Contribution to the knowledge of Chinese and Indian species of the genus *Agathidium* Panzer, 1797 (Coleoptera: Leiodidae: Leiodinae) - part I

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Abstract. Chinese species *Agathidium* (*Euryceble*) *excludum* sp. nov. and *Agathidium* (*Agathidium*) *dalianum* sp. nov. from Yunnan, *A.* (*A.*) *rhombicum* sp. nov. and *A.* (*A.*) *gordicum* sp. nov. from Sichuan and Indian *A.* (*A.*) *papillatum* sp. nov. from Uttaranchal state are described and compared with similar species. The position of some of the new species within the genus Agathidium is briefly discussed. The spermatheca of *A.* (*A.*) *smetalesi* Švec, 2011 is figured for the first time.

INTRODUCTION

Agathidium Panzer, 1797 is the most numerous genus within the family Leiodidae. It comprises 817 species, including subspecies 838 taxa currently. As *Agathidium* is a polyphyletic group in present state of understanding and as the great amount of the species belonging to the genus results in a very limited choice of taxa assessed for the phylogenetic analyses (Sun-Jae Park, Richard Leschen & Kee-Jeong Ahn 2013), the present generic concept is far from settled. Therefore assignment of some newly discovered species to a certain subgenus or even to a species group seems to be difficult or even it can be doubtful. Without any doubts this assumption concerns fully the new species *Agathidium excludum* sp. nov. that is described in the present paper. Therefore the assignment the species to the subgenus *Euryceble* Hlisnikovský, 1964 should be perceived as tentative and provisional. Taking into account the fact that many undescribed Chinese species are still at my disposal and also housed in various European museums, dozens new taxa can be expectedly discovered in China in the future, so this paper is held as the first element of the forthcoming study of the Chinese *Agathidium*. Beside the mentioned species of the subgenus *Euryceble*, there are described further four new species of the genus *Agathidium* belonging to *Agathidium* s. str., tentatively attributed to the *A. laevigatum* species group sensu Angelini (1993).

MATERIAL AND METHODS

Abbreviations of body parts and measurements:

AII-AXI	Antennomeres II-XI.
TI-TIII	Tarsomeres I-III.
AIII/AII	The ratio of the length or width of antennomeres III:II, analogously ratios between others antennomeres.
L	Length.
W	Width.
L/W or W/L	Ratio between measurements.

Terminology:

Supraocular carina = Antero-lateral raised marginal bead of head (e.g. Angelini 2004), i.e. carina at antero-lateral margin of head dorsum running from clypeus just above eyes

(if present) caudally,
subocular line = line or even carina bordering eyes on ventral side,
basal part of median lobe = median foramen (Park, Leschen & Ahn 2013),
median lobe = median lobe of aedeagus,
lateral angle = an angle detectable at elytral margin in lateral view (Švec 2014),
parallelogram = micro-sculpture represented by cells with predominantly parallel long transversally oriented strigosities connecting each other by short conjunctions.

Abbreviations of collections:

CNCO Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Canada;
NMPC National Museum, Praha, Czech Republic;
MSBC Collection of M. Schülke, Museum für Naturkunde Berlin, Germany;
SMTD Staatliches Museum für Tierkunde Dresden, Germany;
OUMNH Jonathan Cooter collection, Oxford University Museum of Natural History;
ZSPC Zdeněk Švec, Praha, private collection, Czech Republic.

The descriptions are based on holotypes. The variability is mentioned in the paragraph "Variability" if necessary and includes features exhibited by paratypes. Important characters of the sexual dimorphism are also included in the mentioned paragraph. Those characters that seem to be usual in the genus - e.g. presence of short recumbent setae in dorsal punctures, microsculpture of the venter, setosity on antennae, legs and venter, are not mentioned in the descriptions.

The examined material has been compared with the type and other *Agathidium* material deposited in ZSPC and in NMPC. The material mentioned in the present paper is deposited in the collections of CNCO, MSBC, OUMNH and in ZSPC. Indication of the place of the deposition CNCO added to the locality data at the type and other examined species should be considered as temporary; this means that the holotypes and a part of the paratypes series and of other studied material temporary deposited in CNCO will be eventually deposited in a public collection in China.

DESCRIPTIONS AND REMARKS

Agathidium (*Euryceble*) *excludum* sp. nov.

(Figs. 1-4, 22-24)

Type material. Holotype (♂): "CHINA: Yunnan, NE Kunming, 25°09'07''N, 102°53'46''E, 2280 m, secondary pine forest, with scattered old alder, litter sifted, 11.VIII.2014, M. Schülke [CH14-04]", (MSBC); paratypes (23 ♂♂, 22 ♀♀), same locality data, (MSBC, ZSPC); (1 ♂, 5♀♀): "CHINA: Yunnan, NE Kunming, 25°08'35''N, 102°53'49''E, 2320 m, mixed forest with alder, oak, and pine, litter and mushrooms sifted, 13.VIII.2014, leg. M. Schülke [CH14-06]", (MSBC, ZSPC).

Description. Length of body 2.1-2.6 mm, in holotype 2.6 mm. Length of body parts in holotype: head 0.4 mm, pronotum 1.0 mm, elytra 1.2 mm, antenna 0.8 mm, aedeagus 1.0 mm. Maximum width of body parts in holotype: head 0.9 mm, pronotum 1.4 mm, elytra 1.4 mm. The species is tentatively attributed to the subgenus *Euryceble* (see Discussion).

Oval, convex (Figs. 1, 22). Dorsum brown-black, legs red-brown. Antennomeres AI-AVIII red-brown, AIX-AXI yellow-red. Ventral surface yellow-brown with darker anterior longitudinal carina of mesoventrite. Dorsum punctured, with microsculpture. Sutural striae absent.

Head. Maximum width of head at eyes, Eyes very strongly convex (Fig. 23), supraocular carina

raised anteriorly before clypeus typically for the *Agathidium* belonging to *madurense* species group sensu Angelini (1993) and the species of the subgenus *Microceble* Angelini & De Marzo, 1986 or the subgenus *Euryceble*. Clypeus a little emarginate, straight at anterior margin; clypeal line or crest or lateral grooves not developed. Antennomere III a little longer than AII (AIII/AII=1.1). AIII shorter than AIV and AV together. Ratio of length of AII/AXI (AII=1.0): 1.0-1.1-0.7-0.9-0.6-0.6-0.6-1.0-1.3-1.8. Ratio of width of AII/AXI (AII=1.0): 1.0-0.9-0.9-0.9-1.0-1.1-1.3-1.9-2.1-2.1. Ratio of W/L of AII/AXI: 0.6-0.5-0.8-0.6-1.0-1.1-1.3-1.2-1.1-0.8. Surface of head microsculptured by irregular parallelograms. Beside sparsely arranged small and fine punctures separated approximately by *5-7* times their own diameter. Subocular line not developed.

Pronotum. Base curved backwardly, anterior margin flatly rounded. Sides moderately rounded in lateral view (Fig. 1). Surface microsculptured by parallelograms a little finer than those on head. Puncturation finer than that of head, separated by about 8-10 or even more times their own diameter.

Elytra. Lateral angle indistinct (Fig. 1). Basic puncturation similar as on pronotum. Between basic punctures, very small very fine extremely dense transversally extended line-shaped micro-punctures (about 0.004 mm long) detectable under higher magnification (200x or more). Toward apex these punctures becomes sparser and finer. Further very fine transverse, oblique and longitudinal lines forming irregular large cells containing one or more basic punctures detectable on elytral surface as it is usual in many other *Agathidium*. Sutural stria absent.

Legs. Anterior TI extremely dilated, broadly oval, broader than tibia at apex, emarginate in the articulation with TII, dorso-ventraly depressed, setose beneath, mid-tarsomere TI distinctly dilated. Tibia of usual size and width. Posterior femora without specific characters. Tarsal formula: *5*-5-4 in male; *5*-4-4 in female.

Mesoventrite. Anterior part raised, feebly sloping caudally, with distinct but obtuse longitudinal carina reaching middle level of mid-coxae. Lateral lines absent.

Metaventrite. Shortened. Central fovea-like depression transversally oval with several long erect setae. Femoral lines very short, very feebly developed, indistinct, detectable only in certain direction of light (Fig. 24). Membranous wings absent.

Genitalia. Aedeagus as in Figs. 2, 3. Operculum oval with distinct apical emargination. Spermatheca as in Fig. 4.

Variability. AIII/AII=1.1-1.3 in the type series. Line-shaped micro-punctures covering all the elytral surface and/or merge in some places each other forming transverse long lines in some of the paratypes. Tarsi slender in female. Metaventral depression missing in females.

Differential diagnosis. *Agathidium* (*Euryceble*) *excludum* sp. nov. is similar to *A.* (*Euryceble*) *antennatum* Hlisnikovský, 1964 from Malaysia in the shape of its body, absence of sutural striae, presence of dorsal microreticulation, the shape of head having strongly convex eyes and the shape of spermatheca. It differs by brown-black coloured dorsum, missing lateral clypeal carina and strongly shortened almost indistinct femoral lines.

Name derivation. The name of the new species derived from Latin excludo (= exclude) reminds of the difficulty concerning to the assignment to relevant subgenus.

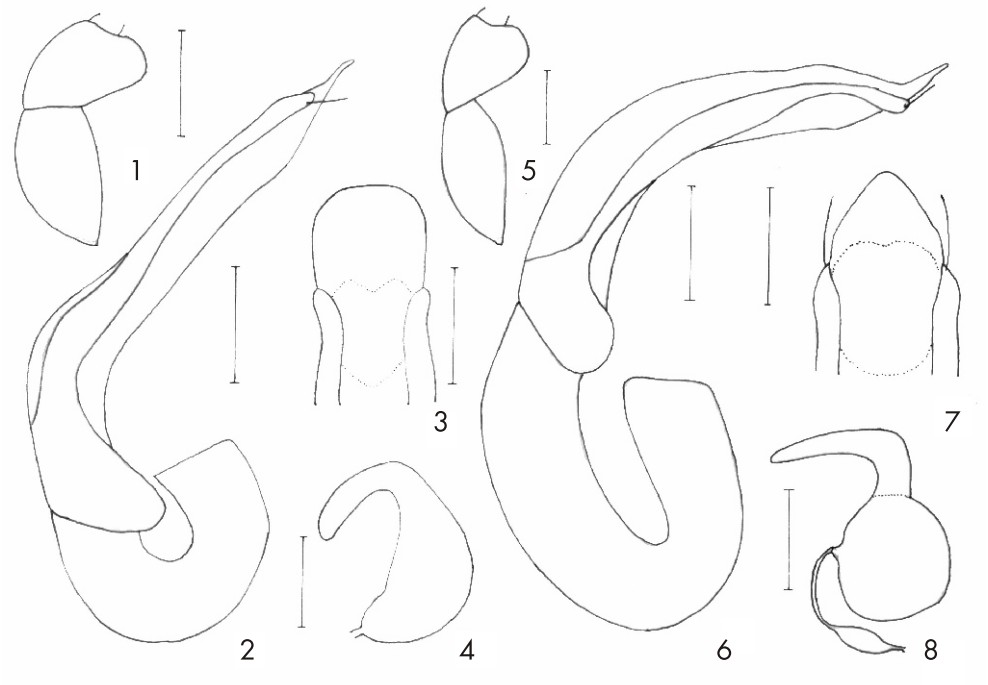
Discussion. *Agathidium excludum* sp. nov. stands between the subgenera *Agathidium* s.str., *Euryceble* Hlisnikovský 1964 and *Microceble* Angelini & De Marzo, 1986. As the differences

between all the four subgenera are based on quantitative characters only, it is difficult to state a sharp distinction between them and therefore to assign some species (in this case *A. excludum*) clearly to the correct subgenus. *A. excludum* conforms to all mentioned groups in presence of obtuse or not detectable lateral angle of elytra and presence of (even indistinct) femoral lines. Further *Agathidium excludum* conforms to:

- *Agathidium* s.str. by clypeus not bordered from rest of head by carina or grooves,
- *Euryceble* and *Microceble* by protuberant eyes and by raised supraocular carina close to clypeus,
- *Euryceble* by large head in comparison to pronotum (ratio of W pronotum/head = 1.53).

Taking into account the similarities mentioned above I decided to attribute *Agathidium excludum* with some reservation to the subgenus *Euryceble*.

There is also the possibility to follow the attitude presented by Wheeler & Miller (2005) attributing species not to the existing subgenera but only to species groups. This seems to be working for the New World *Agathidium* fauna but problems when sorting Old World *Agathidium* would not be eliminated. Thus, the "classic" concept of subgenera and species groups has been followed despite difficulties accompanying the decision about sorting to the groups. The difficulties can also be illustrated in the following species described below.



Figs. 1-8. 1-4: *Agathidium* (*Euryceble*) *excludum* sp. nov. 5-8: *Agathidium* (*Agathidium*) *dalianum* sp. nov. Figs. 1, 5 - shape of pronotum and elytra, lateral view; 2, 6 - aedeagus, lateral view; 3, 7 - apex of aedeagus dorsal view (dotted line indicates shape of operculum); 4, 8 - spermatheca. Scale bar = 1.0 mm in Figs. 1, 5; 0.2 mm in Figs. 2, 6; 0.1 mm in Figs. 3, 4, 7, 8.

Agathidium (*Agathidium*) *dalianum* sp. nov.

(Figs. 5-8, 25-27)

Type material. Holotype (♂): "CHINA, Dali, Yunnan Prov. 10.6.1993, Bečvář lgt." (ZSPC); paratypes (2 ♂♂): same data (ZSPC); paratypes (2 ♂♂, 2 ♀♀): "CHINA, Yunnan, E slope Cangshan at Dali, N 25°40'13.2'', E 100°07'54.8'', 2728 m, 13.v.2010, sift 09-11, V. Grebennikov" (CNCO, ZSPC); (1 ♂): "CHINA, Yunnan, E slope Cangshan at Dali, N 25°40'12.4'', E 100°07'27.2'', 10.v. 2010, 2764 m, sifting 02, V. Grebennikov" (CNCO); (4 ♂♂, 2 ♀♀): "CHINA, Yunnan, E slope Cangshan at Dali, N 25°40'18.6'', E 100°08'00.7'', 2590 m, 11.v.2010, sifting 06, V. Grebennikov" (CNCO, ZSPC); (1♀): "CHINA, Yunnan, E slope Cangshan at Dali, N 25°41'00.6'', E 100°07'19.1'', 2763 m, 14.v.2010, sifting 12, V. Grebennikov" (CNCO); (1 ♂, 2 ♀♀): "CHINA, Yunnan, E slope Cangshan at Dali, N 25°40'48.5'', E 100°07'48.8'', 12.v. 2010, 2724 m, sifting 07, V. Grebennikov" (CNCO, ZSPC); (3 ♂♂, 1 ♀): "CHINA (Yunnan) Dali Bali Autonom. Prov. Diancang Shan W Dali 24°41'20''N, 100°06'12'' E 3160 m (small creek valley) litter and debris sifted 27.v. 2007 D.W.Wrase [02]" (OUMNH, ZSPC); (2 ♀♀): "CHINA: Yunnan, Dali Bai Aut. Pref., mount. range E Weishan, 12 km NE Weishan, 25°17′02-15′′N, 100°22′23-30′′E, 2630-2660 m, scrub with pines and bamboo, litter sifted, 15.ix. 2009, leg. M. Schülke [CH09-54]" (MSBC, ZSPC); (1 ♂): "CHINA: Yunnan [CH07-02A] Dali Bai Autonom. Pref., Diancang Shan W Dali, 25°41′20′′ N, 100°06′12′′ E, 3160 m, small creek valley, litter and debris sifted, 28.v. 2007, M. Schülke" (MSBC); (3 ♂♂, 4 ♀♀): " CHINA: Yunnan [CH07-03], Dali Bai Auton. Pref., Diancang Shan W Dali, 25°41′49′′N, 100°06′24′′E, 2970 m, sifted at rock edges and under small shrubs, 28.V.2007, M. Schülke" (MSBC, ZSPC); (2 ♂♂, 5 ♀♀): "China: Yunnan, Dali Bai Aut. Pref., Zhemo Shan, 7 km NW Xiaguan, 25°32.33′ N, 100°10.11′ E, 2870-2970/ m, scrub with bamboo, oaks, Rhododendr., litter sifted, 18.ix. 2009, leg. M. Schülke [CH09-60]" (MSBC, ZSPC); (1 ♂): "China: N-Yunnan [C2005-09], Dali Bai Nat. Aut. Pref., Diancang Shan, 3 km W Dali old town, pine forest at "Cloud Road", 25°41.1′N, 100°06.8′ E, 2650-2750 m, 17.vi.2005, M. Schülke" (MSBC); (1 ♂): "CHINA: Yunnan, Lincang Pref. Wuliang Shan, old pass road, W side 24°42′58.6″ N, 100°29′52.0″E, 2200 m small creek valley with primary forest remnant, litter sifted, 16. ix. 2009, M. Schülke [CH09-47a]" (ZSPC); (4 ♂♂, 2 ♀♀): "China: Yunnan, Dali Bai Aut. Pref., Wuliang Shan, 9 km SW Weishan, 25°10´15.5´´ N, 100°14´21.8´´ E, 2450 m, scrub with (oak, alder, pine), litter & mushroom sifted 14.ix. 2009, leg. M. Schülke [CH09-51]" (MSBC, ZSPC); (1 ♂, 1 ♀): "China: N-Yunnan [C3-19A] Dali Bai Aut. Nat. Pref., Diancang Shan, 3 km W Dali old town pine forest at "Cloud Road", right upper chairlift station, 25°41.1′ N, 100°06.8′, 2650-2750 m // [C03-19A], pine needles, moss, (dry) in ditches, mushrooms, 30.viii.2003, leg. M. Schülke", (MSBC, ZSPC); (1 ♂, 1 ♀): "China: N-Yunnan [C3-19C] Dali Bai Aut. Nat. Pref., Diancang Shan, 3 km W Dali old town pine forest at "Cloud Road", right upper chairlift station, 25°41.1′ N, 100°06.8′, 2650-2750 m// [C03-19A], pine needles, moss, (dry) in ditches, mushrooms, trap 1.ix.2003, leg. M. Schülke" (MSBC, ZSPC); (1 ♂, 5 ♀♀): "CHINA: Yunnan [CH07-04]/ Dali Bai Auton. Pref., Diancang Shan W Dali, 25°41′47″N, 100°06′32″ E, 3016 m, moist escarpment, litter sifted 28.v.2007, M. Schülke" (MSBC, ZSPC); (1 ♂): "CHINA: Yunnan, Pu'er Pref. Ailao Shan, 37 km NW Jingdong 24°45′12″N, 100°41′24.5″ E, 2350 m devastated forest remont, litter & dead wood sifted, 13.ix.2009 leg. M. Schülke [CH09-48]" (MSBC); (1 ♀): "CHINA: Yunnan [CH07-04], Dali Bai Auton. Pref., Diancang Shan, W Dali, 25ş41.47′ N 100°06.32′ E, 3016 m, moist escarpment, litter sifted, 28.v.2007, leg. A. Pütz"// "Ankauf A. Pütz 2008 Eisenhüttenstadt, Tierkudemuseum DRESDEN" (SMTD); (1 ♂): "CHINA: Yunnan [CH07-02], Dali Bai Auton. Pref., Diancang Shan, W Dali, 25°41.20′ N 100°06.12′ E, 3160 m, small creek valley, litter and debris sifted 27.v.2007, leg. A. Pütz" // " Ankauf A. Pütz 2008 Eisenhüttenstadt, Tierkudemuseum DRESDEN" (SMTD); (5 ♀♀): "CHINA: Yunnan [CH07-35] Dali Bai Auton. Pref.Wuliang Shan, 9 km SW Weishan, 2450-/2500 m, 25°10′14″N, W slope 100°14′22″ E, oaks and pines/ sifted, 13.vi.2007, leg. A. Pütz" // "Ankauf A. Pütz 2008 Eisenhüttenstadt, Tierkudemuseum DRESDEN" (SMTD, ZSPC).

Description. Length of body 2.8-3.4 mm, in holotype 3.4 mm. Length of body parts in holotype: head 0.4 mm, pronotum 1.4 mm, elytra 1.6 mm, antenna 1.0 mm, aedeagus 1.0 mm. Maximum width of body parts in holotype: head 1.1 mm, pronotum 1.7 mm, elytra 1.7 mm.

Oval, flat (Figs. 5, 25). Head and elytra dark brown, pronotum and clypeus a little lighter. Legs and antennae light red-brown. Ventral surface red-brown. Dorsum punctured, entirely microsculptured. Sutural striae absent. The species can be tentatively assessed to the *A. laevigatum* group sensu Angelini (1993) - see also notes in the Discussion.

Head. Maximum width of head shortly before posterior margin of eyes (Fig. 26) Supraocular carina a little raised anteriorly before clypeus resembling the *Agathidium* belonging to madurense species group sensu Angelini (1993). Clypeus feebly emarginate, straight at anterior margin, clypeal line very feebly developed, almost not detectable. Clypeus can be recognized mainly by finer microsculpture. Antennomere AIII distinctly longer than AII (AIII/AII=1.7). AIII shorter than AIV and AV together. Ratio of length of AII/AXI (AII=1.0): 1.0-1.7-0.8-0.8-0.7-0.7-

0.7-1.0-1.2-2.1. Ratio of width of AII/AXI (AII=1.0): 1.0-0.9-0.9-1.0-1.0-1.3-1.2-1.6-1.7-1.6. Ratio of W/L of AII/AXI: 0.8-0.5-1.0-1.0-1.3-1.6-1.5-1.3-1.2-0.6. Microsculpture distinct, consisting of irregular parallelograms. Fine punctures separated approximately by 3-4 times their own diameter. Subocular line not developed.

Pronotum. Base curved backwardly, anterior margin almost straight in middle, rounded laterally, creating two feebly expressed very blunt rounded anterior angles. Sides broadly rounded in lateral view (Fig. 5). Surface microsculptured by irregular parallelograms a little finer than those on head. Puncturation finer than that of head, separated by about 4-6 or even more times their own diameter.

Elytra. Lateral angle indistinct (Fig. 5). Puncturation much larger, more distinctive than that on pronotum. Punctures separated by about 2-4 times their own diameter. Distinctly entirely microreticulate. Further very fine transverse, oblique and longitudinal lines forming irregular large cells containing one or more punctures detectable on elytral surface as it is usual in many other *Agathidium*. Sutural stria absent.

Legs. Anterior TI distinctly dilated, oblong oval, narrower than tibia at apex, dorso-ventrally depressed, emarginate in the articulation with TII, setose densely beneath, mid-tarsomere TI distinctly dilated. Tibia of usual size and width. Posterior femora with distinct tooth before apex. Tarsal formula: 5-5-4 in male; 5-4-4 in female.

Mesoventrite. Anterior part raised feebly sloping dorso-caudally with distinct but obtuse longitudinal carina reaching middle level of mid-coxae. Lateral lines absent.

Metaventrite. Well developed (Fig. 27). Femoral lines shortened, fine but distinct. Membranous wings absent.

Genitalia. Aedeagus as in Figs 4, 5. Operculum oval with slight apical emargination. Spermatheca as in Fig. 6.

Variability. AIII/AII=1.6-2.1 in the type series. The elytral micro-sculpture is stronger or even very strong and distinct simultaneously puncturation very feeble or almost indistinct in the paratypes from the type locality and in some paratypes from other localities. Clypeal line distinct in some of the paratypes or missing in others. Some of the paratypes possessing supraocular carina inobtrusive, low all along its length. Head of some paratypes is widest at posterior margin of eyes. Anterior margin of pronotum rounded, tarsi slender in female.

Differential diagnosis. *Agathidium* (*Agathidium*) *dalianum* sp. nov. is similar to *A.* (*A.*) *paralasti* Angelini & Cooter, 2003 from China (Fujian) in the colour of dorsum, in shape of head, a little raised supraocular carina before clypeus, in the absence of sutural striae, and in the shape of median lobe of the aedeagus in dorsal view. It differs by its smaller body, by the presence of microsculpture on entire dorsum, and by the apex of median lobe not raised in lateral view as the median lobe is in *A. paralasti*. The basal part of the spermatheca is pear-shaped in the new species while the same is short oval in *A. paralasti*.

Name derivation. The name of the new species is derived from the place of the origin.

Discussion. *Agathidium dalianum* sp. nov. stands between the species groups *Agathidium laevigatum* and *A. madurense*. It possesses great variable features that have been regularly considered for stable - height of the supraocular carina and presence or absence of the clypeal line.

Agathidium (*Agathidium*) *rhombicum* sp. nov.

(Figs. 9-12, 28-30)

Type material. Holotype (♂): "P.R. CHINA, Sichuan, NE slope Gongga Shan, N 29°50'50'', E 102°02'28'', 18.vi.2011, 3170m, sift 21, V.Grebennikov" (CNCO); paratypes (7 ♂♂, 14 ♀♀): same data (CNCO, ZSPC, OUMNH); (9 ♂♂, 5 ♀♀): "P.R. CHINA, Sichuan, NE slope Gongga Shan, N29°50'05" E102°02'53", 11.vi.2011, 3019m, sift 15, V.Grebennikov" (CNCO, ZSPC, OUMNH); (2 ♂♂): "P.R. CHINA, Sichuan, NE slope Gongga Shan, N29°47'49" E102°03'46", 14.vi.2011, 2684m, sift 18, V.Grebennikov" (CNCO); (2 ♂♂, 2 ♀♀): "P.R. CHINA, Sichuan, NE slope Gongga Shan, N29°48'15" E102°03'44", 06.vi.2011, 2765m, sift 11, V.Grebennikov" (CNCO, ZSPC); (2 ♂, 3 ♀♀): "P.R. CHINA, Sichuan, E slope Gongga Shan, N29°34'31" E102°00'31", 23.vi.2011, 2832m, sift 26, V.Grebennikov" (CNCO, ZSPC); (11 ♂♂, 5 ♀♀): "P.R. CHINA, Sichuan, NE slope Gongga Shan, N29°50'50" E102°02'28", 21.vi.2011, 3170m, sift 23, V.Grebennikov" (CNCO, ZSPC, OUMNH); (2 ♂♂, 1♀): "P.R. CHINA, Sichuan, NE slope Gongga Shan, N29°52'10" E102°02'01", 12.vi.2011, 3620m, sift16, V.Grebennikov"; (3 ♂♂, 4 ♀♀): "P.R. CHINA, Sichuan, NE slope Gongga Shan, N29°48'15" E102°03'44", 20.vi.2011, 2765m, sift22, V.Grebennikov" (CNCO, ZSPC).

Description. Length of body 3.1-3.5 mm, in holotype 3.5 mm. Length of body parts in holotype: head 0.6 mm, pronotum 1.3 mm, elytra 1.6 mm, antenna 1.2 mm, aedeagus 1.3 mm. Maximum width of body parts in holotype: head 1.2 mm, pronotum 1.7 mm, elytra 1.6 mm.

Oval (Fig. 28). Dorsum light chest-nut, entire antennae and legs yellow-red. Ventral surface red-brown with darker caudal part of mesoventrite. Dorsum punctured, elytra also with congregated micro-punctures resembling microreticulation in certain direction of light. Sutural striae absent. Species therefore attributed tentatively to the species group *A. laevigatum* sensu Angelini (1993).

Head. Maximum width of head at posterior margin of eyes. Eyes flatly drop-shaped (Fig. 29). Supraocular carina low, unobtrusive. Clypeus a little emarginate, feebly convex at anterior margin; clypeal line lacking. Antennomere AIII distinctly longer than AII (AIII/AII=1.5). AIII shorter than AIV and AV together. Ratio of length of AII/AXI (AII=1.0): 1.0-1.5-0.8-1.0-0.7-0.8-0.6-1.2-1.2-2.0. Ratio of width of AII/AXI (AII=1.0): 1.0-1.1-1.1-1.0-1.3-1.6-1.6-2.3-2.4-2.4. Ratio of W/L of AII/AXI: 0.6-0.5-0.8-0.7-1.1-1.3-1.6-1.2-1.2-0.7. Surface of head without microsculpture, with sparsely arranged small and fine punctures separated approximately by 7-8 or more times their own diameter. Subocular line not developed.

Pronotum. Shape in dorsal view as in Fig. 28. Sides moderately rounded in lateral view (Fig. 9). Surface without microsculpture with puncturation similar to that of head, separated by about 5-8 or even more times their own diameter.

Elytra. Basic puncturation stronger and denser than on pronotum, punctures separated by about 4-5 times their own diameter. Between basic punctures with very small very fine extremely dense micro-punctures separated by about 1-2 their diameter detectable under higher magnification. Toward apex, these punctures becomes sparser and finer. Spaces between micro-punctures seem to be a little raised, resembling microreticulation in some direction of light. Further very fine transverse, oblique and longitudinal lines forming irregular large cells containing one or more basic punctures detectable on elytral surface as it is usual in many other *Agathidium*. Sutural stria absent. Lateral angle indistinct (Fig. 9).

Legs. Anterior TI dilated, broadly oval, narrower than tibia at apex, emarginate in the articulation with TII, dorsoventral depressed, setose beneath. Also anterior TII, TIII and mid-tarsomere TI distinctly dilated. Tibia of usual size and width. Posterior femora with distinct tooth at distal quarter at its hind margin. Tarsal formula: 5-5-4 in male; 5-4-4 in female.

Mesoventrite. Anterior part raised, feebly sloping with obtuse faint longitudinal carina reaching middle level of mid-coxae. Lateral lines present, shortened.

Metaventrite. Well developed (Fig. 30). Femoral lines very long, reaching almost lateral margin of metaventrite. Small depression in middle equipped with several erected setae. Membranous

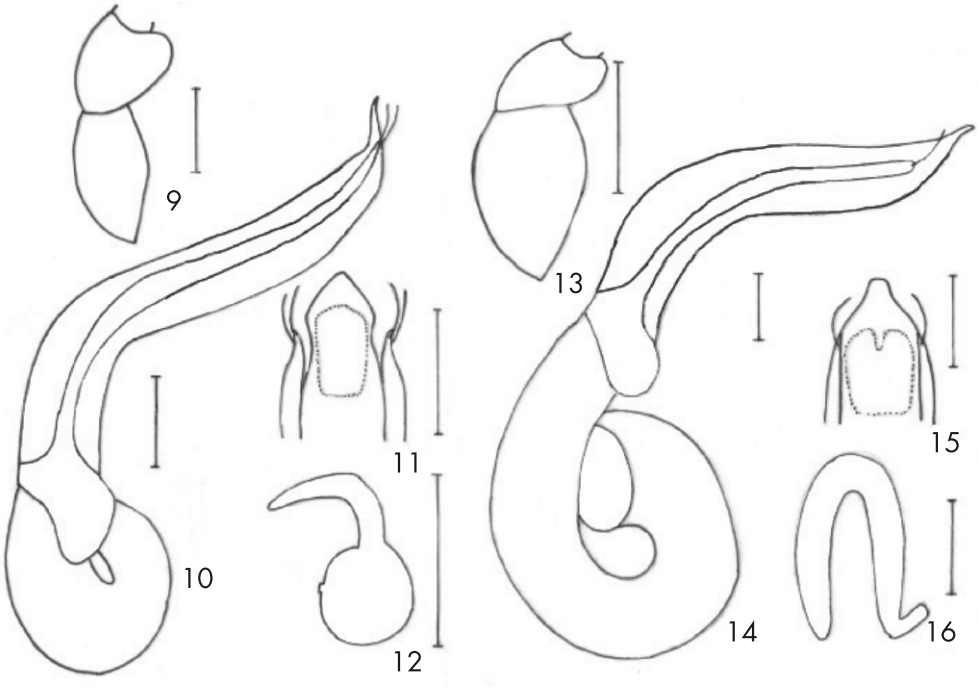
wings absent.

Genitalia. Aedeagus as in Figs. 10, 11. Operculum oval shield-shaped. Spermatheca as in Fig. 12.

Variability. AIII/AII=1.3-1.5 in the type series. Micro-punctures missing in most of the male paratypes while they cover all the elytral surface in female paratypes. Anterior margin of pronotum rounded, tarsi slender in females. Female metaventrite without depression and erect setae.

Differential diagnosis. *Agathidium* (*A.*) *rhombicum* sp. nov. is similar to *A.* (*Agathidium*) *zdeneki* Angelini, 2002 from China (Shaanxi, Hubei) in the absence of sutural striae, presence of dorsal microsculpture and mainly in the shape of the aedeagus and the shape of spermatheca. It differs by chest- nut coloured dorsum, head widest at the posterior margin of eyes and by the proximal part of the median lobe strongly lifted.

Name derivation. The name of the new species is derived from the Latin (and English) word rhombus reminding of the shape of the apex of the median lobe.



Figs. 9-16. 9-12: *Agathidium* (*Agathidium*) *rhombicum* sp. nov. 13-16: *A.* (*A.*) *papillatum* sp. nov. Figs. 9, 13 - shape of pronotum and elytra, lateral view; 10, 14 - aedeagus, lateral view; 11, 15 - apex of aedeagus dorsal view (dotted line indicates shape of operculum); 12, 16 - spermatheca. Scale bar = 1.0 mm in Figs. 9, 13; 0.2 mm in Figs. 10, 14; 0.1 mm in Figs. 11, 12, 15, 16.

Agathidium (*Agathidium*) *papillatum* sp. nov.

(Figs. 13-16, 31-33)

Type material. Holotype (♂): "N-India, Uttaranchal state, co 30 km N of Bageshwar, SE of Dhakuri vill., 2600-2800 m, 25.-26.vi.2003, Z. Kejval & M. Trýzna lgt." (ZSPC); paratypes (4 ♂♂, 3 ♀♀): same data, (ZSPC); (1 ♂): "N-India, Uttaranchal state, Mainital, China Peak env., 1900-2300 m, 18.-19.vii.2003, Z. Kejval & M. Trýzna lgt." (ZSPC).

Description. Length of body 2.1-2.4 mm, in holotype 2.2 mm. Length of body parts in holotype: head 0.4 mm, pronotum 0.7 mm, elytra 1.1 mm, antenna 0.8 mm, aedeagus 0.8 mm. Maximum width of body parts in holotype: head 0.9 mm, pronotum 1.1 mm, elytra 1.2 mm.

Short oval (Fig. 31). Head and elytra chest-nut, pronotum lighter, legs and antennomeres AI-AVIII reddish, AIX-AXI darker, chest-nut coloured. Ventral surface yellow-red. Dorsum punctured and microsculptured. Sutural striae absent. Species therefore attributed to the species group *A. laevidgatum* sensu Angelini (1993).

Head. Maximum width of head just before posterior margin of eyes. Eyes flatly convex (Fig. 32). Supraocular carina low, unobtrusive. Clypeus a little emarginate, straight at anterior margin, clypeal line lacking. Antennomere III distinctly longer than AII (AIII/AI=1.9). AIII longer than AIV and AV together. Ratio of length of AII/AXI (AII=1.0): 1.0-1.9-0.9-0.8-0.6-0.8-0.6-1.3-1.3-2.1. Ratio of width of AII/AXI (AII=1.0): 1.0-0.9-0.7-0.9-0.9-1.0-0.9-1.6-1.9-1.9. Ratio of W/L of AII/AXI: 0.9-0.4-0.7-1.0-1.2-1.2-1.2-1.1-1.3-0.8. Surface of head with feebly expressed microreticulation, with very sparsely arranged small and fine punctures separated more than 10 times their own diameter. Subocular line not developed.

Pronotum. Shape in dorsal view as in Fig. 31. Sides moderately rounded in lateral view (Fig. 13). Surface with microreticulation more distinct than that on head, with puncturation similar to that of head, separated by more than 10 times their own diameter.

Elytra. Lateral angle indistinct (Fig. 13). Microreticulate similarly as on head. Puncturation almost not detectable, punctures small, fine very widely distributed. Further extremely fine transverse, oblique and longitudinal lines forming irregular large cells detectable in some places on elytral surface as it is usual in many other *Agathidium*. Sutural stria absent.

Legs. Anterior TI and TII distinctly dilated heart-shaped, narrower than tibia at apex, dorso-ventrally depressed, setose beneath. Also mid-tarsomere TI and TII distinctly dilated. Tibia of usual size and width. Posterior femora without any specific characters. Tarsal formula: 5-5-4 in male; 4-4-4 in female.

Mesoventrite. Anterior raised part gradually sloping, without longitudinal carina. Lateral lines absent.

Metaventrite. Shortened, as in Fig. 33. Femoral lines fine, shortened, approximately at medial third of metaventrite width merging with posterior margin of mid-coxal holes. Small transversally oval depression in middle equipped with several erect setae. Membranous wings absent.

Genitalia. Aedeagus as in Figs. 14, 15. Operculum oval with longitudinal notch, almost U-shaped. Spermatheca as in Fig. 16.

Variability. AIII/AII=1.6-1.9 in the type series. Distinct micro-reticulation covers all the elytral surface of the female paratypes. Tarsi slender in females. Female metaventrite without depression and without erected setae.

Differential diagnosis. *Agathidium* (*A.*) *papillatum* sp. nov. is similar to *A.* (*Agathidium*) *excelsum* Angelini & De Marzo, 1994 from Nepal in the size and colour of the dorsum, absence

of sutural striae, presence of dorsal microreticulation and mainly in the shape of the aedeagus and of the spermatheca. It differs by flatly convex eyes, by head widest shortly before posterior margin of eyes, by antennal club darker than the rest of antenna, while eyes are quite flat, head of the rhombic shape widest at posterior margin of eyes, antennae entirely unicoloured, reddish, in *A. excelsum*. The basal part of the median lobe is ring-shaped in *A. papillatum* while the same is spiral in *A. excelsum*. The median lobe is roundly tapered to the apical nipple in *A. papillatum* while the apex of the median lobe is constricted far before apical nipple in *A. excelsum*. The basal part of the spermatheca is protracted in a short appendix directed outwardly while the basal part of the spermatheca in *A. excelsum* is shortly bent inwardly.

Name derivation. The name of the new species is derived from the Latin word papilla (= nipple in English) reminds of the apical nipple of the aedeagal apex.

Agathidium (*Agathidium*) *gordicum* sp. nov.

(Figs. 17-20, 34-37)

Type material. Holotype (♂): "P.R. CHINA, Sichuan, NE slope Gongga Shan, N29°47'49" E102°03'46", 14.vi.2011, 2684m, sift 18, V.Grebennikov" (CNCO). Paratypes (5 ♂♂, 3 ♀♀): same data as the holotype (CNCO, ZSPC, OUMNH); (2 ♂♂, 3 ♀♀): "P.R. CHINA, Sichuan, NE slope Gongga Shan, N29°47'41" E102°03'37", 07.vi.2011, 2583m, sift 12, V.Grebennikov" (CNCO, ZSPC); (2 ♂♂): " P.R. CHINA, Sichuan, E slope Gongga Shan, N29°34'31" E102°00', 31", 23.vi.2011, 2832m, sift 26, V.Grebennikov" (CNCO, ZSPC); (4 ♂♂, 9 ♀♀): "P.R. CHINA, Sichuan, NE slope Gongga Shan, N29°48'15" E102°03'44", 06.vi.2011, 2765m, sift11, V.Grebennikov" (CNCO, ZSPC).

Description. Length of body 1.7-2.1 mm, in holotype 1.8 mm. Length of body parts in holotype: head 0.3 mm, pronotum 0.8 mm, elytra 0.7 mm, antenna 0.6 mm, aedeagus 1.0 mm. Maximum width of body parts in holotype: head 0.7 mm, pronotum 1.1 mm, elytra 1.1 mm.

Short oval (Fig. 34). Head and elytra dark brown, pronotum a little lighter, antennomeres yellow-red. Legs yellow-brown. Ventral surface reddish. Dorsum punctured, with microsculpture. Sutural striae absent. Species therefore attributed to the species group *A. laevidgatum* sensu Angelini (1993).

Head. Maximum width of head just before posterior margin of eyes. Eyes very flat in dorsal view, visible as marginal strip (Fig. 35), narrow in lateral view. Supraocular carina low, unobtrusive separated also caudally behind eyes, not merging subocular line. Clypeus a little emarginate, straight at anterior margin, clypeal line lacking. Antennomere AIII a little longer than AII (AIII/AII=1.1) and a little longer than AIV and AV together. Ratio of length of AII/AXI (AII=1.0): 1.0-1.1-0.5-0.4-0.4-0.5-0.4-0.7-0.8-1.4. Ratio of width of AII/AXI (AII=1.0): 1.0-0.7-0.7-0.7-0.7-1.2-1.2-1.8-2.0-1.8. Ratio of W/L of AII/AXI: 0.5-0.4-0.8-1.0-1.0-1.4-1.8-1.4-1.3-0.7. Surface of head with feebly but distinctly developed microreticulation, with extremely fine small sparsely irregularly arranged punctures separated 5- 10 or more times their own diameter

Pronotum. Shape in dorsal view as in Fig. 34. Sides moderately rounded in lateral view (Fig. 19). Surface with microreticulation less distinct than that on head, with puncturation even finer and sparser than on head.

Elytra. Lateral angle indistinct (Fig. 19). Micro-reticulation less distinct than that on head but stronger than on pronotum. Puncturation similar to that on pronotum. Sutural stria absent.

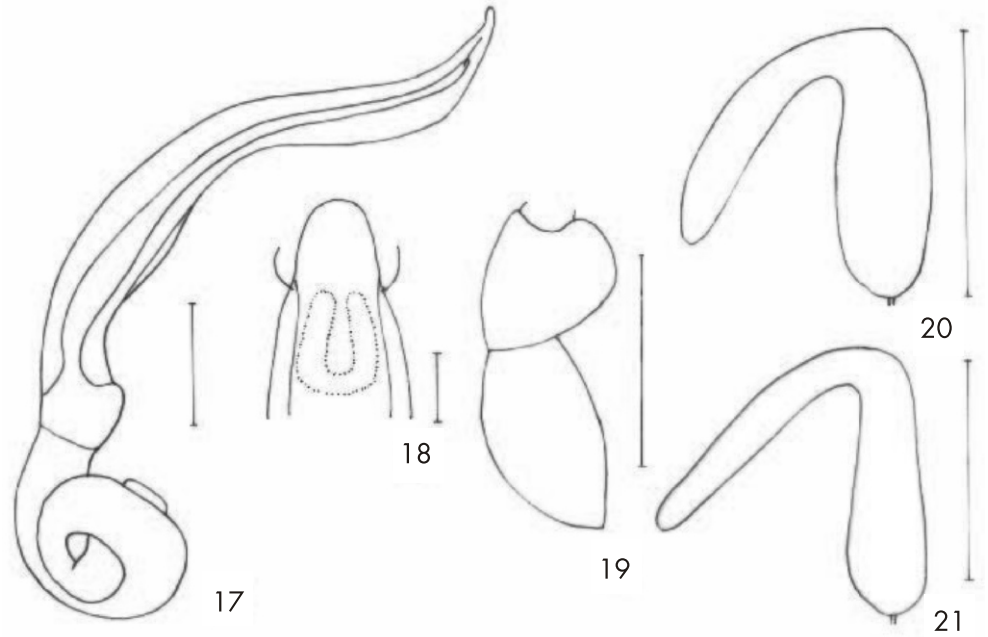
Legs. Anterior TI distinctly dilated, oblong oval, narrower than tibia at apex, dorso-ventrally depressed, setose beneath, distinctly longer than TII+TIII together. Tibia of usual size and width. Posterior femora without any specific characters. Tarsal formula 4-4-4 in male and also in female.

Mesoventrite. Anterior raised part gradually sloping dorso-caudally without longitudinal carina. Lateral lines absent.

Metaventrite. Strongly shortened. As in Fig. 36. Femoral lines fine but distinct, very closely approaching posterior margin of mid-coxal holes. Small transversally oval depression in middle equipped with several erect setae. Membranous wings absent.

Genitalia. Aedeagus as in Figs. 17, 18, 37. Operculum oval with long longitudinal notch, almost U-shaped. Basal part of median lobe knotted. Spermatheca as in Fig. 20.

Variability. AIII/AII=1.1-1.2 in the type series. Micro-reticulation well expressed on head, weakly developed on pronotum and elytra in some paratypes. Tarsi slender in females. Female metaventrite without depression and without erect setae.



Figs. 17-21. 17-20: *Agathidium* (*Agathidium*) *gordicum* sp. nov. 21: *A.* (*A.*) *smetalesi* Švec, 2011. Fig. 17 - aedeagus, lateral view; 18 - apex of aedeagus dorsal view (dotted line indicates shape of operculum); 19 - shape of pronotum and elytra, lateral view; 20, 21 - spermatheca. Scale bar = 0.2 mm in Fig. 17, 1.0 mm in Fig. 19, 0.1 mm in Figs. 18, 20, 21.

Differential diagnosis. *Agathidium* (*A.*) *gordicum* sp. nov. is similar to *A.* (*Macroceble*) *truncatum* Angelini, 2000 from China (Shaanxi, Sichuan) in the shortened metaventrite, size and colour of the dorsum, similar length ratio of AIII/AII, in eyes reduced to a narrow strip dorsally viewed, in the absence of sutural striae and presence of dorsal microreticulation. It differs by the presence of microreticulation on head and pronotum, by flatly unobtrusively emarginate clypeus, that is emarginate distinctly in *A. truncatum*, it differs mainly in the rounded shape of the median lobe and the shape of spermatheca simply U-shaped with stouter basal part.

Discussion. *Agathidium gordicum* sp. nov. is compared in the Differential diagnosis to morphologically closely standing *A. truncatum*, despite the fact, that Angelini (2000) attributed *A. truncatum* to the subgenus *Macroceble* Angelini, 1993. As the difference between the subgenus *Agathidium* and subgenera *Macroceble* and *Euryceble* is obviously quantitative as

to the shortened metaventrite and the short distance between mid- and hind coxae, I take into account mainly the presence or absence of the femoral lines. As *A. gordicum* possesses distinct femoral lines I attribute the species to the subgenus *Agathidium* being simultaneously aware, that structures resembling femoral lines can also be detected on metaventrite of *A. truncatum*.

Name derivation. The name of the new species points to the complicated, knotted basal part of the median lobe in the new species reminiscent of the Gordian Knot cut by Alexander the Great in the well known legend.

Agathidium (*Agathidium*) *smetalesi* Švec, 2011
(Fig. 21)

Material examined: "P.R. China, Yunnan E/ slope N Gaoligongshan,/ N274°6.8' E098°33.1'// 12.-15.vi.2009, 2000/-3000m, sifting 1-7/ V.Grebennikov", 10 ♂♂, 20 ♀♀, (CNCO, ZSPC).

Remark. The spermatheca is figured here for the first time (Fig. 21).

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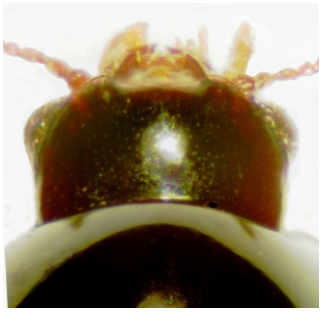

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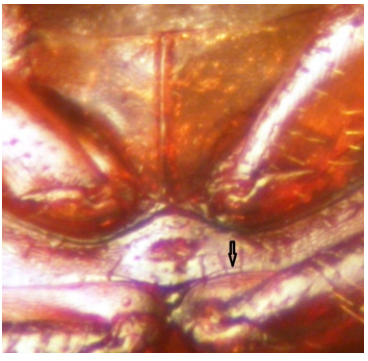

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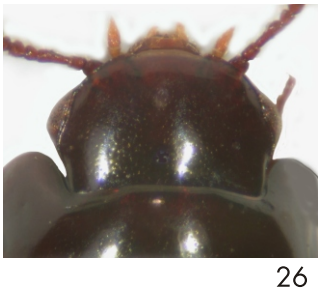

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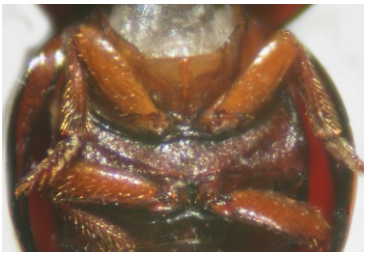

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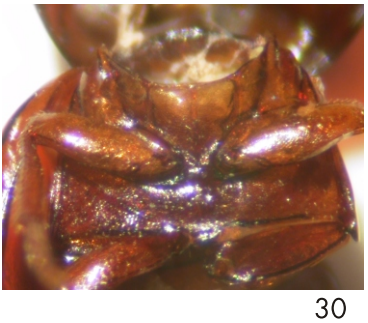

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Figs. 22-30. 22-24: *Agathidium* (*A.*) *excludum* sp. nov. 25-27: *A.* (*A.*) *dalianum* sp. nov.; 28-30: *A.* (*A.*) *rhombicum* sp. nov. Figs. 22, 25, 28 - body, dorsal view (holotypes); 23, 26, 29 - head, dorsal view; 24, 27, 30 - metaventrite.


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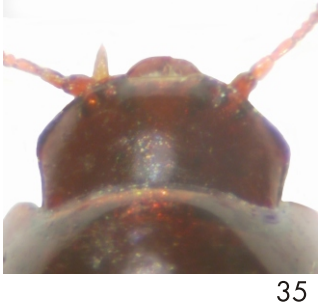
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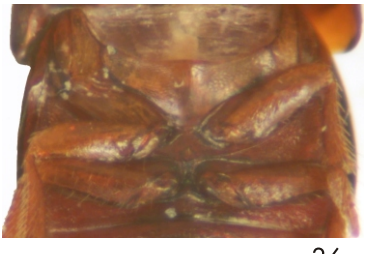
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Figs. 31-37. 31-33: *Agathidium* (*A.*) *papillatum* sp. nov.; 34-37 *A.* (*A.*) *gordicum* sp.nov. Figs. 31, 34 - body, dorsal view (holotypes); 32, 35 - head, dorsal view; 33, 36 - metaventrite; 37 - aedeagus, dorsal view on basal part of median lobe.