


## Description of a new subgenus of *Trichotichnus* (Coleoptera: Carabidae), with two new species from the Western Ghats (India), and remarks on other subgenera

## Описание нового подрода *Trichotichnus* (Coleoptera: Carabidae) с двумя новыми видами из Западных Гат (Индия) и замечания по другим подродам

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**Abstract.** Within *Trichotichnus* Morawitz, 1863, the new subgenus *Parairidessus* subgen. nov. is described, which includes two new species from the Western Ghats in India: *T. saluki* sp. nov. (type species) from Western Karnataka and *T. perforatus* sp. nov. from Maharashtra. Each of the species has distinctive features unusual for *Trichotichnus*: several setae in pronotal apical angles and tarsi densely setose dorsally in *T. saluki* sp. nov., and median lobe with membranous ventral side in *T. perforatus* sp. nov. The other subgenera of *Trichotichnus* (*Iridessus* Bates, 1883, *Trichotichnus* s. str., *Amaroschesis* Tschitschérine, 1897, and *Bottchrus* Jedlička, 1935) are briefly reviewed and their distinctive features are clarified. *Harpalus relucens* Bates, 1973 [= *T. orientalis* (Hope, 1845)] is considered as a type species of *Iridessus* Bates, 1883, which was originally designated by Tschitschérine in 1906; the more recent designation of *Harpalus lucidus* Morawitz, 1863 as the type species of this subgenus by Habu in 1954 is invalid. The systematic position of the Himalayan species *T. tonklii* Kirschenhofer, 1992 and the two North American species, *T. autumnalis* (Say, 1823) and *T. nitidulus* (Chaudoir, 1843) nom. resurr., is discussed. *Harpalus fulgens* Csiki, 1932 (non Dejean, 1829) is considered as an unnecessary substitute name for *Harpalus nitidulus* Chaudoir, 1843. A key to subgenera of *Trichotichnus* is provided.

**Резюме.** В роде *Trichotichnus* Morawitz, 1863 описан новый подрод *Parairidessus* subgen. nov., который включает два новых вида из Западных Гат (Индия): *T. saluki* sp. nov. (типовой вид) из западной Карнатаки и *T. perforatus* sp. nov. из Махараштры. Каждый из этих видов обладает специфическими особенностями, необычными для *Trichotichnus*: *T. saluki* sp. nov. несет несколько щетинок в передних углах переднеспинки и многочисленные щетинки на дорсальной поверхности лапок, а *T. perforatus* sp. nov. характеризуется своеобразным эдегусом с мембранозной вентральной стенкой. Приводится краткий обзор других подродов *Trichotichnus* (*Iridessus* Bates, 1883, *Trichotichnus* s. str., *Amaroschesis* Tschitschérine, 1897, and *Bottchrus* Jedlička, 1935) с уточнением их диагностических признаков. В качестве типового вида *Iridessus* Bates, 1883 принимается *Harpalus relucens* Bates, 1973 [= *T. orientalis* (Hope, 1845)], который был обозначен Чичериным (Tschitschérine) в 1906 году; более позднее обозначение Хабу (Habu) в 1954 году *Harpalus lucidus* Morawitz, 1863 в качестве типового вида невалидно. Обсуждается систематическое положение гималайского вида *T. tonklii* Kirschenhofer, 1992 и двух североамериканских видов, *T. autumnalis* (Say, 1823) и *T. nitidulus* (Chaudoir, 1843), nom. resurr. *Harpalus fulgens* Csiki, 1932 (non Dejean, 1829) рассматривается как неоправданное замещающее название для *Harpalus nitidulus* Chaudoir, 1843. Предложен ключ для определения подродов *Trichotichnus*.

**Key words:** ground beetles, key to subgenera, Carabidae, Harpalina, *Trichotichnus*, *Iridessus*, *Amaroschesis*, *Bottchrus*, new subgenus, new species

**Ключевые слова:** жуки-жужелицы, ключ к под родам, Carabidae, Harpalina, *Trichotichnus*, *Iridessus*, *Amaroschesis*, *Bottchrus*, новый под род, новый вид

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## Introduction

*Trichotichnus* Morawitz, 1863 is a rather diverse genus of Harpalina, with more than 260 species distributed mostly in East and Southeast Asia. Several species occur in the Australian region, Central Europe, Eastern North America and one species in East Africa (Ethiopia). Almost 60 percent of the species have been described in the last three decades and apparently more species will be described in the future. Kataev & Wrase (2017) consider this genus as including four subgenera (*Iridessus* Bates, 1883, *Trichotichnus* s. str., *Amaroschesis* Tschitschérine, 1897, and *Bottchrus* Jedlička, 1935), but taxonomy of *Trichotichnus* is still poorly developed. Some recent authors (for example, Noonan, 1985; Lorenz, 2005) include also *Lyter* Darlington, 1968, *Harpaloxenus* Schauburger, 1933, and *Lampetes* Andrewes, 1940 in this genus, however these taxa differ markedly from it in the shape and setation of the ligular sclerite, as well as in some other features, and seem to warrant each the generic rank. The systematic position of some species of *Trichotichnus* from New Guinea and Australia also needs clarification. On the other hand, the predominantly Mexican genus *Aztecarpalus* Ball, 1970 may be included in *Trichotichnus* as a subgenus since the distinctive features of the both are very similar. In its morphology, *Aztecarpalus* is most similar to *Iridessus* Bates, 1883, differing from it mainly in the elytra with continuous elytral marginal umbilicate series and distinct elongate convexity along the lateral groove apically; this convexity forms additional short interval and additional short stria at apex of elytron as described by Kataev (1999). A similar convexity is present in some *Amaroschesis* Tschitschérine, 1897 and *Bottchrus* Jedlička, 1935, and also being one of the distinctive features of some related genera, for example, *Selenotichnus* Kataev, 1999. However, unlike *Trichotichnus*, some members of *Aztecarpalus* demonstrate such character

as isodiametric elytral microsculpture, which allows retaining the genus status for this taxon.

The purpose of this paper is to describe a new subgenus of *Trichotichnus* and its two new species from the Western Ghats in India. This contribution also includes a brief review of the other subgenera, with special attention to the morphological characteristics and composition of the subgenus *Iridessus*.

## Material and methods

The following abbreviations are used for the depositories of the specimens examined (the names of the curators of the museum and institute collections are in brackets): FMNH, Field Museum of Natural History, Chicago, USA. (A.F. Newton and M.K. Thayer); MNHN, Muséum national d'Histoire naturelle, Paris, France (Th. Deuve and A. Taghavian); NHMB, Naturhistorisches Museum Basel, Switzerland (E. Sprecher); NHMW, Naturhistorisches Museum Vienna, Austria (H. Schillhammer); NMNHS, National Museum of Natural History, Sofia, Bulgaria (B. Guéorguiev); SMNS, Staatliches Museum für Naturkunde, Stuttgart, Germany (W. Schawaller and A. Faille); UASM, Strickland Museum, Department of Biological Sciences, University of Alberta, Canada (late G.E. Ball, and D. Shpeley); ZIN, Zoological Institute, Russian Academy of Sciences, Saint Petersburg, Russia (B.M. Kataev); ZMUC, Zoological Museum, University of Copenhagen, Denmark (A.Yu. Solodovnikov); cWR, collection of D.W. Wrase, Gusow-Platkow (part of Zoologische Staatssammlung München), Germany; cJS, collection of J. Schmidt, Rostock, Germany.

Measurements were taken as follows: body length measured from the anterior margin of the clypeus to the elytral apex; maximum width of head (HWmax), measured as the maximum linear distance across the head, including the com-

pound eyes; minimum width of head (HWmin), measured as the minimum linear distance across the head, which in this case corresponds to the neck constriction just behind the eyes; length of pronotum (PL), measured along its median line; length of elytra (EL), measured from the basal border near scutellum to the apex of the sutural angle; maximum width of pronotum (PWmax) and elytra (EW), both measured at their broadest points; minimum width of pronotum (PWmin), measured at its narrowest point near the hind angles; length and width of metepisterna, measured along their inner and anterior margins, respectively. Measurements were made under a LOMO MBS-10 stereomicroscope using an ocular micrometer. Male and female genitalia were examined in glycerin and then embedded in euparal.

Drawings were prepared by using an ocular grid (10×10 squares) attached to the above mentioned stereomicroscope. Habitus photographs were taken with a Canon EOS 6 D camera with a Canon MP-E 65 mm lens, and subsequently processed using the Helicon Focus 7.2 software and optimised with Photoshop® CS2.

Nomenclature of female genitalia follows Deuve (1993): laterotergite (= hemisternite), gonosubcoxite (= basal stylomere), and gonocoxite (= apical stylomere).

In label data, a single slash mark (/) indicates the end of each line of text label, and a double slash mark (//) separates labels.

## Taxonomy

Order **Coleoptera**

Family **Carabidae**

Tribe **Harpalini**

Subtribe **Harpalina**

Genus ***Trichotichnus*** Morawitz, 1863

*Diagnosis.* Head in most members with fronto-ocular furrows (in some species indistinct or only traces visible). Mentum fused or not fused with submentum, with developed median tooth and narrow epilobes. Paraglossae glabrous. Ligular sclerite with two ventral setae near apex, its apical margin more or less straight and outer angles not markedly lobed. Pronotum bordered

along apical and basal margins; basal edge not ciliate. Elytra glabrous (with at most very fine and sparse setae on lateral intervals apically), smooth or punctate, in most species with one discal setigerous pore on interval 3; intervals 5 and 7 without discal pores. Elytral intervals smooth or with microsculpture consisting of transverse meshes or lines. Protibia only slightly widened apically, its outer margin with one to four (usually two or three) preapical spines; apical spur slender, not dentate at margins. Metafemur with two (rarely three) setigerous pores at posterior margin. Tarsi glabrous or setose. Metatarsomere 1 elongate, about as long as or slightly shorter than metatarsomeres 2 and 3 combined. Male pro- and mesotarsi with ventral adhesive vestiture biseriate. Abdominal sternites mostly without extra setae, in some species with very fine and short setae medially. Laterotergite with one to five setae or small spines apically; gonosubcoxite with one to three preapical spines or setae; gonocoxite with or without one or two setae or small spines on ventral and dorsal outer edges. Median lobe of aedeagus with apical orifice in dorsal position or shifted to left, with or without apical capitulum.

Subgenus ***Parairidessus*** subgen. nov.

Type species: *Trichotichnus saluki* sp. nov.

*Diagnosis.* Fronto-ocular furrows deepened at clypeus, shallow posteriorly, reaching supra-orbital furrows. Fronto-clypeal suture superficial or slightly deepened. Ligular sclerite markedly narrowed apically, truncate at apex, with two ventral setae just at apical edge. Paraglossa moderately wide, rounded apically, separated from ligular sclerite by narrow notch (much narrower than paraglossa apically). Elytra with lateral groove flat throughout, without distinct elongate convexity along this groove apically. Elytral marginal umbilicate series without any gap at middle, consisting of 24–34 setigerous pores. Abdominal sternites glabrous, without extra setae. Last visible (VII) abdominal sternite with two pairs of marginal setigerous pores in both sexes.

*Etymology.* The subgenus name is a combination of the Greek *para* meaning “near”, and the name of the carabid taxon *Iridessus*.

*Composition.* The new subgenus includes two new species from the Western Ghats, India.



**Remarks.** In the combination of the distinctive characters, *Parairidessus* **subgen. nov.** is most similar to *Iridessus* but clearly differs in having the ligular sclerite markedly narrowed apically, the elytral marginal umbilicate series without gap at middle, and the body more convex and elongate, more similar to that of the members of *Trichotichnus* s. str. The new subgenus is also characterised by: dorsum, including head, pronotum and elytra, micropunctate or finely punctate, glabrous; genae narrow, eyes ventrally almost reaching buccal fissure; mentum and submentum fused; palpi with rather long dense setae; metepisternum markedly longer than wide, strongly narrowed posteriorly; protibia not sulcate dorsally; metafemur ventrally with two or three setae at posterior margin and without setae at anterior margin; gonocoxite basally with tiny, hardly recognizable spine at both ventral and dorsal outer edges or only on ventral edge; apical orifice of aedeagus in dorsal position, prolonged to basal bulb; terminal lamella thin, with acute ventral flange at apex; and inner sac with numerous small and moderately sized spines.

Each of the two included species has its own very peculiar distinctive features unusual for *Trichotichnus*. The median lobe of *T. perforatus* **sp. nov.** is sclerotised only laterally, leaving ventral side widely membranous. This character is unusual not only for *Trichotichnus* but also for most other Harpalini, being found only in *Dicheirotichus* Jacquelin du Val, 1857, some representatives of *Bradycellus* Erichson, 1837 (both these genera belong to the subtribe Stenolophina), and, according to Noonan (1973), present in one species of *Allocinopus* Broun, 1903 of the subtribe Anisodactylina (other species of this genus have the ventral side completely sclerotised). In *T. saluki* **sp. nov.**, the tarsi are densely setose on dorsal side and the pronotal apical angles have several distinct setae. In most *Trichotichnus*, tarsi and pronotal apical angles are glabrous; dense tarsal setation is present only in a few species, for example, *T.* (s. str.) *longitarsis* Morawitz, 1863, while sparse and short setae are observed in some species of *Iridessus*, *Bottchrus* and *Amaroschesis*. In *T. perforatus* **sp. nov.**, the tarsi are glabrous dorsally; the setae in pronotal apical angles are present, but much shorter and vary considerably in length up to nearly indistinct in some specimens. Similar extremely short setae

are present in some other species of *Trichotichnus* unrelated to each other, for example, *T.* (s. str.) *coruscus* (Tschitschérine, 1895), *T.* (*Iridessus*) *szekessyi* (Jedlička, 1954), *T.* (*I.*) *parvus* Ito, 2001, some *Bottchrus*, and also in many other Harpalini, for example, some *Lampetes* Andrewes, 1940, *Dioryche* MacLeay, 1825, *Parophonus* Ganglbauer, 1892, and even *Stenolophus* Dejean, 1821. The presence of one or several longer setae in pronotal apical angles, as in *Trichotichnus saluki* **sp. nov.**, is either an individual characteristic of some species, for example, *Harpalus* (*Cryptophonus*) *schaumii* Wollaston, 1864 (Kataev, 2012), or a common character (synapomorphy) of several genera, including those of the *Ophoniscus*-complex (Kataev, 2005). Although differences between *T. saluki* **sp. nov.** and *T. perforatus* **sp. nov.** in the aedeagi and the pronotal and tarsal setation are considerable, the new subgenus seems to be a natural group on the basis of the unique combination of the characters listed in the diagnosis. Many other common characters observed in these two species, including similar habitus, and their distribution in one geographical area also argue for their close relationship. Peculiar structure of the aedeagus of *T. perforatus* **sp. nov.**, as well as the distinct setae in the pronotal apical angles and the densely setose tarsi of *T. saluki* **sp. nov.** are regarded as autapomorphies for these species.

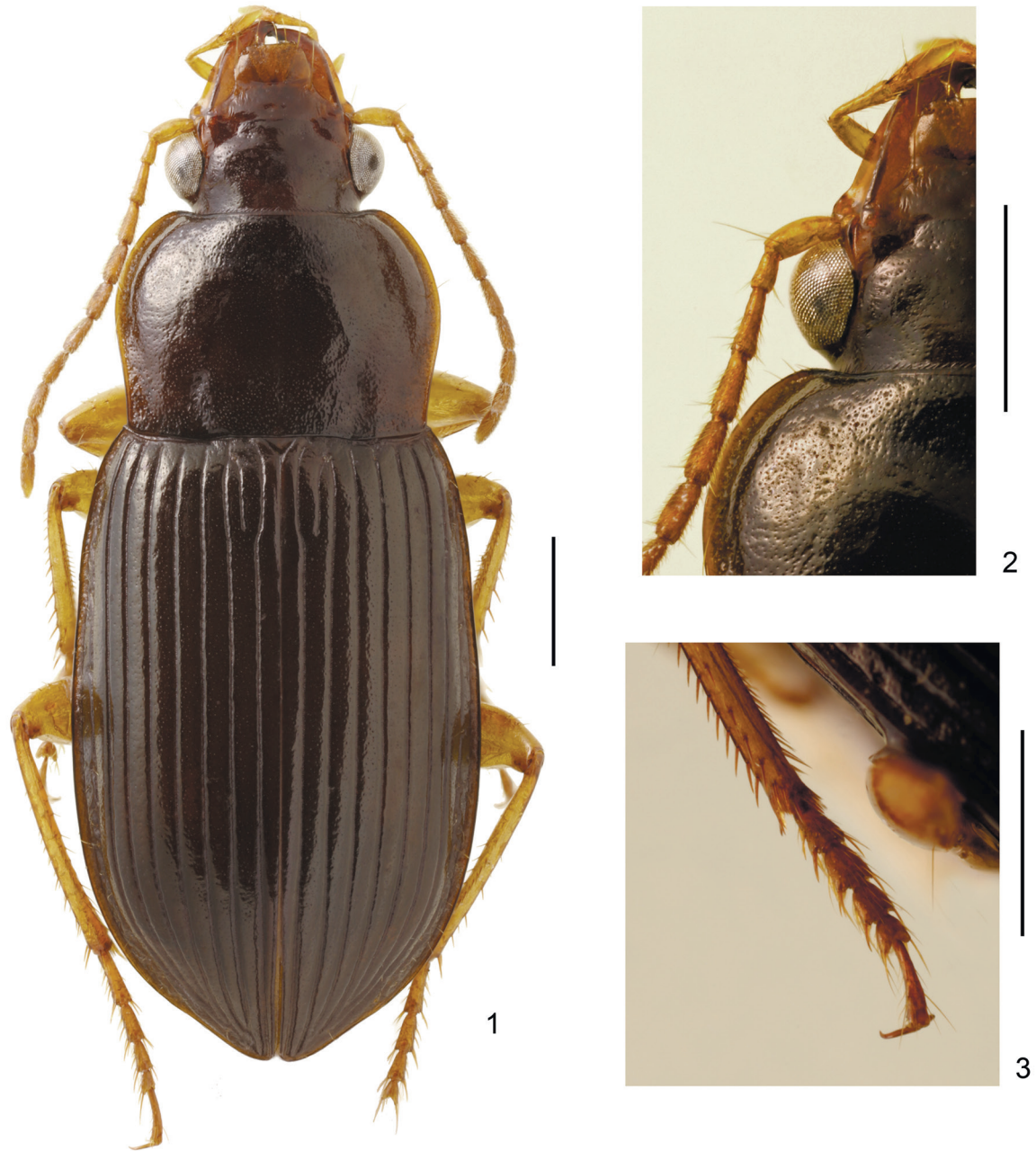
The new subgenus and *Iridessus* (both with shallow fronto-ocular furrows, a narrow ligular sclerite and wide paraglossae) appear to be basal taxa within *Trichotichnus*. The nominotypical subgenus, *Amaroschesis* and *Bottchrus* seem to be more advanced because they have these characters modified: the former two subgenera have narrow paraglossae and the ligular sclerite widened in most species, and the latter subgenus has deep fronto-ocular furrows.

***Trichotichnus* (*Parairidessus*) *saluki* sp. nov.**  
(Figs 1–8, 16a)

**Holotype.** Male, “INDIA: W Karnataka, / W Ghats Mts, Jog Falls, / 530 m, at light, / 14°13.240'N 74°48.471'E, / 2–5.XI.2013 S. Saluk leg.” (ZIN).

**Paratype.** 1 female, same data as for holotype (ZIN).

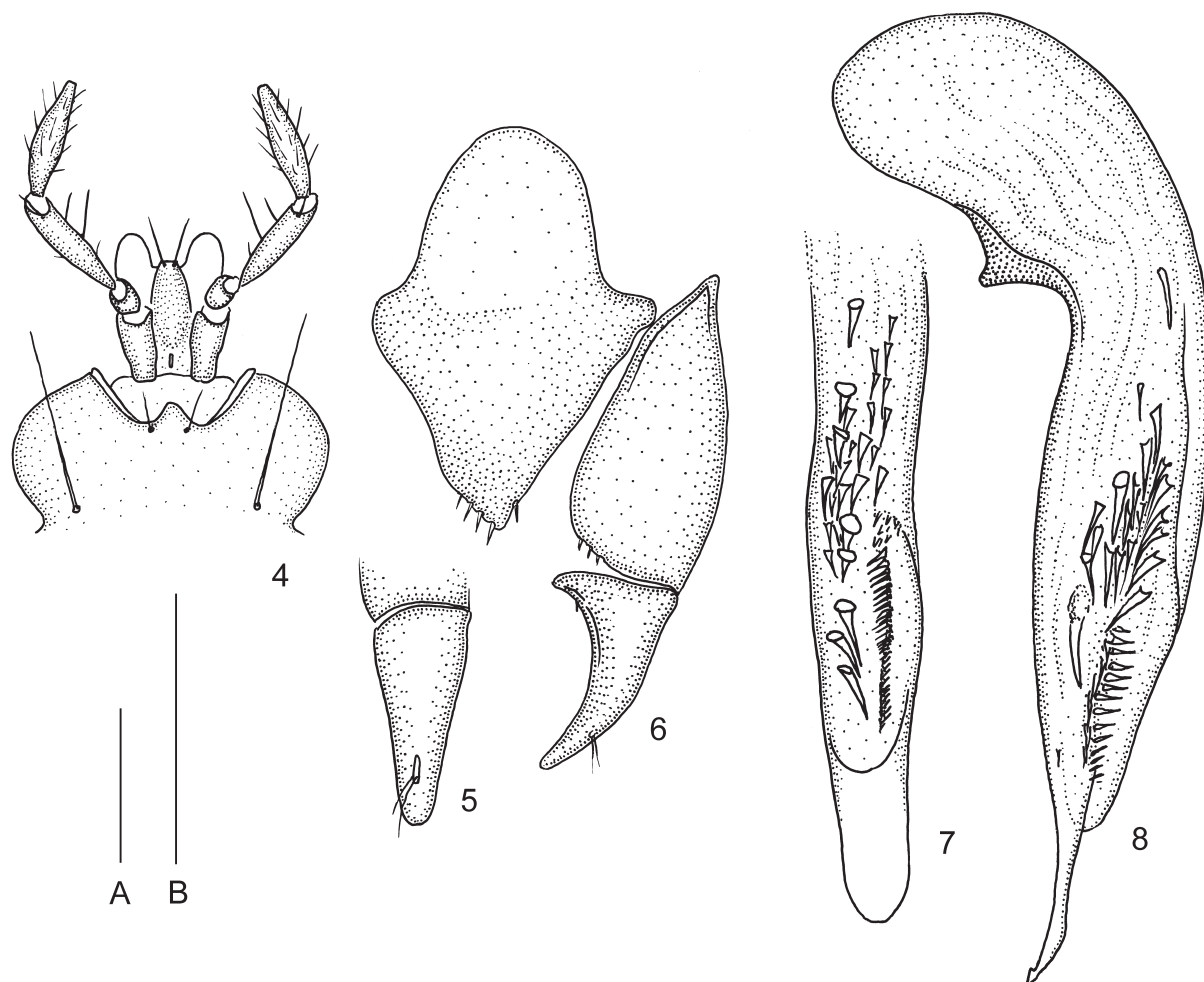
**Description.** Habitus as in Fig. 1. Body length in male 7.7 mm, in female 10.0 mm, width 3.3 and 4.0 mm, respectively.



**Figs 1–3.** *Trichotichnus (Parairidessus) saluki* sp. nov., holotype. **1**, habitus; **2**, head and apical angle of pronotum; **3**, left mesotarsus. Scale bars: 1.0 mm.

**Colour.** Body piceous, shiny on dorsum, very slightly iridescent on elytra; mandibles except for their apices and narrow margins, labrum and very narrow lateral margins of pronotum reddish brown; palpi, antennae and legs light brownish yellow; femora not infuscate in holotype and slightly infuscate in paratype; ventral side with more or less distinct reddish tinge.

**Head (Fig. 2).** Moderately sized ( $HW_{max}/PW_{max}$  0.67,  $HW_{min}/PW_{max}$  0.51–0.52). Eyes large, almost hemispherical ( $HW_{max}/HW_{min}$  1.29–1.30), in lateral view very wide oval, almost touching buccal fissure ventrally. Tempora very short, slightly convex, abruptly sloped to neck, glabrous. Frons and vertex convex, with dense fine micropunctures. Fronto-clypeal suture superficial,



**Figs 4–8.** *Trichotichnus (Parairidessus) saluki* sp. nov., paratype (4–6), and holotype (7, 8). 4, labium; 5, gonocoxite; 6, laterotergite, gonosubcoxite and gonocoxite; 7, 8, median lobe of aedeagus. Ventral view (4, 6), lateral view (5, 8), and dorsal view (7). Scale bars: 0.5 mm (A: 4, 7, 8; B: 5, 6).

almost straight. Frontal foveae deepened, wide. Fronto-ocular furrow deep at clypeus, becoming shallow posteriorly, reaching supraorbital furrow. Supraorbital furrow very narrow, touching upper margin of eye. Supraorbital setigerous pore small, located markedly before level of posterior margin of eye, separated from supraorbital furrow by distance approximately equal to two diameters of pore. Labrum very shallowly concave anteriorly. Clypeus somewhat flat, very shallowly arcuate at anterior margin, with a pair of setigerous pores located in anterior third of clypeus just at its lateral margins. Mentum (Fig. 4) with angulate median tooth, completely fused with submentum; epilobes narrow, slightly widened anteriorly; submentum

with one pair of long setae. Ligular sclerite markedly narrowed anteriorly, truncate at apex, with one pair of ventroapical setae. Paraglossa moderately wide, rounded apically, markedly longer than ligular sclerite and separated from it by narrow notch. Two apical maxillary palpomeres and one apical labial palpomere densely covered with rather long setae. Labial penultimate palpomere about as long as ultimate palpomere. Apex of left mandible acute. Dorsal microsculpture highly obliterate, recognisable only on clypeus and laterally in narrow area under and behind eyes, consisting of transverse meshes. Antennae slender, surpassing pronotal basal edge by three apical antennomeres, with antennomeres 4–8 about 2.5 times as long as



wide. Basal antennomere about as long as antennomere 3.

Pronotum. Transverse (PWmax/PL 1.47–1.49), widest at the end of anterior third, slightly narrowed posteriorly (PWmax/PWmin 1.07–1.12), with one lateral seta inserted just before widest point. Sides rounded in apical two thirds, slightly sinuate in basal third. Apical margin moderately emarginate, very narrowly but distinctly bordered along entire length; apical edge setose. Apical angles widely rounded, protruded ahead, with a few (four or five) short and fine setae (Fig. 2). Basal margin almost straight in middle portion, oblique laterally, bordered along entire length, markedly longer than apical margin and slightly shorter than base of elytra between humeral angles; basal edge glabrous. Basal angles nearly right, not blunted at tip. Pronotal disc moderately convex, strongly sloped to apical angles and moderately sloped to sides in basal portion, clearly flattened at basal angles. Lateral groove narrow apically, widened in basal half, reaching basal pronotal edge. Basal foveae narrow, shallow, isolated from lateral grooves by convexities, reaching pronotal edge. Median line very fine, reaching apical and basal pronotal edges. Surface densely punctate, more coarsely along base and more finely on other areas, with finest punctures in central portion. Microsculpture strongly obliterate, visible mainly only latero-basally, consisting of transverse meshes, in female more distinct than in male.

Elytra. Moderately convex, oval (in male, EL/EW 1.53, EL/PL 2.81, EW/PWmax 1.24; in female, these indices 1.49, 2.90, and 1.31, respectively), widened posteriorly (in female more markedly than in male), with somewhat acute apex. Humeri angularly rounded at tip, with a tiny denticle visible in caudal view. Subapical sinuation distinct but not deep. Sutural angle in both sexes acute, blunted at tip. Basal edge arched, forming an obtuse (in male almost right) angle with lateral margin. Lateral groove narrow and flat throughout, without elongate convexity along groove apically. Striae impunctate, narrow, moderately deep along entire length, anteriorly reaching basal edge. Intervals moderately convex, strongly narrowed apically, finely punctate. Parascutellar striole long, about 0.15 times as long as elytra, with small setigerous pore basally. Interval 3 with a small discal

setigerous pore at stria 2 slightly behind middle. Marginal umbilicate series without gap at middle, consisting of 27–34 setigerous pores. Microsculpture on intervals visible throughout, consisting of transverse meshes; lateral groove and bottom of striae with isodiametric microsculpture.

Hindwings fully developed.

Ventral surface of thorax. Prosternum, pro-, meso- and metepisterna as well as lateral portions of metasternum finely punctate. Prosternum finely setose; apex of prosternal process with several moderately long setae. Metepisternum markedly longer than wide, strongly narrowed posteriorly.

Legs. Metacoxae without additional setae medially. Profemur with several (six to eight) setae on antero-ventral margin, in male slightly wider than in female. Protibia on upper surface without longitudinal sulcus, on outer margin in both sexes with one stouter and two very thin preapical spines. Metafemur ventrally with three setae at posterior margin and without setae at anterior margin. Tarsi densely pubescent dorsally; tarsomere 5 with three or four pairs of ventro-lateral setae (Fig. 3). Metatarsus approximately as long as HWmax, with tarsomeres moderately widened distally; metatarsomere 1 slightly shorter than metatarsomeres 2 and 3 combined; metatarsomeres 1–4 densely setose ventrally. In male, pro- and mesotarsomeres 1–4 very moderately widened, with adhesive scales ventrally. In female, mesotarsomere 1 elongate, slightly shorter than mesotarsomeres 2 and 3 combined.

Abdomen. Sternites glabrous; apex of last visible (VII) sternite bordered, in both sexes widely rounded and with two pairs of marginal setae.

Female genitalia (Figs 5, 6). Laterotergite symmetrical, longer than wide, apically membranous, with five thick setae. Gonosubcoxite shorter than laterotergite, markedly widened posteriorly, with three preapical spines at outer margin. Gonocoxite elongate, about 0.66 times as long as gonosubcoxite, moderately curved, with relatively narrow base and with a tiny, hardly recognisable spine on ventral outer edge.

Male genitalia. Median lobe of aedeagus (Figs 7, 8; slightly deformed basally in holotype) slender, in lateral view rather strongly bent ventrally just after basal bulb, convex along ventral margin medially and slightly curved ventrally at apex, in dor-

sal view somewhat parallel-sided. Apical orifice in dorsal position, prolonged to basal bulb. Terminal lamella in dorsal view (Fig. 7) almost parallel-sided, twice as long as wide basally, narrowly rounded at apex, in lateral view thin, with sharp ventral flange at apex. Internal sac with several groups of narrow moderately sized spines mostly in middle and apical portions of median lobe.

**Comparison.** This new species is markedly distinguished from the congeners by having densely punctate dorsum, pronotal apical angles with several short setae, metafemur ventrally with three setae at posterior margin and tarsi densely setose dorsally.

**Etymology.** The species is named after its collector, my friend and colleague Sergey V. Saluk (Minsk, Belarus).

**Distribution.** Known from the Western Ghats near Jog Falls, Western Karnataka, India (Fig. 16a).

### ***Trichotichnus (Parairidessus) perforatus***

**sp. nov.**

(Figs 9–15, 16b)

**Holotype.** Male, “INDIA occ., 7–11.x.2005 / Maharashtra state / MULSHI env. F. Kantner leg / 40 km W of Pune” (SMNS).

**Paratypes.** 3 males, 6 females, “INDIA occ. Maharashtra st. / WAI env. 3–6.x.2005 / 70 km S of Pune / leg. F. & L. Kantner” (SMNS, ZIN); 1 male, 2 females, “INDIA occ. Maharashtra sta / MAHABALESHWAR env. / 70 km SSW of Pune / 30.ix.–2.x.2005, 1400 m / leg F.L. Kantner” (SMNS).

**Description** (five males and five females measured). Habitus as in Fig. 9. Body length 8.9–9.7 mm, width 3.7–4.1 mm.

**Colour.** Body black, slightly shiny on dorsum, very slightly iridescent on elytra; mandibles except for their apices and narrow margins, labrum and very narrow lateral margins of pronotum reddish brown; palpi, antennae and legs brownish yellow; femora not infuscate; in some specimens, tarsi slightly infuscate; ventral side with more or less distinct reddish tinge.

**Head.** Moderately sized ( $HW_{max}/PW_{max}$  0.63–0.65, mean 0.64;  $HW_{min}/PW_{max}$  0.48–0.50, mean 0.49). Eyes large, almost hemispherical ( $HW_{max}/HW_{min}$  1.29–1.33, mean 1.31), in lateral view very wide oval, almost touching buc-

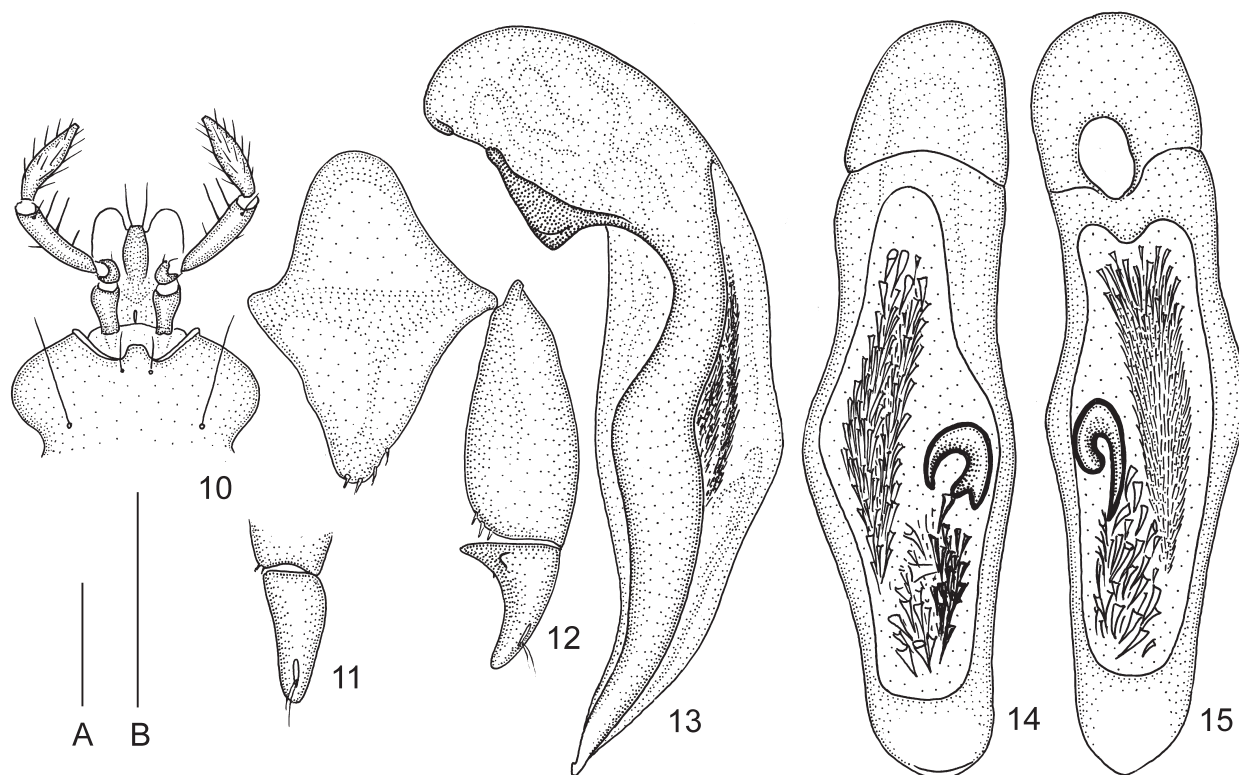
cal fissure ventrally. Tempora very short, slightly convex, abruptly sloped to neck, glabrous. Frons and vertex convex, with very fine micropunctures. Fronto-clypeal suture fine, shallow, straight. Frontal foveae deepened, each with short oblique depression directed inward. Fronto-ocular furrow deep at clypeus, becoming shallow posteriorly, reaching supraorbital furrow. Supraorbital furrow very narrow, touching upper margin of eye. Supraorbital setigerous pore small, located slightly before level of posterior margin of eye, separated from supraorbital furrow by distance approximately equal to one and half diameter of pore. Labrum very shallowly concave anteriorly. Clypeus slightly convex, almost straight along anterior margin, with a pair of setigerous pores located in anterior third of clypeus just at its lateral margins. Mentum (Fig. 10) completely fused with submentum, with wide, rounded median tooth; epilobes narrow, slightly widened anteriorly; submentum with one pair of long setae. Ligular sclerite markedly narrowed anteriorly, truncate at apex, with one pair of ventroapical setae. Paraglossa moderately wide, rounded apically, markedly longer than ligular sclerite and separated from it by narrow notch. Two apical maxillary palpomeres and one apical labial palpomere densely covered with rather long setae. Labial penultimate palpomere about as long as ultimate palpomere. Apex of left mandible acute. Dorsal microsculpture highly obliterate, recognisable only laterally behind eyes, consisting of transverse meshes. Antennae slender, surpassing pronotal basal edge by two apical antennomeres, with antennomeres 4–8 about 2.0–2.5 times as long as wide. Basal antennomere about as long as antennomere 3.

**Pronotum.** Transverse ( $PW_{max}/PL$  1.40–1.49, mean 1.43), widest at the end of anterior third, narrowed posteriorly ( $PW_{max}/PW_{min}$  1.11–1.16, mean 1.14), with one lateral seta inserted in widest point. Sides rounded in apical third and almost straightly converging in basal two-thirds. Apical margin shallowly emarginate, very narrowly bordered along entire length, but occasionally border more or less strongly obliterate at middle; apical edge setose. Apical angles widely rounded, slightly protruded ahead, with one to four very short and fine setae (in some specimens extremely short and hardly recognised). Basal





**Fig. 9.** *Trichotichnus (Parairidessus) perforatus* sp. nov., habitus (holotype). Scale bar: 1.0 mm.



**Figs 10–15.** *Trichotichnus (Parairidessus) perforatus* sp. nov., paratype (10–12), and holotype (13–15). **10**, labium; **11**, gonocoxite; **12**, laterotergite, gonosubcoxite and gonocoxite; **13–15**, median lobe of aedeagus. Ventral view (10, 12, 15), lateral view (11, 13), and dorsal view (14). Scale bars: 0.5 mm (A: 10, 13–15; B: 11, 12).

margin almost straight in middle portion, oblique laterally, bordered either along entire length or only laterally, markedly longer than apical margin and slightly shorter than base of elytra between humeral angles; basal edge glabrous. Basal angles obtuse, blunted at tip. Pronotal disc moderately convex, strongly sloped to apical angles and moderately sloped to sides in basal portion, slightly flattened at basal angles. Lateral groove very narrow in apical third, slightly widened posteriorly, reaching basal pronotal edge. Basal foveae elongate, shallow, isolated from lateral grooves by convexities. Median line distinct, superficial, almost reaching apical pronotal edge anteriorly and touching basal pronotal edge posteriorly. Surface densely and finely punctate along base, in lateral groove and at middle of apical margin; remaining areas with dense micropunctuation. Microsculpture visible only along pronotal margins, consisting of very fine transverse meshes.

Elytra. Moderately convex, elongate oval (in both sexes, EL/EW 1.54–1.59, mean 1.57; EL/PL

2.91–3.08, mean 2.96; EW/PWmax 1.30–1.33, mean 1.32), widest markedly behind middle, with somewhat acute apex. Humeri angularly rounded, with a tiny denticle visible in caudal view. Subapical sinuation distinct but not deep. Sutural angle in both sexes acute and sharp at tip. Basal edge evenly arched, forming a very obtuse angle with lateral margin. Lateral groove flat throughout, at most with indistinct short elongate convexity at apex. Striae impunctate, moderately wide, rather deep along entire length, reaching anteriorly basal edge. Intervals convex, strongly narrowed apically, micropunctate. Parascutellar striole long, 0.17–0.20 times as long as elytra, with a small setigerous pore basally. Interval 3 with a small discal setigerous pore at stria 2 in the beginning of apical third. Marginal umbilicate series without gap at middle, consisting of 24–27 setigerous pores. Microsculpture on intervals visible throughout, consisting of transverse meshes, in female strongly obliterate; lateral groove and striae at bottom with isodiametric microsculpture.



Fig. 16. *Trichotichnus* spp., distribution: *T. (Parairidessus) saluki* sp. nov. (a), and *T. (P.) perforatus* sp. nov. (b).

Hindwings fully developed.

Ventral surface of thorax. Prosternum, pro-, meso- and metepisterna as well as lateral portions of metasternum finely punctate. Prosternum almost glabrous, only with few very short setae at anterior margin and at apex of prosternal process. Metepisternum markedly longer than wide, strongly narrowed posteriorly.

Legs. Metacoxae without additional setae medially. Profemur with several (four to six) setae on antero-ventral margin, in male markedly wider

than in female. Protibia on upper surface without longitudinal sulcus, on outer margin with one preapical spine in male and with three such spines in female. Metafemur ventrally with two setae at posterior margin and without setae at anterior margin. Tarsi dorsally glabrous; tarsomere 5 with three to five pairs of ventro-lateral setae. Metatarsus approximately as long as HWmax, with tarsomeres markedly widened distally; metatarsomere 1 slightly shorter than metatarsomeres 2 and 3 combined; metatarsomeres 1–4 moderately



densely setose ventrally. In male, pro- and mesotarsomeres 1–4 markedly widened and with adhesive scales ventrally. In female, mesotarsomere 1 elongate, almost as long as mesotarsomeres 2 and 3 combined.

Abdomen. Sternites glabrous; apex of last visible (VII) sternite bordered, subtruncate in male and rounded in female, in both sexes with two pairs of marginal setae.

Female genitalia (Figs 11, 12). Laterotergite symmetrical, longer than wide, with four thick setae apically. Gonosubcoxite shorter than laterotergite, moderately widened posteriorly, with three preapical spines on outer margin. Gonocoxite short, about 0.47 times as long as gonosubcoxite, moderately curved, with relatively wide base and with a tiny, hardly recognisable spine on both ventral and dorsal outer edges.

Male genitalia. Median lobe of aedeagus (Figs 13–15) sclerotised only laterally, with wide membranous areas on dorsal and ventral surfaces from basal bulb to terminal lamella, in lateral view S-shaped, rather strongly bent ventrally just after basal bulb, in dorsal view somewhat parallel-sided basally and apically and widened at middle, with sides there rounded. Apical orifice in dorsal position, prolonged to basal bulb. Terminal lamella in dorsal view wide, slightly wider than long, narrowly rounded at apex, in lateral view thin, with sharp ventral flange at apex. Internal sac with a large curved spine on the right side at middle and with two large spiny formations in left basal and right apical portions of median lobe, respectively.

*Comparison.* This new species differs from *T. saluki* **sp. nov.** in having tarsi glabrous dorsally, setae in pronotal apical angles much shorter or occasionally indistinct, dorsum much more finely punctate (only microscopic punctures present), metafemur with two setae at posterior margin, and median lobe of aedeagus widely membranous ventrally. Additional distinctive features of *T. perforatus* **sp. nov.** are as follows: supraorbital seta located more posteriorly, antennae slightly shorter, pronotum with sides not sinuate basally and basal angles more obtuse, blunted at tip, elytra more elongate, with sharp sutural angle and slightly wider lateral groove and striae; in male, abdominal sternite VII subtruncate at tip and pro- and mesotarsi more markedly dilated.

*Trichotichnus perforatus* **sp. nov.** is somewhat similar to *T. (Bottchrus) notabilis* Ito, 1997 from Java in the peculiar shape of the median lobe dilated at the middle, which character (Ito, 1997: Fig. 5) makes the latter species isolated from the other *Bottchrus*. In other characteristics, the aedeagi of these two species are different: the median lobe of *T. notabilis* is sclerotised ventrally, although widely depressed, and the inner sac has no sclerotised elements.

*Etymology.* The species name is a Latin adjective meaning “pierced” and referring to the unsclerotised ventral side of the aedeagus in the new species.

*Distribution.* Known from the Western Ghats within Satara and Pune districts, Maharashtra, India (Fig. 16b).

#### Subgenus *Iridessus* Bates, 1883

*Argestes* LeConte, 1849: 26 [as genus; nomen oblitum, see Bousquet (2008: 328)]. Type species: *Harpalus nitidulus* Chaudoir, 1843, by monotypy.

*Iridessus* Bates, 1883: 240 [as genus]. Type species: *Harpalus relucens* Bates, 1973 [= *Trichotichnus orientalis* (Hope, 1845)], designated by Tschitschérine (1906). [Designation of *Harpalus lucidus* Morawitz, 1863 as a type species of this subgenus by Habu (1954) is invalid].

*Episcopellus* Casey, 1914: 220 [as genus]. Type species: *Feronia autumnalis* Say, 1823, by original designation.

*Carbanus* Andrewes, 1937: 27 [as genus]. Type species: *Carbanus flavipes* Andrewes, 1937 [= *Trichotichnus claripes* Lorenz, 1998], by monotypy.

*Diagnosis.* Fronto-ocular furrows shallow, at most deepened only at clypeus, reaching or not reaching supraorbital furrows, occasionally only traces visible. Fronto-clypeal suture superficial or slightly deepened. Ligular sclerite not widened apically, parallel-sided or slightly narrowed before apex, in most members with outer angles slightly prominent laterally. Paraglossa moderately wide, rounded apically, separated from ligular sclerite by narrow notch (much narrower than paraglossa apically). Elytra with lateral groove flat throughout, without elongate convexity along this groove apically. Elytral marginal umbilicate series with more or less wide gap at middle, occasionally with one intermediate pore in gap, consisting of 15–20 setigerous pores. Abdominal sternites glabrous,

without extra setae. Abdominal sternite VII with two pairs of marginal setigerous pores in both sexes. Gonocoxite with one short seta on ventral outer edge at base (in some members also on dorsal outer edge) or without seta. Median lobe of aedeagus with apical orifice in dorsal position or shifted to left.

**Composition.** This subgenus includes 25 described species. Most of them are distributed in the Oriental region and the southeastern Palearctic, but a few are also known from the Australian and Nearctic regions.

**Remarks.** *Iridessus* was originally erected as a genus for two species: *Harpalus lucidus* Morawitz, 1863 from Japan and *H. relucens* Bates, 1873 [= *T. orientalis* (Hope, 1845)] from Japan and China. *Iridessus* was cited as a separate genus by many subsequent authors (Tschitschérine, 1897b, 1900, 1901, 1906; Jacobson, 1907; Andrewes, 1919; Csiki, 1932; Jedlička, 1954) until Habu (1954) synonymised it with *Trichotichnus*. Several Oriental and Australian species, included now in the subgenus *Iridessus*, were described within the genus *Carbanus* (Andrewes, 1937, 1947; Louwerens, 1962). Darlington (1968: 51) included *Carbanus* in *Trichotichnus* although noted that this taxon is rather distinct in its appearance and “may eventually be separated from *Trichotichnus*”. More recently, Noonan (1976, 1985), Lorenz (2005) and Bousquet (2012) considered *Carbanus* as a synonym of *Trichotichnus* s. str. Japanese authors (for example, Habu, 1961, 1973; Ito, 2001, 2002, 2014) treated the Palearctic and Oriental species of *Iridessus*, including the type species of the latter, as the members of the *orientalis* group of the nominotypical subgenus without reference to *Carbanus*. Ball & Bousquet (2000), Bousquet (2012) and Kataev & Wrase (2017) considered *Iridessus* as a separate subgenus. In the latter work, *Carbanus* was considered as a synonym of *Iridessus* since their diagnostic characteristics are the same. *Carbanus flavipes* Andrewes, 1937 (= *T. claripes* Lorenz, 1998) from Java, the type species of *Carbanus*, is at most only a geographical form of *T. szekessyi* (Jedlička, 1954) which was originally described as *Iridessus* and treated as a member of the *orientalis* group by Ito (2001).

The subgenus is well defined morphologically. In addition to the features listed in the diagnosis, it is also characterised as follows: body compara-

tively small (4.8–8.8 mm), wide and flat, *Amara* (*Celia*) or *Harpalus*-like, with pronotal basal angles in many species more or less rounded at apex; genae narrow to moderately wide, in most species narrower than antennomere 2; protibia not sulcate; and median lobe of aedeagus in many species with more or less developed apical capitulum having flanges both dorsally and ventrally. *Iridessus* differs from *Trichotichnus* s. str. in somewhat wide, rounded apically paraglossae which are separated from ligular sclerite by narrow notches.

### ***Trichotichnus (Iridessus) tonklii***

Kirschenhofer, 1992

(Figs 17–23)

*Trichotichnus* (s. str.) *tonklii* Kirschenhofer, 1992: 39.

**Type material examined.** *Holotype.* Male, “Shabru, 1500–2200 m, 19.IV.1978, Nepal, Tonkli P. // Holotypus // *Trichotichnus tonklii* n. sp., det. Kirschenhofer, 91” (NHMW). *Paratype.* Female, same data as for holotype but labelled “Paratypus” (NHMW).

**Additional material examined.** **Nepal, Bagmati:** 5 males, 2 females, Langtang National Park, Dhunche-Shin Gompa, 28°06.63'N 85°20.47'E, 1950–3250 m, 1.V.2000, A. Konstantinov, S. Lingafelter & M. Volkovitch leg. (ZIN, cWR); 2 females, “Rasuwa Distr., Langtang Tal zw. Syabru Bensi u. Ghora Tabela”, 1600–3000 m, IV.1998, St. Roth leg. (cJS); 1 male, 1 female, Langtang National Park, Ghora Tabela, 3000 m, 13.V.1988, S. Bily leg. (NHMB); 2 males, 2 females, Langtang Valley, Khanglung – Sharpugaon, 2225–2600 m, 16.IX.1984, P. Beron & St. Andreev leg. (NMNHS); 4 males, Langtang Valley, Bamboo Lodge – Lama Hotel, 1900–2400 m, 15.IX.1997, Ahrens leg. (cJS, ZIN).

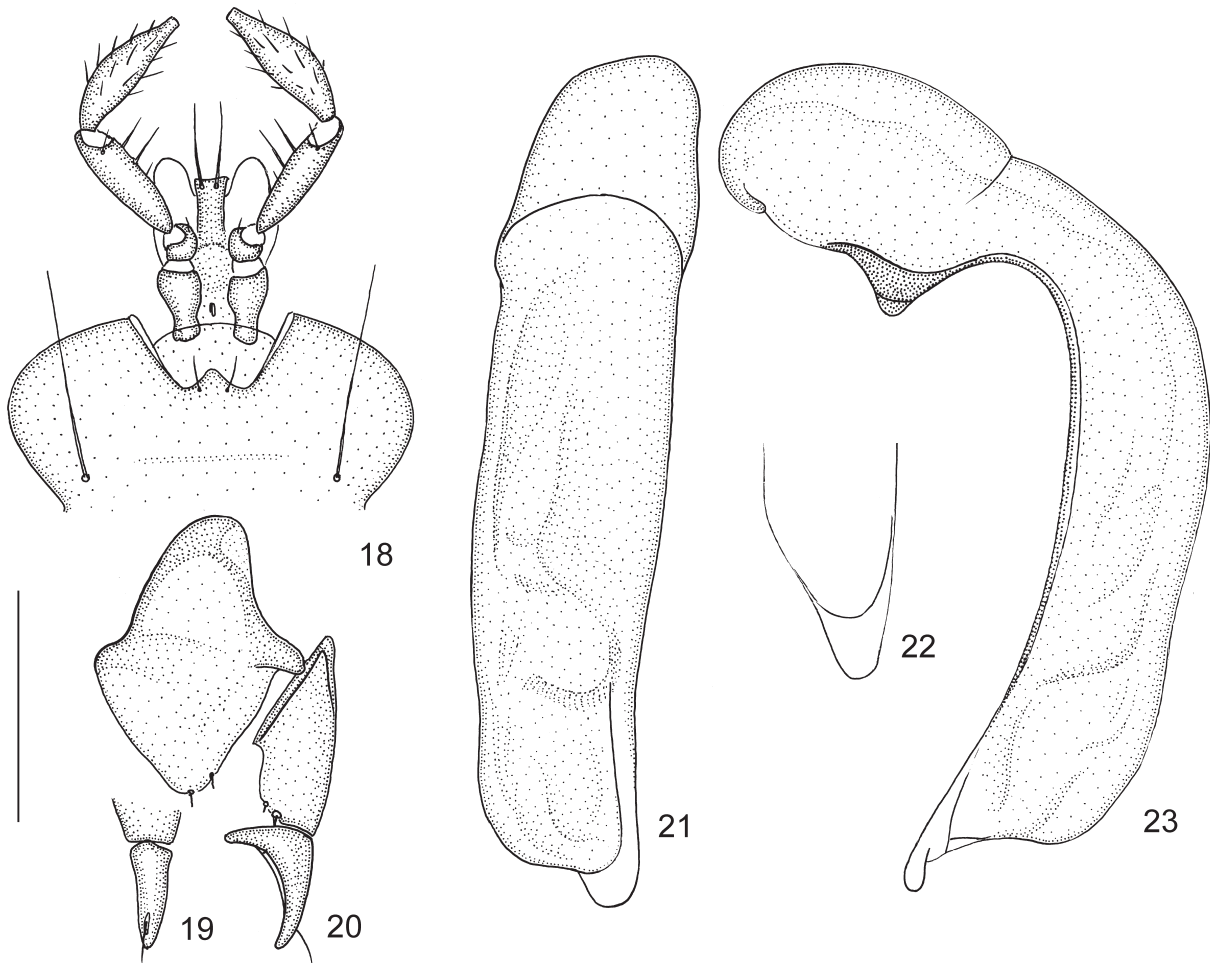
**Diagnosis.** Apterous species markedly differing from other members of *Iridessus* in very short metepisternum which is markedly wider than long.

**Description.** Body length 6.3–8.1 mm, width 2.6–3.5 mm. Habitus as in Fig. 17. Piceous, shiny on dorsum, with palpi, antennae and legs brownish; femora distinctly infuscate. Fronto-clypeal suture and fronto-ocular furrows shallow. Genae moderately wide, about as wide as antennomere 1. Left mandible truncate or blunted at tip. Mentum (Fig. 18) completely fused with submentum; ligular sclerite almost parallel-sided, with outer angles slightly prominent laterally; paraglossa moderately wide, rounded apically, separated from ligular sclerite by narrow notch. Pronotum very finely punctate basally, with basal angles obtuse,



**Fig. 17.** *Trichotichnus (Iridessus) tonklii* Kirschenhofer, 1992, habitus. Scale bar: 1.0 mm.





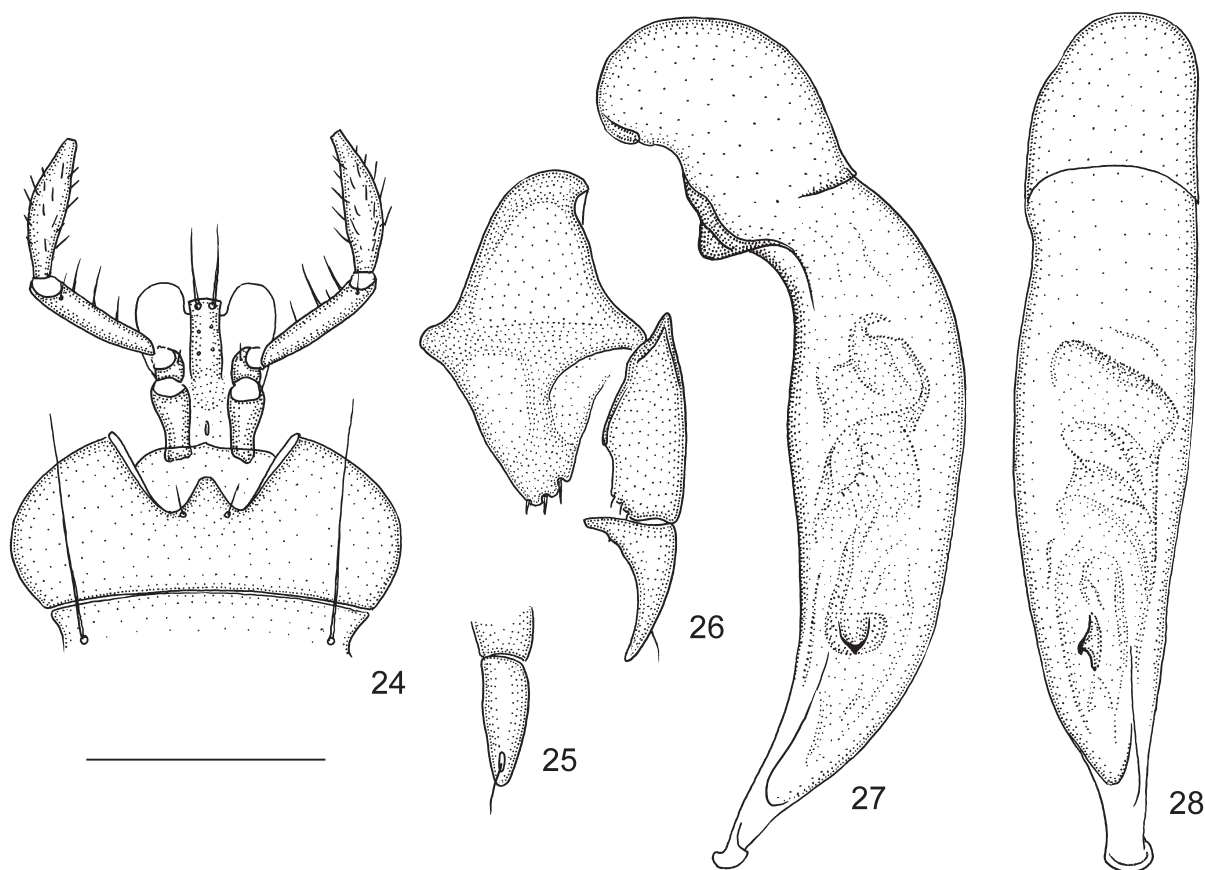
**Figs 18–23.** *Trichotichnus (Iridessus) tonklii* Kirschenhofer, 1992. **18**, labium; **19**, gonocoxite; **20**, laterotergite, gonosubcoxite and gonocoxite; **21**, **23**, median lobe of aedeagus (holotype); **22**, terminal lamella. Ventral view (18, 20), lateral view (19, 23), and dorsal view (21). Scale bar: 0.5 mm.

slightly blunted at tip. Elytra with lateral groove narrow and flat throughout, without elongate convexity along this groove apically. Elytral marginal umbilicate series with a short gap at middle, consisting of 15–18 setigerous pores (seven or eight pores in anterior group and eight to ten such pores in posterior group). Metepisternum markedly wider than long. Profemur anteriorly with two setigerous pores in basal third of lower margin. Metafemur ventrally with two setigerous pores at posterior margin. Tarsi dorsally glabrous. Mesotarsomere 1 of male with two very small adhesive scales just at apex. Abdominal sternite VII with two pairs of marginal setigerous pores in both sexes. Gonocoxite (Figs 19, 20) with a very short (hardly recognisable) seta on both ventral

and dorsal outer edges basally. Median lobe of aedeagus (Figs 21–23) with apical orifice shifted to left, without sclerotised elements in inner sac.

**Distribution.** This species is endemic to the Langtang Valley in Central Nepal (Bagmati Province) where it occurs at altitudes of 1500–3250 m.

**Remarks.** A single known species of *Iridessus* with highly reduced hind wings. It was described as a member of the nominotypical subgenus, without reference to the *orientalis* group, *Iridessus* or *Carbanus*, as closely related to *T. (s. str.) aquilo* Andrewes, 1930. In the general habitus with shallow fronto-ocular furrows and transverse metepisternum, it reminds species of *Amaroschesis*, but in the structure of labium and other characters it should be included in the subgenus *Iridessus*.



**Figs 24–28.** *Trichotichnus (Iridessus) autumnalis* (Say, 1823). 24, labium; 25, gonocoxite; 26, laterotergite, gonosubcoxite and gonocoxite; 27, 28, median lobe of aedeagus. Ventral view (24, 26), lateral view (25, 27), and dorsal view (28). Scale bar: 0.5 mm.

***Trichotichnus (Iridessus) autumnalis***

(Say, 1823)

(Figs 24–28)

*Feronia autumnalis* Say, 1823: 48.

*Episcopellus nitescens* Casey, 1914: 236.

**Material examined.** **Canada, Ontario:** 1 female, Ontario, Lake Erie, Long Point, 7.VI.1956, K. Lindroth leg. (ZIN); 1 male, Lake Erie, Point Pelee, 13–14.VI.1956, K. Lindroth leg. (ZIN). **USA:** 2 males, 1 female, *Missouri*, Callaway County, Mark Twain National Forest, 18 km SWW Fulton, 38°48.0'N 92°08.3'W, 200 m, in forest litter, 14.V.2003, V. Gusarov leg. “[1821]” (ZIN); 1 male, *Illinois*, Union County, Shawnee “S. F.”, Pine Hill, 31.IV.–1.V.1979, H. Goulet leg. (ZIN); 1 female, *Maryland*, Chevy Chase, 24.VII.1946, E. Suenson leg. (ZIN); 1 male, *Indiana*, Dunes State Park, Porter County, 8.VI.1988, N.M. Downie leg. (FMNH).

**Diagnosis.** Among members of *Iridessus*, this species is recognised by elongate body, impunc-

tate pronotum and comparatively wide genae. In impunctate pronotum and wide genae, it is similar to *T. nitidulus*, but can be easily distinguished by narrower body, more distinct fronto-ocular furrows and by presence of parascutellar setigerous pore on elytra.

**Description.** Body length 6.5–7.8 mm, width 2.3–3.4 mm. Dark piceous to black, with very narrow margins of pronotum and elytra as well as elytral suture reddish brown; palpi, antennae and legs brownish yellow. Fronto-clypeal suture and fronto-ocular furrows very shallow, fine. Genae moderately wide, about as wide as antennomere 2. Left mandible acute at tip. Mentum (Fig. 24) separated from submentum by complete suture; ligular sclerite almost parallel-sided, very slightly narrowed before apex; paraglossa rather wide, separated from ligular sclerite by narrow notch. Pronotum impunctate, with basal angles distinct,

angulate. Elytra with lateral groove narrow and flat throughout, without elongate convexity along this groove apically. Elytral marginal umbilicate series with a short gap medially, consisting of seven to nine setigerous pores in anterior group and of eight and nine such pores in posterior group. Metepisternum markedly longer than wide. Profemur anteriorly with at least four setigerous pores along entire length of lower margin. Metafemur ventrally with two setigerous pores at posterior margin. Tarsi dorsally glabrous. Mesotarsomere 1 of male elongate, approximately as long as mesotarsomeres 2 and 3 combined, with a pair of very small adhesive scales just at apex. Abdominal sternite VII with two pairs of marginal setae in both sexes. Gonocoxite (Figs 25, 26) basally with one short stout seta on ventral outer edge and one thin seta on dorsal outer edge. Median lobe of aedeagus (Figs 27, 28) with apical orifice shifted to left and with apical capitulum prominent both dorsally and ventrally. Internal sac with a short spine in apical portion.

**Distribution.** Eastern Canada and the eastern United States, south at least to northeastern Kansas, central Arkansas, southwestern Mississippi, northern Georgia, and eastern South Carolina (Bousquet, 2012).

**Remarks.** The systematic position of this species was changed many times soon after the description. In more recent time, Casey (1914) erected for it the genus *Episcopellus* within Acupalpini (= Stenolophina). Lindroth (1968) also considered *Episcopellus* as a separate genus but close to *Harpalus*, whereas Ball (1960), Habu (1973) and Noonan (1985) treated it as a synonym of *Trichotichnus*. Finally, Kataev (in Ball & Bousquet, 2000) included *T. autumnalis* in the subgenus *Iridessus*. The morphological characteristics of this species listed above, rather well agree with the diagnosis of this subgenus.

***Trichotichnus (Iridessus) nitidulus***  
(Chaudoir, 1843), **nom. resurr.**  
(Figs 29–38)

*Harpalus nitidulus* Chaudoir, 1843: 788.

*Harpalus fulgens* Csiki, 1932: 1162 (non Dejean, 1829), unnecessary substitute name for *Harpalus nitidulus* Chaudoir, 1843 (see Remarks below).

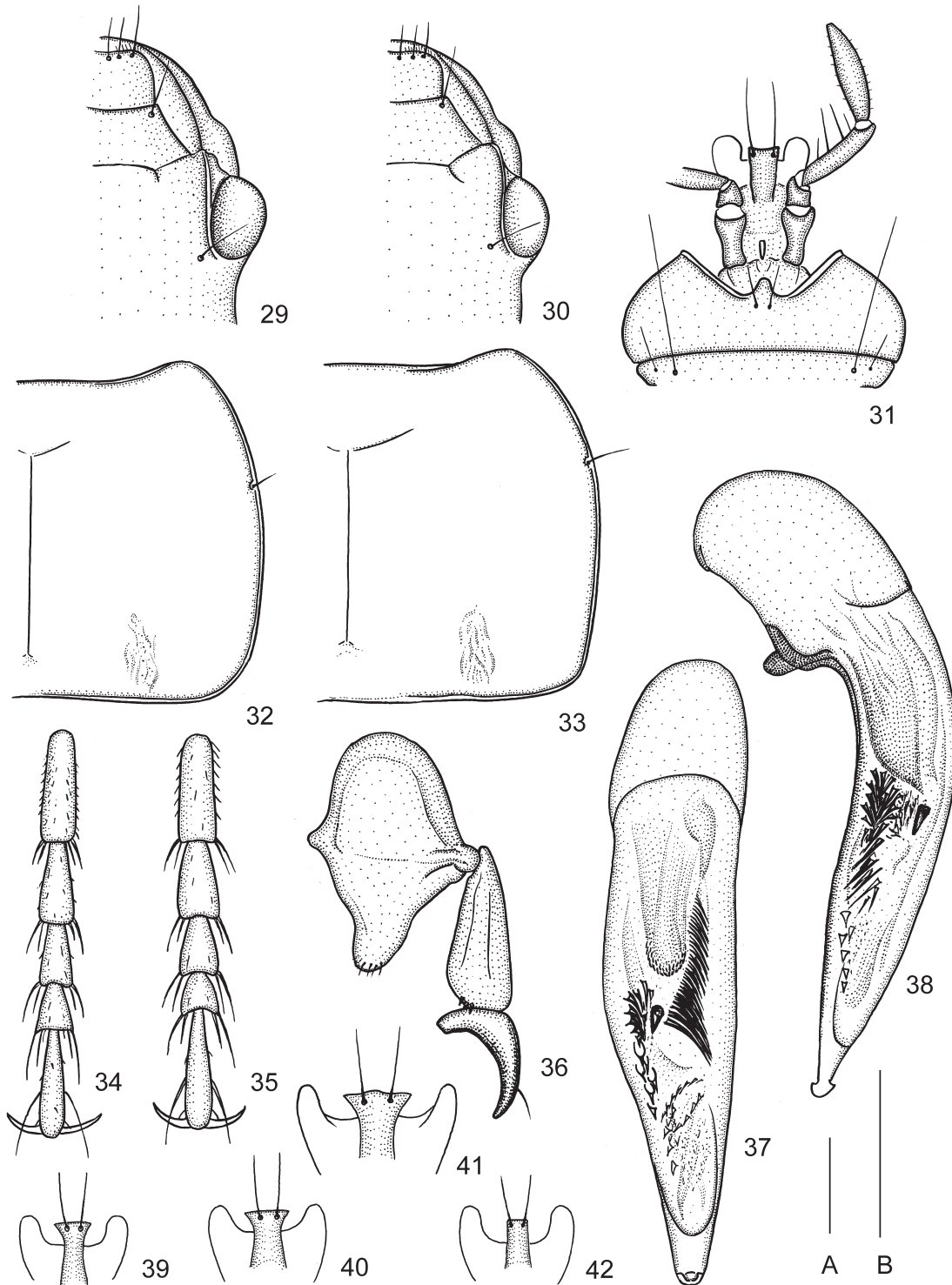
**Type material examined.** *Lectotype* (designated by Lindroth, 1968: 811). Male, “Ex Musaeo Chaudoir // Lectotypus nitidulus Chaud. design. Lindroth // fulgens Cki. (nitidulus Chd.) det. Lindroth 66”, “G.R. Noonan 02–87” (MNHN).

**Additional material examined.** More than 80 specimens from USA collected in Illinois, Indiana, Pennsylvania, New Jersey, Maryland, District of Columbia, West Virginia, Virginia, Kansas, Tennessee, Texas, Louisiana, Alabama, and Florida (FMNH, UASM, ZIN, ZMUC).

**Diagnosis.** Easily recognised among the other members of *Iridessus* by the following characters: head without or with very short and fine fronto-ocular furrows, genae moderately wide, pronotum impunctate, parascutellar pore absent, and tarsi dorsally with very short and sparse setae.

**Description.** Body length 6.1–7.1 mm, width 2.6–2.9 mm. Dark brown to black, shiny, with epipleurae, palpi, antennae and legs brownish yellow. Fronto-clypeal suture very fine, superficial. Fronto-ocular furrows lacking or only slightly visible (Figs 29, 30). Genae moderately wide, about as wide as antennomere 1. Left mandible truncate at tip. Mentum (Fig. 31) separated from submentum by complete suture; ligular sclerite narrow, very slightly widened apically; paraglossa moderately wide, separated from ligular sclerite by narrow notch. Pronotum (Figs 32, 33) impunctate or with a few fine punctures in basal foveae, with rounded basal angles. Parascutellar striole more or less reduced. Parascutellar pore absent. Elytra with lateral groove narrow and flat throughout, without elongate convexity along this groove apically. Elytral umbilicate series with more or less wide gap medially, consisting of six to eight setigerous pores in anterior group and of eight to ten such pores in posterior group. Metepisternum longer than wide. Profemur anteriorly with two setigerous pores in basal third of lower margin. Metafemur ventrally with two setigerous pores at posterior margin. Tarsi dorsally covered with very short and sparse setae (Figs 34, 35). Mesotarsomere 1 in male short, with reduced (occasionally absent) vestiture. Metatarsomere 1 elongate, but shorter than metatarsomeres 2 and 3 combined. Abdominal sternite VII with two pairs of marginal setae in both sexes. Gonocoxite (Fig. 36) without seta on outer margin. Median lobe of aedeagus (Figs 37, 38) with apical orifice slightly shifted to left





**Figs 29–42.** *Trichotichnus* spp. 29–38, *T. (Iridessus) nitidulus* (Chaudoir, 1843). 39, *T. (s. str.) vicinus* (Tschitschérine, 1897); 40, *T. (s. str.) anthracinus* Landin, 1955); 41, *T. (s. str.) vulpeculus* (Say, 1823); 42, *T. (s. str.) laevicollis* (Duftschmid, 1812). Right half of head (29, 30); labium, ventral view (31); right half of pronotum (32, 33); metatarsus (34, 35); laterotergite, gonosubcoxite and gonocoxite, ventral view (36); median lobe of aedeagus, dorsal view (37); the same, lateral view (38); ligular sclerite and paraglossae, ventral view (39–42). Scale bars: 0.5 mm (A: 29, 30, 32, 33; B: 31, 34–42).

and with apical capitulum prominent both dorsally and ventrally. Inner sac with several groups of moderately sized spines and with one larger spine medio-dorsally.

*Distribution.* Southeastern Canada (southernmost Ontario) and the eastern United States south from Pennsylvania and Massachusetts to Florida and Texas (Noonan, 1991; Bousquet, 2012).

*Remarks.* The species was for a long time considered as a representative of the genus *Harpalus* (for example, Lindroth, 1968; Noonan, 1991; Bousquet & Larochelle, 1993; Lorenz, 2005) until Kataev (in Ball and Bousquet, 2000) transferred it to the genus *Trichotichnus* based on the following combination of characters typical for the latter genus and separating it from *Harpalus*: the paraglossae glabrous, elytral microsculpture transverse, metafemur ventrally with two setigerous pores at posterior margin, metatarsomere 1 somewhat elongate and head with fronto-ocular furrows in at least some specimens (while indistinct in many others; similar character state is observed also in some *Trichotichnus*, for example, *T. lucidus*). Based on structure of labium and other features, *T. nitidulus* is included in the subgenus *Iridessus*. *Trichotichnus nitidulus* is similar to *T. autumnalis* in having impunctate pronotum and moderately wide genae. These two North American species are somewhat isolated from the Asian and Australian species and may represent one or two separate species groups within *Iridessus*.

The name *Harpalus fulgens* Csiki, 1932 was introduced instead of *H. nitidulus* Chaudoir, 1843 because of the supposed secondary homonymy with *H. nitidulus* (Stephens, 1828). However, Stephens' name *Ophonus nitidulus* actually refers to *Carabus nitidulus* Schrank, 1781 [now in *Chlaenius*] (see Telfer, 2001: 34; Wrase, 2005: 835) and is thence unavailable (International Commission on Zoological Nomenclature, 1999: Article 49). Since Stephens' name does not fall under the rules of homonymy (International Commission on Zoological Nomenclature, 1999: Article 54.2), *H. fulgens* Csiki, 1932 is the unnecessary substitute name (junior objective synonym) for *H. nitidulus* Chaudoir, 1843. Therefore, the valid name of the species being considered should be *Trichotichnus nitidulus*. This removes the problem (see Bousquet, 2012: 1158) of the junior primary homonymy of *H. fulgens* Csiki, 1932 with *H. fulgens* Dejean, 1829.

### Subgenus *Trichotichnus* Morawitz, 1863

*Trichotichnus* Morawitz, 1863: 63 [as genus; nomen protectum, see Bousquet (2008: 328)]. Type species: *Trichotichnus longitarsis* Morawitz, 1863, by monotypy.

*Asmerinx* Tschitschérine, 1898: 183 [as genus]. Type species: *Carabus laevicollis* Duftschmid, 1812, designated by Tschitschérine (1900).

*Pteropalus* Casey, 1914: 64 [as genus]. Type species: *Harpalus vulpeculus* Say, 1823, designated by Habu (1954).

*Velimius* Jedlička, 1952: 51 [as genus]. Type species: *Velimius edai* Jedlička, 1953, by monotypy.

*Diagnosis.* Fronto-ocular furrows shallow, at most deepened only at clypeus, reaching or not reaching supraorbital furrows. Fronto-clypeal suture superficial or slightly deepened. Genae narrow to moderately wide. Ligular sclerite widened at apex (Figs 39–41) or (for example, in European species) almost parallel-sided (Fig. 42). Paraglossa narrow, separated from ligular sclerite by wide (about as wide as paraglossa apically) notch. Elytra with lateral groove flat throughout, without distinct elongate convexity along this groove apically. Elytral marginal umbilicate series more or less continuous or with a short gap at middle. Metepisternum markedly narrowed posteriorly, its anterior margin not longer than inner margin. Abdominal sternite VII of male with one or two pairs of marginal setigerous pores. Gonocoxite with one short seta (occasionally with two setae) on ventral outer edge or on both ventral and dorsal outer edges at their middle or in their basal portion. Median lobe of aedeagus with apical orifice in dorsal position or slightly shifted to left; apical capitulum absent or small, in many species prominent only dorsally.

*Composition.* This subgenus comprises more than one hundred described species ranged mostly over Palaearctic East Asia and northern part of the Oriental region from northern Pakistan and northern India to the Russian Far East, Japan and Taiwan; south to Vietnam, Thailand and Laos; one species was described from the Philippines and one from North Borneo; four species occur in Central Europe and two in the eastern areas of North America. More than half of all known species were described from Japan; most of them belong to the brachypterous *leptopus* group.

Subgenus **Amaroschesis** Tschitschérine, 1897

*Amaroschesis* Tschitschérine, 1897a: 28 [as genus].

Type species: *Zabrus chinensis* Fairmaire, 1886, designated by Andrewes (1938).

**Diagnosis.** Differing from *Trichotichnus* s. str. mostly in metepisternum wider (its anterior margin longer than inner margin) and only slightly narrowed posteriorly. Hind wings highly reduced. Elytra with lateral groove flat throughout or, in some species, with elongate convexity along this groove apically.

**Composition.** This subgenus comprises about 65 described species from China (Gansu, Shaanxi, Hubei, Sichuan, and Yunnan).

**Remarks.** *Amaroschesis* is morphologically similar to the *leptopus* group of the nominotypical subgenus (Kataev & Ito, 1999), and perhaps two these subgenera should be combined (Ito, 2002b).

Subgenus **Bottchrus** Jedlička, 1935

*Bottchrus* Jedlička, 1935: 8 [as genus]. Type species:

*Bottchrus philippinus* Jedlička, 1935, by monotypy.

*Bellogenus* Clarke, 1971: 264 [as genus]. Type species:

*Bellogenus amazeus* Clarke, 1971, by original designation.

*Pseudotrictichnus* Habu, 1973: 225 [as a subgenus of *Trichotichnus*]. Type species: *Trichotichnus nanus* Habu, 1954, by original designation.

**Diagnosis.** Fronto-ocular furrows deep throughout, reaching inner margin of eyes and continuing into deep supraorbital furrows. Fronto-clypeal suture deepened, fused laterally with fronto-ocular furrows. Genae moderately wide. Ligular sclerite narrow, not widened at apex, more or less parallel-sided or moderately narrowed apically. Paraglossa moderately wide or somewhat narrow, rounded apically, separated from ligular sclerite by narrow notch. Elytra with lateral groove flat throughout or (in some species), with elongate convexity along this groove apically forming short additional interval there. Elytral marginal umbilicate series with more or less wide gap at middle. Abdominal sternites without extra setae or with very fine and short setae medially. Abdominal sternite VII in male and female with two pairs of marginal setigerous pores. Gonocoxite with one or two stout setae on both ventral and dorsal outer edges at middle or basally. Median

lobe of aedeagus with apical orifice shifted to left and with apical capitulum in most species.

**Composition.** This subgenus includes more than 70 described species. Most of them are distributed over Southeastern Asia from Sri Lanka and Hindustan to southern China and Japan, south to Australia. One species, *T. amazeus* (Clarke, 1971), is known from Ethiopia. The systematic position of some species described from New Guinea and Australia needs further study.

**Remarks.** Morphologically well defined subgenus which is easily distinguished from other subgenera by having fronto-ocular furrows deep throughout, reaching deep furrows around inner margin of eyes (Habu, 1973; Noonan, 1985; Kataev, 2016).

**Key to subgenera of *Trichotichnus***

1. Fronto-ocular furrows deep throughout, reaching inner margin of eyes and continuing into deep supraorbital furrows. Fronto-clypeal suture deepened, fused laterally with fronto-ocular furrows. Ligular sclerite narrow, not widened at apex, more or less parallel-sided or moderately narrowed apically. Paraglossa moderately wide or somewhat narrow, rounded apically, separated from ligular sclerite by narrow notch . . . . . ***Bottchrus***
  - Fronto-ocular furrows shallow, at most deepened only at clypeus, reaching or not reaching supraorbital furrows, occasionally only slightly visible. Fronto-clypeal suture superficial or slightly deepened. Ligular sclerite narrow or widened at apex. Paraglossa wide or rather narrow, separated from ligular sclerite by narrow or wide notch . . . . . 2
2. Paraglossa narrow (Figs 39–42), notch between it and ligular sclerite wide, about as wide as paraglossa apically. Ligular sclerite widened at apex or almost parallel-sided. Last visible abdominal sternite (VII) of male with one or two pairs of marginal setigerous pores . . . . . 3
  - Paraglossa wider (Figs 4, 10, 18, 24, 31), notch between it and ligular sclerite narrow, much narrower than paraglossa apically. Ligular sclerite not widened apically, at most with outer angles slightly protruded laterally. Last visible abdominal sternite of male with two pairs of marginal setigerous pores . . . . . 4
3. Metepisternum slightly narrowed posteriorly, its anterior margin longer than inner margin. Species from mainland China . . . . . ***Amaroschesis***
  - Metepisternum markedly narrowed posteriorly, its anterior margin not longer than inner margin. Spe-



cies from China and other countries . . . . .

. . . . . *Trichotichnus* s. str.

4. Ligular sclerite (Figs 18, 24, 31) parallel-sided or slightly narrowed before apex. Elytral marginal umbilicate series with more or less wide gap at middle, occasionally with one intermediate pore in gap, consisting of 15–20 setigerous pores. Body wider and flatter . . . . . *Iridessus*
- Ligular sclerite (Figs 4, 10) markedly narrowed to apex. Elytral marginal umbilicate series continuous, consisting of 24–34 setigerous pores. Body more elongate and more convex . . . . .  
. . . . . *Parairidessus* subgen. nov.

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