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Taxonomical Notes on Southeast Asiatic Species of *Horaeomorphus* Schaufuss (Coleoptera, Scydmaenidae), with Description of a New Species from Taiwan

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Abstract *Horaeomorphus babai* sp. nov. from Taiwan is described. *Horaeomorphus taiwanensis* Franz is transferred to *Stenichnus* Thomson (*Stenichnus* (*Cyrtoscydmus*) *taiwanensis* (Franz) comb. nov.). A redescription of *Horaeomorphus chinensis* Franz from the mainland China is given. Morphological differences between genera *Euconnus*, *Stenichnus* and *Horaeomorphus* are thoroughly discussed. The very high and narrow mesosternal carina is considered an unambiguous feature to separate *Euconnus* from the remaining discussed genera, which both possess mesosternal process only slightly expanded ventrally. The most useful characters to distinguish members of *Horaeomorphus* and *Stenichnus* were found to be: i) *Horaeomorphus*: subtriangular mandibles with subapical teeth; a pair of foveae on the vertex; raised supraantennal tubercles; elytra with two small basal pits covered by posterior margin of pronotum; modified hind trochanters in males of some species, ii) *Stenichnus*: slender, sickle-like mandibles without subapical teeth; the vertex without foveae; supraantennal tubercles slightly raised or not marked; elytra with basal pits not covered by base of pronotum; hind trochanters not modified in both sexes.
Key words: Coleoptera, Scydmaenidae, *Horaeomorphus* Schaufuss, new species, Taiwan, China

Introduction

The genus *Horaeomorphus* Schaufuss (Scydmaeninae, Cyrtoscydmini) comprises over fifty species distributed in Southeast Asia, Australia, New Caledonia, Madagascar and Mauritius (Newton & Franz, 1998; Jałoszyński, 2002). Only three species have been described from the eastern part of Asia: *H. chinensis* Franz from mainland China, *H. taiwanensis* Franz from Taiwan, and recently *H. sakishimanus* Jałoszyński from the Ryukyus, Japan (Franz, 1985; O'Keefe & Li, 1998; Jałoszyński, 2002).

Thanks to the kindness of Dr. Shûhei Nomura, I had the opportunity to examine Scydmaenidae preserved in the collections of the National Science Museum, Tokyo (NSMT). Among specimens of *Horaeomorphus* from Southeast Asia I found an interesting species collected in Taiwan, which turned out to be an undescribed species, as confirmed by a direct comparison to the type material of *H. taiwanensis* Franz and *H. chinensis* Franz preserved in the Museum of Natural History, Vienna (MNH) (kindly sent to me by Dr. Harald Schillhammer). Interestingly, examination of the type specimen of the only Taiwanese species known by far, *H. taiwanensis* Franz, revealed that it belongs to the genus *Stenichnus* Thomson. Therefore, the newly described species, *H. babai* sp. nov., represents the first member of *Horaeomorphus* known from Taiwan. *Horaeomorphus chinensis* Franz is redescribed based on the female holotype. Both species of *Horaeomorphus* from Taiwan and the mainland part of China are known from single specimens. Therefore, only genitalia were dissected, and mouthparts were studied in natural position. Differences in morphology between the genera *Stenichnus* and *Horaeomorphus* are discussed.

Genus ***Horaeomorphus*** Schaufuss

Horaeomorphus Schaufuss, 1889, p. 21. Type species: *Horaeomorphus eumicroides* Schaufuss, by original designation.

A detailed set of features, which characterize the genus *Horaeomorphus*, is given in a recent paper (Jałoszyński, 2002). The following description includes only the most important characteristics: body slender, elongate; head relatively small; vertex with a pair of foveae, sometimes without pits; tempora long, rounded; neck broad; antenna composed of 11 antennomeres, without distinct club, gradually thickened toward apex, antennomere XI large, usually subconical, clearly separated from X; maxillary palpomere III large, elongate, with truncated apex, palpomere IV very small, but clearly visible, elongate, slender and pointed at apex; pronotum oval or heart-shaped, widest in anterior half or near middle, anterior and lateral margins rounded, without sharp edges or lateral carinae, sides narrowing toward base, usually constricted posteriorly; pronotum with row of 3–5 basal foveae sometimes connected by transversal groove; prosternal process very narrow, weakly separating procoxae; mesosternal process wider than prosternal, moderately projecting ventrally; elytra oval, entire, weakly or not depressed at base, basal foveae not visible, humeri variably marked, sometimes indistinct, in some cases prominent, raised, and accompanied by shallow internal groove. Mesocoxae moderately widely separated; metacoxae weakly separated; femora clavate, in some cases various parts of legs (especially hind trochanters) modified in males. Aedeagus with symmetrical parameres and well sclerotized, more or less complicated armature of internal sac. Female genitalia known only for *H. sakishimanus*; this species possesses globular spermatheca and elongate bursa copulatrix (Jałoszyński, 2002).

The subgeneric classification of *Horaeomorphus* remains unclear (discussed in Jałoszyński, 2002). Franz placed *H. chinensis* into *Horaeomorphus* s. str. (Franz, 1985). However, this species is very similar in general aspect to the habitus illustration of *H. nepalensis* Franz, the type species of the subgenus *Pseudosyndicus* Franz (Franz, 1973, fig. 12). Moreover, the characteristics of *H. chinensis* fit well to the diagnostic features for *Pseudosyndicus*. Therefore, the new species is not assigned to any subgenus until a comprehensive revision of *Horaeomorphus* has been undertaken.

Horaeomorphus babai sp. nov.

(Figs. 1A; 2A, E, G, H, K; 3A–C)

Diagnosis. This species is characteristic among Asiatic *Horaeomorphus* by having very convex, relatively large body; head with very high supraantennal tubercles; almost impunctate, large pronotum; and by possessing lateral tubercles on posterior margin of metasternum.

Description. Body slender, uniformly dark brown, setation yellowish, relatively dense, suberect.

Male (Fig. 1A). Body length 2.9 mm. Head (Fig. 2A) 0.45 mm long, 0.55 mm wide, widest at eyes, with distinct constriction between vertex and occiput; neck broad; vertex subrectangular, nearly twice as wide as long, posteriorly steeply lowering toward occiput, central part slightly convex, with a pair of relatively deep, very distinct lateral foveae located at internal edge of very convex supraantennal tubercles, the tubercles well delimited from vertex by shallow, elongate impression; tempora long, slightly narrowing behind eyes, then rapidly narrowing at nearly right angle; frontoclypeal area relatively well developed, transverse, convex, delimited at both sides by very broad excavations of antennal insertions; dorsal surface of head glossy, with very sparse and very fine punctation, sides of frontoclypeus beneath antennal insertions with uneven, slightly coarse surface; posterior part behind eyes with relatively dense, long, suberect to erect setation, vertex with sparse, erect setae, sides of frontoclypeus with very long setae directed forward. Eyes moderately convex, finely faceted, in lateral view with slightly emarginate posterior margin. Antenna (Fig. 2K) slightly longer than combined

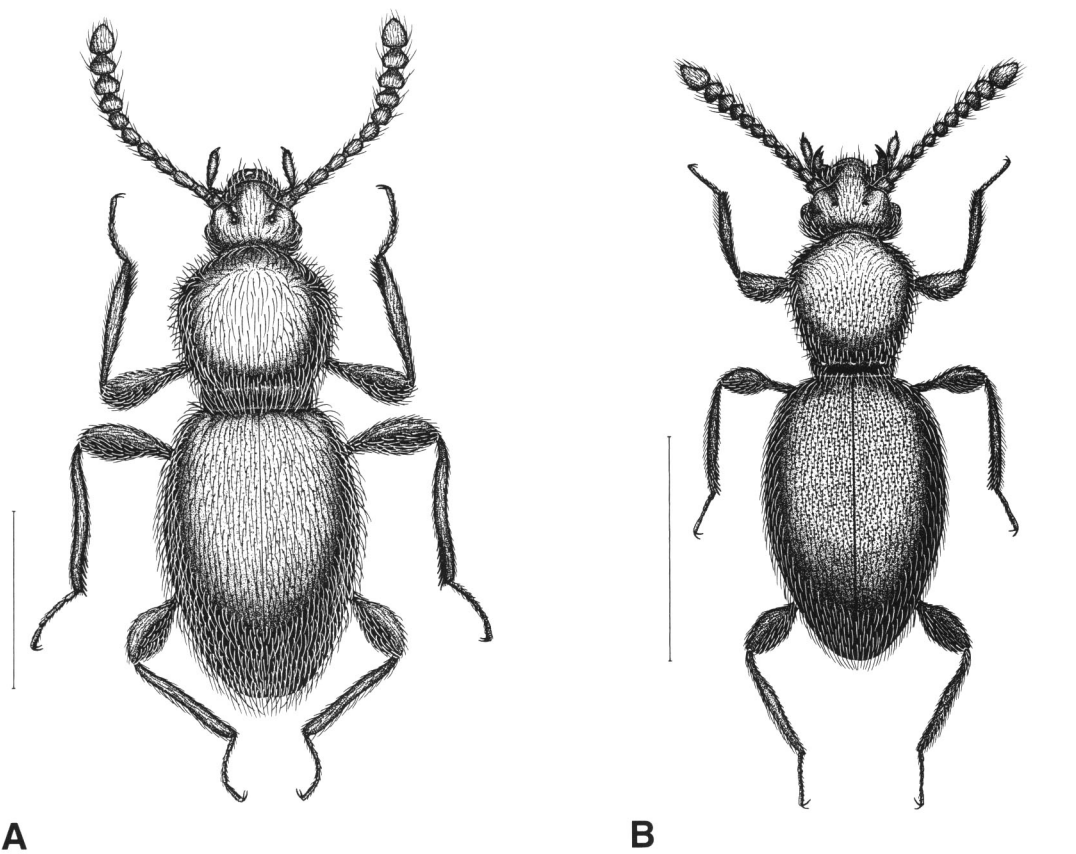

Fig. 1. Habitus of *Horaeomorphus babai* sp. nov., holotype male (A); and *Horaeomorphus chinensis* Franz, holotype female (B). Scale: 1 mm.

length of head and pronotum (length: 1.35 mm), gradually thickening toward apex; antennomeres I–VI; subcylindrical, elongate; II–VI with distinctly separated short, conical basal part; VII–X with flat base, short and transverse cylindrical basal part and conical apical part; antennomere I 1.5× as long as wide, with relatively deep but broad apical emargination; II narrower than I, 1.5× as long as wide; III over 2× as long as wide, distinctly longer than II and IV separately; IV 1.8× as long as wide; V less than 1.5× as long as wide; VI slightly wider and with flatter basal ring than II–V, 1.5× as long as wide; VII as wide as long; VIII larger than VII, slightly transverse; IX–X subequal, similar in shape to VIII but larger; XI subconical, with flat base, less than 1.5× as long as wide, not longer than combined lengths of IX and X; antennal setation relatively sparse, with long erect setae on antennomeres I–VII, gradually denser, and composed of moderately long suberect, and sparser, longer erect setae on VIII–XI.

Mouthparts: Labrum transverse, anterior margin rounded, with sparse, long setation directed forward, a pair of setae distinctly longer. Mandible with regularly rounded, convex external margin, sharp, slender apical tooth and two smaller subapical teeth, base broad. Maxillary palpus (Fig. 2H) enlarged; palpomere I very small, hardly visible in natural position; II long, slender, with expanded and truncate apical part, 3–4× as long as width of apical margin, with moderately dense, short and long suberect setae; III elongate, with slender basal part, expanded in

distal 2/3, slightly narrowing toward truncate apex, with long and short suberect setae; IV elongate, very small, conical, pointed at apex, nearly 2.5× as long as wide at base, with moderately long setation. Details of maxilla and labium not examined.

Pronotum longer than wide (length: 1 mm, maximal width: 0.82 mm, width at base: 0.55 mm), large, widest near anterior 1/5, very convex and slightly flattened in central part in lateral view; discal part oval, with relatively narrow collar behind depressed basal row of five deep foveae; anterior margin and sides broadly rounded, sides at the level of basal foveae slightly constricted, then slightly narrowing toward base, hind angles marked, blunt, base almost straight; upper surface glossy, with very sparse and hardly noticeable punctation, much weaker than that on vertex; sides behind basal constriction with uneven, coarse sculpture composed of irregular grains; pronotal setation suberect, relatively dense on sides, sparse in central part.

Elytra entire, elongate, oval, convex, slightly flattened in central part of anterior half, length: 1.45 mm, combined width: 1.1 mm, widest in middle, basal foveae not visible in natural position, covered by posterior margin of pronotum; humeri distinct, raised, demarcated by shallow internal impression; elytral punctation relatively sparse and very shallow, though denser and significantly more distinct than that on pronotum; distances between individual punctures larger than their diameters; elytral setation relatively dense, composed of suberect setae directed backwards, longer and thicker than on pronotum. Hind wings well developed, much longer than elytra.

Legs relatively short; setation dense and suberect, pro- and mesotibiae with a patch of dense, long and thick setae in apical 1/3 on internal edge. Procoxae large, ovoid, very convex, as broad as clavate part of profemur, with long, recumbent to suberect setae on external margin; mesocoxae very large, ovoid, with dense, long, curved setae along posterior margin; metacoxae with transverse, impunctate basal part and subconical distal part with distinct punctation. Protrochanters very small, about 1.5× as long as wide; mesotrochanters significantly larger than protrochanters, subtriangular with rounded external margin, 1.5× as long as wide; metatrochanters elongate, triangular, 3–4× longer than wide at base, apex pointed. All femora clavate, with slender basal half and expanded apical half, widest near distal fourth, dorsal surface of femur more convex than ventral. Tibiae slightly recurved, slender in basal fourth, then broadening, widest near middle, narrowing toward apex. All tarsi slender, longer than half of tibia, metatarsus longer than pro- and mesotarsi; tarsomere I twice as long as wide at apex; II–IV gradually diminishing in size; V nearly as long as three preceding tarsomeres; claws relatively long; protarsi with longer setation than meso- and metatarsi.

Venter: Ventral surface of head glabrous and without sculpture in central part; postgenae granulate and with dense setation directed dorsally. Basisternal area of pronotum with dense, fine but slightly coarse punctation, covered with dense suberect setae directed laterally and anteriorly. Prosternal process small, narrow, with pointed apex, moderately high, due to remarkable size of procoxae hidden between them and only anterior part well visible. Hypomera glossy, without setation. Mesocoxae moderately widely separated (wider than procoxae), basal part of mesosternal process with relatively broad longitudinal carina in middle, area at each side of carina concave. Surface of mesosternum with very dense, uneven punctation, and with relatively dense setation. Metasternum measured along midline slightly shorter than pro- and mesosternum together, very convex, sides posteriorly raised, with tubercle on hind edge near hind angle above metacoxa; short median metasternal process with distinct notch (Fig. 2G). Sides of metasternum slightly impressed in middle, impressions and margins adjacent to epimera with dense, slightly coarse punctation. Anterior sides of metasternum adjacent to mesocoxae excavated, with very long, curved setae. Central part of metasternum with relatively

sparse, moderately long suberect posteriorly-directed setae, posterior margin of metasternum and lateral impressions with longer setae. Six abdominal sternites visible; visible sternites I–IV subequal in length, narrow, with relatively dense punctation; V twice as long as each preceding sternite; VI as long as V, subtriangular, rounded posteriorly; V–VI impunctate; all visible sternites with long suberect posteriorly-directed setae, VI with a row of thick setae on posterior margin.

Male genitalia: Aedeagus (Fig. 3A–C), length: 0.55 mm, elongate, with broad, rounded base with well demarcated subtrapezoidal ventral part, widest near basal fourth, then narrowing toward rounded apex; ventral foramen small, indistinct, located beneath base of parameres; dorsal opening very large, oval; apex of median lobe curved ventrally at nearly right angle in lateral view. Parameres symmetrical, elongate, with relatively broad base, narrowing toward apex, not exceeding median lobe in length; apex of each paramere with five very thin and short setae of various lengths. Armature of internal sac well developed, symmetrical, composed of funnel-like central complex surrounded at each side by complicated structures forming arches curved inwards in dorso-ventral view. Ejaculatory duct lightly sclerotized, hardly visible.

Female. Unknown

Distribution. Taiwan

Holotype, ♂, S. Taiwan, Mt. Ta Yuen Shan, near Liu Kuei, 5 vi 1989, K. Baba leg.; deposited in NSMT.

Etymology. The new species is dedicated to the late Dr. Kintaro Baba, the collector of the holotype.

Remarks. This species distinctly differs from its South Asiatic congeners by having a very convex, relatively large body and glossy pronotum with very sparse and fine punctation. *Horaeomorphus sakishimanus* can be easily distinguished by having strongly modified hind trochanters in males, and *H. chinensis* possesses smaller and significantly less convex body and a very dense and distinct body punctation.

Horaeomorphus chinensis Franz

(Figs. 1B; 2B, F, I, L, M)

Horaeomorphus chinensis Franz, 1985, p. 116.

Diagnosis. This species can be distinguished from other Asiatic *Horaeomorphus* by relatively small size, moderately convex body, small pronotum, very dense body punctation and by presence of two bristles inserted in median notch of anterior margin of metasternum.

Redescription. Body slender, reddish-brown, legs and palpi slightly brighter, setation yellowish, relatively short, moderately dense, suberect.

Female (Fig. 1B). Body length 2.22 mm. Head (Fig. 2B) widest at eyes, slightly wider than long, length 0.35 mm, width 0.47 mm; tempora rounded, occiput sharply constricted from vertex, wider than 1/2 of head width; vertex distinctly transverse, central part slightly convex, anterior part triangular, steeply lowering toward clypeus, with a pair of relatively shallow but distinct foveae adjacent to raised supraantennal tubercles; clypeus subrectangular, anterior margin rounded, antennal insertions large, antennae inserted at the level of dorsal margin of eye; punctation sparse, individual punctures very small but distinct, sides of clypeus with slightly coarse granulation; dorsal surface glossy, setation sparse, moderately long. Eyes relatively large, moderately convex, finely faceted, in lateral view nearly semicircular with posterior margin slightly emarginate. Antenna (Fig. 2L) relatively short, as long as the combined length of head and pronotum (length: 0.925 mm), gradually thickening toward apex; antennomere I subcylindrical, with broad but shallow apical emargination, 1.8× as long as wide; II–XI with very narrow and flat basal ring; II distinctly narrower, cylindrical; III longer than adjacent segments, slightly more than twice as long as wide; IV–X with conical distal part, slightly indistinct in IV–V, very well demarcated in VI–X; IV–V 1.5× as long as wide; VI–X gradually increasing in size; VI slightly longer than wide; VII as wide as long; VIII–X distinctly wider than long; XI subconical, with flat base, distinctly asymmetrical in dorsal view, shorter

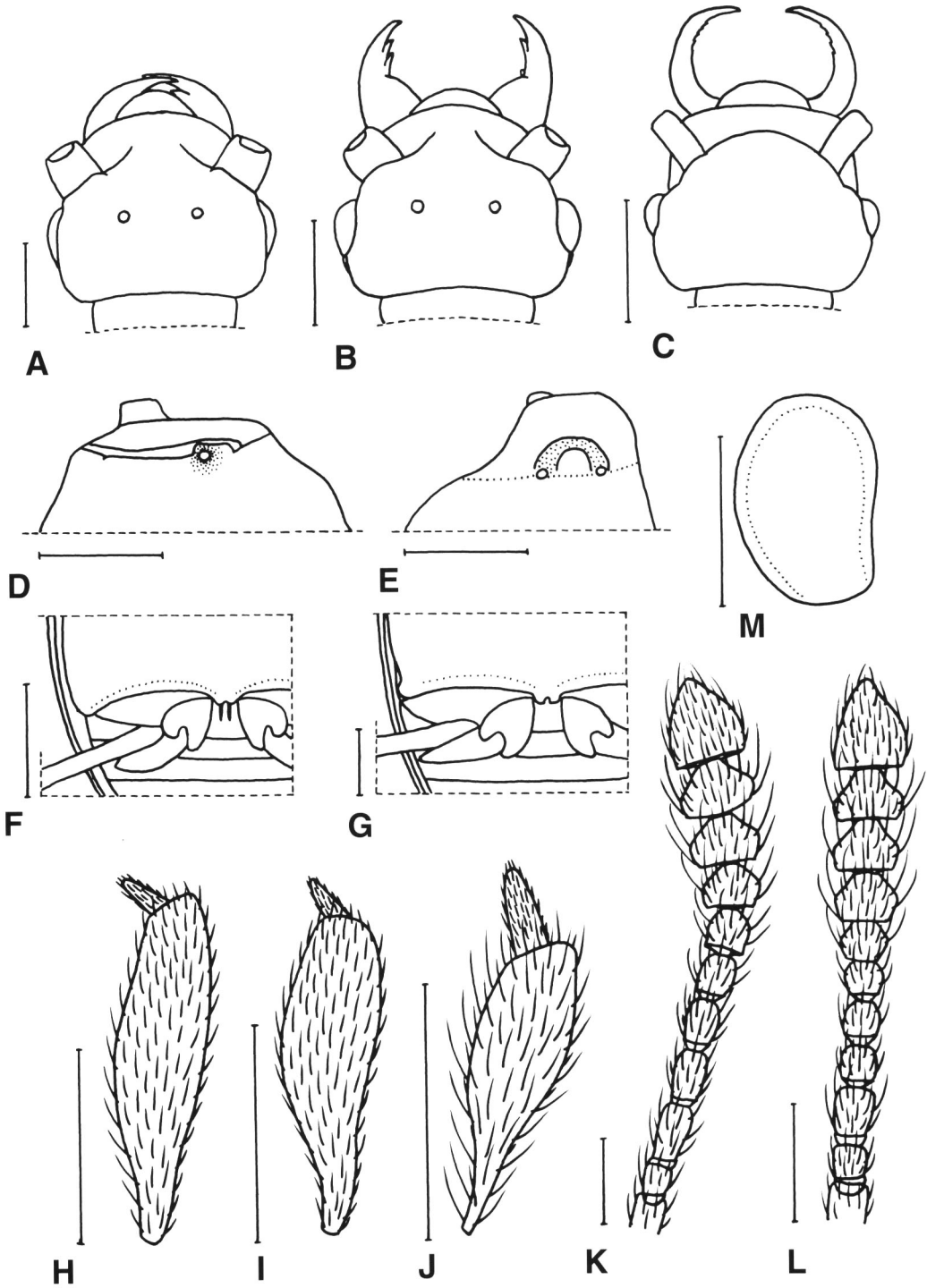

Fig. 2. Head in dorsal view (A–C), base of left elytron in dorsal view (D, E), posterior part of metasternum in ventral view (F, G), right maxillary palpomere III–IV in dorsal view (H–J), left antenna in dorsal view (K, L), and spermatheca (M) of *Horaeomorphus babai* sp. nov. (A, E, G, H, K), *Horaeomorphus chinensis* Franz (B, F, I, L, M), and *Stenichnus taiwanensis* (Franz) (C, D, J). Scale: 0.2 mm for A–G, K, L; 0.1 mm for H–J, M.

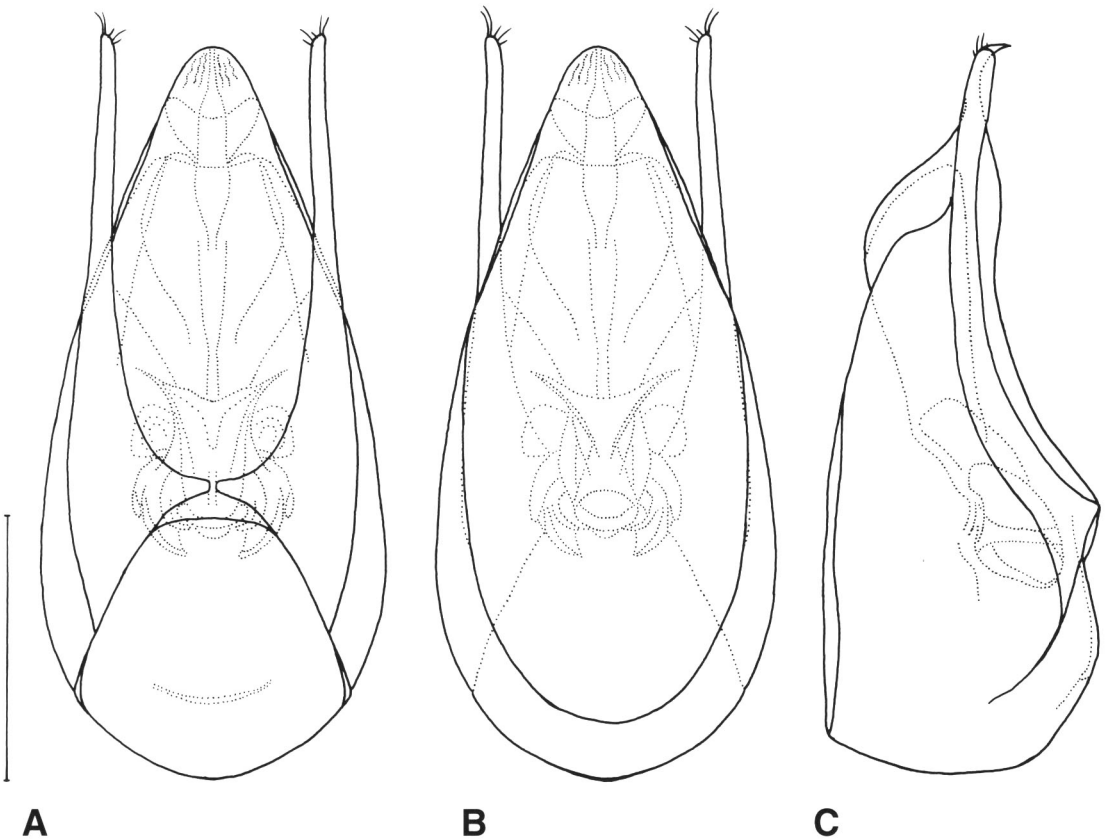

Fig. 3. Aedeagus of *Horaeomorphus babai* sp. nov. in ventral (A), dorsal (B) and lateral (C) views. Scale: 0.2 mm.

than IX–X combined; antennal setation relatively sparse and long, suberect to erect.

Mouthparts: Labrum transverse, anterior margin rounded, with sparse long setae directed forward. Mandibles subtriangular, elongate, curved, with slender and sharp apical tooth and subapical teeth; left mandible with two sharp subapical teeth; right with one long and sharp, and one very small, hardly noticeable subapical tooth; prostheca convex, with very short setae from base of subapical tooth to base. Maxillary palpus (Fig. 2I) enlarged; palpomere I very small, 1.5× as long as wide; II elongate, broadening toward apex, nearly 5× as long as wide at apex; III elongate, distinctly broader than II, widest near middle, 4× longer than wide, apex truncate; IV very small, elongate, 3× longer than wide at base, apex pointed. Maxilla and labium not studied.

Pronotum distinctly longer than wide, widest near anterior 1/4–1/3, relatively flat in lateral view; length 0.62 mm, maximal width 0.57 mm, width at base 0.42 mm; anterior margin rounded, sides narrowing toward base, narrow posterior collar distinctly demarcated from discal part by lateral constriction and transversal groove with three foveae; hind angles blunt; base straight; punctation relatively dense in central part, but individual punctures slightly diffused, not sharply delimited from background, decreasing in size toward anterior margin, anterior 1/5–1/6 impunctate; sides posterior to basal constriction with coarse granulation; dorsal surface glossy; setation moderately long and suberect, directed in various directions on lateral margins.

Elytra entire, oval and elongate, moderately convex; length 1.25 mm, width 0.85 mm, widest just anterior to middle, base wider than base of pronotum; sides regularly rounded, apices blunt, separately rounded; humeri distinct, delimited by short and broad internal humeral groove; each elytron with two basal pits not visible in natural position (i.e. without disarticulating the elytra); punctation dense and distinct, distances between individual punctures equal to or longer than puncture diameters; setation moderately dense, slightly longer than that on pronotum, composed of thicker setae directed backwards. Scutellum not visible. Hind wings well developed, much longer than elytra.

Legs relatively short. Procoxae subconical, 1.5× as long as wide, contiguous; mesocoxae significantly longer than procoxae, nearly globular, separated by very narrow mesosternal process; metacoxae very weakly separated, transversal. Protrochanters small, 1.5× as long as wide; mesotrochanters relatively long, twice as long as wide; metatrochanters elongate, 3× as long as wide. All femora clavate, with very slender basal part, rapidly broadening in basal third (profemora), in middle (mesofemora) or slightly behind middle (metafemora); metafemora distinctly longer than meso- and much longer than profemora. Tibiae relatively short, protibiae shortest, metatibiae longest, slightly broadening toward middle, then narrowing toward apex. Tarsomere I in fore and middle legs twice as long as wide at apex; metatarsomere II 2.5× as long as wide; tarsomeres II–IV decreasing in size; V nearly as long as three preceding tarsomeres. Setation of legs relatively dense; procoxae only with several setae; mesocoxae with very dense, long and curved setation along posterior margin; part of metacoxae adjacent to trochanter with relatively dense setae directed backwards; pro- and mesotrochanters with very sparse setae; mesotrochanters with relatively long setation parallel to the long axis of trochanter; femora, tibiae, and tarsi with moderately dense, recumbent to suberect setation; pro- and mesotibiae with dense setose patch along apical third of internal margin.

Venter: Ventral surface of head with coarse sculpture, submentum with sparse, postgenae with dense granulation; lateral part of each postgena with moderately long setation. Basisternal area of prosternum relatively short, with sparse granulation and dense setation directed toward head; hypomera glossy and glabrous. Mesocoxae moderately widely separated (wider than procoxae); mesosternum with narrow, setose median carina between coxae, epimera glabrous, glossy; metasternum moderately long, longer than mesosternum, convex, depressed beneath mesocoxae, with median notch in posterior margin and a pair of posteriorly-directed bristles inserted between metacoxae (Fig. 2F); sculpture of metasternum very characteristic, composed of indistinct longitudinal wrinkles, setation moderately dense, relatively long, directed backward. Ventral part of abdomen short, equal in length to metasternum, six abdominal sternites visible; visible sternites I and II equal in length, sternites II–III slightly shorter; sternite V 1.5× as long as IV; VI equal in length to V, apex rounded; surface of I–V with fine granulation and relatively long setation directed backward; VI impunctate and glabrous, except for a row of long setae along posterior margin.

Spermatheca (Fig. 2M) simple, ovoid, slightly elongate, very small (length: 0.12 mm), accessory gland not found.

Male. Unknown

Distribution. China, Fukien (=Fujian) Province.

Material examined. Holotype: female, white printed label "Kuatun, Fukien, China, (Tschung Sen.)" and handwritten "23.1.46"; white handwritten label: "*Horaeomorphus chinensis* m." and printed "det. H. Franz"; small white label with female symbol, and red handwritten label: "Holotypus"; deposited in MNH.

Stenichnus* (*Cyrtoscydmus*) *taiwanensis (Franz), comb. nov.

(Figs. 2C, D, J)

Horaeomorphus taiwanensis Franz, 1985, p. 95

Franz (1985) stated that this species differs from all other Southeast Asiatic *Horaeomorphus* by having only a single, deep pit between the antennal insertions. In fact, in members of *Horaeomorphus* the pits are present on the vertex, distinctly posterior to the antennal insertions. The examination of the holotype from Franz's collection revealed that the "pit" is a transversal depression demarcating the clypeus from the frons, and the specimen belongs to the genus *Stenichnus* Thomson, subgenus *Cyrtoscydmus* Motschulsky. The specimen's size and general morphology are consistent with the original description, so a possibility of mislabeling seems unlikely.

Material examined. Holotype: female; two white labels with black handwritten "Taiwan, 1400 m, Fenchihu, 12.4.77, lg. Klapperich", "Horaeomorphus taiwanensis m." and printed "det. H. Franz"; small label with a female symbol; and red label with handwritten "Holotypus" (MNH).

Remarks. *Stenichnus taiwanensis* is similar to the European species *S.* (*Cyrtoscydmus*) *godarti* Latreille. The type specimen is a female, and the species will be redescribed elsewhere. However, some morphological structures are illustrated herein for purpose of further discussion.

Discussion

The genus *Horaeomorphus*, belonging to Cyrtoscydmini, was compared by Franz to *Euconnus* Thomson (Franz, 1986a) and *Scydmaenus* Latreille (Franz, 1986b), in regard to similar aspects of the general morphology. However, *Scydmaenus* belongs to a different tribe of Scydmaeninae, and distinctly differs from all Cyrtoscydmini by having the notched apical margin of the first antennomere, hind femora distinctly separated from coxae by elongate trochanters, and metepisterna not covered by the elytra. *Horaeomorphus*, like all members of Cyrtoscydmini, possesses the first antennomere without an apical notch, hind femora hardly separated from coxae by small trochanters (sometimes modified in males), and metepisterna covered by the elytra.

A number of species of *Horaeomorphus* described from Madagascar (Franz, 1986a) resemble members of *Euconnus*. The actual systematic position of this group of species has yet to be verified. Both morphological and distributional arguments suggest that they may represent a separate group. Morphology of Asiatic and Australian species of *Horaeomorphus* seems to be similar to *Syndicus* Schaufuss and *Stenichnus* Thomson. Members of *Syndicus* are very characteristic by having very small antennomere XI, not demarcated from X, whereas in *Horaeomorphus* antennomere XI is always large and well separated from X by distinct interspace. Unambiguous differences between *Horaeomorphus* and very similar *Stenichnus* have not been presented in the existing literature.

The subgeneric classification of *Stenichnus* and *Euconnus* remains unclear, which significantly contributes to difficulties in taxonomy of allied genera. The purpose of the discussion undertaken below is to clarify the problems with identifying members of *Horaemorphus*. Diagnostic features for Asiatic members of the genus are given below.

The most characteristic difference between *Horaeomorphus* and *Euconnus* is the shape of the mesosternal process. *Euconnus* includes an enormous number of species (nearly 2500 species distributed worldwide, according to Newton & Franz, 1995), and in its present composition most likely represents a heterogeneous group. However, in all species of *Euconnus* the metasternum between the coxae forms a very high, narrow keel, well visible in lateral view. In both *Horaeomorphus* and *Stenichnus* the mesocoxae are moderately widely separated by a low mesosternal process, sometimes with a very low carina, but never with a keel higher than the coxae. The two genera share additional features, such as the pronotum lacks lateral carinae and is

Table 1. Comparison of important diagnostic characters between the genera *Horaeomorphus* and *Stenichnus*.

Horaeomorphus Schaufuss	***Stenichnus*** Thomson
elytra with two small basal pits covered by posterior margin of pronotum	elytra with basal pits clearly visible in natural position, not covered by base of pronotum
supraantennal tubercles distinctly raised	supraantennal tubercles slightly raised or not marked
vertex in most cases with a pair of foveae	vertex without foveae, sometimes with a transversal groove or a pair of longitudinal grooves
hind trochanters modified in males of some species	hind trochanters not modified in males
abdomen relatively short, metasternum relatively long	abdomen long, metasternum relatively short
maxillary palpomere III very long, palpomere IV strikingly short, 4–5× shorter than III	palpomere III moderately long, palpomere IV less than 3× shorter than III
mandible subtriangular, with broad base and subapical teeth	mandible slender, sickle-like, sometimes with finely serrated internal margin

widest in the anterior half, the base of pronotum has a row of foveae, the femora are more or less clavate, in some cases various parts of legs are modified in males, the hind coxae weakly separated, and there is a similar shape of male copulatory organs. In *Euconnus* the pronotum is variable in shape, in many cases conical, widest at base or near middle; the base of the pronotum with foveae or without any particular structures; femora are usually not clavate, slender; legs not modified in males; male copulatory organs very diverse, with several types of design, but distinctly different than those found in *Stenichnus* and *Horaeomorphus*.

Members of *Stenichnus* have a characteristic shape of the pronotum, which is usually significantly smaller than the elytra, moderately convex, with rounded anterior margin, widest at anterior half, and sides narrowing toward base. In Asiatic *Horaeomorphus* the pronotum is usually large, convex or flattened, with oval discal part widest at anterior 1/3–1/5, with roundly narrowing sides, the discal part demarcated posteriorly by a row of foveae, part behind foveae forms a narrow and depressed collar. The division between the disc of pronotum and the posterior collar is usually distinctly marked in *Horaemorphus*, in *Stenichnus* it is usually very indistinct and sometimes the basal foveae are very small or lacking. Antennomeres, especially in distal half of the antenna, in *Stenichnus* are more elongate, slender; in Asiatic *Horaeomorphus* often transverse, with basal cylindrical and apical conical parts, often with basal ring. The shape of the head, especially of the frontoclypeal area, also shows distinct difference between the two genera (Fig. 2AB vs. 2C). Leg modifications in males of *Horaeomorphus* include peculiar, elongate hind trochanters in some species (*e.g.*, *H. sakishimanus* Jałoszyński, 2002), whereas such a modification is not known among *Stenichnus*. On the other hand, in some species of *Stenichnus* profemora are modified in males (*e.g.*, *S. scutellaris* Müller et Kunze). Also the maxillary palpomere III in *Horaeomorphus* is more elongate than in *Stenichnus*, and the palpomere IV is significantly smaller than the preceding one (Fig. 2H, I vs. 2J).

A feature which can be used for unambiguous discrimination between *Stenichnus* and *Horaeomorphus* is the location of basal foveae on the elytra. In *Stenichnus* one or two foveae are usually clearly visible in dorsal view in the natural position of the elytra (Fig. 2D). In some cases the basal foveae on the elytra are less distinct, but still well recognizable. In *Horaeomorphus*, a pair of small basal foveae on each elytron is shifted forward, so that the posterior margin of prothorax covers the foveae and they are not visible in dorsal view without disarticulating the elytra (Fig. 2E). Moreover, the foveae are connected by an

inversed U-shaped groove. The same design of elytral foveae is found in members of *Syndicus* (Jałoszyński, unpublished observations).

The presence or absence of lateral foveae on the vertex is also a very good specific feature for Asiatic species. In the majority of Asiatic members of *Stenichnus* (i.e. in subgenera *Stenichnus* s. str. and *Cyrtoscydmus*) the vertex is usually slightly convex, always without foveae or even impressions (Fig. 2C). The only exception in Asia is the subgenus *Scydmaenichnus* Reitter which, however, possesses not pits on the vertex but a transverse groove on the frons (Reitter, 1905). The only five known members of this subgenus occur in Syria and Cyprus (Newton & Franz, 1998). Most Asiatic species of *Horaeomorphus* have a pair of distinct, sometimes deep lateral foveae located at internal edge of well developed, usually high supraantennal tubercles (Fig. 2A, B).

Finally, the shape of mandibles seems to be constantly different between *Stenichnus* and *Horaeomorphus*. In *Horaeomorphus* the mandible is subtriangular, with a broad base, curved apical tooth, and a variable number of smaller subapical teeth (Fig. 2B). In *Stenichnus* the mandible is sickle-like, slender, curved, and sometimes with serrated internal margin (Fig. 2C).

The differences between *Horaeomorphus* and *Stenichnus* are summarized in Table 1.

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