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A New Genus, *Ohirathous* (Coleoptera, Elateridae, Dendrometrinae) from Taiwan

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Abstract *Ohirathous nantouensis*, a new genus and new species belonging to the subtribe Athouina, from Taiwan is described and illustrated. *Ohirathous* gen. nov. is compared to their related eight genera occurring in Taiwan by comparative analysis based on diagnostic character used in generic level.
Key words: Taxonomy, Coleoptera, Elateridae, Dendrometrinae, *Ohirathous nantouensis* gen. et sp. nov., Taiwan

Introduction

The Taiwanese click beetles were recognized 311 species in 86 genera (Suzuki, 1999), and then by the subsequent taxonomic studies, 32 species were additionally described and recognized (Suzuki, 2001: 1 sp., new to fauna; Platia & Schimmel, 2001: 1 sp., new to fauna; Arimoto & Riese, 2005: 1 sp., new to science; Platia, 2005: 1 sp., new to science; Arimoto, 2006: 3 spp., new to science, 2 spp., new to fauna; Platia & Schimmel, 2007: 17 spp., new to science, 2 spp., new to fauna: Platia, 2008: 3 spp., new to science: Schimmel & Tarnawski, 2010: 1 sp., new to science).

Among these species, subtribe Athouina Candèze, 1859, belonging to Dendrometrini of Dendrometrinae, is consist of a total of 11 species in seven genera, *Parathous* Fleutiaux, 1918 (1 sp.); *Athous* (?) Eschscholtz, 1829 (2 spp.); *Paradima* Miwa, 1928 (1 sp.); *Subathous* Fleutiaux, 1918 (2 spp. including unjustified 1 sp.); *Hemicrepidius* Germar, 1839 (2 spp.); *Scutellathous* Kishii, 1955 (2 spp.); *Taiwanathous* Miwa, 1930 (1 sp.) (Suzuki, 1999; Platia & Schimmel, 2007). The subtribal classification was according to Sánchez-Ruiz (1996) characterized by having the dilated or lamellated tarsomeres, the gradually narrowed metacoxal plate, and the arcuately produced anterior collar of the prosternum in Dendrometrini.

A female specimen collected from Nantou in Taiwan and preserved at National Academy of Agricultural Science (NAAS) in Korea does certainly resemble a member of *Scutellathous* by sharing the pentroof shaped frons of head and the transversely broad frontal groove (Kishii, 2001). However, the specimen has three independent diagnostic characters in the generic level easily distinguishable from *Scutellathous* as follows: 1) the carination on the hind angles of pronotum reaches to middle along the lateral margin, 2) 1st to 4th tarsomeres have a lamella at ventral apex, respectively, and 3) significantly, the bursa copulatrix in the female reproductive organs has two thorny plates at base and one circular thorny line. The combined characters above mentioned were still not examined from previously known genera belonging to tribe Dendrometrini distributing in Oriental and Palearctic Regions. Therefore, we described the female specimen as a new to science placed in a new genus.

Materials and Methods

A female holotype was preserved under air-dried conditions. Firstly, we carefully examined the external morphology of the specimen using stereoscopic microscopes (MZ 16A and MZ 6; Leica, Solms, Germany). And then, before investigation of the female reproductive organs, Genomic DNA extraction of the specimen was performed using a QIAamp DNA Mini Kit (Qiagen, Hilden, Germany) by the briefly modified non-destructive sample method that is to incubate the whole body in ATL (tissue lysis buffer of the Kit) with proteinase K for 24 h. (HAN *et al.*, 2009). This process provided the benefit to be easily removed the female reproductive organs from abdomen without any external destructive. The extracted female reproductive organs was placed in 10% KOH of room temperature for 12 h, and then illustrated under a stereoscopic microscope (MZ 16A), preserved in microvials of glycerin until further examination. After DNA extraction, the specimen was repeatedly and subsequently washed in distilled water and 100% ethyl alcohol. The washed specimens was retuned a dried specimen without the externally damaged morphology. The holotype and DNA stock (no. 3255) were preserved at the Insect Classification Center, Department of Agricultural Biology, NAAS, Suwon, Korea.

The comparative analysis based on the diagnostic characters carried out to reveal the delimitation and/or similarity of the new genus against its related genera occurring in Taiwan. The analysis was alternatively chosen from the results of the previous taxonomic works in generic level (FLEUTIAUX, 1918, 1928; KISHII, 1955, 1987, 1990, 1993, 2001; LAIBNER, 2000; MIWA, 1928, 1930, 1934; ÔHIRA, 1966; PLATIA, 1994; SUZUKI, 1999, 2002). Ten diagnostic characters with 23 states were selected from eight genera, *Paradima*, *Athous* (?), *Hemicrepidius*, *Subathous*, *Taiwanathous*, *Parathous*, *Ohirathous* gen. nov., and *Scutellathous*.

Results and Discussions

The comparative analysis of the genera (Table 1)

1. Frontal margin of head: carinate (A); rolling as pentroof (B). The term 'pentroof like' was introduced by KISHII (2001) to explain a distinctly expended and rolling (not carinate) frontal margin. The pentroof liked frontal margin presented in three genera, *Parathous*, *Ohirathous* gen. nov., and *Scutellathous*.

2. Frontal groove of head: narrow at middle (A); transversely broad at middle (B). The transversely parallel and broad frontal margin presented in three genera, *Parathous*, *Ohirathous* gen. nov., and *Scutellathous*.

3. Impression shape of frons of head: triangular (A); ovate (B). *Taiwanathous* has only the ovate impression on frons of head.

4. Serration of antennae: serrated from 3rd antennomere (A); serrated from 4th antennomere (B). The genus *Hemicrepidius* only serrate from 4th antennomere (LAIBNER, 2000).

5. Length ratio of 2nd and 3rd antennomeres: 3rd antennomere over twice longer than 2nd one (A); 3rd antennomere under twice longer than 2nd one (B). State A grouped five genera, *Paradima*, *Taiwanathous*, *Subathous*, *Parathous*, and *Scutellathous*. State B presented in *Hemicrepidius* and *Ohirathous* gen. nov. but the character was ambiguous in *Athous* (?).

6. Median longitudinal furrow on pronotum: absent (A); present (B). The character state occurred only in *Parathous*.

7. Apex shape of pronotal hind angle: short and obtuse (A); broad and round (B); narrow and sharp (C); sharp and upheaved (D). The apex shape of the pronotal hind angle is more or less variable

Table 1. The differential diagnosis of the qualitative characters examined in genera of Athouina in Taiwan.

	Character		*Paradima*	*Athous*?	*Subathous*	*Taiwanthous*	*Parathous*	*Ohirathous*	*Scutellathous*	*Hemicrepidius*
Head	1	frontal margin	?	carinate (A)	A	A	rolling (B)	B	B	A
	2	frontal groove	?	narrow at middle (A)	absent at middle (C)	A	transversely broad (B)	B	B	A
	3	impression shape of frons head	triangular (A)	A	A	ovate (B)	A	A	A	A
Antennae	4	serration of antennae	from 3rd (A)	A	A	A	A	A	A	from 4th (B)
	5	length ratio of 2nd and 3rd	3rd over twice longer than 2nd (A)	?	A	A	A	3rd under twice longer than 2nd (B)	A	B
	6	median longitudinal furrow	absent (A)	A	A	A	present (B)	A	A	A
Pronotum	7	apex shape of hind angle	short and obtuse (A)	?	A	narrow and sharp (C)	broad and round (B)	sharp and upheaved (D)	D	B
	8	carination of hind angle	absent (A)	present, short (B)	A	A	present, obscure (C)	present, long (D)	B	B
Scutellum	9	dorsal disc shape	convex (A)	with median longitudinal ridge (B)	flattened (C)	?	B	C	C	B
Legs	10	tarsomere lamellation	2nd and 3rd lamellate (A)	A	1st to 3rd lamellate (C)	3rd lamellate (D)	1st to 4th lamellate (B)	B	B	A

within genera. State C represented only in *Taiwanathous*.

8. Carination of pronotal hind angles: absent (A); present, short extending to base of hind angle (B); present, obscure (C); present, long extending to middle of pronotum (D). States D recognized only in *Ohirathous* gen. nov.

9. Dorsal disc condition of scutellum: convex (A); with median longitudinal elevation or ridge (B); flattened (C). *Paradima* has only state A. Three genera, *Athous*, *Hemicrepidius*, and *Parathous* were grouped by state B. State C presented in *Ohirathous* gen. nov. and *Scutellathous*.

10. Tarsomere lamellation of legs: 2nd and 3rd tarsomeres lamellate (A); 1st to 4th tarsomeres lamellate (B); 1st to 3rd tarsomeres lamellate (C); 3rd tarsomere only lamellate (D). Three genera, *Parathous*, *Ohirathous* gen. nov. and *Scutellathous* were grouped by state B. KISHII (1987: 92) diagnosed on the tarsomeres of leg of *Scutellathous*, such as "First tarsal joint simple, second a little expanded apically, third with a clear lamella, fourth slightly expanded or rather simple.....", but this study recognized that 1st tarsomere is also weakly lamellate at ventro-apically in specimens of *Scutellathous comes* (LEWIS, 1894) and S. *porrecticollis* (LEWIS, 1894), and S. *ozakii* (ÔHIRA, 1992), temporally identified by HAN. Therefore we applied the state B into *Scutellathous*. States C and D are represented in *Subathous* and *Taiwanathous*, respectively. Especially, *Ohirathous* gen. nov. was grouped into *Scutellathous* characterized by state D of character 7, but independently delimitated by state D of character 7.

Key to genera of Athouina in Taiwan

1. Hind angles of pronotum without carina 2
— Hind angles of pronotum with a carina 4
2. Frons of head impressed triangularly..... 3
— Frons of head impressed ovately ..... *Taiwanathous*
3. Scutellum convex ..... *Paradima*
— Scutellum flattened ..... *Subathous*
4. Frontal margin of head carinate; frontal groove narrow at middle; 2nd and 3rd tarsomeres lamellate 5
— Frontal margin of head rolling as pentroof shaped; frontal groove parallel transversely at middle; 1st to 4th tarsomeres lamellate 6
5. Antennae serrated from 3rd antennomere ..... *Athous*
— Antennae serrated from 4th antennomere ..... *Hemicrepidius*
6. Pronotum with median longitudinal furrow; apex of hind angles of pronotum broad and round ..... *Parathous*
— Pronotum without such furrow; apex of hind angles of pronotum sharp and upheaved 7
7. A carina on hind angle of pronotum short, extending to the base; 3rd antennomere about twice longer or over than 2nd one; bursa copulatrix with four to five thorny plates, without circular thorny line ..... *Scutellathous*
— A carina on hind angle of pronotum long, extending to middle of pronotum; 3rd antennomere 1.8 times longer than 2nd one; bursa copulatrix with two thorny plates at base and one circular thorny line ..... *Ohirathous* gen. nov.

Systematic Accounts

Family **Elateridae** Leach, 1815
Subfamily **Dendrometrinae** Gistel, 1856
Tribe **Dendrometrini** Gistel, 1856
Subtribe **Athouina** Candèze, 1859

Genus ***Ohirathous*** Han et Park, gen. nov.

Type species. *Ohirathous nantouensis* Han et Park, sp. nov.

Diagnosis. Medium sized, distinctly elongate, subparallel-sided. Head with a triangular impression behind frontal margin; frontal margin well expanded to ahead, rolling like as a pentroof, not carinate; eyes prominent; frontal groove transversely and broadly excavated, declined. Antennae rather short, 11th antennomere reaching to base of pronotal hind angle; 2nd one smallest; 3rd one elongated triangular, 1.8 times longer than 2nd one, longer than 11th one, weakly serrated; 4th triangular, shorter than 3rd one. Pronotum elongate, quadrate, convex, widest at hind angles of pronotum; lateral margins slightly arched, entirely and finely carinated with minute crenulates, anterior angles round; hind angles slightly divergent laterally, short and triangular, with a distinctly ridged carina extending to middle along lateral margins, with apex sharply pointed and distinctly upheaved; posterior margin with a small basal incisures. Prosternum convex; anterior collar elongate, thickly carinated; posterior process straightly elongated, but narrowed to apex; procoxal cavities moderately open to posterior; prosternal sutures simple; posterior margins of hypomeron almost straight. Scutellum subquadrate; anterior margin truncate, completed. Legs slender, from 1st to 4th tarsomeres with a lamella at each ventral apex, respectively. Elytra elongate; humeral mucro prominent; striae punctuated, superficial; strial intervals feebly convex; apex rounded, simple.

Etymology. The genus is named in honor of a famous elaterid specialist Dr. Hitto Ôhira in Japan, who contributed to reveal the morphological features of many species and to review arrangement of generic classification for the Taiwanese elaterid fauna (Ôhira, 1966 a, b, c, 1967, 1968, 1970, 1971 a, b, 1972, 1973 a, b, 1988, 1990, 2003), and from the typical generic name *Athous*.

Ohirathous nantouensis Han et Park, sp. nov.

(Figs. 1 & 3A–G)

Type examined. 1 ♀, Ching Ching Grass field at Ching Jing Farm, Nantou, Taiwan, 9–VII–2001, Tae Woo Kim, DNA 3255 (NAAS).

Description. Holotype (Fig. 1). F e m a l e: 14.5 mm long, 3.5 mm wide, cylindrical, elongate, subparallel-sided, widest at one fifth of anterior of elytra.

Color wholly reddish brown, with apex of mandibles, anterior margin of elytra, elytral striae dusky brown, lustrous; pubescences pale yellow, rather short, subrecumbent.

Head flat between eyes; frontal margin well expanded to ahead (Fig. 2A), rather truncate (Fig. 2B), rolling like as a pentroof (Fig. 2C), with a deep triangular impression behind frontal margin (Fig. 2A); punctures sub-ocellated, dense, irregular, becoming more larger, denser, coarser to anterior; surface smooth, gradually rugous laterally; eyes prominent (Fig. D), with ocelli weakly convex; frontal groove (Figs. 2C & D) transversely and broadly excavated, declined; labrum transversely elongated semi-circular, 5.5 times as wide as long (50 : 9), transversely ridged, with spare and long setae at anterior; mandibles bidentated; maxillary palpi axed shaped, last segment with shallow

Fig. 1. Female holotype of *Ohirathous nantouensis* gen. et sp. nov. from Taiwan.

triangular impression at ventral.

Antennae (Fig. 1) rather short, 11th antennomere reaching to base of pronotal hind angle; 1st one robust, longest, cylindrical, slightly bent inwardly, 2.8 times as long as wide (44 : 16); 2nd one smallest, subtriangular, 1.5 times as long as wide (20 : 13); 3rd one (Fig. 2E) elongated triangular, weakly serrated, 2.1 times as long as wide (36 : 17), 1.8 times longer than 2nd one, longer than 11th one ; 4th triangular, widest, 1.5 times as long as wide; from 5th to 10th gradually narrower and shorter; 11th narrow rhombic, 2.8 times as long as wide (33 : 12) (cat. from 1st to 11th = 44/16, 20/13, 36/17, 27/18, 26/17, 26/16, 26/15, 24/15, 24/14, 25/13.5, 33/12).

Pronotum (Figs. 2A−B) elongate, quadrate, convex, 1.2 times as long as wide (73 : 61), widest at pronotal hind angles; anterior margin simple; lateral margins indistinctly arched, entirely and finely carinated with minute crenulates; anterior angles round, bluntly pointed; base of hind angles weakly sinuate; hind angles slightly divergent laterally, short, triangular, with a distinctly ridged carina extending to middle along lateral margins (Fig. 2B), apex sharply pointed and distinctly upheaved; posterior margin with a small basal incisures at each base of hind angles, lacking basal notch in front of scutellum; punctures rather sparse, simple at median portion, then gradually dense and subocellated to lateral sides.

Prosternum (Fig. 2C) convex, with simple punctures sparely; anterior collar elongate, thickly carinate, slightly longer than apex of hypomeron; posterior process straightly elongated, but narrowed to apex; procoxal cavities moderately open to posterior; prosternal sutures simple; hypomeron with denser and smaller punctures than them of prosternum, posterior margins almost straight, like ear shaped.

Scutellum subquadrate, 1.2 times as long as wide, slightly convex; anterior margin truncate, narrowest; lateral margins subparallel-sided to one third, then slightly broad and rounded at apex; punctures simple, rather sparse; pubescence rather long.

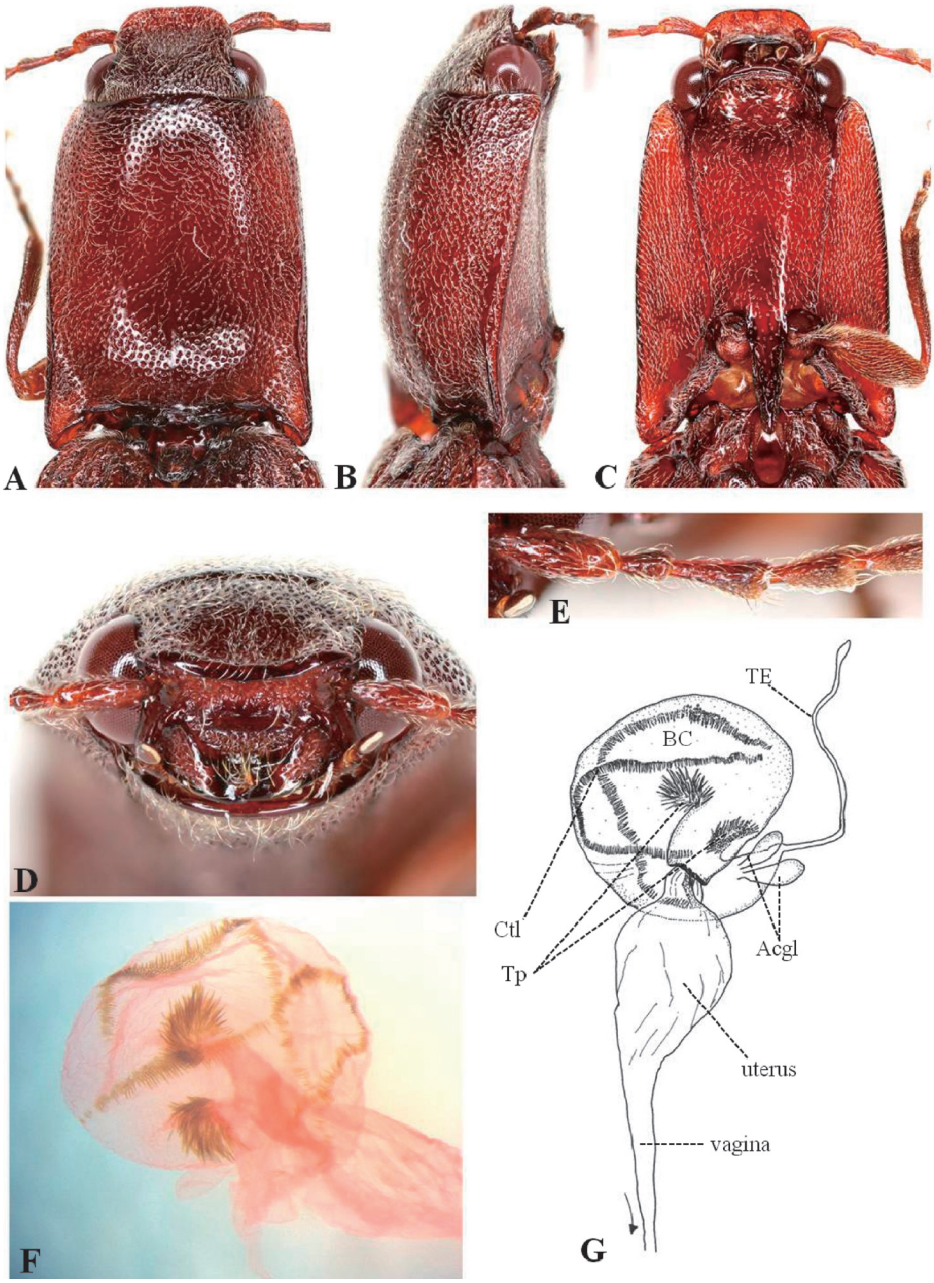

Fig. 2. *Ohirathous nantouensis* gen. et sp. nov. from Taiwan. —— A, head and pronotum in dorsal view; B, ditto in lateral view; C, ditto in ventral view; D, head in ahead view; E, 1st to 4th antennomeres; F, bursa copuratrix and their sclerotized structures; G, illustration of female reproductive organs. —— Acgl, accessory gland; BC, bursa copulatrix; Ctl, circular thorny line; TE, tubular extension; Tp, thorny plate.

Mesocoxal cavity broadly connected with mesepimeron and narrowly with mesepisternum. Metasternum convex; median longitudinal sutures completed; hind coxal plate widest at insertion

of throchanter, out margin slightly convergent to outside.

Legs slender, from 1st to 4th tarsomeres with a lamella at each ventral apex; 1st one with a little lamellate, 2nd one clearly lamellate covered before middle of 3rd one; 3rd one with largest lamella; 4th one with a small lamella; claws simple.

Elytra elongate, 2.8 times as long as wide (198 : 71), convex, widest one fifth of anterior, slightly wider than pronotum (71 : 61); striae punctuated, superficial; humeral mucro prominent; strial intervals feebly convex, with small punctures, and rather rugous surface; posterior apex rounded, simple.

Abdomen each margins of visual sternites weakly crenulate; 7th sternite semi-elliptic, 1.1 times as wide as long.

Female reproductive organs (Figs. 2F−G): ovipositor sub-triangular, with styli; vagina (Fig. 2G) elongate; uterus enlarged at anterior, colleterial grands indistinct, lacking sclerotised structures; bursa copulatrix whelk shaped, one times coiled, with two thorny plates at base and one circular thorny line girded wholly, two short accessory glands bearing just before apex, tubular extension bearing from apex, long.

M a l e. Unknown.

Etymology. Name of the new species is derived from its collection locality, Nantou, Taiwan.

Distribution. Taiwan (Nantou).

Remarks. The novel species is similar to all known species of the genus *Scutellathous* in the general appearance, but may be easily distinguished from these species by the distinct carina on the hind angle of pronotum reaching to middle along the lateral margin, 1st to 4th tarsomeres with a distinct lamella at ventral apex, respectively, and by the bursa copulatrix with two thorny plates at base and one circular thorny line.

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要　　約

HAN, T. M.・Y. B. LEE・S. W. PARK・S. LEE・H. C. PARK: 台湾より記載される新属新種 *Ohirathous nantouensis*（鞘翅目コメツキムシ科）．—— 台湾南投縣より新属新種のコメツキムシ *Ohirathous nantouensis* を記載し，台湾産の Athouina 亜族に含まれる 8 属について属レベルの分類形質について比較を行った．

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