

## Identity of *Nanophyes formosensis* and Fixation of the Type Species of *Zherikhinia* (Coleoptera, Nanophyidae)

Junnosuke KANTOH and Hiroaki KOJIMA

Laboratory of Entomology, Tokyo University of Agriculture,  
1737 Funako, Atsugi, Kanagawa, 243–0034 Japan

**Abstract** The type species of *Zherikhinia* ALONSO-ZARAZAGA, 1999 has been currently attributed to *Nanophyes formosensis* KÔNO, 1930 based on misidentification. To conserve the current usage of the generic name *Zherikhinia*, *Z. distylia* sp. nov., is designated as the type species under Article 70.3.2 of the Code (ICZN, 2000). The new genus is established for true *N. formosensis*, under the name *Chibizo formosensis* (KÔNO, 1930), gen. et comb. nov. *Nanophyes basilineatus* HELLER, 1931 is synonymized with *C. formosensis*. *Zherikhinia distylia* is associated with *Distylium racemosum* (Hamamelidaceae), and *Chibizo formosensis* was captured on the flower buds of *Lagerstroemia subcostata* (Lythraceae).

*Nanophyes formosensis* was described by KÔNO (1930) from Taiwan. MORIMOTO (1964) recorded and figured this species in his revision of the Japanese Nanophyinae. Subsequently, ALONSO-ZARAZAGA (1989) established the genus *Psix*, which was renamed to *Zherikhinia* ALONSO-ZARAZAGA (1999) based on *N. formosensis*. However, after examination of the type materials of *N. formosensis* (Figs. 7, 8), we concluded that the Japanese species recorded by MORIMOTO (1964) and the type species of *Zherikhinia* originally designated by ALONSO-ZARAZAGA (1989) were inconsistent with the true *N. formosensis*, but were misidentification based on the undescribed species.

In this paper, we will describe the misidentified weevil as a new species under the name, *Zherikhinia distylia* sp. nov., and designate it as the type of *Zherikhinia* under Article 70.3.2 of ICZN (2000). Additionally, we revealed that the true *Nanophyes formosensis* does not belong to any genera of Nanophyidae previously known and will establish a new genus receiving for it.

All the specimens are deposited at the Laboratory of Entomology, Tokyo University of Agriculture unless otherwise mentioned.

### *Zherikhinia* ALONSO-ZARAZAGA

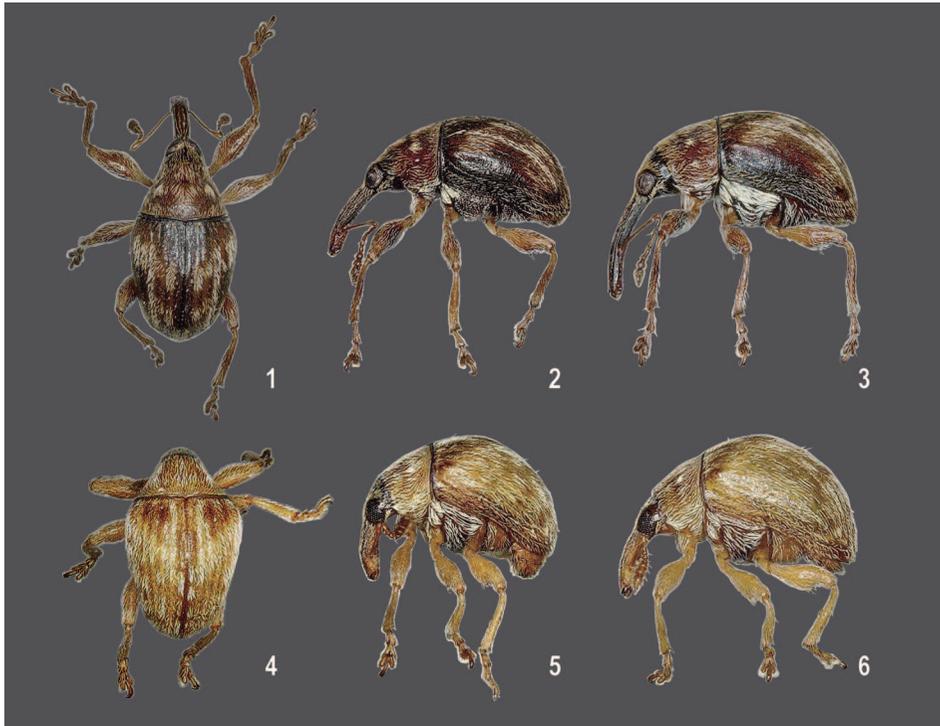
*Psix* ALONSO-ZARAZAGA, 1989, 232 (nec KOZLOV & LE, 1976).

*Zherikhinia* ALONSO-ZARAZAGA, 1999, 12, 62 (catalogue).

See ALONSO-ZARAZAGA (1999) for synonymy.

The type species is herein fixed under Article 70.3.2 (ICZN, 2000) on *Z. distylia* sp. nov. misidentified as *Nanophyes formosensis* (nec KÔNO, 1930) in the original designation by ALONSO-ZARAZAGA (1989).

**Redescription.** As given by ALONSO-ZARAZAGA (1989), except for specialized erect setae present on head, pronotum, odd interstriae of elytra, femora and tibiae. Rostrum with five longitudinal carinae extending distad as far as antennal insertion (including dorsal carina of false scrobes), intercarinal sulci comprising subconfluent foveae, each sulcus with a row of elongate pale scales in both sexes. Forehead between eyes with one or two rows of elongate narrow scales.



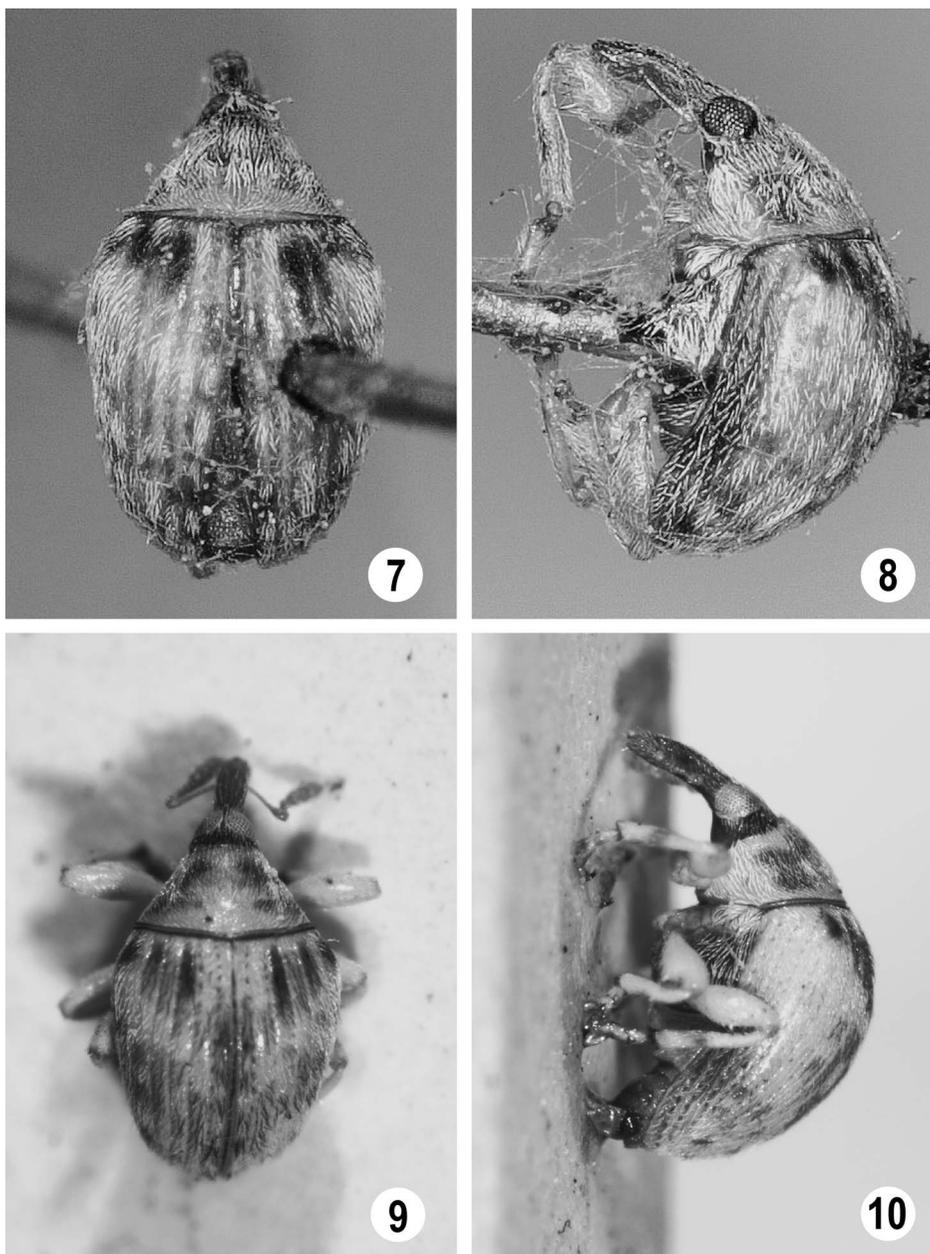
Figs. 1–6. Habitus photographs of *Zherikhinia distyilia* sp. nov. and *Chibizo formosensis* gen. et comb. nov. (Figs. 1–3, *Z. distyilia*; 4–6, *C. formosensis*). — 1, Male dorsal; 2, ditto lateral; 3, female lateral; 4, male dorsal; 5, ditto lateral; 6, female lateral.

Antennae with 4th funicular segment slightly asymmetrical; club with 3rd segment a little longer than basal two segments combined. Pronotum and elytra densely and minutely crenulate at base. Femora each with one large proximal and two to four (rarely one in middle and hind pairs) small distal teeth. Tibiae mucronate in male, unarmed in female.

Terminalia as illustrated (Figs. 15–21). Spiculum gastrale with a pair of lobes anteriorly on posterior arm and apodeme weakly asymmetrical. Ovipositor with hemisternites long. Spiculum ventrale with posterior plate weakly sclerotized; spiculum approximately 1.7 times as long as hemisternites. Spermathecal duct convoluted near base. Spermatheca C-shaped, with cornu twisted apically.

*Distribution.* Japan, Taiwan.

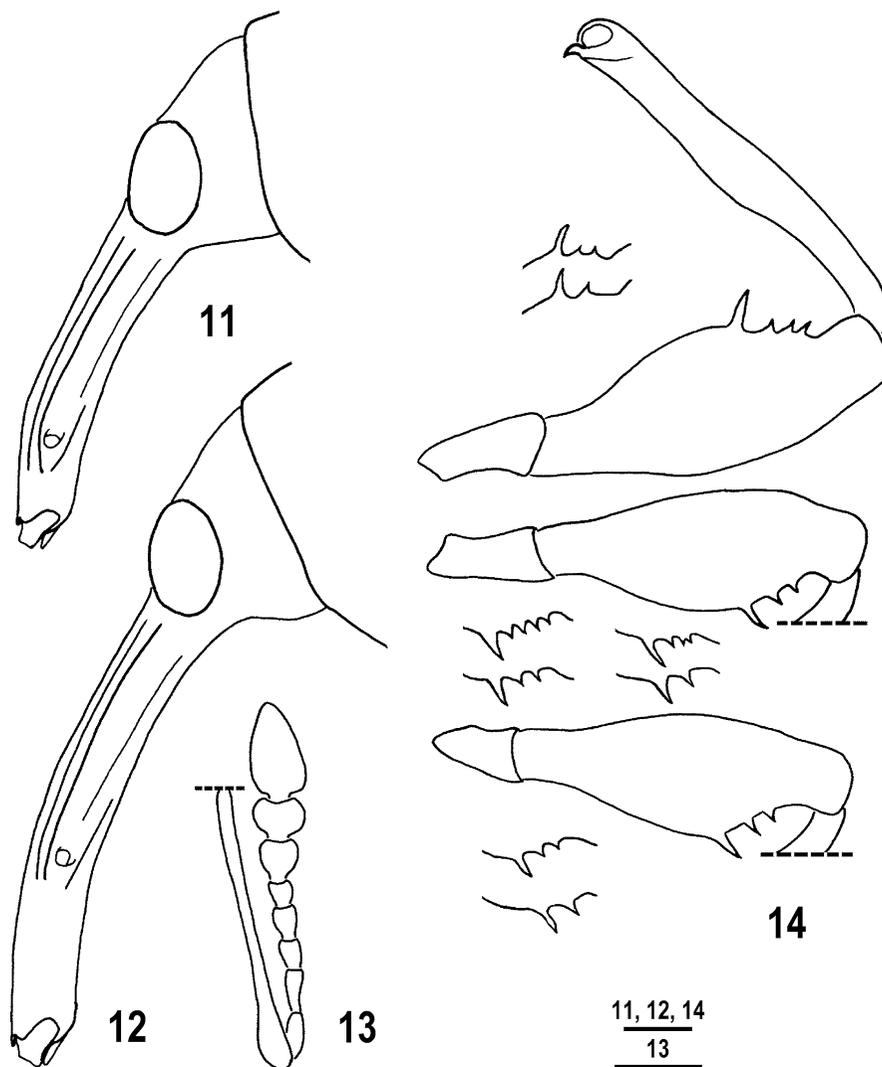
*Comments.* ALONSO-ZARAZAGA (1990) compared *Zherikhinia* (= *Psix* ALONSO-ZARAZAGA, 1989) with *Meregallia* ALONSO-ZARAZAGA, 1990 when he established the latter genus because they share the apomorphic characters: eyes large, closely approximated each other, with one or two rows of hairy scales between them. However, *Zherikhinia* differs from *Meregallia* whether the 8th elytral interstria is crenulate at base (*Meregallia*) or not (*Zherikhinia*). The female rostrum has five longitudinal dorsal carinae in *Zherikhinia*, but it has only four in *Meregallia*. Body color also differs in that it is reddish to dark reddish brown in *Zherikhinia* and black in *Meregallia*. Some differences are observed in their male and female terminalia. The parameroid lobes of tegmen each provided with a row of about six to seven long setae in



Figs. 7–10. Lectotype of *Chibizo formosensis* gen. et comb. nov. and syntype of *Nanophyes basilineatus* HELLER, 1931 (Figs. 7, 8, *C. formosensis*; 9, 10, *N. basilineatus*). — 7, Dorsal; 8, ditto lateral; 9, dorsal; 10, ditto lateral.

*Zherikhinia* while it has numerous long setae, at least more than 15 in number in *Meregallia*. The spermathecal duct is convoluted near the base in *Zherikhinia*, but it is convoluted near the body in *Meregallia*.

*Zherikhinia* is also similar to *Manoja* PAJNI et BHATEJA, 1982 among the Oriental nanophiyd



Figs. 11–14. *Zherikhinia distyilia* sp. nov. — 11, Head, male; 12, ditto, female; 13, antenna; 14, legs (trochanters, femora and tibiae) and variation of femoral teeth, male. Scale=0.2 mm.

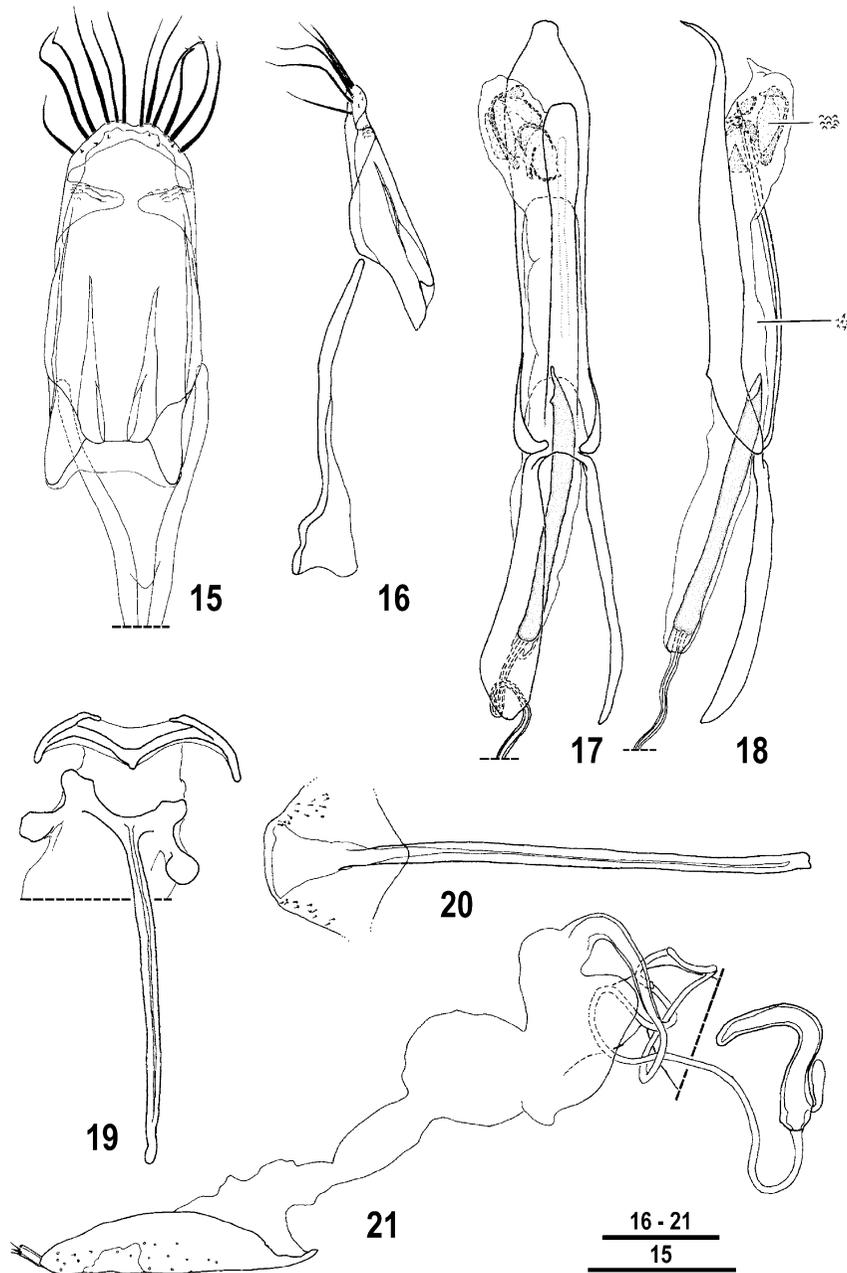
genera in having the 5-segmented antennal funicle and the absence of the basal crenulation of the 8th elytral interstria. However, the eyes are narrowly separated by the distance of minimum width of scape in *Manoja*, though they are almost touching in the middle in *Zherikhinia*.

See also a key in the comments of *Chibizo* gen. nov.

*Zherikhinia distyilia* sp. nov.

(Figs. 1–3, 11–21)

*Nanophyes formosensis* (nec KÔNO, 1930): MORIMOTO, 1964, 84 (Kyushu, Okinawa, Ishigaki, Formosa; figures of habitus, antenna, aedeagus and tegmen); MORIMOTO, 1984, 268; AZUMA *et al.*, 2002, 274; KOJIMA & MORIMOTO,



Figs. 15–21. *Zherikhinia distylia* sp. nov. — 15, Tegmen, dorsal; 16, ditto, lateral; 17, aedeagus, dorsal; 18, ditto, lateral; 19, sternite 8 and spiculum gastrale; 20, spiculum ventrale, ventral; 21, female genitalia, lateral. Scale = 0.2 mm.

2004, 72 (misidentification).

*Psix formosensis*: ALONSO-ZARAZAGA, 1989, 232 (description and figures based on a Japanese specimen).

*Zherikhinia formosensis*: ALONSO-ZARAZAGA, 1999, 62.

*Description.* Male. Length: 1.8–2.4 mm; pronotal width: 0.8–1.1 mm; elytral width: 1.0–1.2 mm.

Derm reddish to dark reddish brown, head, rostrum dorso-laterally behind antennal insertion, apical segment of antennal club, basal keels of pronotum and elytra, along suture, basal and lateral parts of elytra, median part of femora, apices and sometimes median part of tibiae, apices of tarsi, meso- and metathoraces, sometimes ventrite except apical one or two segments fuscous. Vestiture of white to yellowish white hairy scales fasciate on pronotum and elytra (Figs. 1–3), dark area of pronotum and elytra with fuscous hairs.

Rostrum about 1.3 times as long as pronotum, antennae inserted at apical third of rostrum; funicle with basal two segments subequal in length or 2nd a little shorter than 1st, 3rd and 4th subequal in length, 0.7 times as long as 2nd, 5th a little shorter than the preceding; club nearly as long as funicle.

Prothorax 0.6–0.7 times as long as wide. Elytra 1.3–1.4 times as long as wide, widest just behind humeri; interstriae smooth and glossy between bases of scales.

Terminalia as illustrated (Figs. 15–19). Tegmen with parameroid lobe slightly emarginate at apex, each lobe with marginal row of six to seven long setae; basally lateral lobes faintly sclerotized. Aedeagus with pedon symmetrical, downcurved at tip. Tectum approximately half width of pedon. Aedeagal apodemes two-thirds of aedeagal body in length. Internal sac with two curved frena, flagellum nearly as long as aedeagal apodeme.

Female. Length: 2.1–2.8 mm; pronotal width: 1.0–1.3 mm; elytral width: 1.2–1.5 mm.

Resembles male except for rostrum about 1.5 times as long as pronotum. Terminalia as illustrated (Figs. 20, 21).

*Etymology.* The specific name is derived from the host of the weevil.

*Type series.* Holotype: male, Ootomi, Iriomote-jima Is., Okinawa Pref., 7–IV–2005, J. KANTOH leg. Paratypes: [Japan] 1 female, Fureaino-mori, Amami Is., 23–III–1990, Y. OKUSHIMA leg.; 1 female, Mt. Omoto, Ishigaki Is., 20–28–IV–1990, T. HANATANI leg.; 1 male and 1 female, Uchiyama, Tsushima Is., Nagasaki Pref., 3–4–VII–1992, H. KOJIMA leg.; 1 male, Mt. Hoyoshidake, Takayama-machi, Kagoshima Pref., 11–VI–1997, H. KOJIMA leg.; 1 male and 1 female, Maese-dake, Ishigaki Is., 14–III–2003, H. HIRANO leg.; 55 males and 40 females, same locality as the holotype, 28–XII–2004, 1–3–I–2005, 7–IV–2005, 25–XII–2006, J. KANTOH leg.; 1 male, Banna Park, Ishigaki-jima Is., Okinawa Pref., 31–XII–2006, J. KANTOH leg.; 1 male, Takeda-rindou, Ishigaki-jima Is., Okinawa Pref., 31–XII–2006, J. KANTOH leg.; 1 female, Yuwan, Amami-Ōshima Is., Kagoshima Pref., 11–IV–2007, J. KANTOH leg. [Taiwan] 1 male, Meifeng, 13–V–1975, S. IMASAKA leg.; 1 male, same locality and collector, 19–V–1977.

*Distribution.* Japan (Kyushu, Tsushima and Ryukyus: Amami-Ōshima, Okinawa-hontō, Ishigaki-jima and Iriomote-jima Isls.), Taiwan.

*Biological notes.* A number of adults were captured on *Distylium racemosum* (Hamamelidaceae), and new adults emerged and, larvae and pupae were found in the fruit. Association of nanophyid weevil with Hamamelidaceae is recorded for the first time.

### *Chibizo* gen. nov.

Type species: *Nanophyes formosensis* KÔNO, 1930.

*Description.* Derm yellowish to light reddish brown, with vestiture of dark hairs and white to yellowish white elongate scales. Pale scales forming fasciae on pronotum and elytra. Specialized erect setae present on head, pronotum, odd interstriae of elytra, femora and tibiae.

Rostrum relatively short, not longer than pronotum, with five longitudinal dorsal carinae, of which median one is fine, extending distad as far as antennal insertion (including dorsal carina of false scrobes), intercarinal sulci coriaceous, each sulci with one to two rows of elongate pale scales in both sexes. Eyes narrowly separated, with row of elongate narrow scales on each side along inner margin of eye. Antennae with funicle 5-segmented, 1st segment longest, 4th asymmetrical; club 3-segmented, segments clearly separated, apical segment nearly as long as basal two segments combined; scape longer than funicle.

Pronotum trapezoidal, finely, densely and uniformly punctate; base densely minutely crenulate. Elytra 10-striate, 10th stria erased at middle; 8th interstria minutely crenulate between base and humerus; bases densely minutely crenulate. Male pygidium simple. Legs with trochanter relatively short, especially in hind pair, which is a little longer than broad; femora moderately clavate, each with one large proximal and two, sometimes one to three distal teeth; tibiae mucronate in male, unarmed in female.

Terminalia as illustrated (Figs. 26–32). Spiculum gastrale with pair of lobes anteriorly on posterior arm and apodeme curved asymmetrically. Tegmen with parameroid lobes distinctly separated by deep notch, each lobe with single marginal row of 10 or more setae. Tegminal fenestrae not clear; plate base bilobate. Aedeagus with pedon symmetrical, sometimes weakly rightward. Apodeme nearly as long as aedeagal body. Internal sac with curved frenum and notably elongate flagellum. Spiculum ventrale with posterior plate very weakly sclerotized, bearing small setae. Ovipositor with hemisternites very short; spermathecal duct relatively short, not convoluted.

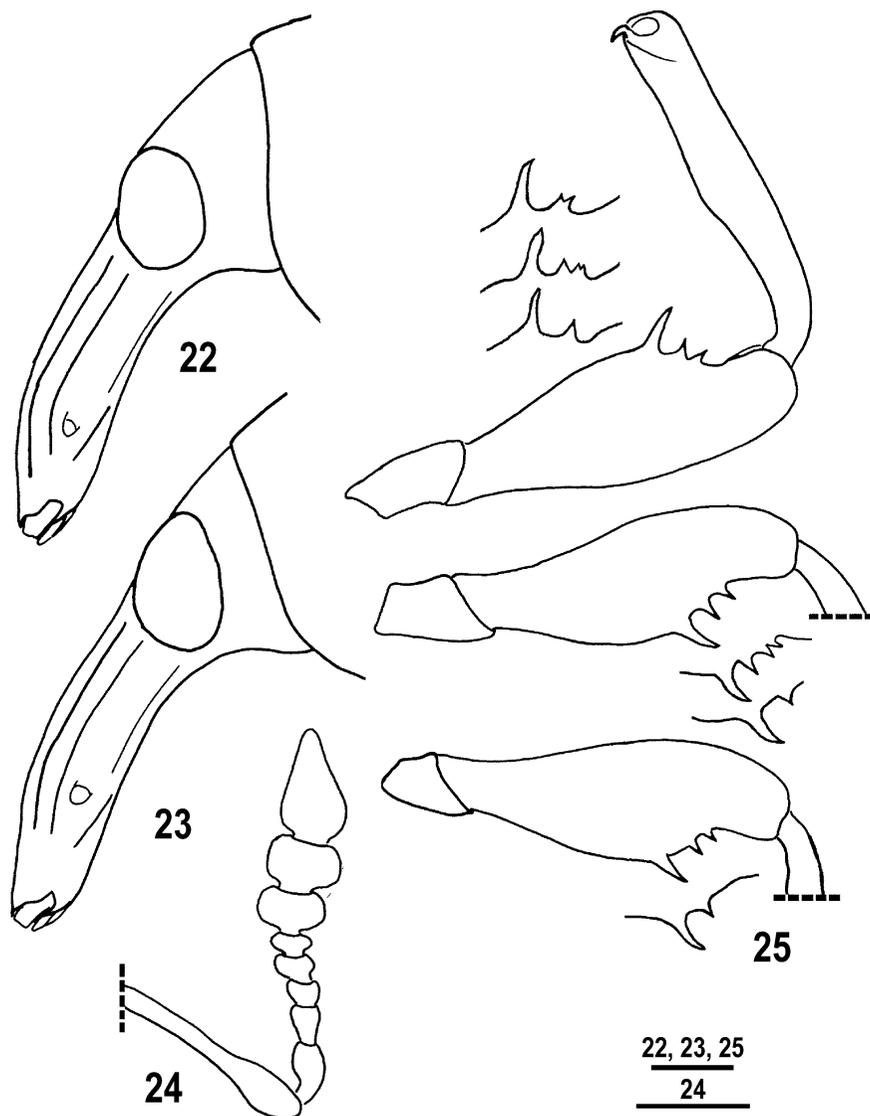
*Etymology.* Name is derived from the Japanese name of nanophyid weevils. Gender is masculine.

*Comments.* *Chibizo* is similar to the Oriental nanophyid genera, which have the 5-segmented antennal funicle and are associated with arboreous plants, but is separable from them by the following key.

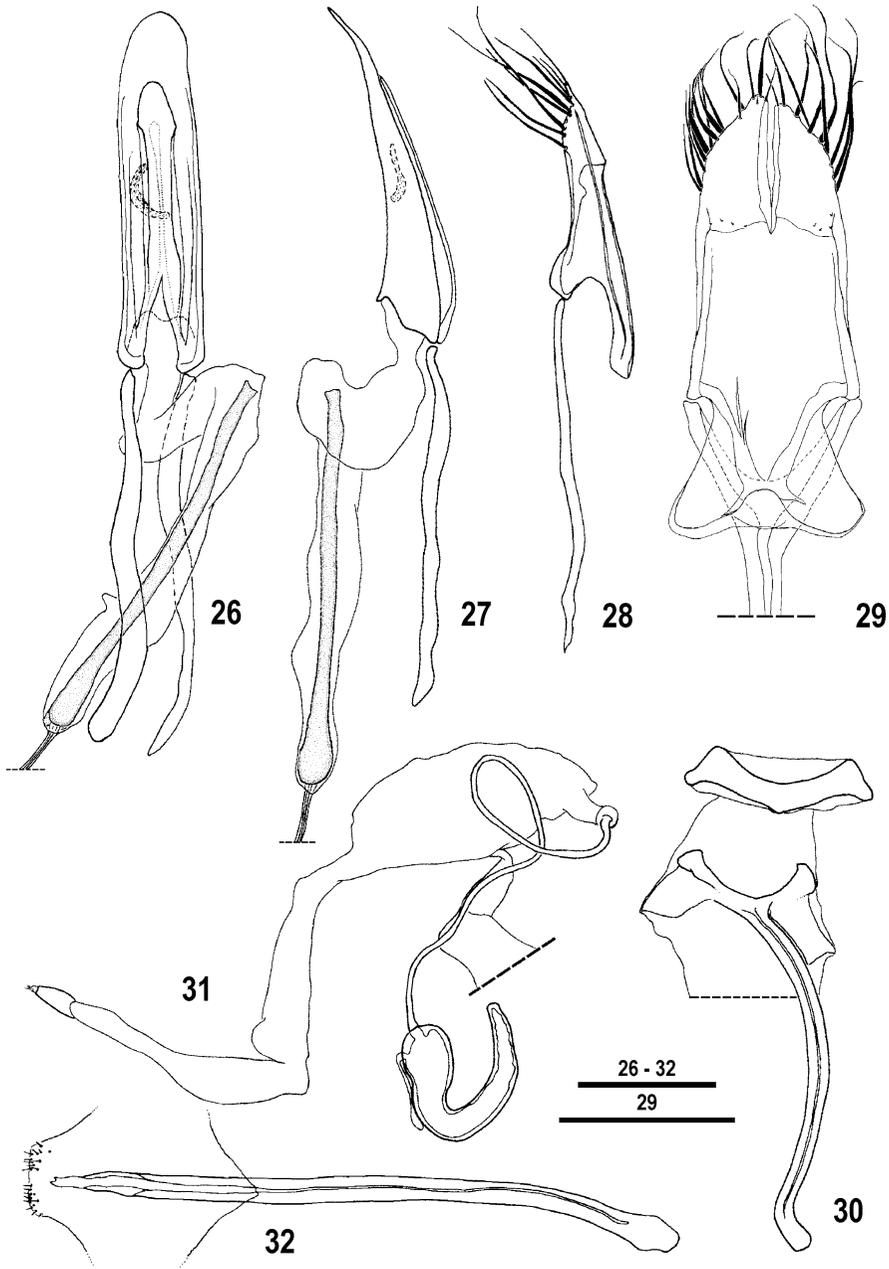
1. Elytra with 8th interstria not crenulate between base and humerus. .... 2
- Elytra with 8th interstria minutely crenulate between base and humerus. .... 3
2. Eyes almost touching in midline. Femora armed with one long proximal and two, sometimes three distal teeth. Associated with *Distylium* (Hamamelidaceae). Japan, Taiwan. ....  
..... *Zherikhinia* ALONSO-ZARAZAGA, 1999
- Eyes narrowly separated by distance about minimum width of scape. Femora armed with one long proximal and four, sometimes three distal teeth. Associated with *Lagerstroemia* (Lythraceae). Burma, India: Assam. .... *Manoja* PAJNI et BHATEJA, 1982
3. Antennae with 2nd funicular segment approximately twice as long as 1st. Associated with *Dipterocarpus* (Dipterocarpaceae). Bengal, Sundaland (Borneo, Peninsular Malaysia, Indonesia). .... *Damnux* LYAL, 2003
- Antennae with 2nd funicular segment shorter than 1st. .... 4
4. Male and female rostra subequal in length. Eyes narrowly separated, with row of elongate narrow scales on each side along inner margin of eye. Derm yellowish to light reddish brown. Associated with *Lagerstroemia* (Lythraceae). Taiwan. .... *Chibizo* gen. nov.
- Female rostrum longer than that of male. Eyes almost touching along midline, with one or two rows of elongate narrow scales between them. Derm black. Associated with Diptero-carpaceae. Sundaland (Peninsular Malaysia, Borneo), Sulawesi, Philippines (Palawan).  
..... *Meregallia* ALONSO-ZARAZAGA, 1990

*Chibizo formosensis* (KÔNO, 1930), comb. nov.

(Figs. 4–10, 22–32)

*Nanophyes formosensis* KÔNO, 1930, 153 (Formosa); KLIMA, 1934, 20 (Formosa); KANTOH & KOJIMA, 2009, 165 (Taiwan, habitus photographs).*Nanophyes formosanus* KÔNO, 1930, 151 (in key).*Nanophyes basilineatus* HELLER, 1931, 101. *Syn. nov.***Redescription.** Male. Length: 2.0–2.2 mm; pronotal width: 0.6–0.7 mm; elytral width: 1.0–1.1 mm.

Figs. 22–25. *Chibizo formosensis* gen. et comb. nov. — 22, Head, male; 23, ditto, female; 24, antenna; 25, legs (trochanters, femora and tibiae) and variation of femoral teeth, male. Scale=0.2 mm.



Figs. 26–32. *Chibizo formosensis* gen. et comb. nov. — 26, Aedeagus, dorsal; 27, ditto, lateral; 28, tegmen, lateral; 29 ditto, dorsal; 30, sternite 8 and spiculum gastrale, ventral; 31, female genitalia, lateral; 32, spiculum ventrale, ventral. Scale=0.2 mm.

Derm yellowish to light reddish brown; head, basal keels of pronotum and elytra, femoral teeth, apices of tibiae and tarsal claws fuscous, rostrum, dorso-lateral part of pronotum, suture, basal and lateral parts of elytra, and meso- and metathoraces often fuscous, femora and tibiae

rarely with dark faint fascia around middle. Vestiture of white to yellowish white elongate scales slightly condensed on base of 2nd elytral interstria, sides of pro- to metathoraces and procoxae; elytra with fuscous hairs in dark areas.

Rostrum weakly curved, a little shorter than pronotum. Antennae inserted beyond middle of rostrum; funicle with 1st segment about twice as long as wide, 2nd 0.7 times as long as 1st, 3rd to 5th subequal in length, a little shorter than 2nd; club with basal two segments transverse.

Prothorax 0.5–0.6 times as long as wide. Elytra 1.1–1.2 times as long as wide, widest just behind humeri; interstriae smooth and glossy between bases of scales.

Terminalia as illustrated (Figs. 26–30). Tegmen with parameroid lobes each cusped and bearing 10–14 short and long mixed setae; basally with broad lateral lobes faintly sclerotized. Aedeagus with pedon rounded at apex. Tectum approximately half width of pedon. Internal sac folded, with curved frenum, flagellum approximately 1.5 times as long as aedeagal body.

*F e m a l e*. Length: 2.0–2.3 mm; pronotal width: 0.6–0.7 mm; elytral width: 1.2–1.4 mm.

Resembles male except for antennae inserted a little beyond middle of rostrum. Terminalia as illustrated (Figs. 31, 32).

*Specimens examined*. Lectotype: male, herewith designated (Figs. 7, 8) with labels: “Formosa Matsumura, Ako, (7–IV–1907 on backside)” and “*Nanophyes formosensis* KÔNO ♂ Type” and “SYNTYPE, ÔHARA and HIRONAGA, 2006” and “0000000825, Sys. Ent. Hokkaido Univ. Japan, [SEHU]”; 1 female, Kosempo, viii–1919, Col. T. SHIRAKI; 34 males and 40 females, Fenshuiling, Manchou Hsiang, Pingtung Hsien, 29~31–V–2006, J. KANTOH & T. TSURU leg.; 2 males, Chihpen Wenchuan, Peinan Hsiang, Taitung Hsieng, 4~5–VI–2006, J. KANTOH leg.

*Distribution*. Taiwan (Taitung and Pingtung Hsiens).

*Biological notes*. Weevils were captured on the flower buds of *Lagerstroemia subcostata* (Lythraceae) with several other nanophyid species, such as *Shiva taiwanus* KANTOH et KOJIMA, 2009, *Pseudorobitis axeli* (ALONSO-ZARAZAGA, 1989), *P.* sp. and *Nanophyes miwai* KÔNO, 1930 (KANTOH & KOJIMA, 2009, 2010).

*Comments*. HELLER (1931) described *Nanophyes basilineatus* from Kosempo, Formosa. After examination of the syntype kept in Staatliche Naturhistorische Sammlungen, Dresden (Figs. 9, 10), it was realized that this should be a synonym of *Chibizo formosensis*.

*Chibizo formosensis* resembles *Shiva taiwanus* in their appearance coexisting on the same host, though they are readily distinguishable by the number of antennal funicle.

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### 要 約

関東準之助・小島弘昭： オオチビゾウムシ *Nanophyes formosensis* の正体と *Zherikhinia* 属の基準種の指定 (コウチュウ目チビゾウムシ科)。—— *Nanophyes formosensis* KÔNO, 1930 は台湾から記載され、日本からは MORIMOTO (1964) によって記録された。その後、ALONSO-ZARAZAGA (1989) が日本産の標本に基づいて

*Psix* 属を設立したが、この属名は異物同名だったため ALONSO-ZARAZAGA (1999) によって *Zherikhinia* 属に改められた。ところが、我われが北海道大学総合博物館に所蔵されていた河野コレクションの *Nanophyes formosensis* の基準標本を検した結果、MORIMOTO (1964) によって記録された日本産種が別種の誤同定に基づくものであることが判明した。したがって、*Zherikhinia* 属の基準種とされた種は新種であり、本論文で *Zherikhinia distylia* sp. nov. と新たに命名し記載した。また、真の *Nanophyes formosensis* については *Nanophyes* 属と明らかに異なる特徴を有することから、新属 *Chibizo* gen. nov. を設立、再記載し、レクトタイプを指定した。さらに、HELLER (1931) が台湾から記載した *Nanophyes basilineatus* を *Chibizo formosensis* (KÔNO), comb. nov. のシノニムとした。

チビゾウムシ科内で寄主植物の特定されている属は少ないが、記載した *Zherikhinia distylia* はマンサク科のイスノキを寄主としており、幼虫は朔果の内部を食べて成長する。チビゾウムシ科におけるマンサク科植物の寄主利用は、今回初めて確認された。*Chibizo formosensis* についてはミソハギ科のシマサルスベリから複数属のチビゾウムシ、とくに *Shiva taiwanus* と混じって採集された。

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