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A Report of Four Weevil Species (Coleoptera, Curculionoidea) with Issues Related to the “Shiraki Collection”

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ABSTRACT

Dr. Tokuichi Shiraki laid a solid foundation for entomological studies in Taiwan during the Japanese colonial period (1895-1945). He not only investigated Taiwan's entomofauna and advanced its agricultural entomology but also made significant contributions to the establishment of relevant policies and institutions. However, the insect specimens he left behind in Taiwanese institutions include numerous questionable exotic species labelled as originating from Taiwanese localities, which confused subsequent entomofaunistic studies in Taiwan. This issue has been termed the "Shiraki Collection". The present study reports the "Shiraki Collection" issue as it applies to weevils (Coleoptera: Curculionoidea). We identified four exotic weevil species labelled as originating from Kotosho (currently Orchid Island, Taitung County), namely *Orthorhinus cylindrirostris* (Fabricius, 1775) and *Siraton roei* (Boheman, 1843) (Curculionidae: Molytinae) from Australia, *Tanaos interstitialis* Fahraeus, 1871 (Brentidae: Apioninae) from South Africa and "*Orthorhynchoides* (*Guineorhinotia*)" *misoolensis* Legalov, 2024 (Belidae: Belinae) from New Guinea. Given specimens with identical label data originating from various countries, we found no consistent pattern linking a specific Taiwanese locality to any particular foreign region. This finding underscores the need for further investigation to clarify the provenance of all questionable specimens in the "Shiraki Collection".

Key words: Weevil, Shiraki Collection, Questionable Distribution, Taiwan Entomology

Dr. Tokuichi Shiraki (1882-1970) was one of the most important pioneers in developing entomology in Taiwan. As a civil worker at the Government-General of Taiwan during the Japanese colonial period (1895-1945), he worked on Taiwan's entomofauna and in applied entomology for 40 years (1907-1947). In addition to his scientific studies, Tokuichi Shiraki also played a leading role in establishing the Entomology and Sericulture Laboratory at Taihoku Imperial University (currently the Department of Entomology, National Taiwan University (NTU)), the first modern entomological laboratory in Taiwan, and served

as the director of the "Insect Collection of Formosa". After the end of Japanese colonisation, the entomological collection was divided into two parts: one part, consisting of moths, Diptera, Hemiptera and Orthoptera, was transferred to the NTU Insect Museum located in the Department of Entomology, and the other part, comprising butterflies, Hymenoptera and Coleoptera, to the Taiwan Agricultural Research Institute (TARI) (Schacht and Yang, 2003; Chu, 2005; Ou, 2007).

Entomologists have noticed the existence of numerous questionable specimens in the collection left by Tokuichi Shiraki since the 1970s, which are apparently exotic species but were labelled as having been collected in Taiwan and thus caused significant confusion in Taiwan's faunistic research. This issue has been referred to as the "Shiraki Collection" in subsequent publications. The origin of the “Shiraki Collection” can be traced back to 1913-1916, when Tokuichi Shiraki took a large number of Taiwanese insect specimens to the Natural History Museum (NHMUK) in London for identification. It is assumed that he brought numerous identified specimens from NHMUK back to Taiwan and deliberately replaced their labels with new ones stating various Taiwanese localities, such as Hori (currently Puli, Nantou County), Musha (currently Wushe, Nantou County), and Koshun (currently Hengchun, Pingtung County) (Kurosawa 1980a, b, 1981; Chu and Hsiao, 1981; Schacht and Yang, 2003; Chu, 2005, 2011; Ou, 2007). The "Shiraki Collection" issue has been reported in various coleopteran families, including Bolboceratidae, Buprestidae, Cerambycidae, Cicindelidae, Cucujidae, Elateridae, Endomychidae, Erotylidae, Eucnemidae, Geotrupidae, Helotidae, Histeridae, Lucanidae, Ommatidae, Scarabaeidae and Staphylinidae (e.g., Nakamura, 1974; Kurosawa 1980a, b, 1981; Chu and Hsiao, 1981; Suzuki, 1988, 2002; Ôhara, 1999, 2003; Chu, 2005, 2011; Lee and Satô, 2006; Ho, 2019).

Weevils (Curculionoidea) are a super-diverse beetle group, with approximately 5800 described genera and 62000 described species. They are currently classified into eight extant families, namely Anthribidae, Attelabidae, Belidae, Brentidae, Caridae, Cimberididae, Curculionidae, and Nemonychidae (Oberprieler *et al.*, 2007; Shin *et al*., 2018). Despite this super-diversity, the "Shiraki Collection" issue has been poorly investigated regarding its weevils. Up to the present time, only Yoro (2023) has mentioned two possible cases of the "Shiraki Collection" on his website, one regarding a specimen of *Lepropus flavovittatus* (Pascoe, 1881) (Curculionidae: Entiminae), labelled as originating from Horisha (currently Puli, Nantou County) but the species actually occurring in India and Laos (Poorani and Ramamurthy, 1997), and the other a specimen of *Ceocephalus antennatus* (Ritsema, 1882) (Brentidae: Brentinae), labelled as originating from Kotosho (currently Orchid Island, Taitung County) but the species widely distributed in the Oriental region (Sforzi and Bartolozzi, 1997). However, recent observations indicate that the latter species is indeed present on Taiwan Island (Hsu C-T and Chiang J-M, personal communications) and may thus also occur on Orchid Island, thus possibly rendering the label data on Shiraki's specimen as correct.

During a recent examination of specimens in the collection of the TARI, the first author noticed that six weevil specimens were labelled as originating from Kotosho, but all appeared to belong to the fauna native to the Southern Hemisphere. Following a detailed comparison with authoritatively identified specimens in the Australian National Insect Collection, CSIRO, Australia, and identification based on relevant taxonomic revisions (Hsiao and Oberprieler, 2020; Legalov, 2024), we recognised two specimens as curculionid species from Australia, another as a brentid species from South Africa and the last as a belid species from New Guinea. Here, we illustrate these four specimens and provide relevant taxonomic and biological comments on the species they represent. Photographs were taken and stacked using a LeadView 8000 AIO Plus 4K16M camera (Leader Scientific Co., Ltd, Taiwan) mounted on a Zeiss Stemi 2000-C stereomicroscope and edited with the software program Photoshop CS6. Label data are cited verbatim, with a double slash (//) denoting data from different labels and a single one (/) those on different lines on a label. Abbreviations: ex. = specimen(s) of unidentified sex.

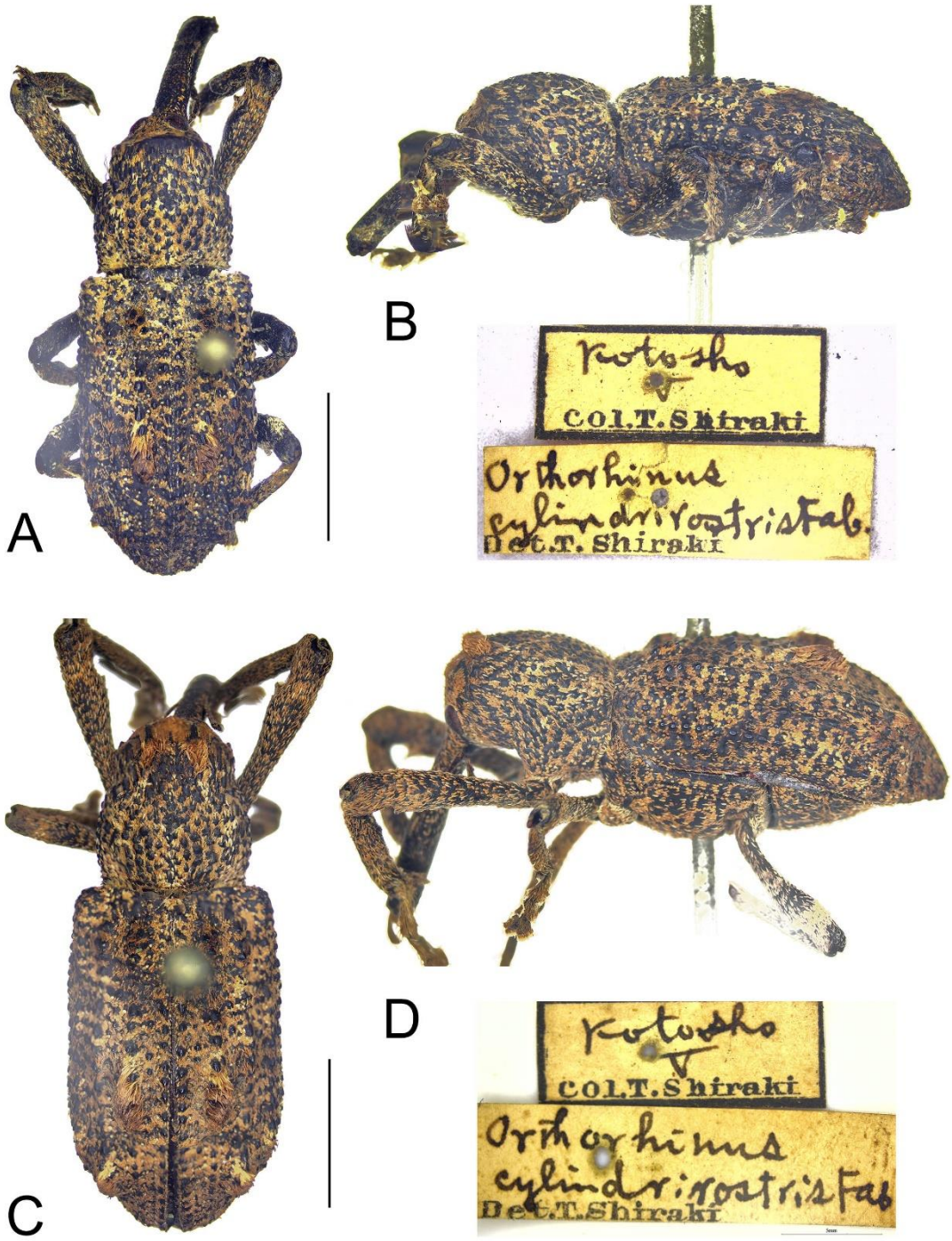

Fig. 1. Specimens of *Orthorhinus cylindrirostris* (Fabricius, 1775), with questionable label data by Tokuichi Shiraki. A. Dorsal view of the adult male. B. Ditto, lateral view. C. Dorsal view of another adult female. D. Ditto, lateral view. Scale bar: 5.0 mm.

***Orthorhinus cylindrirostris* (Fabricius, 1775)** (Fig. 1)

Material examined. 2 ♀: "Kotosho / V / Col. T. Shiraki // *Orthorhinus* / *cylindrirostris* Fab. / Det. T. Shiraki".

Remarks. The specimens can be readily identified as belonging to this species based on their large body size (13-15 mm), black body and legs densely covered with greyish to yellowish and dark brown scales, and the forelegs being distinctly longer than the mid- and hindlegs (Fig. 1), as also shown by Zimmerman (1992: plate 593). *Orthorhinus cylindrirostris* belongs to the tribe Orthorhinini of the subfamily Molytinae (Pullen *et al.*, 2014). Given its endemic distribution in Australia, Orchid Island is

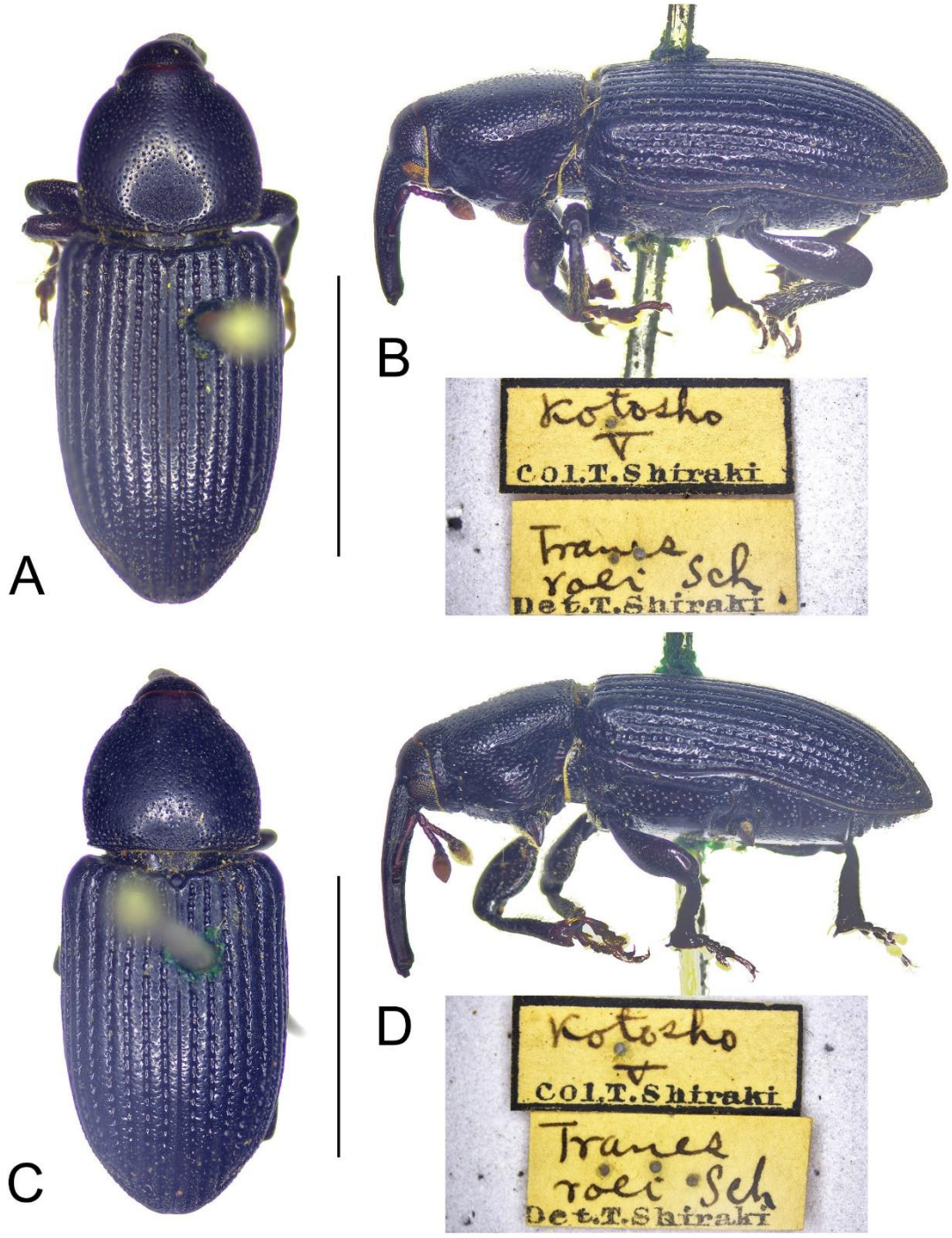

Fig. 2. Specimens of *Siraton roei* (Boheman, 1843), with questionable label data by Tokuichi Shiraki. A. Dorsal view of the adult male. B. Ditto, lateral view. C. Dorsal view of the adult female. D. Ditto, lateral view. Scale bar: 5.0 mm.

unlikely to be part of its natural distribution. The species is naturally associated with various Australian tree species, in particular acacias and eucalypts, but has also been recorded to infest exotic crops such as citrus, blueberries, and grapevines (Murdoch *et al.*, 2014).

***Siraton roei* (Boheman, 1843)** (Fig. 2)

Material examined. 1 ♂: "Kotosho / V / Col. T. Shiraki // *Tranes* / *roei* Sch. / Det. T. Shiraki"; 1 ♀: same as above.

Remarks. The specimens can be readily identified as belonging to this species based on the black, lustrous, and nearly glabrous body and legs, sparsely and finely punctate pronotum, regularly and coarsely punctate abdominal

ventrite 5, rostrum longer than pronotum in the female and the femora ventrally without a ventral tooth (Fig. 2). *Siraton roei* belongs to the *Tranes* group of the subfamily Molytinae and is restricted to the coastal region of southwestern Western Australia. Therefore, Orchid Island is unlikely to form part of its natural distribution. Furthermore, the species is a trunk-borer of *Macrozamia fraseri* and *M. riedlei*, which are also endemic cycad species in southwestern Western Australia (Hsiao and Oberprieler, 2020). Orchid Island has traditionally been the main region of the indigenous Tao people of Taiwan, lacking natural populations of cycads or a cultural history of utilizing cycad plants. It is unlikely that these Australian cycads were introduced to Orchid Island during the Japanese colonial period.

***Tanaos interstitialis* Fahraeus, 1871** (Fig. 3A-B)

Material examined. 1 ex: "Kotosho / V / Col. T. Shiraki // *Tanaos* / *sanguineus* Thunb. / Det. T. Shiraki"

Remarks. The specimen can be readily referred to as this apionine genus based on its black head, reddish prothorax, elytra and legs, stout body, short rostrum and short and straight antennae (Fig. 3A-B). Although the specimen was originally identified as *Tanaos sanguineus* (Thunberg, 1815) by Tokuichi Shiraki, it exhibits a slightly broader rostrum, head and elytra, a subtrapezoidal prothorax and coarse elytral striation compared with the syntype of *T. sanguineus* (Alonso-Zarazaga, 2013: fig. 5) and in these features agrees much better with *T. interstitialis* Fahraeus, 1871 (Oberprieler *et al.*, 2007: fig. 12). Given the endemic distribution of *T. interstitialis* in South Africa, it is unlikely that Orchid Island represents part of its natural distribution. The species of *Tanaos* are associated with the plant genus *Protea*, their larvae developing in the flower heads (May, 1993).

***"Orthorhynchoides* (*Guineorhinotia*)" *misoolensis* Legalov, 2024** (Fig. 3C-D)

Material examined. 1 ex: "Kotosho / V / Col. T. Shiraki // *Belus* / sp. / Det. T. Shiraki"

Remarks. Although Shiraki identified the specimen as *Belus* sp., its distinctly metallic, lustrous body suggests that it belongs to the genus and subgenus *Orthorhynchoides* (*Guineorhinotia*), established by Legalov (2007) based on *Belus viridimetallicus* Heller, 1901 from Papua New Guinea. The specimen is closely similar to *Orthorhynchoides* (*Guineorhinotia*) *misoolensis* Legalov, 2024 based on its reddish-brown forelegs and bluish metallic elytra with six spots of pale setae, finely sculptured pronotum and a narrow row of pale setae along the lateral margins of the pronotum (Legalov, 2024). Although the setae appear yellowish on the specimen, this may represent intraspecific variation or colour fading due to the old age of the type specimens (Pascoe Collection). Furthermore, the generic placement of this species is controversial, as both *Orthorhynchoides* Legalov, 2007 and *Guineorhinotia* Legalov, 2007 have been treated as synonyms of *Rhinotia* Kirby, 1819 by Marvaldi and Ferrer (2014) and Pullen *et al.* (2014). For the purposes of this study, we tentatively retain the species in Legalov's genus but are cognisant of the fact that it may belong to *Rhinotia*. This species and closely related congeners are only known from New Guinea and adjacent islands, and as the subfamily Belinae only occurs in the Southern Hemisphere (Li *et al*., 2024: fig. 2), it is doubtful that Orchid Island constitutes part of its natural distribution.

It remains unclear why Tokuichi Shiraki brought such a large number of identified exotic specimens back to Taiwan and replaced their original labels with his own, stating various Taiwanese localities. Given the predominantly tropical Asian distribution of these specimens, it has been speculated that Shiraki intended to study the fauna of the region in line with the Southern Expansion Doctrine of the Japanese Empire while attempting to obscure the origin of these exotic specimens (Chu and Hsiao, 1981; Chu, 2005, 2011). However, it should be noted that *Tanaos interstitialis*, found in the present study, is not distributed in tropical Asia but in Africa, and *Orthorhinus* and *Siraton* are not tropical Asian genera but temperate Australian ones. It is also believed that Shiraki may have maintained a catalogue containing the original label data along with the replaced locality names to aid researchers in accessing the correct information in his laboratory, which is now part

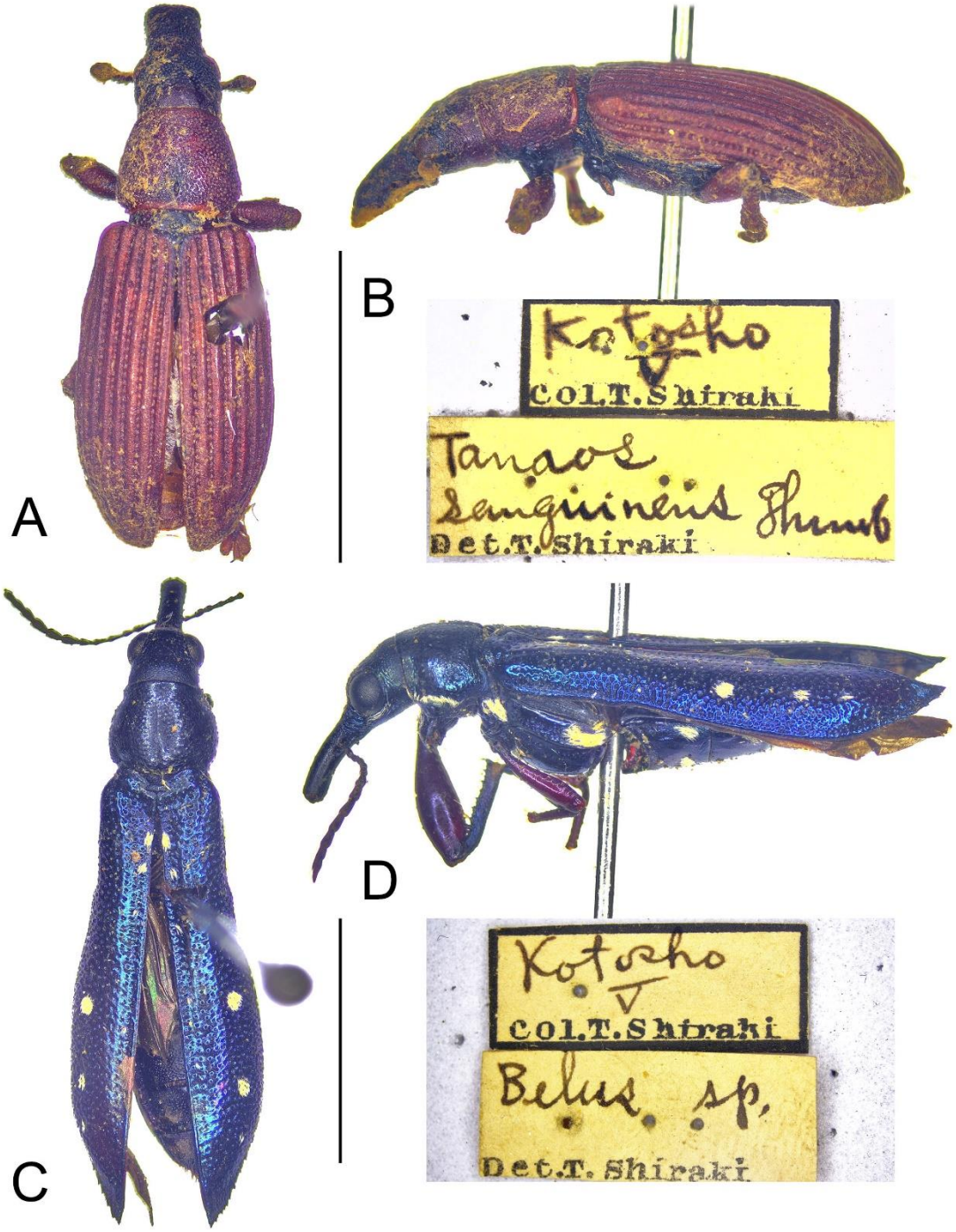

Fig. 3. Specimens of *Tanaos interstitialis* Fahraeus, 1871 and "*Orthorhynchoides* (*Guineorhinotia*)" *misoolensis* Legalov, 2024, with questionable label data by Tokuichi Shiraki. A. Dorsal view of the *T. interstitialis* specimen. B. Ditto, lateral view. C. Dorsal view of the "*O.* (*G.*)" *misoolensis* specimen. D. Ditto, lateral view. Scale bar: 5.0 mm.

of the Department of Entomology at NTU, but this list has been unavailable at NTU since the end of Japanese colonisation (Chu and Hsiao, 1981; Chu, 2005, 2011). As a result, determining the original labels of these questionable specimens has been extremely difficult. In the present study, the label data "Kotosho / V / Col. T. Shiraki" are linked to three different regions of the world, indicating no specific association between a particular Taiwanese locality and a foreign country. Fortunately, recent advancements in social media, international collaboration, and specimen digitalisation can facilitate the documentation of questionable

specimens in the "Shiraki Collection". Up to the present, most research on the "Shiraki Collection" has focused on Coleoptera, while non-coleopteran groups have been poorly investigated, with the exceptions of ants (Terayama, 2018), horse flies (Tabanidae) (Schacht and Yang, 2003) and termites (Li *et al*., 2010). Therefore, further studies are necessary to fully clarify the "Shiraki Collection".

Acknowledgments

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涉及素木標本問題的四種象鼻蟲（鞘翅目，象鼻蟲總科）之報導

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摘　要

素木得一 (Tokuichi Shiraki) 博士為日本殖民時代的臺灣昆蟲學研究奠定了堅實的基礎。他不僅研究了臺灣的昆蟲相和農業昆蟲學，更對於相關法規和研究機構的建立有著卓越的貢獻。然而，素木得一遺留在臺灣相關研究機構的標本收藏中，卻包含了數量可觀的可疑外國產昆蟲標本，這些外國物種被標示為來自臺灣的產地，造成後世研究臺灣昆蟲相的困擾，該議題也因此被稱為「素木標本問題」。本研究報導象鼻蟲類的素木標本問題，我們確認了四種被標記產自臺灣的紅頭嶼（今臺東縣蘭嶼鄉），但實際上卻是外國產的象鼻蟲，包含象鼻蟲科魔喙象鼻蟲亞科 (Curculionidae: Molytinae) 中產自澳洲的 *Orthorhinus cylindrirostris* (Fabricius, 1775) 和 *Siraton roei* (Boheman, 1843)，三錐象鼻蟲科針嘴象鼻蟲亞科 (Brentidae: Apioninae) 中產自南非的 *Tanaos interstitialis* Fahraeus, 1871，以及羊齒象鼻蟲科羊齒象鼻蟲亞科 (Belidae: Belinae) 中來自新幾內亞的"*Orthorhynchoides* (*Guineorhinotia*)" *misoolensis* Legalov, 2024。有鑒於這些來自不同國家的標本均有著完全相同的素木氏標籤，我們因此無法辨認出任何臺灣產地與原產國家間的特定對應關係。本研究顯示未來應該持續釐清素木得一標本收藏中所有標示可疑的外國產昆蟲。

關鍵詞：象鼻蟲、素木標本、可疑分布、臺灣昆蟲學