Jinhaku Sonan’s skipper type collection deposited at Taiwan Agricultural Research Institute (Lepidoptera: Hesperiidae)

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Abstract

Of the 12 skipper taxa described by Jinhaku Sonan (1892-1984) from Taiwan and Hainan Island, 2 are recognized as valid species-level names, 4 as valid subspecies-level names, whereas the remaining 6 are considered junior subjective synonyms of other taxa. A revised status is established for a Hainan taxon, Tagiades japetus hainana Sonan, stat. rev., and Polytremis kiraizana (Sonan) is formally confirmed as a species endemic to Taiwan. The valid species-level names are Ochlodes niitakanus (Sonan) and Polytremis kiraizana (Sonan). The valid subspecies-level names are Lobocla bifasciata kodairai Sonan, Pseudocoladenia dan sadakoe Sonan & Mitono, Notocrypta feisthamelii arisana Sonan, and Tagiades japetus hainana Sonan. Tagiades menaka kotoshona Sonan is considered a junior subjective synonym of T. trebellius martinus Plötz, Ampittia maro matsumurai Sonan a junior subjective synonym of Ampittia dioscorides etura Mabille, Parnara kotoshona Sonan a junior subjective synonym of Parnara guttata (Bremer & Grey), Parnara ranrunna Sonan a junior subjective synonym of Caltoris cahira austeni (Moore), Gangara thyris hainana Sonan a junior subjective synonym of Gangara thyris thyris (Fabricius), and Telicota palmarum hainanum Sonan a junior subjective synonym of Cephalrenes acalle oceanica (Mabille) in the present study.

Key words: Hesperiidae, Formosa, Hainan, taxonomy

Introduction

The Japanese entomologist Dr. Jinhaku Sonan (1892–1984) is considered one of the most productive naturalists studying the fauna of Taiwan (Formosa) before and during World War II (Chu 2005). It was estimated over a hundred articles on the fauna of Taiwan were published by him during an approximate 30-year period from 1911, when he published his first entomological article on thrips, to the end of World War II (Wu 1996). He was considered one of the pioneer researchers on the agricultural pests of Taiwan, with pests of tea being the focus (Anonymous 1984). Besides applied entomology, Sonan also contributed considerably on taxonomy and biology of many insect groups, especially wasps and butterflies. The groups of insects he studied included Lepidoptera, Odonata, Hymenoptera (parasitic wasps), Hemiptera (cicadas), and Orthoptera (locusts); he even contributed on vertebrate study by writing an article on biology of pangolins and discovering the first salamander species from Taiwan (Wu 1996). In addition to the fauna of Taiwan, Sonan also published on the fauna of Japan and Hainain Island of southern China (Sonan 1930a, 1938a; Anonymous 1984).
In 1907, Sonan became an employee of the Agricultural Experiment Station, Government of Formosa, which was reorganized to the Department of Agriculture, Government Research Institute, in 1921 and the Agricultural Experimental Station in 1939, and finally established as Taiwan Agricultural Research Institute (TARI hereafter) in 1945 (Shih et al. 2002). During his entomological carrier, Sonan published 5 papers on skipper taxonomy, 3 on Taiwan and 2 on Hainan, and described 12 taxa. The types of these skippers were deposited in the collection of the institutes that represent the predecessors of TARI at Taipei. During that period, the predecessors of TARI were located adjacent to the Department of Entomology, Taiwan Imperial University (TIU, the predecessor of today’s National Taiwan University, NTU), and entomological collections of both institutions were under the control of Dr. Tokuichi Shiraki, an influential Japanese entomologist at that period of time. The Lepidoptera collection under supervision of Shiraki was divided into two parts, with the "Rhopalocera" (butterflies and skippers) deposited in TARI and “Heterocera” (moths) in TIU. The insect and mite collection of TARI was founded in 1903 and located at Taipei (Shih et al. 2005). Sonan remained assigned with a position in TARI until 1947, when he returned to Japan at the age of 55 and changed his family name to Minamikawa, leaving all his entomological collection in Taiwan. As TARI was relocated to a new facility in Taichung [= Taizhong], the Rhopalocera part of the collection including Sonan’s butterfly/skipper types was also moved with the institute.

Evans (1949) made the first effort to revise most of the skippers described by Sonan, and subsequent taxonomic decisions may be seen in Shirôzu (1960). However, neither author of these two major taxonomic works involving Sonan’s skipper taxa seems to have examined any of Sonan’s skipper types. Instead, they were based on study of the literature. We made the first attempt to examine and clarify the taxonomic status of the skipper taxa described by Sonan. During our survey, it was established that all of the types of skippers described by Sonan are present in the Sonan collection at TARI. We review the history of taxonomic changes of all these skipper taxa, and clarify taxonomic status whenever necessary.

**Material and methods**

Specimens deposited in the Sonan collection hosted by TARI at Taichung, Taiwan, Republic of China, were examined for type materials of skippers. Types were stored in a type collection room separated from general collection. Types were verified using original descriptions and associated illustrations and collecting data, plus taxonomic notes published by various authors. Types of the other major collections involving Taiwan skippers were also examined to verify the taxonomic status of Sonan’s skipper types.

**Results**

The majority of the 12 skipper taxa described by Sonan were monobasic, with only *Ampittia maro matsumurai* Sonan, 1936 and *Augiades bouddha niitakana* Sonan, 1936 involve multiple specimens. In these cases a holotype was specified, thus there is no need to designate a lectotype for any Sonan’s skipper taxa.

**TAIWAN**

*Lobocla kodairai* Sonan, 1936

Zephyrus 6:209.

Labels (the slash denotes new line): “Lobocla/ kodairai Sonan/ DET. J. SONAN,” “Hori/ 27 VII 1934/ K. Kodaira,” “No. 49,” “Type [in red].”
FIGURES 1–18. Types of skipper taxa described by Jinhaku Sonan: 1–3, holotype of Loboclava kodairai, upperside, underside, labels; 4–6, holotype of Coladenia sadakoe, upperside, underside, labels; 7–9, holotype of Tagiades menaka kotoshona, upperside, underside, labels; 10–12, holotype of Notocrypta arisana, upperside, underside, labels; 13–15, holotype of Ampittia maro matsumurai, upperside, underside, labels; 16–18, holotype of Augiades bouddha niitakana, upperside, underside, labels.

Only one female specimen (Fig. 1–2) was included in Sonan’s (1936) original description of this taxon. The material bearing the type label (Fig. 3) matches the original description. Evans (1949) treated kodairai as a
synonym of Loboclia bifasciata (Bremer & Grey, 1853), while Shirôzu (1944, 1960) retained the name kodairai as a subspecific name. Loboclia bifasciata shows tremendous variation especially in male genitalia (Evans 1949). There is no doubt that this taxon belongs to bifasciata or its complex because its male genitalia (Shirôzu 1960) agree with those of bifasciata, but in order to judge whether the Taiwanese taxon is distinct or not, further investigation is required. Evans (1949) suspected that kodairai might be represented by a stray specimen, evidently an erroneous view as this taxon has been shown to be a montane skipper native to the island (Shirôzu 1960; Yamanaka 1980). We tentatively follow Shirôzu’s (1944, 1960) treatment, regarding kodairai Sonan, 1936 as a subspecific name of Loboclia bifasciata (Bremer & Grey, 1853).

Coladenia sadakoe Sonan & Mitono, 1936
Zephyrus 6:184

Labels: “Coladenia/ sadakoe/ Sonan et Mitono/ DET J. SONAN,” “KAHODAI/ FORMOSA/ 1930.X.25/ COL. T MITONO,” “No. 50,” “Type [in red].”

A single female was designated as the holotype in the original description (Sonan and Mitono 1936) and the specimen (Fig. 4–6) examined from TARI matches the description. Evans (1949) listed this taxon as a synonym of C. agni igna Semper, 1892 without giving any reason. This treatment was followed by Shirôzu (1960) and Bridges (1983). The type specimen shows the characteristics of Pseudocoladenia dan (Moore 1881) rather than C. agni igna (Shimonoya & Murayama 1976). This viewpoint was accepted by subsequent authors (e.g. Yamanaka 1980; Uchida 1991; Chiba et al. 1992; Uchida 1995; Hsu et al. 2007). The name sadakoe Sonan & Mitono, 1936 is considered a valid subspecific name for P. dan from Taiwan in the present study.

Tagiades menaka kotoshona Sonan, 1936
Zephyrus 6:212

Labels: “Tagiades/ menaka/ kotoshoana Sonan DET. J. SONAN,” “Kotosho/ 10 III – 14 IV 1920/ J. Sonan/ Col. T. OKUNI,” “No. 51,” “Type [in red].”

A single male specimen was designated as the holotype in the original description and the specimen bearing the type label matches the description (Fig. 7–9). Evans (1949) listed kotoshona as a synonym of T. litigiosa litigiosa Möschler, 1878. Again, no reason was given. Umeno (1937) pointed out that no diagnostic features could be identified between kotoshona and “Tagiades menaka martinus Pätz [sic].” Shirôzu (1943) subsequently treated kotoshona as a synonym of T. trebells martinus Plötz, 1884. This treatment was followed by subsequent authors (e.g. Shirôzu 1960; Chiba et al. 1992; Tsukiyama et al. 1997). The type shows the characteristics of T. trebells martinus, which is the only Tagiades found in Kotosho (= Lanyu) (Shirôzu 1960, Yamanaka 1980), a small island off the southeastern coast of Taiwan. Neither T. menaka Moore, 1865 nor litigiosa has been confirmed from Taiwan (Chiba et al. 1992). The name kotoshona Sonan, 1936 is regarded as a junior subjective synonym of T. trebells martinus Plötz, 1884 in the present study.

Notocrypta arisana Sonan, 1930
Zephyrus 2:175, Tab. 14, fig. 7.

A male specimen was designated as the [holo]type in the original description (Sonan 1930b), and the holotype was retrieved in TARI (Fig. 10–12). Evans (1949) listed arisana as a synonym of Notocrypta paralysos asawa Fruhstorfer, 1911, and this treatment was followed by Bridges (1983). However, N. paralysos has not been recorded on the main island of Taiwan (Chiba et al. 1992). Shirôzu (1960) considered arisana a melanin form of N. curvifascia. Based on the investigation by Hiroshi Tsukiyama, Morishita (1978) treated it as a subspecies of N. feisthamelii (Boisduval, 1832). This treatment was followed by subsequent authors (e.g. Yamanaka 1980; Hsu & Li 1989; Chiba et al. 1992), and is accepted by the present study.

**Ampittia maro matsumurai Sonan, 1936**
Zephyrus 6:213.

Labels: “Ampittia maro/ matsumurai/ Sonan/ DET. J. SONAN,” “Taiwan/ Ishida,” “No.52,” “Type [in red].”

A male specimen was designated as the holotype by Sonan (1936), and this holotype was retrieved in TARI (Fig. 13–15). Evans (1949) considered this taxon a synonym of Ampittia dioscorides etura Mabille, 1891 described from Hong Kong. This treatment was followed by subsequent authors (e.g. Yamanaka 1980; Bridges 1983; Hamano 1987; Chiba et al. 1992). The name matsumurai Sonan, 1936 is regarded as a junior subjective synonym of Ampittia dioscorides etura Mabille, 1891 in the present study.

**Augiades bouddha niitakana Sonan, 1936**
Zephyrus 6:213.

Labels: “Augiades/ bouddha/ niitakana Sonan/ DET. J. SONAN,” “800- SUIGEN/ 24 VII 1930/ Col. J. Sonan,” “No. 60,” “Type [in red].”

A male specimen was designated as the holotype by Sonan (1936), and this holotype was retrieved in TARI (Fig. 16–18). Evans (1949) treated this taxon as a subspecies of Ochlodes siva Moore, 1878, and this treatment was followed by Bridges (1983). Shirôzu (1960), however, considered this taxon a synonym of Augiades sylvanus var. formosana Matsumura, 1919, which was recognized to represent a valid subspecies of Ochlodes subhyalina (Bremer & Grey, 1853) by Evans (1949). Based on the characteristics of male genitalia, Chiba and Tsukiyama (1996) subsequently raised formosana to species status, and considered it a species endemic to Taiwan. Hsu et al. (2006) however, found that formosana Matsumura, 1919 is actually a junior subjective synonym of Ochlodes venata (Bremer & Grey, 1853), so niitakana Sonan, 1936 should be resurrected in the combination Ochlodes niitakanus. Shirôzu (1960) claimed that the allotype female of niitakana was probably a different species. His statement seems to be groundless. We examined the female paratype of niitakana (Fig. 19–21) and confirmed that it was conspecific with the male holotype.

**Parnara kotoshona Sonan, 1936**
Zephyrus 6:214.

Labels: “Parnara/ kotoshona Sonan/ DET. J. SONAN,” “Kashoto/ 2 X 1923/ J. Sonan,” “No. 61,” “Type [in red].”

A male specimen was designated as the holotype by Sonan (1936), and this holotype was retrieved from TARI (Fig. 22–24). Evans (1949) synonymized this taxon with Parnara guttata (Bremer & Grey, 1853). His treatment has been followed by all subsequent authors (e.g. Shirôzu 1960; Bridges 1983; Chiba & Elliot 1991; Chiba et al. 1992; Tsukiyama et al. 1997). The name kotoshona Sonan, 1936 is regarded as a junior subjective synonym of Parnara guttata (Bremer & Grey, 1853) in the present study.

An inconsistency in locality was found between the identification label and data label of the holotype. The collecting locality is given as “Kotosho” (= Lanyu) on the identification label whereas it is “Kashoto” (=
Ludao) on the data label. Sonan (1936) gave “Kotosho” as the type locality in the original description of *kotoshona*. These two islands are separated by approximately 73 km, and *P. guttata* is more commonly found on Ludao than on Lanyu (Yamanaka 1980). Sonan may have misread his own hand-writing on the data label when he decided to describe his specimens as a new species over 10 years after he collected the specimens. Consequently the true type locality of *kotoshona* perhaps should be Kashoto (Ludao), not Kotosho (Lanyu).

**FIGURES 40–42.** Male genitalia of *Polytremis kiraizana* (based on a specimen collected from “Formosa [=Taiwan], Sept 1974”): 40, dorsal view of tegumen, 41, lateral view of 9th + 10th sclerites with left valva attached, 42, dorsal view of phallus. Scale bar = 1 mm.

*Parnara ranrunna* Sonan, 1936


Label: “Parnara/ranrunna Sonan/DET. J. SONAN,” “Ranrun/10 III 1926/S. Isshiki,” “No. 67,” “Type [in red].”

A single male specimen was designated as the holotype by Sonan (1936), and the holotype was retrieved from TARI (Fig. 25–27). Evans (1949) synonymized this taxon with *Caltoris bromus yanuca* Fruhstorfer, 1911. However, his treatment was not followed by most subsequent authors (e. g. Shirôzu 1960; Hamano 1986; Chiba *et al*. 1992), who retained it as a distinct *Caltoris* species. Yamanaka (1980), citing an unpublished idea from Hiroshi Tsukiyama, regarded this taxon as a junior synonym of *Caltoris cahira austeni* (Moore, 1884). This viewpoint was endorsed by Hsu and Wang (2005), and accepted by the present study.
FIGURES 43–45. Male genitalia of *Polytremis mencia* (based on a specimen collected from “Tianmushan, Zhejiang [=Zhejiang Province], [China], May–June 1982”): 43, dorsal view of tegumen, 44, lateral view of 9th + 10th sclerites with left valva attached, 45, dorsal view of phallus. Scale bar = 1 mm.

**Parnara kiraizana** Sonan, 1938
Zephyrus 7:255.

Labels: “Parnara/ kiraizana Sonan/ DET. J. SONAN,” “ Kirai/ 10 VIII 1934/ M. Yamanaka,” “ No. 65,” “ Type [in red].”

A male was designated as the [holo]type when Sonan (1938b) described this taxon, and the holotype was retrieved from TARI (Fig. 28–30). Evans (1949) treated this taxon as a subspecies of *mencia* Moore, 1877 [as *Polytremis mencia kiraizana*]. Shirôzu (1960) viewed it as a distinct species but transferred it to the genus *Pelopidas* without giving a rationale. He probably judged by the general appearance of *kiraizana*, notably the male stigma on the upperside of the forewing. Shirôzu’s treatment was followed by a few subsequent authors (e.g. Yamanaka 1980). However, this transfer was inappropriate, as the mesotibia of *kiraizana* possess no spines, a diagnostic character for the genus *Polytremis*, whereas the mesotibia of *Pelopidas* species possess prominent spines (Evans 1949; Kawazoé & Wakabayashi 1976; Tsukiyama et al. 1997). This point was recognized by a few authors, who considered *kiraizana* a species endemic to Taiwan and used the combination of *Polytremis kiraizana* for the taxon (e.g. Hamano 1986; Sugiyama 1999). Nevertheless, this combination is never explicitly proposed, and no comparison between *mencia* and *kiraizana* was performed. The male genitalia of *kiraizana* (Fig. 40–42) and those of *mencia* (Fig. 43–45) are considerably different, thus we support that the combination of *Polytremis kiraizana* should be applied to this taxon (confirmed status). Although both *P. suprema* Sugiyama, 1999 from Guangxi and *P. matsui* Sugiyama, 1999 from Sichuan may...
be good candidates for continental relatives, *P. kiraizana* is regarded as an endemic Taiwanese species for the present (Fig. 46).

![FIGURE 46. A map showing the distribution of *Polytremis kiraizana* Sonan and taxa closely related to the species: Circle denotes *P. kiraizana*, triangle *P. suprema* and square *P. matsu*.](image)

HAINAN

*Gangara thyrsis hainana* Sonan, 1930

Labels: “Gangara/ thyrsis/ hainana Son./ DET. J. SONAN,” “thyrsis,” “hainana/ Sonan,” “Hainan 1929[?]”

Sonan (1930a) specified “one mall[e]” when he described *Gangara thyrsis hainana*, thus it represents the holotype of the taxon. This holotype was found in TARI (Fig. 31–33). Evans (1949) listed *hainana* as a synonym of *Gangara thyrsis thyrsis* (Fabricius, 1775). *Gangara thyrsis* is widespread from the Himalayas across India and Sundaland to the Philippines and Sulawesi with weak geographical differentiation (Evans 1949), and we follow Evans’ treatment. The name *hainana* Sonan, 1930 is regarded as a junior subjective synonym of *Gangara thyrsis thyrsis* (Fabricius, 1775) in the present study.

*Telicota palmarum hainanum* Sonan, 1938

Sonan (1938a) specified a male [actually female] specimen when he described Telicota palmarum hainanum Sonan, thus it represents the holotype. This holotype was located in TARI (Fig. 34–36), and the specimen conforms to the original description (p. 370) and associated figure (fig. 2) given by Sonan (1938). Evans (1949) listed hainanum as a synonym of Cephrenes chrysozona oceania (Mabille, 1904). Maruyama (1991) pointed out that the correct name for this taxon should be Cephrenes acalle oceania, and his treatment has been followed by de Jong & Treadaway (1993). Consequently the name hainanum Sonan, 1938 is regarded as a junior subjective synonym of Cephrenes acalle oceania (Mabille, 1904) in the present study.

Tagiades menaka hainana Sonan, 1938


Sonan (1938a) specified just one male specimen when he described Tagiades menaka hainana, thus it represents the holotype of the taxon. The unique type (holotype) of the taxon was found in TARI (Fig. 37–39), and the specimen conforms to the original description and associated figure in Sonan (1938a) although the collecting year was “1908” in the original description but “1930” on the label. Evans (1949) intended to list hainana as a synonym of Tagiades menaka menaka (Moore, 1865), but the name hainana was in the index of his catalogue and not in the text. The characteristics of the holotype, however, do not agree with those of T. menaka. Instead, the holotype possesses diagnostic characters of T. japetus (Stoll, 1782) defined by Evans (1949) and Tsukiyama (1980) as it has no hyaline spot in front of spots at the end of discoidal cell and a prominent hyaline spot in cell M₃ and Cu₁ of the forewing (Fig. 37–38). The wing markings of the specimen are generally similar to those of the wet season form of T. j. ravi Moore, 1865, but differ from it by possessing a white hindwing fringe instead of brown. Although it is difficult to accept the fact that this rather common skipper is represented by a single specimen, there is no specific evidence that it was mislabelled. Thus the name hainana may be used as the valid subspecific name for populations of T. japetus (status revised) inhabiting the island pending further research.

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Literature cited


species (Lepidoptera: Hesperiidae). *Butterflies*, 14, 3–16. [In Japanese with English abstract]


Sonan, J. (1930a) Some butterflies from Hainan Island. *Transactions of the Natural History Society of Formosa*, 20, 31–37. [In Japanese]

Sonan, J. (1930b) Notes on some butterflies from Formosa. *Zephyrus*, 2, 165–176, 1 pl. [In Japanese]

Sonan, J. (1936) Notes on some butterflies from Formosa. *Zephyrus*, 6, 205–216, 3 pls. [In Japanese]


Sonan, J. (1938b) Notes on some butterflies from Formosa (5). *Zephyrus*, 7, 250–275, 1 pl. [In Japanese]


Umeno, A. (1937) On the butterflies of Koushun Gun, Formosa, mainly around Kuraru area (IV). *Zephyrus*, 7, 142–149. [In Japanese]
