云 南 植 物 研 究 1999, Suppl. Ⅺ:99 ~ 120
Acta Botanica Yunnanica

高黎贡山鞘翅目步甲科盗甲属三新种

David H. KAVANAUGH[1], 龙春林[2]
(1 美国加里福尼亚科学院, 加州旧金山 94118)
(2 中国科学院昆明植物研究所, 昆明 650204)

摘要: 描述了产于中国云南高黎贡山南段步甲科盗甲属 (*Leistus*) 的 3 个新种: 长颚盗甲 (*Leistus tanaognathus*)、高黎贡山盗甲 (*Leistus gaoligongensis*) 和李氏盗甲 (*Leistus lihengae*)*, 前两种的模式标本均采自保山市赧亢垭口 (海拔 2130 m, 位于北纬 24°49.9'、东经 98°46.0'), 李氏盗甲的模式标本采自高黎贡山大蒿坪垭口东坡保山市境内的落水洞 (位于赧亢垭口东北部, 海拔 2300 m, 北纬 24°56.9'、东经 98°45.4')。此外, 作者还编制了云南盗甲属分种检索表。

关键词: 高黎贡山, 步甲科, 新种, 长颚盗甲, 高黎贡山盗甲, 李氏盗甲
分类号: Q 949

Three New Species of Genus *Leistus* Frölich (Coleoptera: Carabidae: Nebriini) from Gaoligong Mountains of Yunnan Province, China

David H. KAVANAUGH[1], LONG Chun – Lin[2]
(1 *California Academy of Sciences, San Francisco*, CA 94118, USA)
(2 *Kunming Institute of Botany, The Chinese Academy of Sciences*, Kunming 650204)

Abstract Three new species of *Leistus* Frölich, all from southern parts of the Gaoligong Mountains of western Yunnan Province, China, are diagnosed, described and illustrated: *Leistus tanaognathus* n. sp. (type locality = Nankang Yakou, 24°49.9'N 98°46.0' E, 2130m); *Leistus gaoligongensis* n. sp. (type locality = Nankang Yakou, 24°49.9'N 98°46.0'E, 2130m); and *Leistus lihengae* n. sp. (type locality = Luoshuidong, 24°56.9'N 98°45.4'E, 2300 m). A preliminary key to the *Leistus* species known to occur in Yunnan Province is provided.

Key words: Gaoligong Mountains, Carabidae, New species, *Leistus tanaognathus*, *L. gaoligongensis*, *L. lihengae*

The first Sino – American expedition to the Gaoligong Mountains of Yunnan Province, China involved systematists from the Kunming Institutes of Botany (KIB) and Zoology (KIZ) and the California Academy of Sciences (CaAS) and was conducted in October and November of 1998. Fieldwork was designed to include a general reconnaissance of southern portions of the Gaoligong Mountains and initial

* 本新种以中国科学院昆明植物研究所李恒研究员的名字命名

efforts toward an inventory of the plants and animals of the mountain range, especially the biota endemic to the native mixed hardwood/conifer forests.

The Gaoligong Mountains of extreme western Yunnan extend north – south for more than 300 kilometers, with their crest, in the central part of the range, forming the border between China and Myanmar. They also separate and form parts of the watersheds of two of southeast Asia's major rivers, the Irrawaddy (Dulongjiang) and Salween (Nujiang) rivers. Due to their geographic isolation and rugged topography, upper reaches of the range are less disturbed than most other areas in Yunnan; and two reserves, the Nujiang and Gaoligong Mountains Nature Reserves, have been established to protect remaining tracts of old growth forest.

Areas of primary forest were sampled at several points along the axis of the range, on both eastern and western slopes; and a total of about 8,000 terrestrial invertebrates were collected by team members. Among these were representatives of three species of the carabid beetle genus Leistus Frölich (1799). Ten *Leistus* species are previously known to occur in Yunnan Province (Farkac, 1995), and one these, *Leistus brancuccii* Farkac, has been recorded from the Gaoligong Mountains. Nonetheless, all three species sampled during the expedition appear to be new species. In this report, we present diagnoses and descriptions of these new species, with illustrations of important features of external and genitalic structure. We also provide a preliminary key for identification of adults of *Leistus* species known or suspected to occur in Yunnan Province and briefly discuss the status of the taxonomy of genus *Leistus* in China.

This is Scientific Contribution # 4 from the Center for Biodiversity Research and Information (CBRI) at the California Academy of Sciences.

1 Materials and Methods

This study is based on examination of 154 specimens representing the species described herein and several hundred additional specimens representing other *Leistus* species. Most of the species previously described from China, including those recorded from Yunnan, are known from very few specimens, most of which (including holotypes) are deposited in private collections (e.g. Farkac, 1995). We therefore relied on original and subsequent published descriptions, rather than on specimens, for many critical comparisons and for developing the key to the known species of Yunnan. This is unfortunate, but it was necessary in order to complete this report at this time. We are confident that, if descriptions and accompanying illustrations for the species previously known from Yunnan are accurate, the species described herein indeed represent new taxa. Descriptions used for comparative purposes are those of Andrewes (1929), Bänninger (1925), Dvorák(1994), Farkac (1993, 1995), and Perrault (1980, 1985a, 1985b, 1991).

Although the descriptions of most *Leistus* species previously recorded from Yunnan include measures of body length, what these values actually represent is unclear. We include two measures of body length (in millimeters) in the description of each species to facilitate future comparisons. Standardized body length (SBL) equals the sum of three measurements: head length, measured along the midline

from the apical margin of the clypeus to a point opposite the posterior margin of the eye; pronotal length, measured along the midline from the apical to basal margin; and elytral length, measured along the midline from the apex of the scutellum to a point opposite the apex of the longer elytron. Apparent body length (ABL) equals the distance measured along the midline from the apex of the labrum to a point opposite the apex of the longer elytron. SBL is preferred over ABL because it measures only fixed lengths and is not subject to variation in the alignment or retraction or extension of body parts.

We also include for each new species values for several indices, most of them used by Farkac (1995). These include: antennal index (IA) (equals length of antennomere 5 / length of antennomere 3); labial palpus index (ILP) (equals length of palpomere 3 / length of palpomere 2); pronotal index 1 (IPw/l) (equals width / length of pronotum); pronotal index 2 (IPm/b) (equals maximum width of pronotum / basal width of pronotum); elytral – pronotal index (IE/P) (equals greatest width across combined elytra / maximum width of pronotum); and elytral index (IEl/w) (equals length / width of combined elytra). Farkac (1995) did not specify how elytral length was measured. Because the elytra base is always, but to a varying extent, hidden beneath the base of the pronotum, we suggest that elytral length for this index be measured the same as for that component of SBL, namely as the length along the midline from the apex of the scutellum to a point opposite the apex of the longer elytron. It is unlikely that Farkac used this particular measure of elytral length, so our values for IEl/w are probably not directly comparable with his.

Observations of structural features were made with a Wild Model M – 5 stereoscopic dissecting microscope. Measurements were made using a calibrated ocular grid with a scale interval of 0.1 mm and illustrations were prepared with the aid of a camera lucida, both mounted on the Wild microscope.

3 Taxonomy

Descriptions of New Species

Leistus tanaognathus new species(长颚盗甲,新种)

(Figures 1, 5 and 10)

TYPE MATERIAL——Holotype, a unique female, deposited in KIZ, labeled"CHINA, Yunnan Province, Gaoligong Mountains, Baoshan Prefecture, Baoshan County, Nankang Yakou, 24°49.9'N 98°46.0'E"/"2130m, 4 ~ 7 November 1998, Stop # 98 – 129B, D. H. Kavanaugh, C. E. Griswold, C. – L. Long, R. Li, & S. – X. He collectors"/"Sino – American Expedition, Gaoligong Mountains, Yunnan, Peoples Republic of China, October – November, 1998"/"Holotype *Leistus tanaognathus* Kavanaugh & Long"[red label]. Type locality: Nankang Yakou.

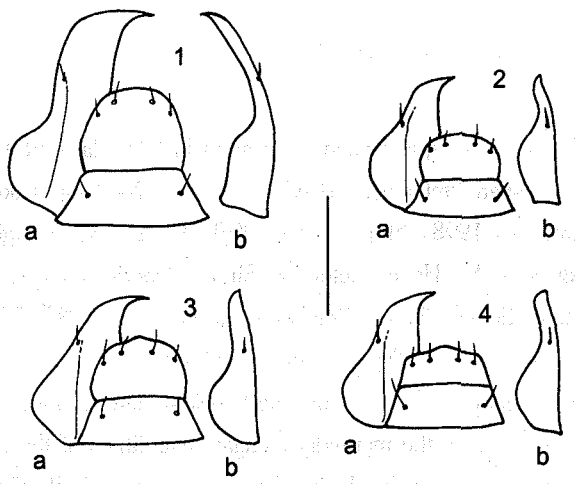
ETYMOLOGY——The specific name is derived from the Greek words, tanaos, meaning "long", and gnathos, meaning"jaw", in reference to the markedly elongate mandibles of the type specimen.

DIAGNOSIS——Adults of this species can be distinguished from those of all other known *Leistus* species, except *Leistus championi* Andrewes, by their markedly long and apical down – curved mandibles (Fig. 1). From the *L. championi*, they can be distinguished on the basis of (1) form of the gular carina with a graded series of distinct tubercles, from longest laterally to shortest medially, on

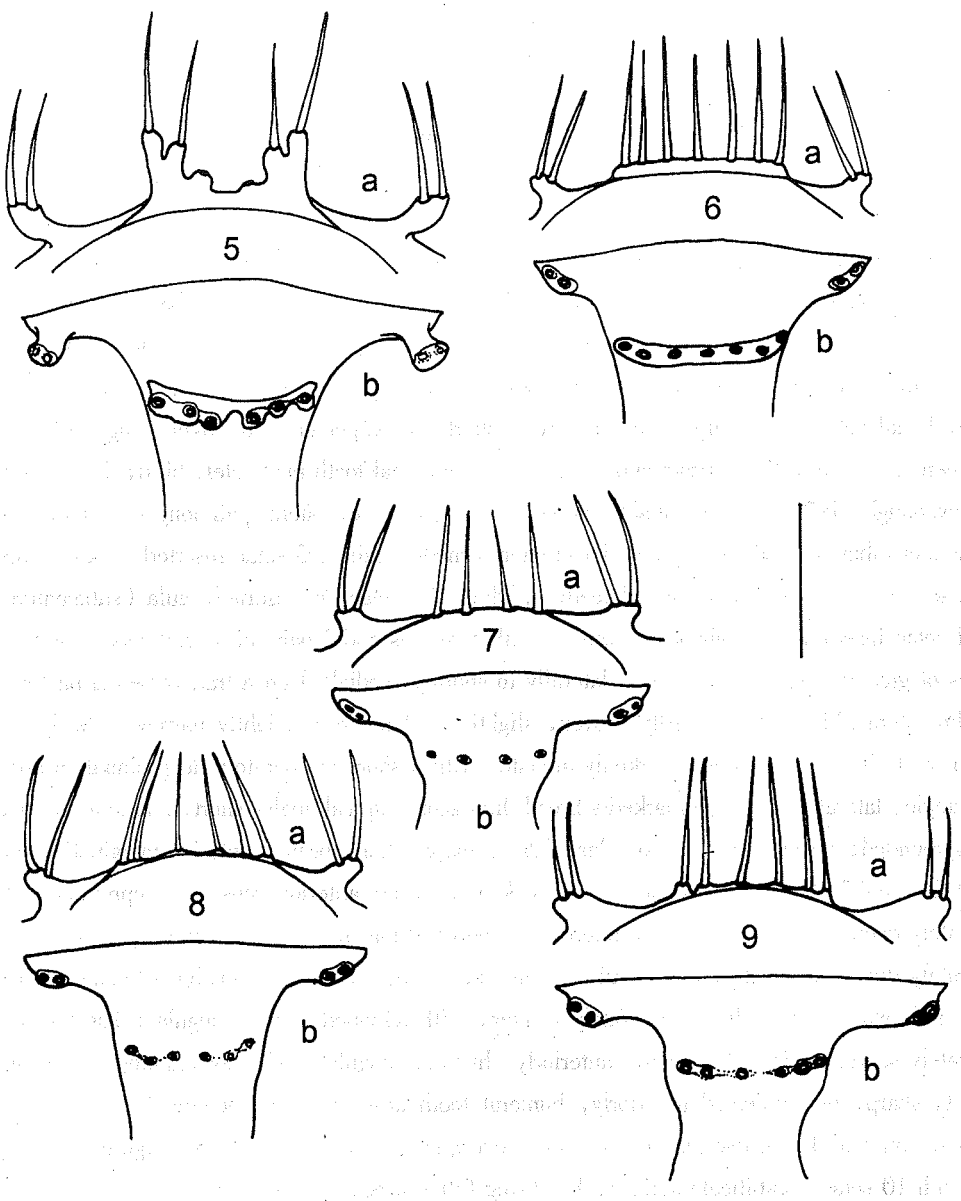
the carina (Fig. 5) in *L. tanaognathus*; without distinct tubercles in *L. championi* (Perrault, 1985b, Fig. 22), (2) shape of the pronotum relatively longer and narrower (IPw/l = 1.38), slightly less narrowed basally (IPm/b = 1.74), and with lateral explanation broader in *L. tanaognathus*; relatively shorter and wider (IPw/l = 1.42 ~ 1.44), slightly more narrowed basally (IPm/b = 1.86), and with lateral explanation slightly narrower in *L. championi* (Perrault, 1985b, Fig. 3), and (3) larger size [female ABL = 11.9 mm in *L. tanaognathus*; 9.5 mm in *L. championi* (Perrault, 1985b)].

DESCRIPTION——Size large for the genus, female SBL = 10.3 mm and ABL = 11.9 mm. Body form typical for genus, IE/P = 1.38, IEl/w = 1.60. Head, labrum, and antennomere 1 black, mandibles, maxillae, palpi, and middle portions of antennomeres 2 ~ 4 reddish brown, antennomeres 5 ~ 12 and bases and apices of antennomeres 3 ~ 4 pale reddish; pronotum black, with lateral margins slightly paler (piceous); elytra black; legs with femora black, tibiae and tarsi pale reddish. Dorsum without metallic reflection. Head with frons sparsely but moderately coarsely punctate, also faintly rugulose laterally, vertex more sparsely and finely punctate; pronotum with discal region sparsely and very finely punctulate, apical, basal and lateral regions coarsely and moderately densely punctate; elytral intervals impunctate; thoracic venter (except prosternum medially, proepisternum laterally, and medial two – thirds of metasternum) very coarsely and densely punctate; abdominal venter smooth, except sternum 2 (first visible sternum) and lateral portions of sterna 3 and 4 (second and third visible sterna) very coarsely and densely punctate. Pronotum shiny, head slightly duller, eytra faintly iridescent. Microsculpture comprised of moderately impressed isodiametric sculpticells on head, faintly impressed isodiametric sculpticells on pronotum, and faintly impressed irregular and slightly transverse (less than twice as wide as long) sculpticells on elytra.

Head shape typical for genus, constriction posterior to eyes long, less abrupt, narrowed at about



Figs. 1 ~ 4. Left mandible, clypeus, and labrum; a = dorsal aspect, b = left lateral aspect, mandible only; scale line = 1.0 mm. 1. *Leistus tanaognathus* n. sp. 2. *Leistus lihengae* n. sp. 3. *Leistus gaoligongensis* n. sp. 4. *Leistus yunnanus* Bänninger.



Figs. 5~9. Submentum, insertion of gular setae; a = posterior aspect, inverted (ventral side up), b = insertion pattern, ventral aspect; scale line = 0.5 mm; gc = gular carina; ls = lateral setae; ms = medial setae. 5. *Leistus tanaognathus* n. sp. 6. *Leistus niger* Gebler. 7. *Leistus lihengae* n. sp. 8. *Leistus gaoligongensis* n. sp. 9. *Leistus yunnanus* Bänninger.

45 angle to longitudinal axis. Eyes large, markedly convex. Antennae moderately elongate, extended to apical 40% of elytron; antennomere 1 (scape) extremely long, straight, slightly narrowed basally; antennomere 2 (pedicel) with three subapical setae, one anteroventral and two anterodorsal; antenomere 4 glabrous; antennomere 5 slightly longer than antennomere 3, IA = 1.23; flagellar antennomeres (5~12) markedly elongate and slender. Labrum (Fig. 1) long, apical margin smoothly con-

vex, with two pairs of setae. Clypeus with apical margin truncate. Mandible (Fig. 1) long and distinctly deflected downward apically, markedly explanate basolaterally, narrow and parallel – side subapically, lateral margin with extremely deep sinuation. Maxilla with palpiger trisetose (one short, slender seta inserted basomedially, one long, spiniform seta inserted subapicomedially, and one long, spiniform seta inserted apically on a very long process); stipes with five long spinform setae, first (anteriormost), second, and third setae inserted apically on very long, separate processes, fourth and fifth (posteriormost) setae inserted apically on medium length, separate processes. Labium with anterior margin of ligular sclerite extended as a long – tined trident, fringe setae and basal setae absent from trident; ligular sclerite with a broad medial carina, terminated anteroventrally as a medium – length tubercle at the base of the trident, one pair of setae inserted on apex of tubercle; paraglossae separate, lobate; labial palpus with palpomere 2 relatively short and palpomere 3 relatively long, ILP = 0.98, palpomere 2 unisetose (near basal end). Mentum with apical tooth moderately bifid; 2 pairs of m2 setae(Kavanaugh, 1979) inserted slightly anterior of mental base, lateral pair longer, inserted on short but distinct tubercles and slightly anterior of shorter medial pair; m3 setae inserted on short tubercles; epilobes with short but distinct apical teeth on which m4 setae are inserted; gula (submentum) with lateral setae inserted on a pair of medium – length tubercles and 3 pairs of medial setae inserted on tubercles of graded length (from longest laterally to shortest medially) on a transverse carina (Fig. 5).

Pronotum (Fig. 10) markedly convex, slightly cordate, base slightly narrow, IPw/l = 1.38, Ipm/b = 1.74; lateral margin markedly arcuate, with a short, moderately deep sinuation anterior to basal angle; lateral explanation markedly broad throughout; apical angles short, markedly broad, moderately rounded; basal angles rectangular; lateral margination absent; anterior margination complete except for medial 25%, deeply impressed, moderately wide; anterior transverse impression broad and moderately deep; posterior transverse impression deep and narrow; basal foveae deep, slightly narrow, moderately divergent basally; midlateral seta present, without a swelling medial to point of insertion; basolateral seta absent. Elytra moderately convex, with silhouette subrectangular; basal margination moderately short, moderately concave anteriorly; humerus angulate, slightly rounded, humeral carina distinct, sharp, not projected anteriorly, humeral tooth absent; striae moderately deep, moderately punctate; interval 3 with five discal setae (one near apex), setiferous punctures slightly foveate; interval 9 with 10 setae (umbilicate series). Hindwing full – sized.

Intercoxal process of prosternum moderately broadly lanceolate, with margination complete. Metasternum slightly short, length posterior to mesocoxa equal to diameter of mesocoxa. Sterna 4 to 6 each with a pair of posterior paramedial setae; sternum 7 with two pairs of apical paramedial setae in female.

Legs longer than average for genus; hindcoxa with one basal seta; front and middle tarsi with climbing setae ventrally on tarsomeres 1 to 4 in both sexes.

MALE genitalia unknown.

FEMALE with basal apodemes of tergum 8 absent or very short. Hemisternite 8 with medium – length setae on medial one – third of apical margin, basal apodeme wide, moderately emarginate api-

cally, with lateral arm markedly shorter than medial arm. Proctiger (tergum 9) hemispheric, narrowly membranous apically. Valvifer (laterotergite 9) with basal apodeme moderately broad. Gonacoxa with five or six short ventral diagonal setae and two short mediodorsal setae. Bursa copulatrix (Fig. 28) with longitudinal axis (lateral aspect) slightly arched basodorsally; spermathecal chamber slightly short, symmetrical, broadly wedge – shaped, triangular (dorsal aspect), slightly extended posterodorsally (lateral aspect); insemination duct not sclerotized; spermathecal duct long, loosely and irregularly convoluted, distinctly thicker proximally and gradually narrowed distally, inserted in apical midline on spermathecal chamber.

HABITAT DISTRIBUTION AND LIFE HISTORY——The holotype specimen was collected at night at the edge of a patch of disturbed mixed hardwood forest with very sparse understory. It was found running over dry leaf litter on the forest floor, about 10 meters away from the edge of a small forest stream. No additional specimens of *L. tanaognathus* were found in several hours of continued searching in the same area, while more than 80 specimens of *L. gaoligongensis* were encountered in the same habitat during this time.

GEOGRAPHICAL DISTRIBUTION——At present, known only from the type locality in the southern Gaoligong Mountains of western Yunnan Province.

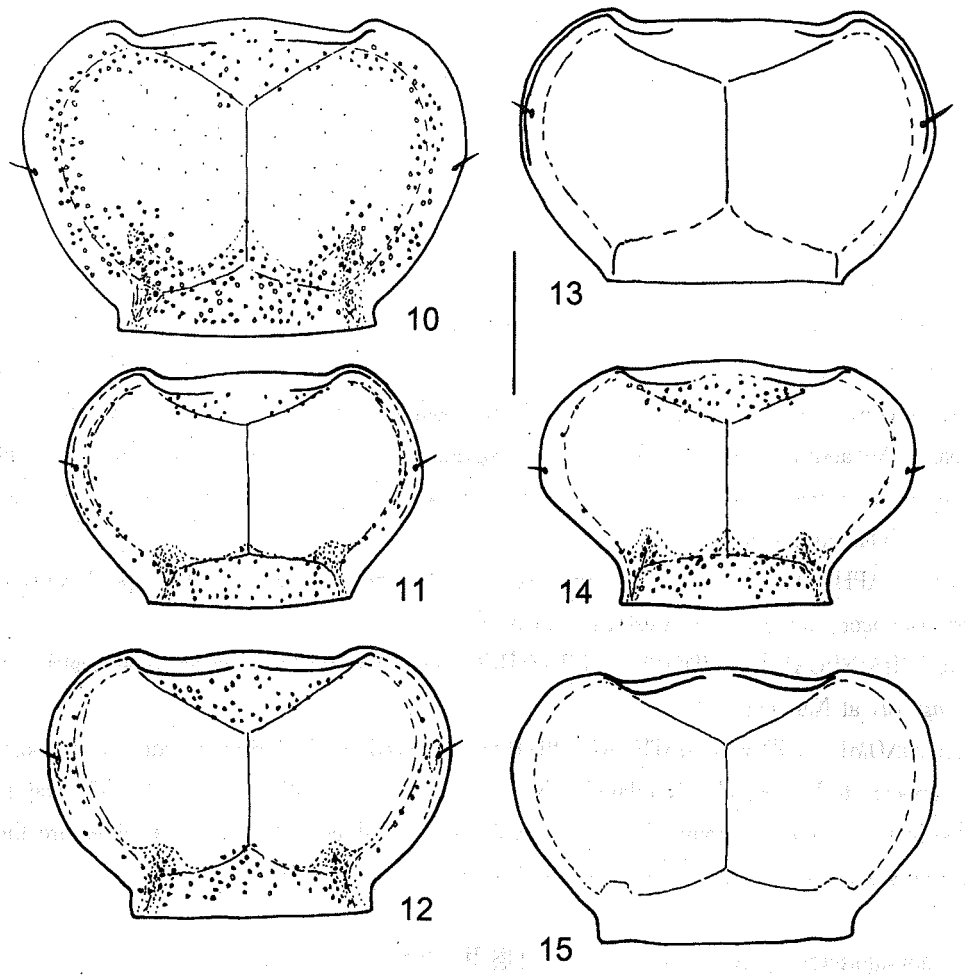
GEOGRAPHICAL RELATIONS WITH OTHER SPECIES——This species is sympatric with *L. gaoligongensis* at Nankang Yakou.

TAXONOMIC AND FAUNISTIC AFFINITIES——Based on similarities in adult morphology, this species appears to be very closely related only to *L. championi*, which Perrault (1985a and 1985b) included in his *nepalensis* group of subgenus *Evanoleistus* Jedlicka. Its faunal affinities are therefore toward the west, with the *Leistus* fauna of the Himalayan region of India and Nepal.

Leistus gaoligongensis new species(高黎贡山盗甲,新种)

(Fig. 3, 8, 12, 25 and 27)

TYPE MATERIAL——Holotype, a male, deposited in KIZ, labeled"CHINA, Yunnan Province, Gaoligong Mountains, Baoshan Prefecture, Baoshan County, Nankang Yakou, 24°49.9′N 98°46.0′ E"/"2130m, 4 ~ 7 November 1998, Stop #98 – 129B, D. H. Kavanaugh, C. E. Griswold, C. – L. Long, R. Li, & S. – X. He collectors"/"Sino – American Expedition, Gaoligong Mountains, Yunnan, Peoples Republic of China, October – November, 1998"/"Holotype *Leistus gaoligongensis* Kavanaugh & Long"[red label]. Paratypes, a total of 130, deposited in KIZ and CaAS: 53 males and 35 males, same locality and expedition labels as holotype/"Paratype *Leistus gaoligongensis* Kavanaugh & Long"[yellow label]; 27 males and 15 females, labeled"CHINA, Yunnan Province, Gaoligong Mountains, Baoshan Prefecture, Baoshan County, 26 air km E of Tenchong at Luoshuidong, 24°56.9′ N 98°45.4′ E"/ "2300 m, 26 ~ 31 October 1998, Stop #98 – 127A, D. H. Kavanaugh, C. E. Griswold, C. – L. Long & S. – X. He collectors"/"Sino – American Expedition, Gaoligong Mountains, Yunnan, Peoples Republic of China, October – November, 1998"/"Paratype *Leistus gaoligongensis* Kavanaugh & Long"[yellow label]. Type locality: Nankang Yakou.



Figs. 10 ~ 15. Pronotum, dorsal aspect; scale line = 1.0 mm (refers to Figs. 10 ~ 12 and 14 only). 10. *Leistus tanaognathus* n. sp. 11. *Leistus lihengae* n. sp. 12. *Leistus gaoligongensis* n. sp. 13. *Leistus birmanicus* Perrault (redrawn from Perrault, 1985a, Fig. 8). 14. *Leistus yunnanus* Bänninger. 15. *Leistus brancuccii* Farkac (redrawn from Farkac, 1995, Fig. 3).

ETYMOLOGY——This species is named for the Gaoligong Mountains, where both known populations of this species occur.

DIAGNOSIS——Adults of this species can be distinguished from those of all other known *Leistus* species by the following combination of character states: body black, antennomeres 2 to 12, mandibles, labrum, and tibiae and tarsi pale reddish; elytra with distinct greenish – golden metallic reflection; lateral margin of mandible distinctly sinuate (Fig. 3a); gular setae inserted on very short, separate tubercles not or only slightly connected by low cuticular bridges (gular carina absent); pronotum (Fig. 12) with lateral margin evenly arcuate and with a short, deep sinuation anterior to rectangular basal angle, lateral explanation markedly wide; male median lobe (Fig. 25) with apex long and asymmetrically expanded apically, apical orifice without wing sclerites basally.

Members of this species are most similar to those of *L. brancuccii* Farkac, with which they share form of the pronotum and general shape of the apex of the male median lobe, but from which they can be distinguished by their greenish – golden elytral reflection (bronze in *L. brancucci*), pale reddish antennomeres 2 to 4 (pale brown in *L. brancuccii*), pale reddish tibiae (darker in *L. brancuccii*), and longer apex of the median lobe (shorter in *L. brancuccii*, see Farkac, 1995, Figs. 22 and 23).

DESCRIPTION——Size medium for the genus; male SBL = 7.3 ~ 8.3 mm and ABL = 8.4 ~ 9.2 mm, female SBL = 7.7 ~ 8.6 mm and ABL = 8.5 ~ 9.9 mm. Body form typical for just, but elytra slightly shorter and broader than in most species, males with IE/P = 1.24 ~ 1.32 and IEl/w = 1.57 ~ 1.67, females with IE/P = 1.31 ~ 1.33 and IEl/w = 1.55 ~ 1.59; relative head width greater in females than in males. Head and antennomere 1 black, labrum, mandibles, maxillae, palpi, and all antennomeres pale reddish (labrum slightly darker in some individuals); pronotum black, with lateral margins slightly paler (piceous); elytra black; legs with femora black, tibiae and tarsi pale reddish. Head and pronotum without metallic reflection, elytra with distinct greenish – golden metallic reflection. Head with frons sparsely and finely punctate, also faintly rugulose laterally, vertex finely punctulate; pronotum with discal region smooth, apical and basal regions coarsely and moderately densely punctate, lateral regions sparsely and finely punctate; elytral intervals impunctate; thoracic venter with prosternum anterolaterally, mesepisternum, mesepimeron, metasternum laterally, and metepisternum coarsely and moderately densely punctate, other areas smooth or sparsely and more finely punctate; abdominal venter smooth, except sternum 2 and paralateral portions of sternum 3 coarsely and moderately densely punctate. Head, pronotum and elytra shiny, elytra very slightly iridescent. Microsculpture comprised of faintly impressed isodiametric sculpticells on head, very faintly (nearly effaced) slightly transverse (less than twice as wide as long) sculpticells on pronotum, and moderately impressed markedly transverse (more than three times as wide as long, formed into microlines in some areas) sculpticells on elytra.

Head shape typical for genus, constriction posterior to eyes short abrupt, narrowed at about 750 angle to longitudinal axis. Eyes large, markedly convex. Antennae slightly elongate, extended to apical half of elytron; antennomere 1 (scape) moderately long, straight, slightly narrowed basally; antennomere 2 (pedicel) with three subapical setae, one anteroventral and two anterodorsal; antenomere 4 glabrous; antennomere 5 distinctly longer than antennomere 3, IA = 1.44 ~ 1.60; flagellar antennomeres (5 ~ 12) markedly elongate and slender. Labrum (Fig. 1) long, apical margin smoothly convex or slightly projected medially, with two pairs of setae. Clypeus with apical margin truncate. Mandible (Fig. 3) medium length, not distinctly deflected downward apically, markedly explanate basolaterally, narrowed distally, lateral margin with a moderately deep sinuation. Maxilla with palpiger bisetose (with two long, spiniform seta, one inserted subapicomedially and one inserted apically on a long process); stipes with five long spinform setae, first (anteriormost), second, and third setae inserted apically on short or moderate length, separate processes (one individual examined with first and second setae on one basally – fused short process), fourth and fifth (posteriormost) setae inserted apically on short, separate processes. Labium with anterior margin of ligular sclerite extended as a long –

tined trident, fringe setae and basal setae absent from trident; ligular sclerite with a broad medial carina, terminated anteroventrally as a medium – length tubercle at the base of the trident, one pair of setae inserted on apex of tubercle; paraglossae separate, lobate; labial palpus with palpomere 2 relatively short and palpomere 3 relatively long, ILP = 0.91 ~ 0.95, palpomere 2 unisetose (near basal end). Mentum with apical tooth emarginate or slightly bifid; 2 pairs of m2 setae inserted slightly anterior of mental base, lateral pair longer than medial pair; m3 setae inserted on short tubercles; epilobes each with a short but distinct apical teeth on which m4 seta is inserted; gula (submentum) with lateral setae inserted on a pair of short tubercles and 2.5 or 3 pairs of medial setae inserted on very short tubercles (lateral two pairs incompletely jointed by slightly raised cuticular bridges, but not forming a carina) (Fig. 8).

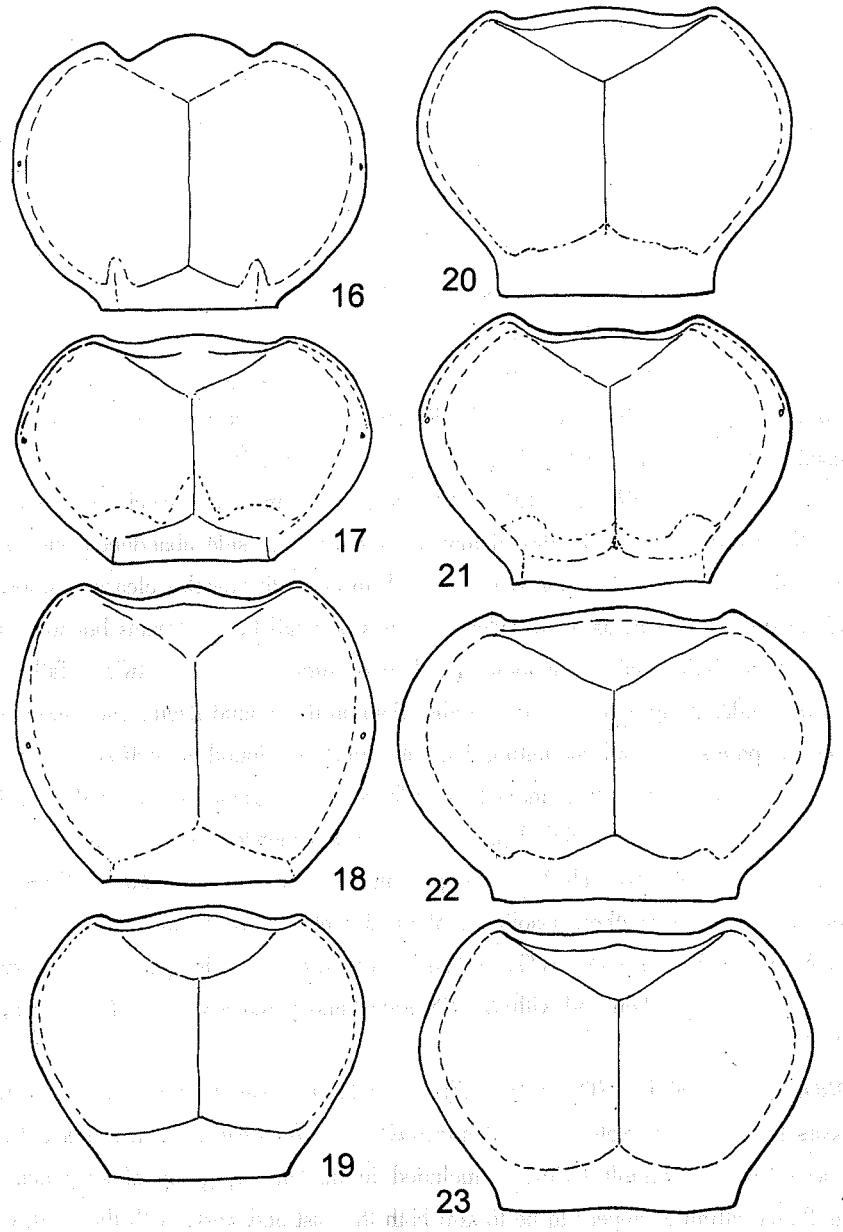
Pronotum (Fig. 12) markedly convex, moderately cordate, base slightly narrow, IPw/l = 1.46 ~ 1.56, Ipm/b = 1.61 ~ 1.78; lateral margin markedly arcuate, with a short, moderately deep sinuation anterior to basal angle; lateral explanation broad throughout, center of explanation slightly convex as a raised longitudinal swelling parallel to lateral margin in anterior half to two – thirds in most individuals; apical angles very short, markedly broad, markedly rounded; basal angles rectangular; lateral margination faintly present anteriorly only; anterior margination complete or narrowly interrupted only at middle, deeply impressed, moderately wide; anterior transverse impression narrow and deep; posterior transverse impression markedly deep and narrow; basal foveae deep, medium – width, moderately divergent basally; midlateral seta present, with a small swelling medial to point of insertion; basolateral seta absent.

Elytra moderately convex, with silhouette subrectangular; basal margination medium – length, slightly or moderately concave anteriorly; humerus angulate, slightly rounded, humeral carina distinct, sharp, not projected anteriorly, humeral tooth absent; striae medium – depth, moderately punctate; interval 3 with four to six discal setae (one near apex in most individuals), setiferous punctures slightly foveate; interval 9 with six to nine setae (umbilicate series). Hindwing full – sized.

Intercoxal process of prosternum moderately broadly lanceolate, with margination complete or complete except at apex. Metasternum slightly short, length posterior to mesocoxa slightly greater than diameter of mesocoxa. Sterna 4 to 6 each with a pair of posterior paramedial setae; sternum 7 with one pair of apical paramedial setae in males, two pairs in females.

Legs average length for genus; hindcoxa with one basal seta; front and middle tarsi with climbing setae ventrally on tarsomeres 1 to 4 in both sexes.

MALE genitalia with median lobe as in Fig. 25; basal bulb rounded and markedly closed basally; dorsobasal piece present as a large, simple sagital fin in dorsal midline; mid – shaft medium – width, moderately tapered apically, circular in cross – section; preapical shaft narrow, slightly tapered apically in lateral aspect, straight and slightly tapered apically in ventral aspect, without right or left lateral flanges, ventral curvature evenly concave; apex extremely long, apically expanded asymmetrically as in Fig. 25b (oblique ventral aspect), broadly hooked dorsally (lateral aspect, Fig. 25a), plane of apical face (apical aspect) markedly deflected left, without a ventral longitudinal keel; apical



Figs. 16－23. Pronotum, dorsal aspect. 16. *Leistus businskyi* Dvorák (redrawn from Dvorák, 1994, Fig. 7). 17. *Leistus angulicollis* Fairmaire (redrawn from Perrault, 1991, Fig. 4). 18. *Leistus krali* Farkac (redrawn from Farkac, 1993, Fig. 6). 19. *Leistus deweianus* Farkac (redrawn from Farkac, 1995, Fig. 4). 20. *Leistus jani* Farkac (redrawn from Farkac, 1995, Fig. 5). 21. *Leistus kubani* Farkac (redrawn from Farkac, 1993, labeled as Fig. "3", but cited as "2"in the caption). 22. *Leistus kucerai* Farkac (redrawn from Farkac, 1995, Fig. 7). 23. *Leistus klarae* Farkac (redrawn from Farkac, 1995, Fig. 6).

orifice slightly deflected right, without wing sclerites basally. Parameres (Fig. 27) asymmetrical; left

paramere (Fig. 27b) short, broad, narrowed basally; right paramere (Fig. 27a) moderately long, slender.

FEMALE with basal apodemes of tergum 8 absent or very short. Hemisternite 8 with medium – length setae on medial one – third of apical margin, basal apodeme wide, slightly emarginate apically, with lateral arm slightly shorter than medial arm. Proctiger (tergum 9) hemispheric, narrowly membranous apically. Valvifer (laterotergite 9) with basal apodeme moderately broad. Gonacoxa with six to eight medium – length ventral diagonal setae and three or four short mediodorsal setae. Bursa copulatrix (Fig. 30) with longitudinal axis (lateral aspect) slightly arched basodorsally; spermathecal chamber slightly short, symmetrical, broadly wedge – shaped, triangular (dorsal aspect), slightly extended posterodorsally (lateral aspect); insemination duct not sclerotized; spermathecal duct long, loosely and irregularly convoluted, distinctly thicker proximally and gradually narrowed distally, deflected slightly right just distal to insertion in apical midline on spermathecal chamber.

HABITAT DISTRIBUTION AND LIFE HISTORY——Almost all specimens were collected at night in partially disturbed mixed hardwood forest, most on or beside abandoned and overgrown dirt roads or trails, where ground cover was sparse enough to make the beetles clearly visible. Individuals were most abundant in moist areas at the edges of seeps or small forest streams but were also found in dry leaf litter. Many individuals were found perched or running on dead twigs, fallen branches of trees, or bamboo stalks lying on the ground, rather than on the ground itself, and these sites appear to serve as gathering points. Several copulating pairs of adults were found at such sites at both localities. No individuals were found by beating understory or forest edge vegetation, either during the day or at night; and only one individual was found perched on a low understory leaf at night.

GEOGRAPHICAL DISTRIBUTION——At present, known from only two localities, 14 air kilometers (akm) apart, in the southern Gaoligong Mountains of western Yunnan Province.

GEOGRAPHICAL RELATIONS WITH OTHER SPECIES——This species is sympatric with *L. tanaognathus* at Nankang Yakou and with *L. lihengae* (and perhaps also *L. brancuccii*, see below) at Luoshuidong.

TAXONOMIC AND FAUNISTIC AFFINITIES——Based on similarities in adult morphology, this species appears to be closely related to *L. brancuccii*, *L. birmanicus*, *L. lihengae*, *L. yunnanus*, and other species which Perrault (1985a) included in his crassus group of subgenus Evanoleistus Jedlicka. Its faunal affinities appear to be toward both the east and west, with the *Leistus* fauna of the region extending from eastern Pakistan (*Leistus heinzi* Farkac), through the Himalayan region and northeastern Myanmar, and across Yunnan, Sichuan, Guizhou, and Fujian Provinces to Taiwan (*Leistus smetani* Farkac) and Japan (*Leistus crassus* Bates).

TAXONOMIC NOTES——Farkac (1995: 148) recorded *Leistus brancuccii* from the Gaoligong Mountains at"25°57'N 98°45'E". If the cited coordinates are actually in degrees and minutes, rather than degrees only (as written), then this record is also from Luoshuidong. In 1995, the cited year of collection of the female specimen on which this record is based, the main road from Bawan to Tengchong over the Gaoligong Mountains passed through Luoshuidong, and the cited elevation for the

record, "2200 ~ 2500 m"is also appropriate for this locality. However, if the cited coordinates are, in fact, as written (i.e., in degrees only), then the record for *L. brancuccii* is allopatric with respect to both *L. gaoligongensis* and *L. lihengae*, about 30 akm southwest of the southern limit of the known range of the former and 45 akm southwest of the type locality of the latter.

Leistus brancuccii is unique among *Leistus* species presently known from Yunnan in that it is the only one recorded from more than one mountain range in the province (i.e., Gaoligong Mountains and Cangshan) or also from outside the province (i.e., from Guizhou Province) (Farkac, 1995). A general pattern of extremely restricted geographical ranges of species holds as well for the *Leistus* faunas of several other provinces in China (see additional discussion below). This pattern, coupled with the fact that the record for the Gaoligong Mountains is based on a single female, and Farkac (1995) apparently did not examine characters of female genitalic structure, suggests that this record may be suspect. The Gaoligong Mountains specimen indeed may be conspecific with *L. brancuccii*; but perhaps it is a female of *L. gaoligongensis*. If the latter, then that specimen either does not fit Farkac's description of *L. brancuccii* or, alternatively, it does not fit our description of *L. gaoligongensis*. A third possibility is that it represents a distinct, undescribed species, adults of which are active in Spring (cited collection date was "8 ~ 16 v. 1995").

Leistus lihengae new species(李氏盗甲,新种)

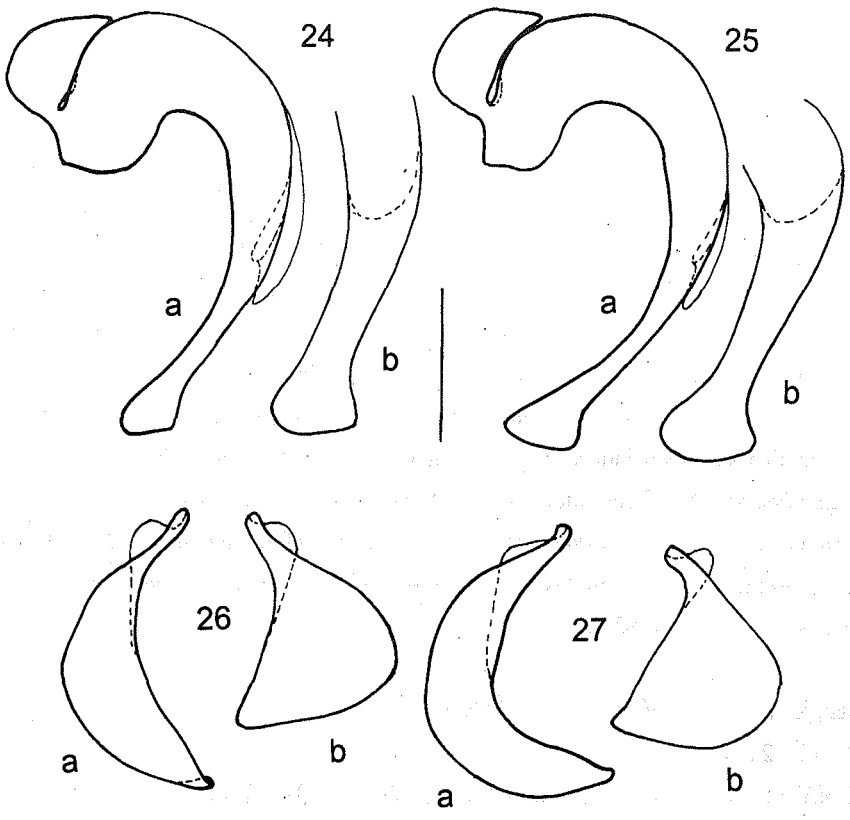
(Fig. 2, 7, 11, 24 and 26)

TYPE MATERIAL——Holotype, a male, deposited in KIZ, labeled"CHINA, Yunnan Province, Gaoligong Mountains, Baoshan Prefecture, Baoshan County, 26 air km E of Tenchong at Luoshuidong, 24°56.9'N 98°45.4'E"/ "2300 m, 26 ~ 31 October 1998, Stop #98 - 127A, D. H. Kavanaugh, C. E. Griswold, C. - L. Long & S. - X. He collectors"/"Sino - American Expedition, Gaoligong Mountains, Yunnan, Peoples Republic of China, October - November, 1998"/"Holotype *Leistus lihengae* Kavanaugh & Long"[red label]. Paratypes, a total of 21, deposited in KIZ and CaAS: 15 males and 6 females, same label data as holotype/"Paratype *Leistus lihengae* Kavanaugh & Long"[yellow label]. Type locality: Luoshuidong.

ETYMOLOGY——We take great pleasure in naming this species in honor of Professor Li Heng, leader of the first Sino - American expedition to the Gaoligong Mountains.

DIAGNOSIS——Adults of this species can be distinguished from those of all other known *Leistus* species by the following combination of character states: body black, antennae, mandibles, labrum and legs entirely pale reddish; head and pronotum with distinct greenish metallic reflection, elytra with brilliant copper or golden metallic reflection; lateral margin of mandible distinctly sinuate (Fig. 2a); gular setae inserted separately and directly on surface of submentum (gular carina absent); pronotum (Fig. 11) with lateral margins without or with only a short and very shallow sinuation anterior to obtuse basal angle; male median lobe (Fig. 24) with apex long and asymmetrically expanded apically, apical orifice without wing sclerites basally.

Members of this species appear to be most similar to those of *L. birmanicus* Perrault, with which



Figs. 24 ~ 25. Median lobe of aedeagus; a = left lateral aspect, b = apex, ventral oblique aspect (perpendicular to plane of apical ventral surface), scale line = 0.5 mm. 24. *Leistus lihengae* n. sp. 25. *Leistus gaoligongensis* n. sp. 26 ~ 27. Parameres of aedeagus, lateral aspect; a = right paramere, b = left paramere; scale line = 0.5 mm. 26. *Leistus lihengae* n. sp. 27. *Leistus gaoligongensis* n. sp.

they share general form of the pronotum and shape of the apex of the male median lobe, but from which they can be distinguished by the greenish metallic reflection on the head and pronotum (absent from *L. birmanicus*), copper or golden metallic reflection of the elytra (greenish in *L. birmanicus*), antennae and legs entirely pale reddish (antennomere 1 and tibiae darker in *L. birmanicus*), and basal piece (sagital fin) of male median lobe large (smaller in *L. birmanicus*; see Perrault, 1985a, Fig. 9a).

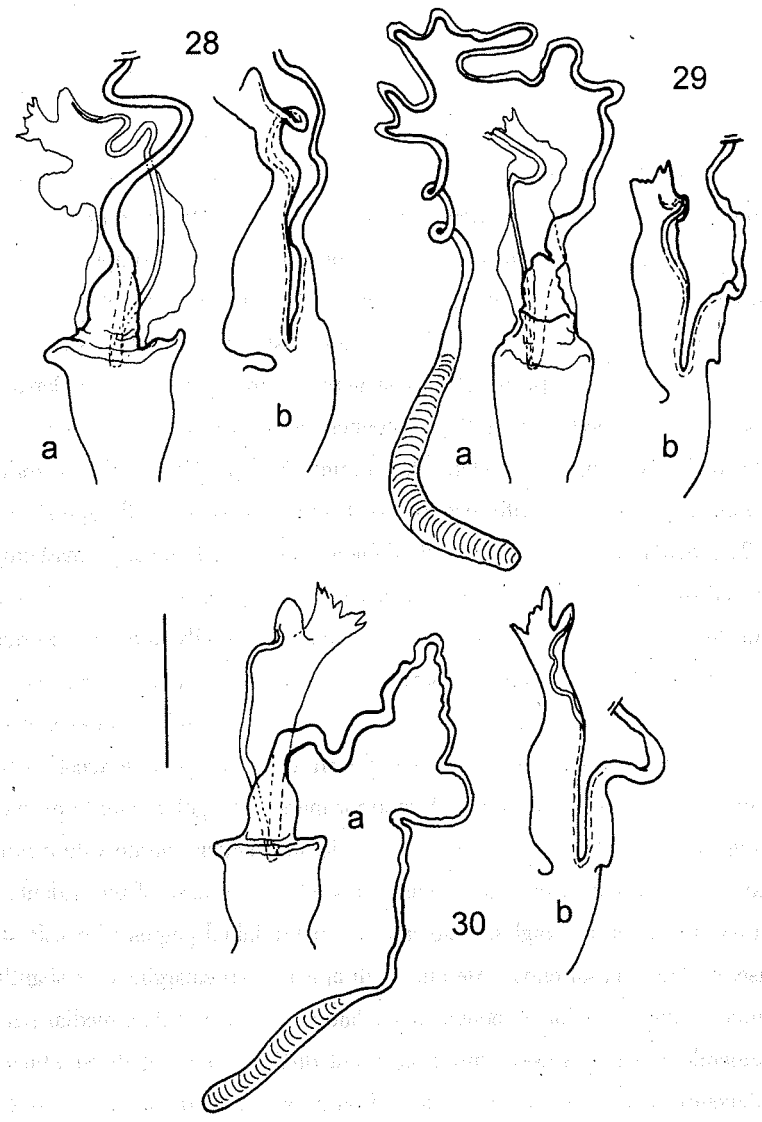
DESCRIPTION——Size medium for the genus, male SBL = 7.2 ~ 7.7 mm and ABL = 8.1 ~ 8.7 mm, female SBL = 7.6 ~ 8.1 mm and ABL = 8.4 ~ 8.8 mm. Body form typical for genus, except head slightly narrower and elytra slightly shorter and wider than in most species, males with IE/P = 1.26 ~ 1.29 and IEl/w = 1.59 ~ 1.67, females with IE/P = 1.33 ~ 1.38 and IEl/w = 1.49 ~ 1.55; relative head width equal in males and females, elytra relatively shorter and wider in females than in males. Head black, labrum, mandibles, maxillae, palpi, and all antennomeres pale reddish; pronotum black, with lateral margins slightly paler (reddish brown); elytra black; legs with femora,

tibiae and tarsi pale reddish. Head and pronotum with distinct greenish metallic reflection, elytra with brilliant copper – golden metallic reflection. Head with frons sparsely and finely punctate, also faintly rugulose laterally, vertex finely punctulate; pronotum with discal region smooth, apical and basal regions coarsely and sparsely punctate, lateral regions sparsely and finely punctate; elytral intervals impunctate; thoracic venter with prosternum anterolaterally, proepisternum posteriorly, mesepisternum, mesepimeron, and metepisternum coarsely and sparsely punctate (metasternum with a few coarse punctures at extreme lateral edge only), other areas smooth or sparsely and more finely punctate; abdominal venter smooth, except sternum 2 and paralateral portions of sternum 3 coarsely and moderately densely punctate. Head, pronotum and elytra shiny. Microsculpture comprised of faintly impressed isodiametric sculpticells on head, faintly impressed broken isodiametric sculpticells on pronotum, and moderately impressed moderately transverse (about twice as wide as long) sculpticells on elytra.

Head shape typical for genus, constriction posterior to eyes short, abrupt, narrowed at about 75° angle to longitudinal axis. Eyes large, markedly convex. Antennae slightly elongate, extended to apical half of elytron; antennomere 1 (scape) moderately long, straight, slightly narrowed basally; antennomere 2 (pedicel) with three subapical setae, one anteroventral and two anterodorsal; antenomere 4 glabrous; antennomere 5 distinctly longer than antennomere 3, IA = 1.44 ~ 1.60; flagellar antennomeres (5 ~ 12) markedly elongate and slender. Labrum (Fig. 1) long, apical margin smoothly convex or slightly projected medially, with two pairs of setae. Clypeus with apical margin truncate. Mandible (Fig. 2) medium length, not distinctly deflected downward apically, markedly explanate basolaterally, narrowed distally, lateral margin with a moderately deep sinuation. Maxilla with palpiger bisetose (with two long, spiniform seta, one inserted subapicomedially and one inserted apically on a long process); stipes with five long spinform setae, first (anteriormost), second, and third setae inserted apically on short or moderate length, separate processes (one individual examined with first and second setae on one basally – fused short process), fourth and fifth (posteriormost) setae inserted apically on short, separate processes. Labium with anterior margin of ligular sclerite extended as a long – tined trident, fringe setae and basal setae absent from trident; ligular sclerite with a broad medial carina, terminated anteroventrally as a medium – length tubercle at the base of the trident, one pair of setae inserted on apex of tubercle; paraglossae separate, lobate; labial palpus with ILP = 0.87 ~ 0.93, palpomere 2 unisetose (near basal end). Mentum with apical tooth emarginate or slightly bifid; 2 pairs of m2 setae inserted slightly anterior of mental base, lateral pair longer than medial pair; m3 setae inserted on short tubercles; epilobes each with a short but distinct apical teeth on which m4 seta is inserted; gula (submentum) with lateral setae inserted on a pair of short tubercles and 2 pairs of medial setae inserted on very short, separate tubercles (no trace of a carina) (Fig. 7).

Pronotum (Fig. 11) markedly convex, markedly cordate, base slightly narrow, IPw/l = 1.48 ~ 1.67, IPm/b = 1.63 ~ 1.70; lateral margin markedly arcuate, with a short, very shallow sinuation anterior to basal angle; lateral explanation broad throughout, center of explanation slightly convex as a raised longitudinal swelling parallel to lateral margin in anterior half in most individuals; apical angles very short, moderately broad, markedly rounded; basal angles slightly or moderately obtuse; lateral

margination faintly present anteriorly only; anterior margination complete except for medial 25%, moderately impressed, moderately wide; anterior transverse impression narrow and deep; posterior transverse impression markedly deep and narrow; basal foveae slightly shallow, medium – width, moderately divergent basally; midlateral seta present, with or without a small swelling medial to point of insertion; basolateral seta absent.



Figs. 28 ~ 30. Bursa copulatrix; a dorsal aspect, b = left lateral aspect, scale line = 0.50 mm. 28. Leistus tanaognathus n. sp. 29. *Leistus lihengae* n. sp. 30. *Leistus gaoligongensis* n. sp.

Elytra moderately convex, with silhouette subrectangular; basal margination medium – length, slightly or moderately concave anteriorly; humerus angulate, slightly rounded, humeral carina distinct,

sharp, not projected anteriorly, humeral tooth absent; striae medium – depth, moderately punctate; interval 3 with three to six discal setae (one near apex in most individuals), setiferous punctures slightly foveate; interval 9 with six or seven setae (umbilicate series). Hindwing full – sized.

Intercoxal process of prosternum moderately broadly lanceolate, with margination complete or complete except at apex. Metasternum slightly short, length posterior to mesocoxa slightly greater than diameter of mesocoxa. Sterna 4 to 6 each with a pair of posterior paramedial setae; sternum 7 with one pair of apical paramedial setae in males, two pairs in females.

Legs average length for genus; hindcoxa with one basal seta; front and middle tarsi with climbing setae ventrally on tarsomeres 1 to 4 in both sexes.

MALE genitalia with median lobe as in Fig. 24; basal bulb rounded and markedly closed basally; dorsobasal piece present as a large, simple sagital fin in dorsal midline; mid – shaft medium – width, moderately tapered apically, circular in cross – section; preapical shaft narrow, slightly tapered apically in lateral aspect, straight and slightly tapered apically in ventral aspect, without right or left lateral flanges, ventral curvature evenly concave; apex extremely long, apically expanded asymmetrically as in Fig. 24b (oblique ventral aspect), broadly hooked dorsally (lateral aspect, Fig. 24a), plane of apical face (apical aspect) markedly deflected left, without a ventral longitudinal keel; apical orifice slightly deflected right, without wing sclerites basally. Parameres (Fig. 26) asymmetrical; left paramere (Fig. 26b) short, broad, narrowed basally; right paramere (Fig. 26a) moderately long, slender.

FEMALE with basal apodemes of tergum 8 absent or very short; hemisternite 8 with medium – length setae on medial one – third of apical margin, basal apodeme wide, slightly emarginate apically, with lateral arm slightly shorter than medial arm; proctiger (tergum 9) hemispheric, narrowly membranous apically; valvifer (laterotergite 9) with basal apodeme moderately broad; gonacoxa with five to seven short ventral diagonal setae and two or three short mediodorsal setae. Bursa copulatrix (Fig. 29) with longitudinal axis (lateral aspect) slightly arched basodorsally; spermathecal chamber slightly short, symmetrical, broadly wedge – shaped, triangular (dorsal aspect), slightly extended posterodorsally (lateral aspect); insemination duct not sclerotized; spermathecal duct long, loosely and irregularly convoluted, distinctly thicker proximally and gradually narrowed distally, inserted apically slightly right of midline on spermathecal chamber.

HABITAT DISTRIBUTION AND LIFE HISTORY—— Almost all specimens were collected at night in partially disturbed mixed hardwood forest, under the same circumstances as described for *L. gaoligongensis*. As with that species, many individuals were found perched or running on dead twigs, fallen branches of trees, or bamboo stalks lying on the ground, and one copulating pair was found at such a site. No individuals were found by beating understory or forest edge vegetation, either during the day or at night; and only one individual was dislodged from moss on a tree trunk 1.5 m above the ground. Adults of *L. lihengae* were found together with *L. gaoligongensis* adults at the type locality.

GEOGRAPHICAL DISTRIBUTION——At present, known only from the type locality in the southern Gaoligong Mountains of western Yunnan Province.

GEOGRAPHICAL RELATIONS WITH OTHER SPECIES——This species is sympatric with *L. gaoligongensis and perhaps also L. brancuccii* (see above) at Luoshuidong. TAXONOMIC AND FAUNISTIC AFFINITIES —— Based on similarities in adult morphology, this species appears to be closely related to *L. brancuccii*, *L. birmanicus*, *L. gaoligongensis*, *L. yunnanus*, and other species which Perrault (1985a) included in his *crassus* group of subgenus *Evanoleistus* Jedlicka. Its faunal affinities appear to be as described for *Leistus gaoligongensis*.

A Key to the Leistus Species Known or Suspected to Occur in Yunnan Province

Thirteen species of *Leistus*, including the three described in this report, are known to occur in Yunnan. *Leistus birmanicus* Perrault (1985a:22) was described from the Adung Valley, Myanmar, which is an upper tributary of the Irrawaddy (Dulong Jiang) near the border with Yunnan. Although not yet recorded from the province, this species may also occur Yunnan, most likely on the western flank of the northern part of the Gaoligong Mountains, and, therefore, is included in the key.

We remind users of this key that character states cited and illustrations provided are based on our review of the literature and not of representative specimens (see above), except for *Leistus yunnanus* Bänninger (1925) and the new species described in this report. References, including descriptions and illustrations, that we used for species included in the key were as follows: *Leistus angulicollis* Fairmaire (1886): Perrault (1991); *L. birmanicus* Perrault: Perrault (1985, original description); *Leistus businskyi* Dvorák: Dvorák (1994, original description) and Farkac (1993); *Leistus brancuccii* Farkac, *Leistus deuveianus* Farkac, *Leistus jani* Farkac, *Leistus klarae* Farkac, and *Leistus kucerai* Farkac: Farkac (1995, original descriptions); and *Leistus krali* Farkac and *Leistus kubani* Farkac: Farkac (1993, original descriptions). Characters of pronotal shape and structure dominate the key because (1) they are useful in distinguishing adults of these species and (2) pronota have been illustrated for all of the included species. Illustrations provided here are redrawn from those provided by previous authors (see citations with figure captions). We did not use characteristics of the median lobe of the aedeagus of males in the key because (1) examination of these structures requires dissection, (2) males are still unknown for two of the species (*L. krali* and *L. tanaognathus*), and (3) all species can be distinguished without reference to internal characters. We regard this as only a preliminary, working key, one to be checked and improved through future comparisons with specimens of all included species.

1 Gular setae inserted separately and directly on the gular surface (Fig. 7) or on short isolated tubercles (Figs. 8, 9) (in *L. gaoligongensis* and *L. yunnanus* adults, tubercles may be united by low cuticular swellings or bridges ····· **2**

1' Gular setae inserted on a district transverse carina (Figs. 5, 6) ····· **6**

2.(1) Pronotum (Figs. 11, 13) without or with only a short very shallow sinuation of the lateral margin anterior to the basal angle ····· **3**

2' Pronotum (Figs. 12, 14, 15) with a deep sinuation of the lateral margin anterior to the basal

angle ····· **4**

3(2) Legs and antennae entirely pale reddish; head and pronotum dorsally with distinct greenish metallic reflection; elytra with brilliant copper or golden metallic reflection ····· ····· ***Leistus lihengae*** new species

3' Legs with femur (and perhaps also tibia) and antennal scape (antennomere 1) dark (brown); head and pronotum dorsally without metallic reflection; elytra with a greenish metallic reflection ····· ***Leistus birmanicus*** Perrault

4(2') Pronotum (Fig. 14) with lateral margin narrowly curved and with a long sinuation anterior to basal angle, lateral explanation widest at middle (near insertion of midlateral seta) and distinctly narrowed anteriorly and posteriorly ····· ***Leistus yunnanus*** Bänninger

4' Pronotum (Figs. 13 and 15) with lateral margin more evenly arcuate and with a shorter and more abrupt sinuation anterior to basal angle, lateral explanation wide throughout (or only slightly narrowed anteriorly) and ····· **5**

5(4') Antenna with antennomeres 1 to 4 dark (piceous), antennomeres 5 to 12 paler (brownish); elytra with a distinct bronze metallic reflection; pronotum (Fig. 15) with lateral explanation moderately wide ····· ***Leistus brancuccii*** Farkac

5' Antennae with antennomere 1 (scape) piceous, antennomeres 2 to 12 pale reddish; elytra with a distinct greenish golden metallic reflection; pronotum (Fig. 13) with lateral explanation markedly wide ····· ***Leistus gaoligongensis*** new species

6(1') Gular carina (Fig. 5) with distinct tubercles, graded from longest laterally to shortest medially; mandible (Fig. 1) very long, markedly sinuate laterally, and apically recurved ventrally ····· ***Leistus tanaognathus*** new species

6' Gular carina (Fig. 6) without distinct tubercles of graded length; mandible (Figs. 2 ~ 4) shorter, less sinuate laterally and apically not or only slightly recurved ventrally ··· **7**

7(6') Pronotum (Figs. 16, 17) markedly narrowed basally, ratio of greatest pronotal width to width across pronotal base (IPm/b) equals 2.00 or more ····· **8**

7' Pronotum (Figs. 18 ~ 23) slightly or moderately narrowed basally, IPm/b less than 2.00 ····· **9**

8(7) Pronotum (Fig. 17) with apical width (measured between apices of apical angles) distinctly greater than basal width (measured between basal angles), lateral margin without a sinuation anterior to basal angle, apical margin slightly and gradually sinuate medial to apical angles ····· ***Leistus angulicollis*** Fairmaire

8' Pronotum (Fig. 16) with apical width nearly equal to basal width of base, lateral margin slightly but distinctly sinuate anterior to basal angle, apical margin deeply and abruptly sinuate medial to apical angles ····· ***Leistus businskyi*** Dvorák

9(7') Pronotum (Fig. 18) with lateral margin evenly arcuate and without sinuation anterior to basal angle, lateral explanation moderately broad at middle but markedly narrowed anteriorly ··· ····· ***Leistus krali*** Farkac

9' Pronotum (Figs. 19 ~ 23) with lateral margin evenly arcuate or not but with sinuation present (least so in L. deuveianus (Fig. 19) anterior to basal angle, lateral explanation narrow or broad but not markedly narrowed anteriorly ····· **10**

10(9') Pronotum (Figs. 19, 20) with lateral explanation narrow ····· **11**

10' Pronotum (Figs. 21 ~ 23) with lateral explanation moderately or markedly broad ····· **12**

11(10) Pronotum (Fig. 19) with sinuation of lateral margin very shallow anterior to basal angle, basal angles distinctly obtuse ····· ***Leistus deuveianus*** Farkac

11' Pronotum (Fig. 20) with sinuation of lateral margin deep anterior to basal angle, basal angles rectangular ····· ***Leistus jani*** Farkac

12(10') Pronotum (Fig. 21) with sinuation of lateral margin very short, just slightly anterior to basal angle, basal angles rectangular, lateral margination present on lateral explanation anterior to insertion of midlateral seta ····· ***Leistus kubani*** Farkac

12' Pronotum (Figs. 22, 23) with sinuation of lateral margin longer, more distant from (anterior to) basal angle, basal angles rectangular or obtuse, lateral margination absent from lateral explanation ····· **13**

13(12') Pronotum (Fig. 22) with sinuation of lateral margin deep, basal angles rectangular, lateral explanation very broad ····· ***Leistus kucerai*** Farkac

13' Pronotum (Fig. 23) with sinuation of lateral margin shallow, basal angles obtuse, lateral explanation only moderately broad ····· ***Leistus klarae*** Farkac

3 Discussion

All three species described in this report appear to represent *Leistus* subgenus *Evanoleistus* Jedlicka (1967), as redefined by Perrault (1980, 1985a, and 1985b), with *L. tanaognathus* probably related to species in Perrault's (1985a and 1985b) *nepalensis* group and both *L. gaoligongensis* and *L. lihengae* related to species in his (Perrault, 1985a) *crassus* group. As noted by both Sciaky (1994) and Farkac (1995), subgeneric concepts within genus *Leistus*, and especially with respect to subgenera *Evanoleistus*, *Neoleistus* Erwin (1970), and *Leistus* s. str., are in need of further clarification. A detailed phylogenetic analysis is required to better understand relationships among these groups.

Our knowledge of the diversity of *Evanoleistus*, as currently interpreted, has expanded tremendously in the last decade. Jedlicka included only his new species, *Leistus nepalensis* Jedlicka (1967), in his new subgenus. Subsequently, 15 other species described before 1960 and formerly included in other subgenera have been transferred to *Evanoleistus*. The first of these species described was *Leistus crassus* Bates (1883). By the end of the 1970's, 14 species were known, and 10 more species were described during the 1980's (Deuve, 1985; Perrault, 1985 and 1986). No less than 44 new species (Dvorák, 1994; Farkac, 1993, 1995; Farkac and Sciaky, 1998; Morvan, 1991; Perrault, 1990, 1994; Sciaky, 1994, 1995), including the three described here, have been added in the 1990's,

bringing the total number of species presently included in *Evanoleistus* to 68. Of these, 43 (63%) are known only from localities in China; and, as suggested by Farkac (1995), this number is sure to increase as new areas in China are sampled.

Based on our current knowledge of the geographical distributions of *Evanoleistus* species in China, the general pattern appears to be one of extremely restricted geographical ranges of species, particularly in Yunnan, Sichuan, Gansu, and Qinghai Provinces. All species known from this region, with the exception of *L. brancucci*, are known only from single mountain ranges or mountain systems; and, as suggested above, Farkac's (1995) concept of *L. brancuccii* may have been too inclusive (i.e., the record of *L. brancuccii* from Gaoligong Mountains may be based on a female of *L. gaoligongensis*). Whether this pattern reflects geographical ranges that are really this restricted or merely inadequate sampling remains to be tested.

A second feature of the pattern apparent to date is that of sympatry among two or more geographically restricted species in the same mountain range or system, although these species may occupy different altitudinal ranges on the same mountain/system. For example, *L. gaoligongensis* is sympatric with *L. tanaognathus* and *L. lihengae* in the Gaoligong Mountains; *Leistus kubani* and *L. krali* are sympatric in the Habashan, northwestern Yunnan (Farkac, 1993); *L. jani* and *L. klarae* are sympatric west of Zhongdian, northwestern Yunnan (Farkac, 1995); *Leistus perraulti* Sciaky and *Leistus cylindricus* Sciaky are sympatric at Zhangla, northern Sichuan (Sciaky, 1994); and *Leistus haeckeli* Farkac, *Leistus sciakyi* Farkac, and *Leistus wrasei* Farkac and Sciaky are sympatric on Gongga Shan, southwestern Sichuan (Farkac, 1995; Farkac and Sciaky, 1998).

Comprehensive faunal surveys of areas previously sampled are likely to discover additional new species, as well as additional instances of sympatry among *Evanoleistus* species. Areas that remain poorly sampled or never have never sampled, like northern portions of the Gaoligong Mountains, should yield even more new species when explored. Clearly the basic faunal inventory of *Leistus* in general and *Evanoleistus* in particular for China is far from complete, and future field and laboratory efforts are likely to be highly informative. However, interpretation of the distributional patterns that are recognized must await development of a sound hypothesis of phylogenetic relationships among the species represented.

Acknowledgements The 1998 Sino – American expedition to the Gaoligong Mountains was supported by generous donations from friends of the CaAS and by CBRI (CaAS), the Chinese Academy of Sciences (ChAS), the Yunnan Provincial Science and Technology Commission (YSTC), and the Kunming Institutes of Botany (KIB) and Zoology (KIZ). Special thanks are due to Drs. Tran Hoang and Nina Jablonski (CaAS) and Mr. Cao Daming (YSTC) for their efforts and support in making this expedition a success, and to Dr. Li Heng (KIB), expedition leader, and Bruce Bartholomew, leader for the CaAS contingent.

Mr. He Shao – xian, Tengchong Bureau of Forestry, provided superb logistical support and assistance in the field, and Mr. Li Rong (KIB) assisted ably with the collection of specimens. We also received vital logistical support from managers and staff of the Forestry Department facilities in Bawan, Dahaoping, Liuku, Nankang, Pianma, Qushi, and Tengchong. A draft of the manuscript was read and criticized by Drs. Charles Griswold and Nina Jablonski (CaAS).

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