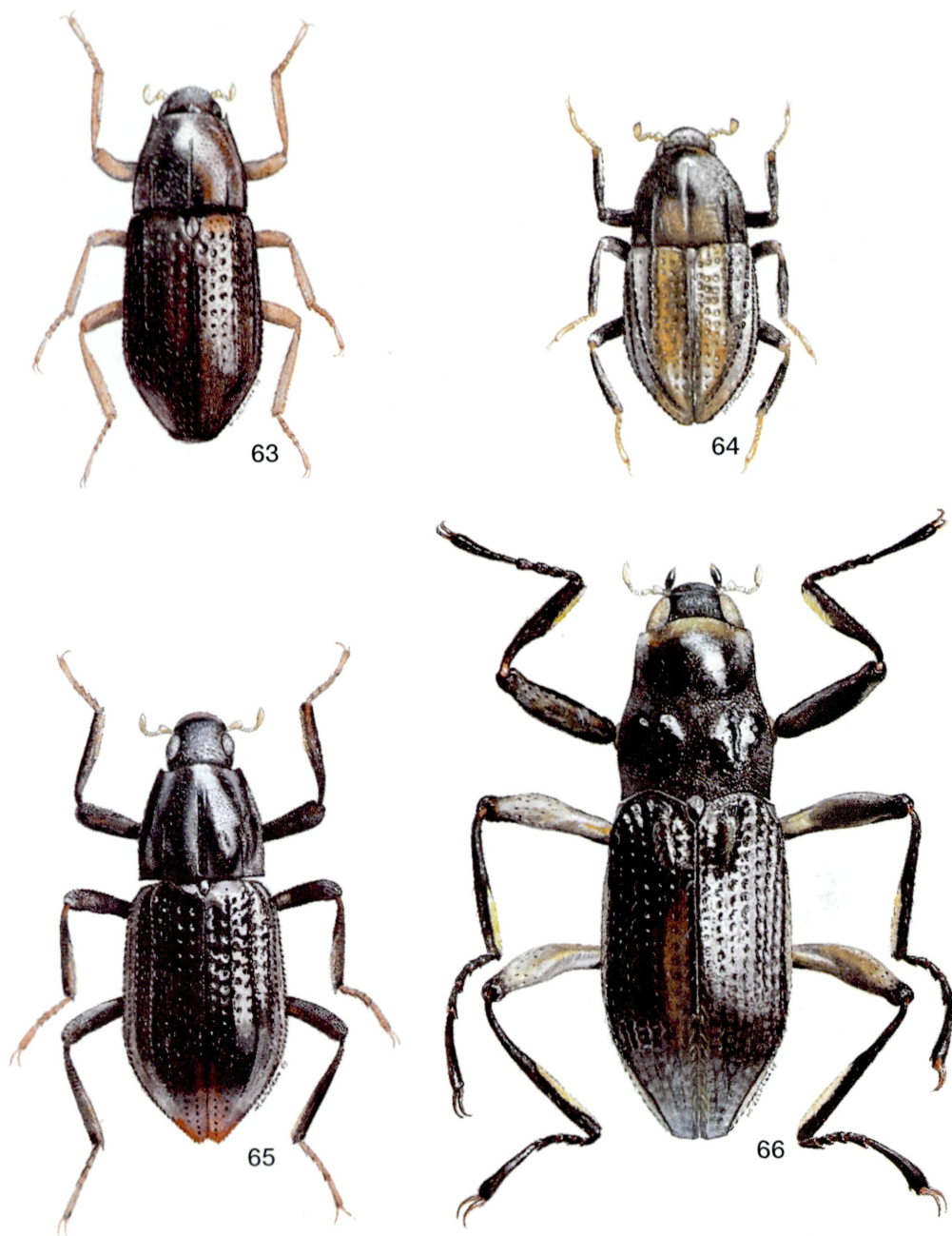


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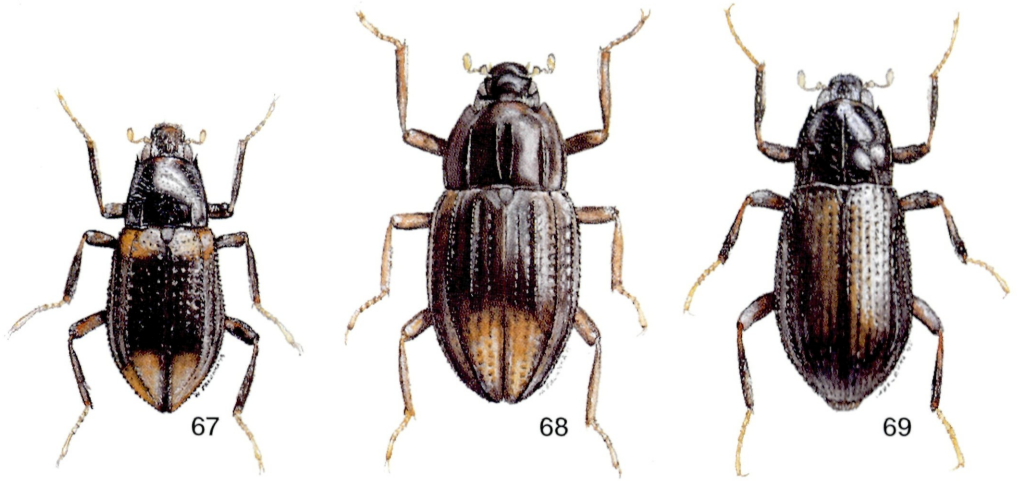
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Figs. 59 - 62: Habitus of 59) *Zaitzevia* sp. (Jilin), 60) *Urumaelmis uenoi tokarana* SATÔ, paratype, 61) *Cuspidevia velaris* sp.n. (Guangxi), 62) *Paramacronychus granulatus* (Japan).



Figs. 63 - 66: Habitus of 63) *Eonychus dudgeoni* sp.n., 64) *Sinonychus lantau* sp.n., 65) *Vietelmis* sp. (Hunan), 66) *Macronychus quadrituberculatus*.





Figs. 67 - 69: Habitus of 67) *Indosolus* sp. (Hong Kong), 68) *Jilanzhunychus costatus* sp.n., 69) *Zaitzeviaria brevis*.

### *Zaitzevia* CHAMPION (= *Awadoronus* KÔNO)

TYPE SPECIES: *Zaitzevia solidicornis* CHAMPION, 1923

DIAGNOSIS: Habitus (Fig. 59). Antenna 8-segmented. Elytral carinae on intervals 5, 7 and 8 or (if stria 5 and 6 completely fused) on intervals 5, 6 and 7 (Fig. 39); elytral plastron usually restricted to area between lateral margin and fifth (or sixth or seventh) interval. Aedeagus (Figs. 36, 37): parameres either fused to penis and reduced to apices, or thin and discernible; apically without setae or with one or two inconspicuous setae but never with a group of setae as in *Cuspidevia* gen.n.; teeth of ventral sac not always present. Ovipositor (Fig. 38): Apico-lateral angle of preterminal segment dilated.

DISTRIBUTION: North India to China, Japan, Russian Far East and North America. Numerous undescribed species, including several Chinese species, are deposited in the NMW.

### *Zaitzeviaria* NOMURA

TYPE SPECIES: *Zaitzevia brevis* NOMURA, 1958

DIAGNOSIS: Habitus (Fig. 69). Very diverse genus which needing re-definition. Antenna 8-segmented. Elytral carinae on intervals 7 and 8; elytral plastron restricted to area between lateral margin and seventh interval.

DISTRIBUTION: Widely distributed in the eastern Palearctic and the Oriental region.

### Acknowledgements

We wish to thank E. de Boise (BML) for sending a syntype of *Zaitzevia solidicornis*, and P. Lindskog (NRS) for sending the holotype of *Indosolus nitidus*. Special thanks are due to D. Dudgeon for donating his specimens of *Cuspidevia velaris* and *Eonychus dudgeoni* to the NMW. Furthermore, we are indebted to W. Zelenka for the habitus illustrations, to P. Sehnal, F.B. Brandstetter for the SEM photographs, and to J.F. Kodada and W.D. Shepard for critical reading of the manuscript.

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