

**The *Liatongus* species with moveable clypeal horn
(Coleoptera: Scarabaeidae)**

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Abstract. Currently the genus *Liatongus* Reitter, 1892 contains the following five species with moveable clypeal horn: *L. ancorifer* sp. n. (China: Yunnan prov.), *L. appositicornis* sp. n. (China: Gansu prov.), *L. clypeicornis* Scheuern, 1988 (Bhutan), *L. hastatus* sp. n. (Nepal) and *L. triacanthus* (Boucomont, 1920) (Sikkim, Darjeeling; first record for China: Xizang here given). Diagnostic characters including parameres of the three newly described species are illustrated. Female of *L. triacanthus* is described for the first time. Table with characters separating *Liatongus* species with moveable clypeal horn from each other is given. Taxonomic position of the species closely related to *L. triacanthus*, distinctive defensive behaviour and potential necrophagy are discussed.

Taxonomy, new species, distribution, Coleoptera, Scarabaeidae, Scarabaeinae, Oniticellini, Palaearctic region, Oriental region

Introduction

The dung beetle genus *Liatongus* Reitter, 1893 comprises recently more than 40 species distributed worldwide except the Australian region (Balthasar, 1963; Ferreira, 1969). Identification of Oriental species remained difficult until Balthasar (1963) produced monograph included a key to all to that time known species of this genus distributed in the Palaearctic and the Oriental regions. The only systematic contribution concerning above regions since that time has been the paper by Scheuern (1988) with description of *L. clypeicornis*. In the present paper three new peculiar *Liatongus* species with moveable clypeal horn are described from the transition zone between the Palaearctic and Oriental regions.

Material and methods

At least five specimens, if available of each species under study, were dissected for examination of parameres. Specimens chosen for scanning electron micrographs were cleaned by ultrasound.

The following codes (after Arnett et al., 1993) identify the collections housing the material examined:

DACD Germany, Dresden, Dirk Ahrens collection;
DKCP Czech Republic, Praha, David Král collection;
JRCP Czech Republic, Poděbrady, Jiří Rejsek collection;
MNHN France, Paris, Museum national d'histoire naturelle (Y. Cambefort);
NHMB Switzerland, Basel, Naturhistorisches Museum (M. Brancucci);
VBCP Czech Republic, Praha, Vladimír Beneš collection.

Specimens of the newly described species are provided with one red printed label: [Name of a taxon] sp. n. HOLOTYPUS, ALLOTYPUS or PARATYPUS with No, [symbol for male or female], David Král & Jiří Rejsek det. 1996. Exact label data are cited for the type material only, separate labels are indicated by double slash (//). Author's remarks and complementations are found in square brackets. Abbreviations used: [p] – preceding data printed, [h] – the same but handwritten, HT – holotype, AT – allotype, PT – paratype.

Systematic part

Liatongus ancorifer sp. n.

(Figs 1-3, 7-9, 13-15, 19-21, 26-27)

Type material. HT (male), AT (female) and PT Nos 1-8 (males) and Nos 9-18 (females), labelled: China N-YUNNAN 27°18' N, 100°13' E Jinsha r. vall. 1900 m DAJU, HUTIAO gorge lgt. D. Král 15-17/7' [19]90; PT Nos 19-54 (males) and Nos 55-133 (females): YUNNAN cca 2000 m 27.15N 100.09E HUTIAO gorge Jinsha r. 18-22/7. [19]92 David Král leg.; PT Nos 134-143 (males) and 144-147 (females): CHINA N. Yunnan Haba mts. HUTIAOXIA h=2400 m S. Murzin [legit] 21.-26.6.1996. HT, AT and PT Nos 1-37, 43-54, 70-136, 144 in DKCP; PT Nos 38-42, 55-69, 137, 145-147 in JRCP.

Description. Body length 7.9-10.2 mm (HT 10.2 mm, AT 9.8 mm); colour dark brown; body and extremities in general appearance shagreened and opaque; setation reddish brown to pale.

Male (HT). Head coarsely, densely and approximately regularly punctate; punctures approximately circular, superficial, anterolaterally approximately equal in size; surface of each puncture microreticulized, usually bearing thickened, erect seta; setae of different size, longer ones lanceolate with ravelled out surface; on genae punctation becoming denser; vertex with punctures rather sparser and smaller; narrow area around clypeal horn impunctate. Surface between punctures microsculptured, moderately shiny. Anterior margin of clypeus weakly emarginate, each side of emargination with slightly upturned obtuse denticle; anterolateral margin feebly arcuate to complete, distinctly impressed clypeogenal suture. Clypeal horn (Figs 1-2) moveable, very long, extended to pronotal horns; basal two thirds regularly broadly arcuate (horn remarkably remote from head), than almost straight until apex; basis as wide as anterior clypeal emargination; before apical

third with two broad, anchor-shaped, lateroventrally directed protuberances, apices of protuberances curved anteriorly; apex of horn flattened laterally, regularly rounded. Dorsal surface of horn coarsely, densely, almost regularly punctate; punctures approximately circular, apically and laterally becoming more or less elliptic, each puncture usually bearing short, thick, apically ravelled out seta, punctures separated by less than their diameter (Fig. 19); surface between punctures not microsculptured, moderately shiny; ventral surface glabrous, shiny. Lateral margin of gena regularly arcuate, from clypeus separated by shallow emargination.

Pronotum remarkably wider than elytra, maximum width in anterior third; unevenly convex, discal area depressed, anteromedially with distinct longitudinal keel; each side lateromedially with distinct impression. Anterior angles almost rectangular, lateral margin in anterior quarter nearly straight, at anterior third arcuate, than nearly straight to basis (Fig. 2). Two posterolateral horns (Fig. 1) long, erect, directed slightly posteriorly; remarkably distant each other (horn basis situated approximately at level of elytral interval 4); at basis inside rather flattened, slightly convergent inwards and slightly regularly curved inwards and anteriorly. Anterior angles finely bordered and slightly crenulate, anterior and lateral margin bordered, basis not bordered. Punctuation (cf. Fig. 7) consisted of large, superficial, circular to irregularly oval or elliptic (especially on lateral sides of horns) punctures of unequal size; anterolaterally and laterally punctures confluent, discally and along basis punctures becoming smaller and more sparser; area between horns only with several very irregularly spaced punctures; horns anteromedially glabrous and shiny. Surface of each puncture microreticulized; usually bearing (predominantly laterally and anterolaterally) short, lanceolate seta; surface of setae ravelled out (Figs 20, 21). Surface between punctures finely transversally microsculptured, moderately shiny.

Scutellum (cf. Fig. 8) parallelsided, apex rounded; surface microsculptured, moderately shiny, with several indistinct punctures.

Elytron remarkably flattened with interval 8 distinctly swollen, in dorsal aspect anterior two thirds of lateral elytral margin invisible. Striae (cf. Figs 8, 9) distinctly impressed, superficial, relatively wide, with microsculptured and opaque surface; striae punctures large, superficial, indistinctly microsculptured, shiny, bearing very short seta, remarkably crenating intervals margins, separated by more or less their diameter. Intervals (cf. Figs 8-9) distinctly microreticulized, opaque, with small, shiny granules, each granula usually bearing short, lanceolate, erect seta; surface of seta distinctly ravelled out; sutural interval angustate, eleviate, with setae longer than in remaining intervals and arranged in one close row; intervals 2-5 flat, intervals 2 and 4 basally a little wider than intervals 3 and 5, interval 6 narrowed basally; setiferous granules of intervals 2-3 sparsely distributed and arranged in two rather irregular rows, granules of intervals 4-8 spaced closer and not arranged in rows. Epipleural carina distinctly developed, epipleuron with small, shiny, sparsely and irregularly spaced granules.

Metasternum (cf. Fig. 15) slightly convex, with medial longitudinal impunctate line and shallow posterior depression; punctation double, consisted of coarse, superficial, more or less circular punctures, intermixed with fine and sparsely distributed ones. Surface of punctures setiferous.

Punctation of femora (cf. Figs 13, 14) double, consisted of coarse, superficial, different in shape (circular, oval, elliptic to kidney-shaped), densely and almost regularly distributed punctures, intermixed with fine and sparsely distributed ones. Surface of coarse punctures microreticulized, each puncture usually bearing short, lanceolate seta, setae of different length. Some punctures, predominantly of meso- and metafemur confluent. Surface between punctures opaque.

Pygidium basally not bordered; unevenly convex, with depressed areas medially and posterolaterally; surface distinctly microsculptured, opaque, punctures coarse, sparse, superficial, bearing erect, lanceolate setae. Ventrites microsculptured, punctures and setae hardly indicated.

Parameres (Figs 26, 29).

Female (AT) differs from male in the following characters: clypeal and pronotal horns missing; clypeus entirely punctate, punctation anteromedially sparser and finer, but surface between punctures entirely opaque; pronotum convex with medial area flattened, entirely punctate; last two ventrites medially not angustate.

Variability. Above described holotype is an example of maximally developed male "major". In weakly developed male "minor" clypeal horn is entirely vanished and pronotal horns are reduced to weak protrusions situated in anterior third of pronotum (Fig. 3). Between these two extremes we can find a scale of transitional specimens. Clypeal and pronotal horns are of different length, anchor-shaped protuberances are differently reduced to triangular denticles of different size. The more reduced the horns, the further anteriorly they are situated (PT Nos 27-37).

Differential diagnosis. See Table 1.

Collection circumstances. Specimens collected in 1990 were found buried under dry dog excrements; specimens from 1992 were all taken from under one dry dog cadaver together with representatives of the families Trogidae and Histeridae; and specimens from 1996 were taken from pitfall traps. The locality Hutiaoxia [= Tiger gorge] represents open, deep valley of the Yangtze River grown with relatively highly xerothermic steppe-like vegetation, situated between the Yulongshan and the Habashan mountain ranges.

Name derivation. The specific name, a Latin adjective "ancorifer" (anchor bearing), refers to the shape of moveable clypeal horn of the new species.

Distribution. China: Yunnan prov.

Liatongus appositicornis sp. n.

(Figs 4-6, 10-12, 16-18, 22-24, 28-29)

Type material. HT (male), AT (female) and PT Nos 1-22 (males) and Nos 23-38 (females), labelled: China, S Gansu prov., Venxian env., 18.-26.6.1995, Beneš lgt. [p]. HT, AT and PT Nos 5-10 and 26-28 in DKCP; PT Nos 1-4, 23-25 in JRCP; PT Nos 11-22, 29-38 in VBCP.

Description. Body length 8.3-9.6 mm (HT 9.0 mm, AT 9.6 mm); colour dark brown; body and extremities in general appearance shagreened and opaque; setation reddish brown to pale.

Male (HT). Head coarsely, densely and approximately regularly punctate; punctures approximately circular, superficial, anteriorly strongly unequal in size; surface of each puncture microreticulized, bearing medially thickened, erect seta; setae of different size, longer ones, lanceolate with ravelled out surface; on genae punctation becoming denser; vertex with punctures rather sparser and smaller; narrow area around clypeal horn impunctate. Surface between punctures microsculptured, moderately shiny. Anterior margin of clypeus weakly emarginate, each side of emargination with slightly upturned obtuse denticle; anterolateral margin regularly arcuate to complete, distinctly impressed clypeogenal suture. Clypeal horn (Figs 4, 5) moveable, very long, extended approximately between pronotal horns; basally regularly curved, than almost straight, apical part curved posteroventrally (remarkably adjoining to head in lateral aspect); basis as wide as anterior clypeal emargination; just behind of middle with two nearly triangular, approximately laterally directed protuberances; protuberances prolonged posteriorly in long obtuseangled protrusions, directed more ventrally than protuberances; apex laterally flattened, regularly rounded. Dorsal surface of horn coarsely, densely, almost regularly punctate; punctures approximately circular, apically and laterally becoming more or less elliptic, each puncture usually bearing short, thick, apically ravelled out seta (Fig. 22), punctures separated by less than their diameter; surface between punctures not microsculptured, moderately shiny; ventral surface glabrous, shiny. Lateral margin of gena regularly arcuate, from clypeus separated by shallow emargination.

Pronotum wider than elytra, maximum width in anterior third; unevenly convex, discally depressed, medioanteriorly slightly elevate; each side mediolaterally with distinct impression. Anterior angles almost rectangular, lateral margin in anterior quarter nearly straight, than broadly regularly arcuate, before basis slightly sinuate (Fig. 5). Two posterolateral horns (Figs 4, 5) very long, erect, being more or less rectangular to dorsal plane of pronotum; remarkably distant each other (horn basis situated approximately at level of elytral interval 4); at basis inside rather flattened, slightly convergent inwards and slightly regularly curved inwards and anteriorly. Anterior angles finely bordered and slightly crenulate, anterior and lateral margin bordered, basis not bordered. Punctation (cf. Fig. 10) consisted of large, superficial, circular to irregularly oval or elliptic (especially on lateral sides of horns) punctures of unequal size; arranged anterolaterally and laterally in nearly reticulate structure,

punctures not confluent; discally and along basis punctures becoming smaller and more sparser; area between horns only with several very irregularly spaced punctures; horns anteromedially glabrous and shiny.

Surface of each puncture microreticulized; usually bearing (predominantly laterally and anterolaterally) short, lanceolate seta; surface of seta ravelled out (Figs 23, 24). Surface between punctures finely transversally microsculptured, moderately shiny.

Scutellum (cf. Fig. 11) parallelsided, apex rounded; surface microsculptured, moderately shiny, with several indistinct punctures.

Elytron remarkably flattened with interval 8 distinctly swollen, in dorsal aspect anterior two thirds of lateral elytral margin invisible. Striae (cf. Figs 11-12) distinctly impressed, superficial, relatively wide, with microsculptured and opaque surface; stria punctures large, superficial, indistinctly microsculptured, shiny, bearing very short seta, remarkably crenating intervals margins, separated by more or less their diameter. Intervals (cf. Figs 11, 12) distinctly microreticulized, opaque, with small, shiny granules, each granula usually bearing short, lanceolate, erect seta; surface of setae distinctly ravelled out (Fig. 12); sutural interval angustate, elevate, with setae longer than in remaining intervals and arranged in one close row; intervals 2-5 flat, intervals 2 and 4 basally a little wider than intervals 3 and 5, interval 6 narrowed basally; setiferous granules of intervals 2-3 sparsely distributed and arranged in two rather irregular rows, granules of intervals 4-8 spaced closer and not arranged in rows. Epipleural carina distinctly developed, epipleuron with small, shiny, sparsely and irregularly spaced granules.

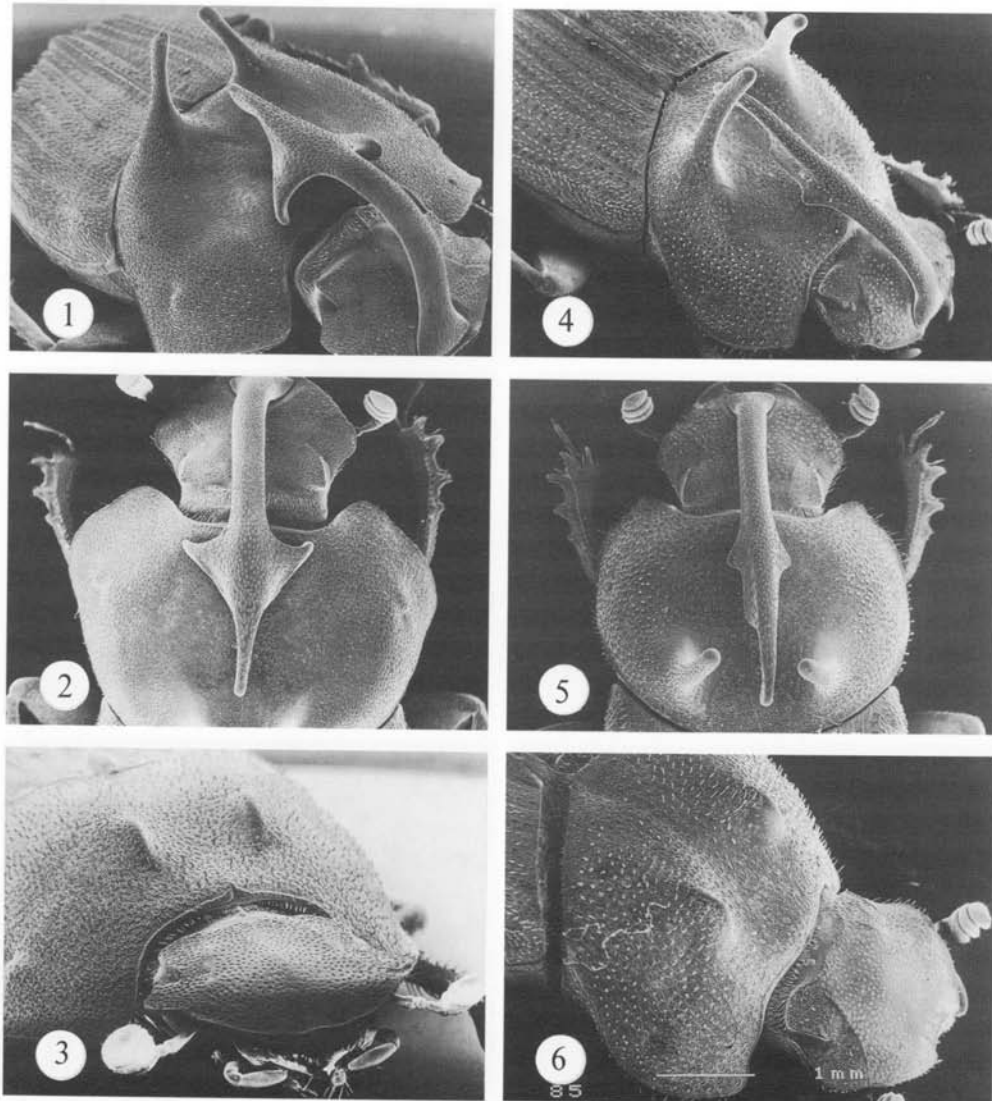
Metasternum (cf. Fig. 18) slightly convex, with medial longitudinal impunctate line and shallow posterior depression; punctation simple, consisted of coarse, superficial, more or less circular punctures (along midline elliptic). Surface of punctures setiferous.

Punctuation of femora (cf. Figs 16, 17) simple, consisted of coarse, superficial, strongly different in shape (circular, oval, elliptic to kidney-shaped), densely and almost regularly distributed punctures, not intermixed with fine ones. Surface of coarse punctures microreticulized, each puncture usually bearing short, lanceolate seta, setae of different length. Surface between punctures opaque.

Pygidium basally not bordered; unevenly convex, with depressed areas medially and posterolaterally; surface distinctly microsculptured, opaque, punctures coarse, sparse, superficial, bearing erect, lanceolate setae. Ventriles microsculptured, punctures and setae distinct.

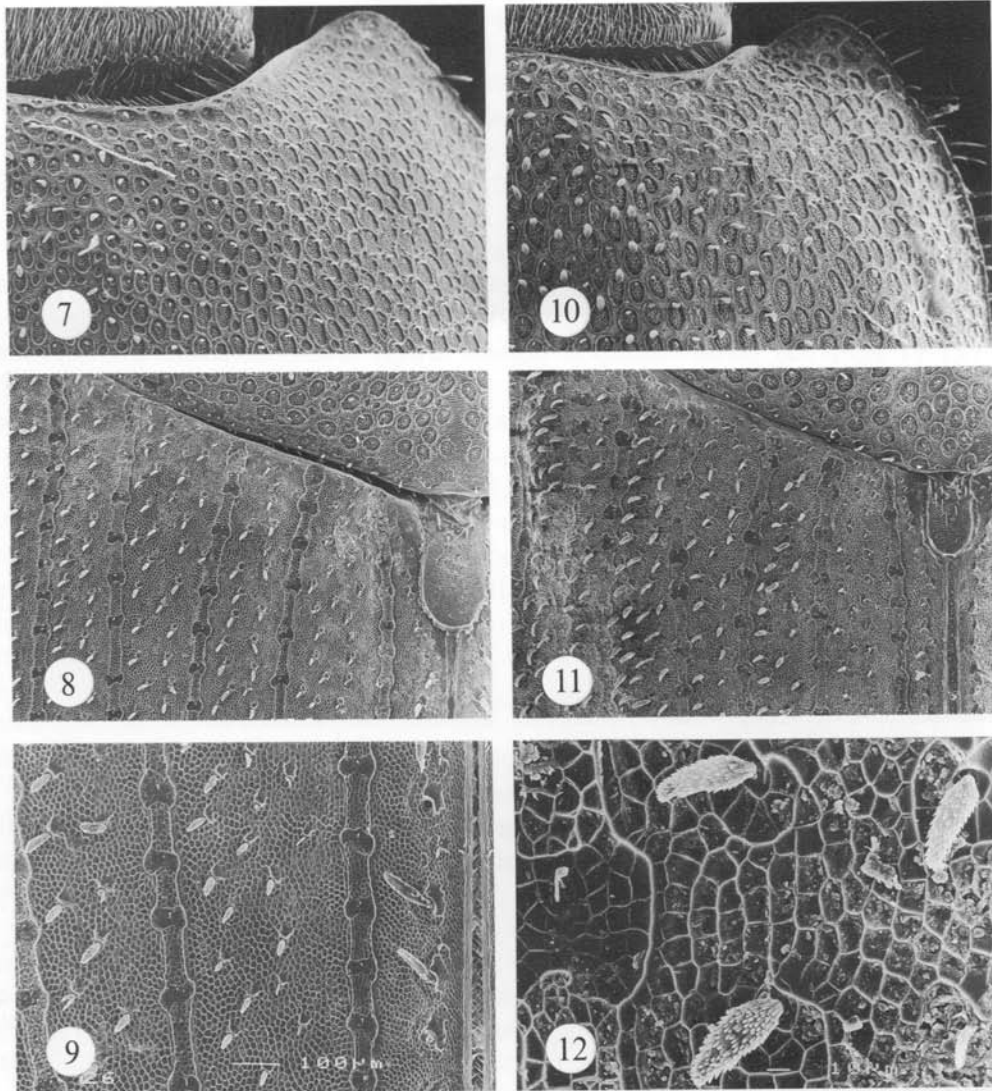
Parameres (Figs 27, 30).

Female (AT) differs from male in the following characters: clypeal and pronotal horns missing; clypeus entirely punctate, punctation anteromedially sparser and finer, but surface between punctures entirely opaque; pronotum convex with medial area flattened, entirely punctate; last two ventrites medially not angustate.



Figs 1-6. *Liatongus ancorifer* sp. n. (1-3) and *L. appositicornis* sp. n. (4-6), head and pronotum of male. 1 – HT, fla, magn. $\times 15$; 2 – HT, da, magn. $\times 14$; 3 – PT No 37, fa, magn. $\times 22$; 4 – PT No 1, fla, magn. $\times 12$; 5 – PT No 1, da, magn. $\times 15$; 6 – PT No 10, dla, magn. $\times 20$ (da – dorsal aspect, dla – dorsolateral aspect, fa – frontal aspect, fla – frontolateral aspect).

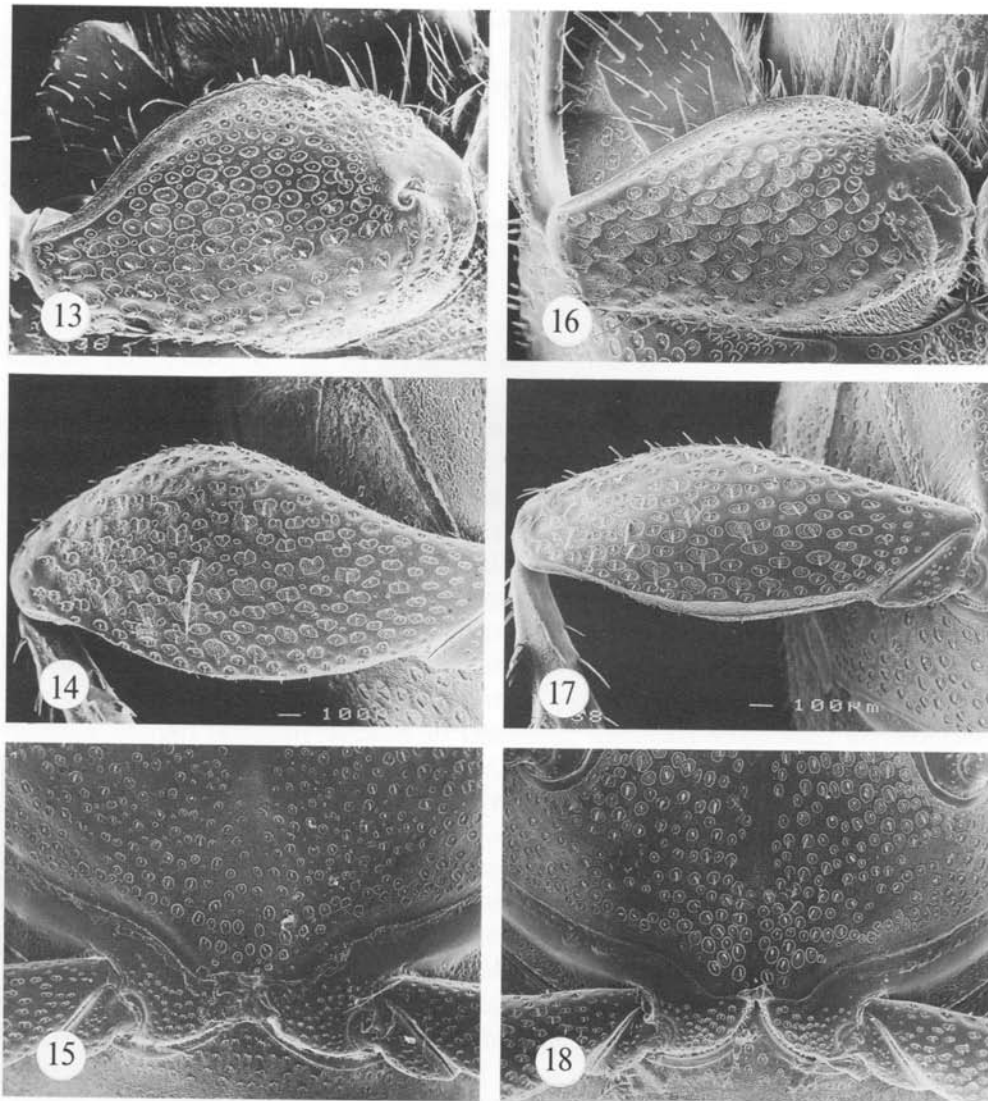
Variability. Above described holotype is an example of maximally developed male “major”. In weakly developed male “minor” clypeal horn is entirely vanished and pronotal horns are reduced to weak protrusions situated in anterior third of pronotum (Fig. 6). Between these two extremes we can find a scale of tran-



Figs 7-12. *Liatongus ancorifer* sp. n. AT (7-9) and *L. appositicornis* sp. n. PT No 23 (10-12), female, dorsal aspect. 7, 10 – anterolateral part of pronotum; 8, 11 – scutellum and basal part of left elytron; 9 – detail of left elytral stria 1-2 and intervals 1-3; 12 – detail of left elytral stria 5 and interval 5 with lanceolate setae (magn.: 7, 8, 10, 11 – $\times 50$; 9 – $\times 100$; 12 – $\times 450$).

sitional specimens. Clypeal and pronotal horns are of different length, lateral horn protuberances are differently reduced to triangular denticles of different size. The more reduced the horns, the further anteriorly they are situated (e.g., PT Nos 5-10).

Differential diagnosis. See Table 1.

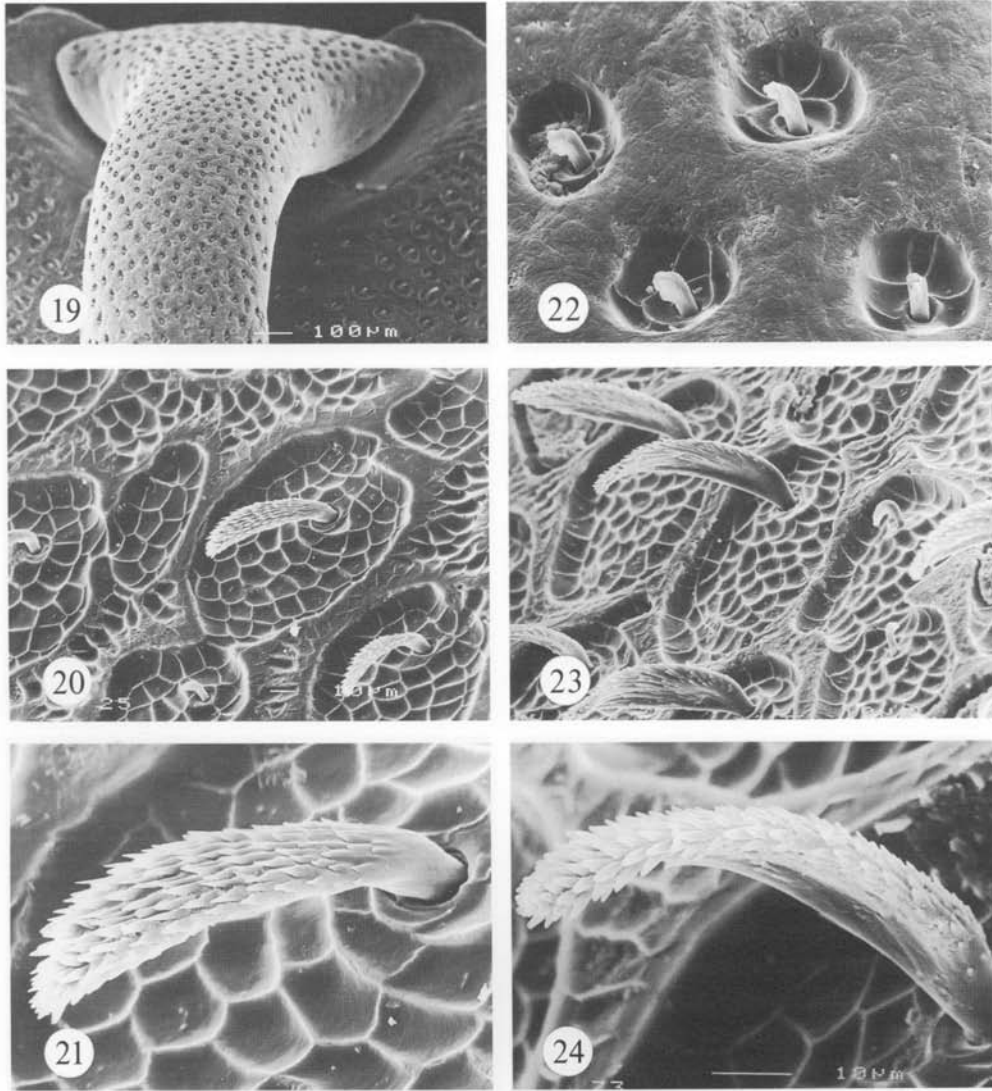


Figs 13-18. *Liatongus ancorifer* sp. n. PT No 44 (13-15) and *L. appositicornis* sp. n. PT No 27 (16-18), female, ventral aspect. 13, 16 – right profemur; 14, 17 – right mesofemur; 15, 18 – metasternum (magn.: 13, 14, 16, 17 – $\times 40$; 15, 18 – $\times 35$).

Collection circumstances. Forested habitat, collected from cow dung.

Name derivation. The specific name, “*appositicornis*” combined from Latin words “*appositus*” (apposite, adjoining) and “*cornu*” (horn), refers to the clypeal horn of the new species being remarkably adjoining to the head.

Distribution. China: Gansu prov.



Figs 19-24. *Liatongus ancorifer* sp. n. HT (19-21) and *L. appositicornis* sp. n. PT No 1 (22-24), male, dorsal aspect. 19 – anterodorsal part of clypeal horn, magn. $\times 80$; 20, 23 – detail of anterolateral pronotal punctation with lanceolate setae, magn. $\times 500$; 22 – detail of clypeal horn punctation (anterodorsal part), magn. $\times 1000$; 21, 24 – lanceolate pronotal seta, magn. $\times 1700$.

Liatongus clypeocornis Scheuern, 1988

Liatongus clypeocornis Scheuern, 1988: 305, figs 1, 4, 5, 10, 12, 25, 26, 28.

Type locality. Bhutan, Thimphu Umgeb. (Scheuern, 1988).

Type material examined. HT (male), labelled: Bhutan Thimphu Umg. 1975 Dorjee Kandu [p]; in NHMB.

Diagnosis. For diagnostic characters see Table 1 and Scheuern, 1988.

Distribution. Bhutan.

Liatongus hastatus sp. n.

(Figs 25, 30-31)

Type material. HT (male), labelled: Nepal, 15.10.1992, Annapurna region, PISANG, Pečínka lgt. [p]; PT Nos 1, 2 (males): Nepal-Himalaya, Annapurna-Mts., leg. Ahrens 1993 // Chame bis Bhratang, 29.5., 2700-2900 m [p]. HT in DKCP, both PT in DACD.

Description. Male (Fig. 25). Body length 8.0-8.4 mm (HT 8.4 mm); colour almost black, body and extremities in general appearance shagreened and opaque, setation reddish brown to pale.

Head coarsely, densely and approximately regularly punctate; punctures approximately circular, superficial, anteriorly strongly unequal in size; surface of each puncture microreticulized, bearing medially thickened, erect seta; setae of different size; on genae punctation becoming denser; vertex with punctures rather sparser and smaller; narrow area around clypeal horn impunctate. Surface between punctures microsculptured, moderately shiny. Anterior margin of clypeus weakly emarginate, each side of emargination with slightly upturned obtuse denticle; anterolateral margin regularly arcuate to complete, distinctly impressed clypeogenal suture. Clypeal horn (Fig. 25) moveable, long, extended approximately to discal depression of pronotum; basally regularly curved, then almost straight, apical part curved posteroventrally; basis as wide as anterior clypeal emargination; just behind of middle with two nearly triangular, approximately laterally directed protuberances; protuberances not prolonged posteriorly; apex laterally flattened, regularly rounded. Dorsal surface of horn coarsely, densely, almost regularly punctate; punctures approximately circular, apically and laterally becoming more or less elliptic, usually bearing short, thick seta, punctures separated by less than their diameter; surface between punctures not microsculptured, moderately shiny; ventral surface glabrous, shiny. Lateral margin of gena regularly arcuate, from clypeus separated by shallow emargination.

Pronotum wider than elytra, maximum width in anterior third; unevenly convex, discally depressed, medioanteriorly slightly elevate; each side mediolaterally with distinct impression. Anterior angles almost rectangular, lateral margin in anterior quarter nearly straight, then broadly regularly arcuate, before basis slightly sinuate. Two posterolateral horns, relatively short, erect, directed slightly posteriorly; remarkably distant each other (horn basis situated approximately at level of elytral interval 4); at basis inside rather flattened, slightly convergent inwards and slightly regularly curved inwards and anteriorly. Anterior angles finely bordered and slightly crenulate, anterior and lateral margin bordered, basis not bordered.

Punctuation consisted of large, superficial, circular to irregularly oval or elliptic (especially on lateral sides of horns) punctures of unequal size; arranged anterolaterally and laterally in nearly reticulate structure, punctures not confluent; discally and along basis punctures becoming smaller and more sparser; area between horns only with several very irregularly spaced punctures; horns anteromedially glabrous and shiny. Surface of each puncture microreticulized; usually bearing short, lanceolate seta. Surface between punctures finely transversally microsculptured, moderately shiny.

Scutellum parallelsided, apex rounded; surface microsculptured, moderately shiny, with several indistinct punctures.

Elytron remarkably flattened with interval 8 distinctly swollen, in dorsal aspect anterior two thirds of lateral elytral margin invisible. Striae distinctly impressed, superficial, relatively wide, with microsculptured and opaque surface; stria punctures large, superficial, indistinctly microsculptured, shiny, bearing very short seta, remarkably crenating intervals margins, separated by more or less their diameter. Intervals distinctly microreticulized, opaque, with small, shiny granules, each granula usually bearing short, lanceolate, erect seta; sutural interval angustate, elevate, with setae longer than in remaining intervals and arranged in one close row; intervals 2-5 flat, intervals 2 and 4 basally a little wider than intervals 3 and 5, interval 6 narrowed basally; setiferous granules of intervals 2-3 sparsely distributed and arranged in two rather irregular rows, granules of intervals 4-8 spaced closer and not arranged in rows. Epipleural carina distinctly developed, epipleuron with small, shiny, sparsely and irregularly spaced granules.

Metasternum slightly convex, with medial longitudinal impunctate line and shallow posterior depression; punctuation simple, consisted of coarse, superficial, more or less circular punctures (along midline elliptic). Surface of punctures setiferous.

Punctuation of femora simple, consisted of coarse, superficial, strongly different in shape (circular, oval, elliptic to kidney-shaped), densely and almost regularly distributed punctures, not intermixed with fine ones. Surface of coarse punctures microreticulized, each puncture usually bearing short, lanceolate seta, setae of different length. Surface between punctures opaque.

Pygidium basally not bordered; unevenly convex, with depressed areas medially and posterolaterally; surface distinctly microsculptured, opaque, punctures coarse, sparse, superficial, bearing erect, lanceolate setae. Ventrites microsculptured, punctures and setae distinct.

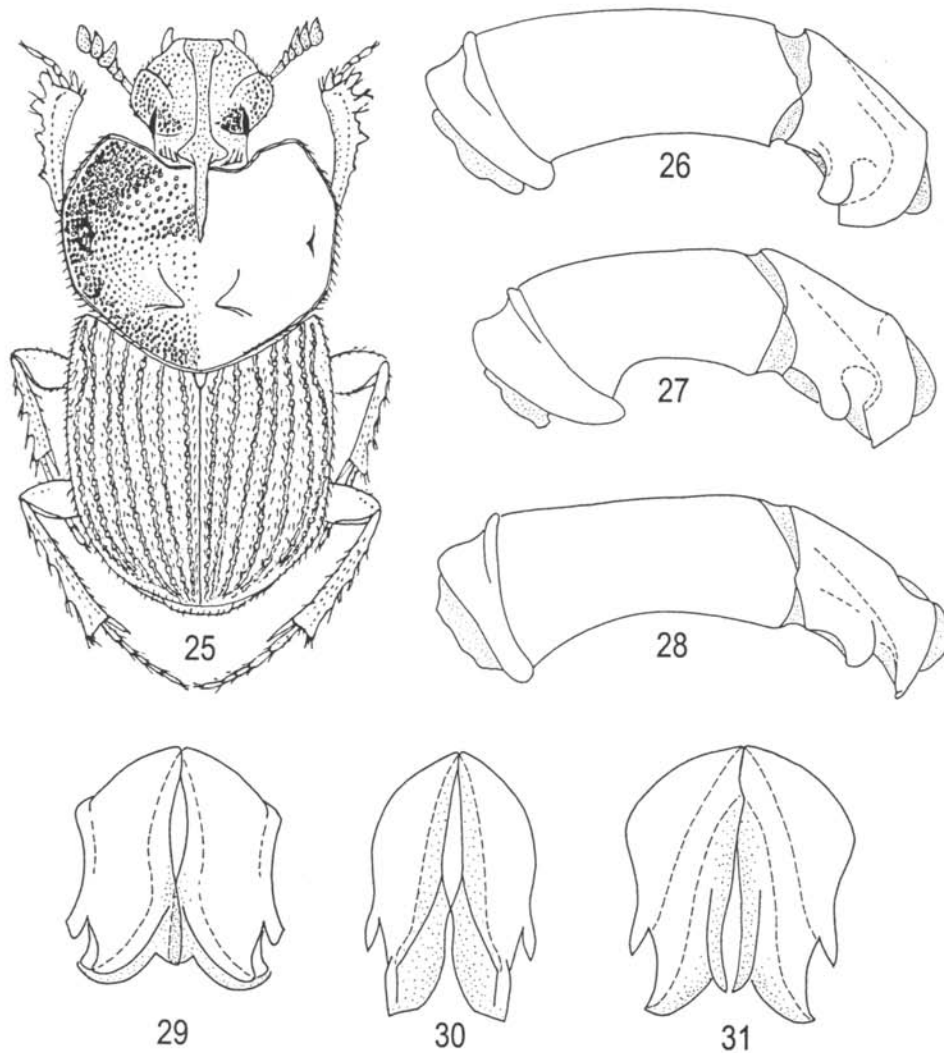
Parameres (Figs 28, 31).

Female unknown.

Differential diagnosis. See Table 1.

Name derivation. The specific name, a Latin adjective "hastatus" (armed with a spear), refers to the shape of clypeal horn of the new species.

Distribution. Nepal.



Figs 25-31. *Liatongus hastatus* sp. n. HT (25, 28, 31), *L. ancorifer* sp. n. HT (26, 29), *L. appositicornis* sp. n. PT No 1 (27, 30). 25 – habitus, male, dorsal aspect; 26-28 – aedeagus, lateral aspect; 29-31 – parameres, dorsal aspect.

Liatongus triacanthus (Boucomont, 1920)

Oniticellus triacanthus Boucomont, 1920: 264.

Liatongus triacanthus: Janssens 1953: 79; Ferreira, 1969: 391; Scheuerm, 1988: 309, figs 2, 3, 8, 9, 11, 13-21, 27, 28.

Type locality. Metabéléland (Boucomont, 1920).

Type material examined. Male, labelled: Metabéléland S. Africa // Ex. Musaeo N. van de Poll // Boucomont det. 1920 [p] // Lectotype *Liatongus triacanthus* (Boucomont) [h] Y. Cambefort det. 198[p]3[h], in MNHN [unpublished].

Additional material examined. China, Xizang: China, E-Tibet, 2500-2400 m, N of Brahmaputra great bend, 30°00'-07' / 94°52'-95°09', 16.-20.7.[19]92, L.+ R. Businský lgt., 1 male and 2 females in DKCP; China – E Tibet, Tome, Tangmai, 2000 m, 30 km W of Donjung, 12.-13.6.1997, leg. A. Wrzeczionko, 2 males and 4 females in DKCP and 2 males and 4 females in JRCP; India, Sikkim: British India, Sikkim, Lachen-Lachung, VIII.1933 // Museum Paris, ex. coll. R. Oberthur // *Liatongus triacanthus* (Boucomont), Y. Cambefort det. 1983, 1 male in MNHN; India, West Bangla: Distr. Darjeeling, India, W. Wittmer // Rimbick – Raman, 1950-2450 m, 17.5.[19]75 // *Liatongus* (s. str.) *triacanthus* Bouc., Scheuern det. 85, 1 male in NHMB.

Diagnosis. For diagnostic characters see Table 1 and Scheuern, 1988.

Description of female. Body length 7.2-8.6 mm; colour almost black, body and extremities in general appearance shagreened and opaque, setation reddish brown to pale.

Head coarsely, densely and approximately regularly punctate; punctures approximately circular, superficial, anterolaterally unequal in size; surface of each puncture microreticulized, usually bearing medially thickened, erect seta; setae of different size; on genae punctation becoming denser; anteriorly and on vertex punctures rather sparser and smaller. Surface between punctures microsculptured, opaque. Anterior margin of clypeus weakly emarginate, each side of emargination with slightly upturned obtuse denticle; anterolateral margin regularly arcuate to complete, distinctly impressed clypeogenal suture. Lateral margin of gena regularly arcuate, from clypeus separated by shallow emargination.

Pronotum wider than elytra, maximum width in anterior third; convex, medial area depressed; each side mediolaterally with distinct impression. Anterior angles almost rectangular, lateral margin broadly arcuate to basis. Anterior angles finely bordered and slightly crenulate, anterior and lateral margin bordered, basis not bordered. Punctation consisted of large, superficial, circular to irregularly oval or elliptic punctures of unequal size; arranged anterolaterally and laterally in nearly reticulate structure; punctures not confluent. Surface of each puncture microreticulized; usually bearing short, lanceolate seta. Surface between punctures finely transversally microsculptured, moderately shiny.

Scutellum parallelsided, apex rounded; surface microsculptured, moderately shiny, impunctate.

Elytron remarkably flattened with interval 8 distinctly swollen, in dorsal aspect anterior two thirds of lateral elytral margin invisible. Striae distinctly impressed, superficial, relatively wide, with microsculptured and opaque surface; striae punctures large, superficial, indistinctly microsculptured, shiny, bearing very short seta, remarkably crenating intervals margins, separated by more or less their diameter. Intervals distinctly microreticulized, opaque, with small, shiny granules, each granula usually bearing short, lanceolate, erect seta; sutural interval angustate, elevate, with setae longer than in remaining intervals and arranged in one close row; intervals 2-5 flat, intervals 2 and 4 basally a little wider than intervals 3 and 5,

interval 6 narrowed basally; setiferous granules of intervals 2-3 sparsely distributed and arranged in two rather irregular rows, granules of intervals 4-8 spaced closer and not arranged in any rows. Epipleural carina distinctly developed, epipleuron with small, shiny, sparsely and irregularly spaced granules.

Metasternum lightly convex, with medial longitudinal impunctate line and shallow posterior depression; punctation simple, consisted of coarse, superficial, more or less circular punctures (along midline elliptic). Surface of punctures setiferous.

Punctation of femora simple, consisted of coarse, superficial, strongly different in shape (circular, oval, elliptic to kidney-shaped), densely and almost regularly distributed punctures, not intermixed with fine ones. Surface of coarse punctures microreticulized, each puncture usually bearing short, lanceolate seta, setae of different length. Surface between punctures opaque.

Pygidium basally not bordered; unevenly convex, with depressed areas medially and posterolaterally; surface distinctly microsculptured, opaque, punctures coarse, sparse, superficial, bearing erect, lanceolate setae. Ventrites microsculptured, punctures and setae distinct.

Distribution. India: Sikkim and the district Darjeeling of West Bangla (Scheuern, 1988). First record from China (Xizang [=Tibet]). Record from Metabéléland [nowadays in Zimbabwe] caused maybe by mislabelling of the type material, seems to be improbable (for details see Scheuern, 1988).

Discussion

Complex of diagnostic characters of *Liatongus* species with moveable clypeal horn:

- (1) anterior clypeal margin in well-developed male armed with distinct moveable horn;
- (2) pronotum in well-developed male depressed and armed with two horns;
- (3) prosternal longitudinal carina not extended to mesosternum and not widened posteriorly;
- (4) metasternum anteriorly absent from V- or Y-shaped depression;
- (5) elytral interval 8 remarkably swollen, therefore lateral elytral margin in dorsal aspect invisible;
- (6) dorsal surface setaceous shagreened and opaque.

All of the above five species of the genus *Liatongus* share a unique autapomorphy – a moveable clypeal horn (1), and may in consequence be classified as at least a species group. However, other diagnostic characters associated with this genus are not as clear. Character (5) is not fully developed in *L. clypeocornis* but is observed in two other species (*L. davidi* (Boucomont, 1919) and *L. rhinoceros* Arrow, 1931) which lack the moveable clypeal horn. *L. rhinoceros* is presently the only known species with a small horn on the clypeus, but not a moveable one. Characters (2-4 and 6) classify these species in the vicinity of the *L. phanaeoides* (Westwood, 1840) species group (sensu Balthasar, 1963). On the generic level these ambiguities can only be resolved by an alpha-taxonomic revision of the genus

as such and subsequent comparison with related genera, ideally the entire Oniticellini tribe. The probable result of this would be a division of the heterogeneous and, in all likelihood, polyphyletic genus *Liatongus* into several genera; however, that is not the aim of the present paper.

Highly interesting defence behaviour was observed in the *L. ancorifer* sp. n. (senior author). The structure of its body surface is relatively unusually rugged (e.g., microsculpture and lanceolate setae, cf. Figs 7-24) for a member of the subfamily Scarabaeinae, and fulfils a unique function. Particles of detritus, food, sand etc. adhere to the beetle's body surface enabling it to completely blend in with the colour of its surroundings. Furthermore, the angular body shape mimics a small stone and when disturbed the beetle quickly retracts its legs alongside the body becoming virtually invisible on a structured surface (soil or food source). If disturbed for a longer period (with a pair of tweezers for instance) it spreads its legs out to the sides and plays dead. A similar body structure is found among other species of the genus *Liatongus* which possess the moveable clypeal horn, making a similar defence strategy probable. Similar forms of thanatosis and camouflage in the tribe Oniticellini have been reported by Krikken (1983) for African species of *Cytochirus* Lesne, 1900, although this particular strategy has been observed for the first time in the genus *Liatongus*. Analogous behaviour has been recorded by the senior author among the *L. phanaeoides* species group (*L. davidi*, *L. endroedii* Balthasar, 1956 and *L. incurvicornis* (Fairmaire, 1887) in China) and the related genera *Drepanocerus* Kirby, 1828 (*D. runicus* Arrow, 1909 and *D. sinicus* Harold, 1868 in Thailand) and *Sinodrepanus* Simonis, 1985 (*S. falsus* (Sharp, 1875) in Thailand and *S. rex* (Boucomont, 1912) in China). Behaviour of this type has developed, probably independently, amongst certain members of other tribes; for instance in Eurysternini (Gill, 1990), Scarabaeini (Mathews, 1974) or Sisyphini (Ferreira, 1969).

The majority of specimens (114) from the type series of *L. ancorifer* sp. n. were collected from beneath a single desiccated dog cadaver, several others (19 specimens) from under dry dog excrements containing a great amount of keratinous matter (hairs etc.) (for details see "collection circumstances"). Although there was an adequate amount of dung of varying age from large herbivores (horses, cattle and sheep) in the immediate surroundings, no specimens were uncovered from these potential sources. This suggests that the species is at least optionally necrophagous or possibly even keratinophagous (as are members of the Trogidae group that were found along with the species in question). Necrophagy amongst adults of this group is associated with an efficient protein intake necessary for successful reproduction (cf. Cambefort, 1991) but has not yet been observed in the genus *Liatongus*; evident keratinophagy would constitute a unique and surprising circumstance.

Table 1. Characters separating *Liatongus* species with moveable clypeal horn from each other.

	<i>L. ancorifer</i> sp. n.	<i>L. appositicornis</i> sp. n.	<i>L. clypeocornis</i>	<i>L. hastatus</i> sp. n.	<i>L. triacanthus</i>
Character	Character state				
Shape of clypeal horn in lateral aspect ^{*)}	basal two thirds regularly curved (Fig. 1)	curved only in basal quarter, then straight (Fig. 4)	curved only in basal quarter, then straight	curved only in basal quarter, then straight	curved only in basal quarter, then straight
Shape of lateral horn protuberances ^{*)}	anchor-shaped, acuteangular, apices directed anterolaterally (Fig. 2)	triangular, apices directed laterally, prolonged posteriorly in obtuseangled protrusions (Fig. 5)	protuberances absent	triangular, apices directed laterally (Fig. 25)	anchor-shaped acuteangular, apices directed posterolaterally
Punctuation of anterolateral part of clypeus	equal in size, punctures separated by their diameter	strongly unequal in size, punctures separated by less than their diameter	equal in size, punctures separated by their diameter	unequal in size, punctures separated by less than their diameter	unequal in size, punctures separated by less than their diameter
Shape of pronotum in male ^{*)}	discally depressed, medioanteriorly with longitudinal keel	discally depressed, medioanteriorly slightly elevate	discally depressed, medioanteriorly slightly elevate	discally depressed, medioanteriorly slightly elevate	discally depressed, medioanteriorly slightly elevate
Situation and orientation of pronotal horns ^{*)}	distinctly distant each other, directed slightly posteriorly (Figs 1, 2)	distinctly distant each other, nearly rectangular to dorsal plane of pronotum (Figs 4, 5)	exhibited only as two low protuberances	distinctly distant each other, directed slightly posteriorly	closely each other, nearly rectangular to dorsal plane of pronotum
Lateral outline of pronotum in male ^{*)}	in anterior quarter straight, in anterior third arcuate, than nearly straight to basis (Fig. 2)	in anterior quarter nearly straight, then broadly regularly arcuate, slightly sinuate before basis (Fig. 5)	in anterior quarter nearly straight, then broadly regularly arcuate, slightly sinuate before basis	in anterior quarter nearly straight, then broadly regularly arcuate, slightly sinuate before basis	in anterior quarter nearly straight, then broadly regularly arcuate, slightly sinuate before basis
Punctuation of anterolateral part of pronotum	confluent (Fig. 7)	reticulate (Fig. 10)	reticulate	reticulate	reticulate
Shape of elytral interval 8	distinctly swollen, in dorsal aspect anterior two thirds of lateral elytral margin invisible	distinctly swollen, in dorsal aspect anterior two thirds of lateral elytral margin invisible	only slightly swollen, in dorsal aspect lateral elytral margin all visible	distinctly swollen, in dorsal aspect anterior two thirds of lateral elytral margin invisible	distinctly swollen, in dorsal aspect anterior two thirds of lateral elytral margin invisible
Punctuation of metasternum	double (Fig. 15)	simple (Fig. 18)	simple	simple	simple
Punctuation of femora	double (Figs 13, 14)	simple (Figs 16, 17)	simple	simple	simple
Shape of parameres	as in Figs 26, 29	as in Figs 27, 30	as in figs in Scheuern, 1988	as in Figs 28, 31	as in figs in Scheuern, 1988

^{*)} see paragraphs "Variability" on pages 4 and 7.

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