

## A New Species of the Genus *Phelotrupes* (Coleoptera, Geotrupidae) from Taiwan, with Notes on the Taiwanese Geotrupidae Species

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**Abstract** A new species of the family Geotrupidae from Taiwan, under the name of *Phelotrupes* (*Eogeotrupes*) *chenwenlongi* sp. nov. is described. *P. (E.) formosanus* (MIWA, 1930) is redescribed and supplementary descriptions are made for *P. (Sinogeotrupes) taiwanus* (MIYAKE et YAMAYA, 1995) and *P. (S.) insulanus* (HOWDEN, 1965). Besides, a key to the species of the genus *Phelotrupes* from Taiwan is presented.

Three species of the genus *Phelotrupes* have been recorded from Taiwan (NIKOLAJEV *et al.*, 2016): i.e., *Phelotrupes* (*Sinogeotrupes*) *insulanus* (HOWDEN, 1965), *P. (S.) taiwanus* (MIYAKE et YAMAYA, 1995) and *P. (Eogeotrupes) formosanus* (MIWA, 1930). *P. (E.) formosanus* was described by MIWA (1930) as *Geotrupes laevistriatus formosanus* but, because of MIWA's poor description, the morphological features of this species had not been known, sufficiently. Later, HOWDEN (1965) designated the female specimen, which was represented by one of the drawings in MIWA (1930), as the lectotype of "*Geotrupes formosana*". Further, HOWDEN (1965) made comments on some morphological features of this species based on a female specimen identified as "*G. formosana*" by him. However, up to the present, the features of male have not been known for *P. (E.) formosanus* (see also the notes on *P. (E.) formosanus* stated below).

Of late, we have had the opportunity to examine a series of geotrupid specimens from Taiwan, and found one undescribed species related to *P. (E.) formosanus* among them. Thus, we describe a new species of *Phelotrupes* (*Eogeotrupes*) from Taiwan. Besides, we also redescribe *P. (E.) formosanus* based on male and female specimens (note that the lectotype was not included), and supplementary descriptions are also made for *P. (Sinogeotrupes) taiwanus* and *P. (S.) insulanus*. Lastly, we provide a key to the four species of the genus *Phelotrupes* from Taiwan. We followed BOVO and ZUNINO (1983) and also KRÁL *et al.* (2001) for the terminologies.

### *Phelotrupes* (*Eogeotrupes*) *chenwenlongi* sp. nov.

(Figs. 1, 3–4)

*Description of holotype.* Length: 15.9 mm (excluding mouth parts).

**Male.** Body somewhat small-sized for this genus, oblong-oval, not so strongly convex. Dorsal side fairly shining, very smooth and entirely glabrous; ventral side almost opaque except for very shining legs, and distinctly clothed with blackish brown hairs. Color unicolor black, dorsal surface partly tinged with only slightly bluish luster; ventral surface also black; mouth parts, palpi and legs brown to blackish brown; antennae with foot-stalk chestnut brown, club segments almost pale brown.

Head strongly produced forward with labrum shallowly but distinctly emarginate in front; clypeus well produced and parabolic in outline; clypeal margin slightly reflexed and thinly bordered; me-



Figs. 1–2. Habitus of *Phelotrupes* (*Eogeotrupes*) spp., scale 10 mm. — 1, *P. (E.) chenwenlongi* sp. nov., male (holotype); 2, *P. (E.) formosanus* (MIWA, 1930), male.

dian portion of clypeus with a small pointed tubercle distinctly raised in lateral view and connecting with short obtuse keel in front of the tubercle; clypeal suture sharply depressed in front and indistinct behind; T-shaped suture indistinct posteriorly; eye-tubercles weak, but slightly raised; eye-canthus with external margin almost straight and broadened posteriad, and then suddenly narrowed toward base; surface shining, with clypeus somewhat uneven, transversely rugose, and densely covered with small vague punctures, frons to vertex smooth, almost impunctate, eye-canthus irregularly and somewhat finely sculptured.

Pronotum transverse, weakly convex above, simply formed, about 1.5 times as wide as long ( $Pl : Pw = 5.6 : 8.5$ ), widest at basal 1/2; median longitudinal groove entirely effaced; anterior margin shallowly emarginate, with marginal line thick in the middle and obviously thin on either side, posterior edge of the marginal line slightly raised; lateral margins gently rounded and thickly bordered in basal 1/2, and nearly evenly narrowed toward apex and thinly bordered in apical 1/2; anterior angles weakly produced, rounded and thinly bordered at apex, posterior ones obtuse; basal margin bi-sinuate, thickly bordered at ante-scutellar portion and almost un-bordered on either side; lateral fovea small, deeply grooved, posteromedial fovea lacking; surface widely very smooth and punctulate on disc except for either punctate lateral portion where is irregularly and sparsely scattered with about 30 strong small punctures. Scutellum broadly triangular in outline, parallel-sided basally, only slightly micro-granulose laterally, with a small median fovea.

Elytra somewhat strongly convex, about 1.2 times as long as wide (El : Ew = 7.7 : 9.2), widest at the middle, with a distinct humeral callus; each elytron with 14 striae, inner seven of which are obviously grooved though sometimes interrupted in part, situated between suture and humeral callus; outer seven of which are somewhat shallowly and weakly grooved than the inner seven striae, and very often interrupted in part; striae punctures weak and mostly indistinct, becoming larger laterad; intervals somewhat convex, almost smooth, punctulate all over. Macropterous.

All femora with either ventral side very smooth and impunctate, bearing two distinct transverse indented ridges. Metafemora with a short small tooth near the middle at posterior margin. Metatrochanter very slightly produced as a rounded tooth. Protibiae fairly slender, somewhat strongly dilated apicad, strongly and evenly incurved, with seven external teeth, which are gradually decreasing in size from apex to base; inner distal end obliquely toothed ventrally; ventral side armed with a fairly strong sharp tooth at the middle of ventromedial edge, and with three small teeth posteriorly. Abdomen with ventrites micro-granulose, rather irregularly punctate.

Aedeagus. Phallobase asymmetrical; Phl ca. 3.5 mm and Phw ca. 1.5 mm in ventral view; lateral portion of left ventral lobe noticeably large and well visible in dorsal view; ventral side with distinct sagittary ventral suture; median portion much widely and deeply incised, and separated into two ventral lobes; right ventral lobe very wide and narrowed at apex; left ventral lobe narrow, strongly incurved and constricted near apex. Parameres asymmetrical; Prl ca. 1.2 mm in dorsal view; in dorsal view, right paramere moderately broad at base and narrowed apicad; left paramere almost simply narrowed apicad; apices of both parameres fringed with dense hairs; ventral apico-median area distinctly narrow, rather shallowly notched at left portion in ventral view.

*F e m a l e.* Unknown.

*Holotype:* ♂, Taiwan, Kaohsiung Hsien, nr. Liukuei, Mt. Chuhsieshan, 17.VII.1984, W. L. CHEN leg.

*Type depository.* The holotype will be deposited in the collection of the National Museum of Nature and Science, Tsukuba.

*Distribution.* Taiwan.

*Etymology.* This species is named after the collector of the holotype. The late Mr. Wenlong CHEN was a very famous collector of beetles and butterflies in Taiwan and a very good gentleman.

*Notes.* The present new species is somewhat related to *Phelotrupes (Eogeotrupes) formosanus* (MIWA, 1930) from Taiwan, but can be distinguished from the latter by the following characters in male: 1) body distinctly smaller and rather depressed, whereas in *P. formosanus*, it is clearly larger and fairly strongly convex; 2) dorsal surface strongly shining and very smooth, especially on pronotum; 3) pronotum with anterior angle thinly bordered at apex, whereas in *P. formosanus*, it is distinctly thickly bordered at apex; 4) elytra with striae punctures almost effaced on inner seven striae instead of being distinctly punctate; 5) clypeus more strongly produced than in *P. formosanus*; 6) parameres of male genitalia with ventral apico-median area differently shaped and smaller, and phallobase with left lateral portion clearly broad and well produced laterally in dorsal view, whereas in *P. (E.) formosanus*, the former is larger and the latter is very narrow and less produced laterally.

***Phelotrupes (Eogeotrupes) formosanus* (MIWA, 1930)**

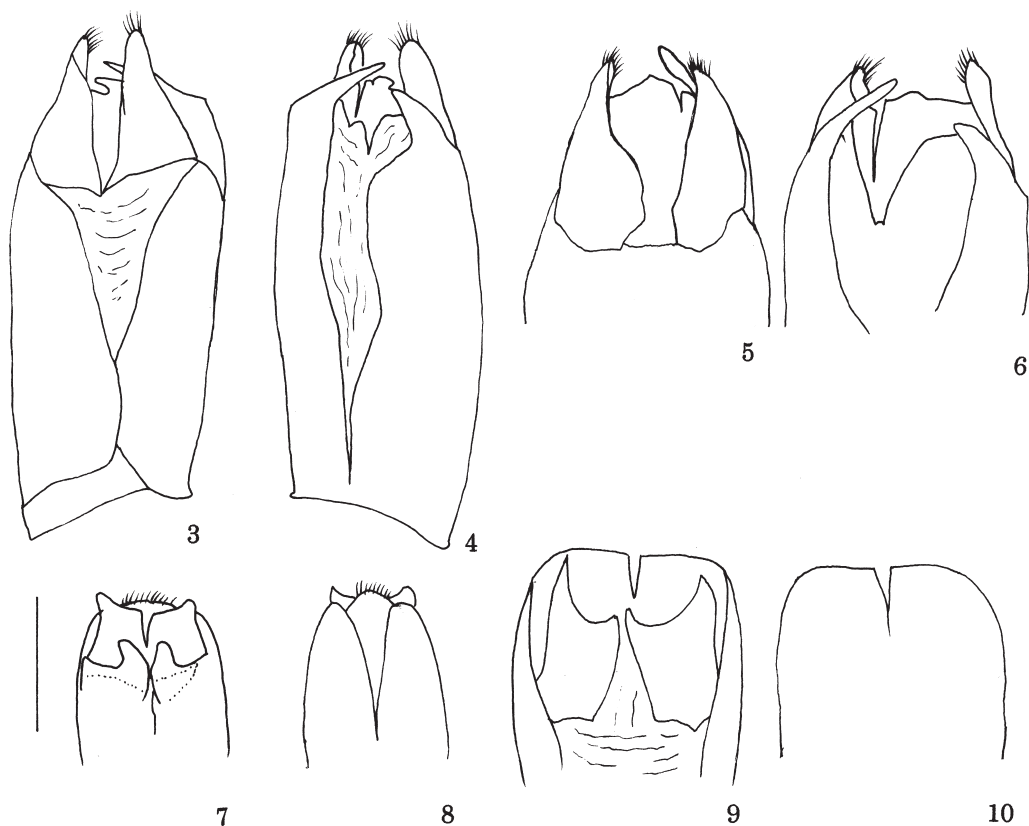
(Fig. 2, 5–6)

*Geotrupes laevistriatus formosanus* MIWA, 1930: 164, fig. 1.

*Geotrupes formosanus*: MIWA & CHŪJŪ, 1939: 31.

*Geotrupes formosana*: HOWDEN, 1965: 504 [lectotype designated for female]; NOMURA, 1973: 45.

*Phelotrupes (Eogeotrupes) formosanus*: KRÁL *et al.*, 2001: 92.



Figs. 3–10, Male genitalia of *Phelotrupes (Eogeotrupes)* spp., and *Phelotrupes (Sinogeotrupes)* spp., scale 1 mm. — 3–4, *P. (E.) chenwenlongi* sp. nov.; 5–6, *P. (E.) formosanus* (MIWA, 1930); 7–8, *P. (S.) taiwanus* (MIYAKE et YAMAYA, 1995); 9–10, *P. (S.) insulanus* (HOWDEN, 1965) (odd-number in dorsal view and even-number in ventral view).

*Re-description.* Length: 20.8 mm (excluding mouth parts).

**M a l e.** Body large-sized, with dorsal side shining. Color almost black, with dorsal and ventral surface partly covered with very slight bluish luster; antennae with foot-stalk dark brown, club segments pale brown to dark yellowish brown. Head with clypeus rather strongly produced forward and forming parabolic line, with median portion distinctly raised as a tubercle posteriorly and keeled anteriorly; eye-tubercles weakly raised; surface densely and somewhat rugosely punctate. Pronotum wide, fairly strongly convex, simply formed, ca. 1.8 times as wide as long (Pl : Pw = 6.0 : 10.6), widest at basal 1/3, with fine median longitudinal groove in basal 1/2; lateral margins almost parallel-sided and thickly bordered in basal 1/2, then almost linearly narrowed anteriorly and thinly bordered in apical 1/2; anterior angles well produced forward, with tip rounded and fairly thickly bordered; base obviously bi-sinuate, thickly and briefly bordered in the middle; surface smooth and shining, impunctate except for very sparsely and finely punctate lateral portions. Scutellum with a distinct median fovea in apical half. Elytra slightly wider than pronotum, about 1.0 times as wide as long (El : Ew = 10.8 : 11.3), widest at a little behind the middle; each elytron with 14 striae, inner seven of which are strongly

grooved; stria punctures dense and distinct. All femora each with ventral side impunctate and smooth, bearing two transverse indented ridges. Metafemora armed with a very strongly projected sharp tooth situated a little before middle on posterior edge, ca. 1.2 mm in length, then slightly lobed outward. Metatrochanter slightly produced as a rounded tubercle. Protibiae rather short and relatively broad, with six external teeth; ventral side armed with a strong sharp tooth a little before middle of ventromedial edge, and with four small teeth posteriorly. Aedeagus. Phallobase asymmetrical; Phl ca. 4.1 mm and Phw ca. 1.9 mm in ventral view; ventral side with sagittary ventral suture distinct, considerably widely and deeply incised in median portion, which is separated into two ventral lobes; right ventral lobe wide and briefly narrowed at apex; left ventral one distinctly narrow, strongly incurved, fairly prolonged and constricted near apex. Parameres asymmetrical; Prl ca. 1.5 mm in dorsal view; in dorsal view, right paramere broad in basal 1/2, and suddenly narrowed apicad in apical 1/2; left paramere gradually narrowed apicad; in ventral view, ventral apico-median area deeply notched at left-most portion, elongate at left side, and broad at right side. Variation. Length: 17.5–20.9 mm (n = 7). Body usually shining to very shining, though rarely sub-opaque on pronotum. Color almost black, usually with very slight bluish tinge on elytra. Scutellum with median fovea constantly distinct. Female. Clypeus opaque, indefinitely punctate, more strongly produced forward than in male, and clearly narrower. Pronotum less strongly convex than in male; lateral portion more coarsely punctate. Protibiae slightly broader; ventral side longitudinally arranged with six to seven small teeth along the ventromedial edge.

*Specimens examined.* 1 ♂, Taiwan, Nantou Hsien., Mt. Kuantaoshan, 13.V.1987, C. C. LOH leg.; 1 ♀, ditto, nr. Wushe, 2.X.1995; 1 ♀, ditto, Puli, 1959; 1 ♀, ditto, Taichung Hsien, 21.VIII.1979; 1 ♀, ditto, Taoyuan Hsien, Mt. Rarashan, 3.VI.1987, C. C. LOH leg.; 1 ♂, 1 ♀, ditto, Kaohsiung Hsien, 18.IX.1984, W. L. CHEN leg.

*Notes.* MIWA (1930, p. 164) described this species from Taiwan as a subspecies of the Japanese species, *Phelotrupes (E.) laevistriatus* MOTHCHULSKY and, on the same page of the description, he presented the two drawings of both sexes of the described subspecies. Judging from the drawings, however, the male and female specimens of the drawings apparently represent two different species. Later, MIWA and CHÛJÔ (1939, p. 31) raised this subspecies as a full species in their "Catalogue Coleopterorum Japonicorum" without comments. On the other hand, HOWDEN (1965, p. 502) described a new species, *Geotrupes insulana*, from Taiwan; additionally, in the same paper, he pointed out that the drawings in MIWA (1930) represent two species, and so he designated the female specimen represented by one of the drawings as the lectotype of *Geotrupes formosana* and regarded another (the male specimen) as belonging to the new species, *G. insulana* HOWDEN, 1965. Furthermore, HOWDEN (1965) made comments on some morphological features of *G. formosana* based on the single female specimen in the collection of the California Academy of Science.

***Phelotrupes (Sinogeotrupes) taiwanus* (MIYAKE et YAMAYA, 1995)**

(Figs. 7–8)

*Sinogeotrupes taiwanus* MIYAKE et YAMAYA, 1995: 32.

*Geotrupes substriatellus*: MIWA, 1930, 164; MIWA & CHÛJÔ, 1939: 32; HOWDEN 1965: 502; NOMURA, 1973: 45.

*Phelotrupes (Sinogeotrupes) taiwanus*: KRÁL et al., 2001: 135. (partim).

Length: 16.5–22.1 mm (n = 25).

*Supplementary description.* Body distinctly matt on the dorsal side. Head strongly produced forward; clypeus parabolic in outline, with median portion slightly raised behind as a small tubercle, and keeled anteriorly. Pronotum with anterior margin fairly thickly bordered in the middle, only slightly

raised at the middle of marginal border; lateral margins usually rather finely, sometimes slightly thickly, bordered in basal 2/5 and finely so in the rest. Metafemora with posterior margin produced as a slight rounded prominent tooth at basal 4/11. Protibiae with ventral side longitudinally arranged with six to seven small teeth along the ventromedial edge. Male genitalia elongate. Phallobase almost symmetrical, ca. 3.2–3.5 mm (n = 3) in ventral view; in dorsal view, median apices of phallobase each produced as rounded lobe, ca. 0.2–0.3 mm in length; in ventral view, ventral lobes rather broadly notched in elongate V-shape. Parameres almost symmetrical, ca. 0.7–0.8 mm in length, each apex briefly emarginated in the middle and produced as rounded prominent outward. Female. Pronotum with anterior margin noticeably and briefly thickly bordered, the border well swollen at the middle and a little notched at posterior side. Metafemora with posterior margin simply formed, without tooth. Protibiae with ventral side longitudinally arranged with similar teeth as those of male, but clearly lower and smaller.

*Specimens examined.* 1 ♂, 1 ♀, Taiwan, Taichung Hsien, Pulu, 21.VIII.1979, K. SUGINO leg.; 2 ♂♂, 1 ♀, ditto, Nantou Hsien, Sungkan, 15.V.1987, C. C. LOH leg.; 2 ♂♂, 2 ♀♀, ditto, Meifeng, 13–15.VII.1974, T. OCHI leg.; 1 ♂, 2 ♀♀, ditto, Mt. Hehuanshan, 6.III.1979, C. C. LOH leg.; 4 ♂♂, 5 ♀♀, ditto, Chiai Hsien, Fengchifu, 7–15.VII.1974, T. OCHI leg.; 1 ♂, 1 ♀, ditto, 15. VIII. 1978, K. SUGINO leg.; 1 ♂, 1 ♀, ditto, Kaohsiung Hsien, Liukuei, 10.VII.1979, W. L. CHEN leg.

### *Phelotrupes (Sinogeotrupes) insulanus* (HOWDEN, 1965)

(Figs. 9–10)

*Geotrupes insulana* HOWDEN, 1965: 503; NOMURA, 1973: 45.

*Geotrupes laevistriatus formosanus*: MIWA, 1930: 164 (partim).

*Phelotrupes (Sinogeotrupes) insulanus*: KRÁL *et al.*, 2001: 128.

Length: 15.5–20.3 mm (n = 24).

*Supplementary description.* Body moderately shining on the dorsal side. Male genitalia. Phallobase almost symmetrical, ca. 4.2–4.5 mm (n = 3) in ventral view; in ventral view, apico-median portion briefly and longitudinally notched, the notch ca. 0.4 mm in length (n = 3). Parameres almost symmetrical, ca. 1.2–1.3 mm in length, each apex of paramere with two teeth and roundly emarginate between the teeth; outer tooth strongly and straightly projected and inner one slightly produced.

*Specimens examined.* 1 ♂, Taiwan, Taoyuan Hsien, Mt. Rarashan, 2.VI.1972, L. F. Hang leg.; 4 ♂♂, 2 ♀♀, ditto, 15.VI.1977; 2 ♂♂, 1 ♀, ditto, 28.VI.1986, C. C. LOH leg.; 2 ♂♂, 1 ♀, ditto, Nantou Hsien, Meifeng, 7.VIII.1987, H. SAKAINO leg.; 3 ♂♂, 4 ♀♀, ditto, Mt. Hehuanshan, 13.VIII.1995, C. C. LOH leg.; 1 ♂, 2 ♀♀, ditto, Chiai Hsien, 9.VII.1974, T. OCHI leg.; 1 ♀, ditto, Kaohsiung Hsien, Liukuei, 6.X.1979, W. L. CHEN leg.

### A Key to the Species of the Genus *Phelotrupes* from Taiwan

- 1 (4) ♂: male genitalia with phallobase almost symmetrical in ventral view; parameres almost symmetrical in dorsal view. Scutellum without median fovea. (Figs. 7–10). ..... Subgenus *Phelotrupes (Sinogeotrupes)* ..... 2
- 2 (3) Dorsal side entirely matt, almost strongly micro-granulose. Pronotum simply formed, without transverse groove behind anterior margin. Elytron with intervals entirely flat; striae weak, very shallowly grooved, striae punctures somewhat fine though distinct. Color unicolor black, without metallic tinge. 18.5–22.6 mm. ♂: male genitalia as figured in 7–8. .... *P. (S.) taiwanus* (MIYAKE et YAMAYA)

- 3 (2) Dorsal side moderately shining, not micro-granulose. Pronotum not simply formed, with distinct transverse groove just behind anterior margin, whose median portion is depressed in V-shape. Elytron with intervals somewhat convex; striae strong, rather deeply grooved; striae punctures mostly vague, partly distinct. 17.9–21.2 mm. ♂: male genitalia as figured in 9–10. .... *P. (S.) insulanus* (HOWDEN)
- 4 (1) ♂: male genitalia with phallobase distinctly asymmetrical in ventral view; parameres somewhat asymmetrical in dorsal view. Scutellum with a distinct median fovea. (Figs. 3–6). .... Subgenus *Phelotrupes* (*Eogeotrupes*) ..... 5
- 5 (6) Body larger, strongly convex dorsally, with pronotum weakly to moderately shining, smooth. Pronotum with anterior angle thickly bordered at tip. Elytron with striae punctures distinct in inner seven striae. ♂: male genitalia with phallobase bearing left lateral portion clearly narrower and scarcely produced laterally in dorsal view. 17.5–20.9 mm. ♂: male genitalia as figured in 5–6. .... *P. (E.) formosanus* (MIWA)
- 6 (5) Body smaller, weakly convex dorsally, with pronotum very shining and fairly smooth. Pronotum with anterior angle thinly bordered at tip. Elytron with striae punctures not distinct, mostly effaced on inner seven striae. ♂: male genitalia with phallobase bearing left lateral portion clearly broader and distinctly produced laterally in dorsal view. 15.9 mm. ♂: male genitalia as figured in 3–4. .... *P. (E.) chenwenlongi* sp. nov.

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### 要 約

越智輝雄・益本仁雄・藍 艶秋:台湾からセンチコガネ科(鞘翅目)の1新種。——*Phelotrupes* (*Eogeotrupes*) *chenwenlongi* sp. nov. を記載した。また、これまで知られていなかった *P. (E.) formosanus* (MIWA, 1930)♂の形態について再記載し、*P. (Sinogeotrupes) taiwanus* (MIYAKE et YAMAYA, 1995) 及び *P. (S.) insulanus* (HOWDEN, 1965) の、十分に知られていない♂交尾器を含む形態的特徴について記載した。さらに、台湾産4種の検索表を付した。

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