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Notes on *Neope pulahoides* (Moore, [1892]) and *Neope leechi* Okano & Okano, 1984 stat. nov.

(Lepidoptera, Nymphalidae, Satyrinae)

by

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Abstract: In this paper, *Neope pulahoides* (Moore, [1892]) is studied, and *N. pulahoides leechi* Okano & Okano, 1984 is raised to specific status, viz. *N. leechi* Okano & Okano **stat. nov.** A new subspecies from Jinfo-shan, Chongqing (former East Sichuan), Southwest China is described as *Neope pulahoides **fudelii*** **subpec. nov.**

Neope pulahoides (Moore, [1892]) (Satyrini: Lethina) is known from the northern Oriental region with four subspecies from west to east: subspec. *tamur* Fujioka, 1970 from E. Nepal; subspec. *pulahoides* Moore from N.E. India, N. Thailand and S.W. China (S.E. Tibet, N.W. Yunnan); subspec. *leechi* Okano & Okano, 1984 from W. China (Sichuan, Chongqing, Guangxi); and subspec. *chuni* Mell, 1942 from S.E. China (Fujian) (Fujioka, 1970; Okano & Okano, 1984; Bozano, 1999; Huang, 2001; Lang, 2017; Inayoshi, 2023). Many authors treated the taxon *pulahoides* Moore as a subspecies of *Neope pulaha* (Moore, [1858]), and d'Abrera (1985) even treated it as a junior synonym of the latter. The treatment of the nomen *pulahoides* Moore as a subspecies of *Neope pulaha* (Moore) belongs to two different situations, the first, it is a true *pulahoides* Moore in subspecific status (e.g. in Fruhstorfer in Seitz, 1911; Talbot, 1949; Kimura et al., 2016), and the second, it is a misidentification of *N. pulaha pulaha* (Moore) (e.g. in Osada et al., 1999; Monastyrskii, 2005; Shizuya et al., 2005; Monastyrskii & Devyatkin, 2016). Furthermore, Saito & Vu (2020) wrongly identified *Neope pulaha* (Moore) from N. Vietnam as *N. pulahoides leechi* Okano & Okano. Actually, *Neope pulahoides* (Moore) has ♂ brand totally absent on its forewing upperside, whereas a pair of parallel sexual brands are well present in the space 1b on the forewing upperside of *N. pulaha* (Moore). This feature can easily separate these two species from each other. However, in this paper, the purpose only focuses on the taxonomy of *Neope pulahoides* (Moore). Based on the past knowledge, *Neope pulahoides* (Moore) has two quite different forms, viz. the pale form such as the typical *pulahoides* Moore as illustrated by d'Abrera (1985: p. 435: fig. *N. pulaha* d.s.f. ♂) and the dark form such as the typical *leechi* Okano & Okano as illustrated by Lang (2017: pl. II: fig. 7). In experience, the present author previously thought that the pale is the dry seasonal form (d.s.f.) and the dark is the wet seasonal form (w.s.f.), because the two forms were obtained in a same area. In fact, specimens of the pale form or the so called d.s.f. had also been collected in wet season (July and August), therefore, the pale and dark forms are not simply two seasonal forms but possibly are different species. To explain this phenomenon, the present author re-examined a series of related specimens collected from S.W. China (Sichuan, Chongqing, Guizhou, Yunnan, Guangxi), and the result reveals that: the two forms are respectively two distinct species whose ranges are partly overlapped. Among them, the former subspecies *leechi* Okano & Okano should be a distinct species, and in its range, true *Neope pulahoides* (Moore) can often be found including a new subspecies from S. Chongqing (southeastern border of the Sichuan Basin). Certainly, seasonal forms are still present in bivoltine *Neope pulahoides* (Moore), but their difference is obviously weak comparing with the difference between the pale and dark forms mentioned above.

Materials in this study are kept in Chongqing Museum of Natural History, Beibei, CHINA (CMNH) and Dr. Song-Yun Lang's private collection, Beibei, CHINA (LSY). For comparison, photographs of 2 ♂♂ syntypes of *Neope pulahoides chuni* Mell kept in the Mell's collection (Berlin) were provided by Mr. S. Y. Huang (Bonn).

Neope pulahoides pulahoides (Moore, [1892]) (figs: 1-5, 17b, 18-19)

Blanaida pulahoides Moore, [1892]: 304, pl. 94: 2. TL: Naga Hills; E. Pegu.
Neope pulahoides xizangana Wang in Chou, 1994: 756. TL: Linzhi, Xizang.
Neope chayuensis Huang, 2002: 363. TL: Chayu, S.E. Tibet.

Material: 1 ♂, CHINA, Yunnan, Gongshan, Gazu & Qiqi, 24-V-2009, Alt. 1650-1980 m, leg. ex. coll. Jian-Qing Zhu (LSY); 1 ♂, CHINA, Yunnan, Lüchun, 2198 m, 17.VIII.2023, leg. Yi Lang (LSY); 1 ♂, CHINA, Yunnan, Xichou, Jiguan-shan, 1700 m, 28.IV.2019, leg. Song-Yun Lang (LSY); 4 ♂♂, CHINA, Guangxi, Tianlin, Cenwang Lao-shan, 1300-1700 m, 7-9.V.2015, leg. Song-Yun Lang (LSY); 1 ♂, CHINA, Guizhou, Leishan, Leigong-shan, 28.IV.2018, leg. Song-Yun Lang (LSY); 1 ♂, CHINA, Guizhou, Sandu, 1200 m, 17.VII.2022, leg. Song-Yun Lang (LSY).

Notes: A) *Neope pulahoides xizangana* Wang, 1994 was described basing upon a single ♂ from Tibet and it was sunk to a junior synonym of *N. pulaha* (Moore) by Huang (2002). Judging from the holotype illustrated in Chou (1994), it has no brand on its forewing upperside, therefore, it should be a junior synonym of *N. pulahoides* (Moore).

B) *Neope chayuensis* Huang, 2002 (fig: 17b7) was treated as a junior synonym of *N. pulahoides* (Moore) by Lang (2017). Furthermore, it should be the wet season form of *N. pulahoides pulahoides* (Moore).

Distribution: China (S.E. Tibet, Yunnan, Guangxi, S. Guizhou), N. Thailand, ?N. Maynmar, N.E. India.

Neope pulahoides f u d e l i i **subspec. nov.** (figs: 6-8, 17a)

Holotype: ♂, [CHINA, Chongqing], ginfu-shan [Jinfo-shan], APR-1929, N0020, SATY0012 (CMNH). **Paratypes:** 1 ♂, ginfu-shan, MAY-1929, N0014 (CMNH); 1 ♂, MAY, N0022, SATY0020 (CMNH); 1 ♂, ginfu-shan, JUL-1929, N0012, SATY0021 (CMNH).

Diagnosis: A) The new subspecies can be distinguished from the nominate subspecies by the combination of the following characters: 1) on the forewing upperside, the pale markings are yellowish, whereas they are creamy white in the nominate subspecies; 2) on the forewing underside, the pale postdiscal markings are yellowish, whereas they are whitish in the nominate subspecies; 3) on the hindwing underside (dry season form), the postdiscal ocelli are more reduced than those in the nominate subspecies; 4) the dorsal

ridge of the uncus is more roundly swelled near its apex than in the nominate subspecies.
B) The new subspecies can be distinguished from subspec. *chuni* Mell (♂ genitalia not examined) from S.E. China by the combination of the following characters (based on the dry season form only): 1) on the forewing underside, the subapical ocellus in the space 5 is obscure, whereas it is clear in subspec. *chuni* Mell; 2) on the forewing underside, the whitish pupils of the ocelli in the spaces 2 and 3 are obscure, whereas they are prominent in subspec. *chuni* Mell; 3) on the hindwing underside, the postdiscal ocelli are ill defined in the spaces from 4 to 7, whereas they are clear in subspec. *chuni* Mell.
Etymology: The subspecific name *fudelii* is named after Fu De-Li which is the Chinese name of Mr. Walter Friedrich who was a German and engaged as a manager of the Department of Entomology, the Science Institute of West China (1930-1950), SIWC, the predecessor of CMNH. Together with local assistants of SIWC, Friedrich collected in Sichuan including nowadays Chongqing (Ginfu, Bango, Ta-Tsien-Lu, Kiulung, etc.) from 1929 to 1935 and obtained abundant butterflies, including this typical material (Lang, 2016). Friedrich also sent his Lepidopteran harvests to Mr. Otto Bang-Haas, therefore, his butterflies also can be found in some German museums.
Distribution: China (S. Chongqing).

Neope leechi Okano & Okano **stat. nov.** (figs: 9-16, 17d, 20-21)

Neope pulaha ramosa: Seitz (*nec* Leech), 1907: 90 (partim), pl. 33c, ♀.
Neope pulahoides leechi Okano & Okano, 1984: 121, pl. 8: 5-8. TL: Emeishan [Omei], Sichuan.

Material: 2 ♂♂, CHINA, Sichuan, Omei, Jiulinggang, 1700 m, 7-8.VIII.2013, leg. Song-Yun Lang (LSY); 1 ♂, CHINA, Sichuan, Omei, Xixinsuo, 1460 m, 10.VIII.2013, leg. Song-Yun Lang (LSY); 1 Song-Yun, CHINA, Sichuan, Ebian, Heizhugou, 1800-2000 m, 17.VIII.2013, leg. Song-Yun Lang (LSY); 4 ♂♂, 1 ♀, CHINA, Chongqing, Jiangjin, Simian-shan, 1000-2000 m, 24.VII-9.VIII.2009, 15.VIII.2010, legs. He-Li Deng & Ai-Min Li (CMNH); 3 ♂♂, 2 ♀♀, CHINA, Guizhou, Shibing, 800 m, 15-16.VII.2022, legs. Song-Yun Lang & Jiang Hou (LSY); 2 ♂♂, CHINA, Guizhou, Panxian, 1900 m, 20.VII.2022, legs. Song-Yun Lang & Jiang Hou (LSY); 1 ♂, CHINA, Guangxi, Jinxiu, 1200-1400 m, 22.VII.2011, leg. Jian-Qing Zhu (LSY).
Diagnosis: *Neope leechi* Okano & Okano **stat. nov.** can be distinguished from *N. pulahoides* (Moore) by the combination of the following characters: 1) on the forewing upperside, the basal two thirds of the vein 1b, the basal half of the vein 2, and the cubitus are outlined by thinner yellowish lines, whereas they are highlighted by paler and thicker yellowish lines in *N. pulahoides* (Moore); 2) on the forewing underside, the blackish patch in the spaces 2 and 3 and the cell is broadly separated by yellow along veins, whereas it is only weakly divided in *N. pulahoides* (Moore); 3) on the hindwing underside, the greyish discal fascia located between the postdiscal ocelli and the discal band is obviously narrower than its parallel ocelli in the spaces 1b and 2, whereas it is as wide as the diameter of its parallel ocelli in the spaces 1b and 2 in *N. pulahoides* (Moore); 4) the uncus (fig: 17d) is more tapering apically, whereas its dorsal ridge is roundly swelled near the tip in *N. pulahoides* (Moore) (fig: 17a-c).
Notes: A) Comparing with those of *N. pulahoides* (Moore), the unci of *N. leechi* Okano & Okano **stat. nov.** often have more elongated tips and less swelled ridges, and this distinction becomes more conspicuous in their sympatric region, such as S. Chongqing, Guizhou and Guangxi. In W. Sichuan, where no true *N. pulahoides* (Moore) has been found, the unci of *N. leechi* Okano & Okano **stat. nov.** have more kinds of variation in shape. For example, an uncus (fig: 17d1) from Omei (the type locality) has a more humped dorsal ridge; and an uncus (fig: 17d3) from nearby Ebian has a shortened tip. Moreover, the contour of the mentioned uncus (fig: 17d1) from Omei is similar to that of Nepalese *N. pulahoides tamur* Fujioka (fig: 17c). Certainly, this similarity can hardly cover the truth that the two species have already been separated. First, a degree of infraspecific variation can be observed in each species (fig: 17), so a likeness of their shapes might be expected at their respective extremes. Second, as mentioned above, in the sympatric region, the difference between these two species is often more remarkable. For instance, in S. Chongqing, where the Dalou-shan range acts as a section of the southern border of the Sichuan Basin, unci of *N. pulahoides* ***fudelii*** **subspec. nov.** (fig: 17a) from Jinfo-shan often have the most humped tip within species, whereas unci of *N. leechi* Okano & Okano **stat. nov.** (fig: 17d4-5) from Simian-shan often have a very sharp and elongated tip. It is worth mentioning that both Jinfo-shan and Simian-shan are mountains in the Dalou-shan range with only 100 km in distance (fig: 22).
B) *Neope leechi* Okano & Okano **stat. nov.** is most likely a univoltine butterfly, because all its known specimens were collected in summer (from July to August). In its range, its appearance is somewhat similar to some w.s.f. individuals of *N. pulahoides* (Moore) (figs: 5, 8), but features listed in the diagnosis above can effectively distinguish them from each other.
C) *Neope leechi* Okano & Okano **stat. nov.** and *N. pulahoides* (Moore) have not been collected together from a same locality even in their sympatric area. This kind of distributional pattern of two sibling species is called the "checkerboard" distribution (Mackenzie et al., 1998) and it recalls the same patterns which are displayed by *N. fusca* Leech, 1891 & *N. armandii* (Oberthür, 1876) and by *Lethe dura* (Marshall, 1882) & *L. yuemingae* Lang, 2014 of the same subtribe (Lethina) in S. China as mentioned by Lang (2014, 2017). However, these conclusions about all of their distributional patterns mentioned here are temporary and need more further surveys.
D) According to part of photographs of "*Neope pulahoides* (Moore)" provided by Wu & Hsu (2017: p. 502-503), it can be deduced that *N. leechi* Okano & Okano **stat. nov.** is also distributed in S.E. China (Fujian) which is also the range of *N. pulahoides chuni* Mell. In N. Vietnam, the record of *N. pulahoides leechi* Okano & Okano **stat. nov.** (Saito & Vu, 2020; Inayoshi, 2023) is only a misidentification of *N. pulaha pulaha* (Moore). Until now, the southernmost record of *N. leechi* Okano & Okano **stat. nov.** is from Jinxiu, Guangxi (figs: 16, 17d11). Furthermore, true *N. pulahoides* (Moore) is also expected in the fauna of Vietnam.
Distribution: China (Sichuan, Chongqing, Guizhou, Guangxi, Fujian).

Additional notes: A) A ♂ *N. pulahoides pulahoides* (Moore) (fig: 3, 17b5) was collected from Lüchun, S. Yunnan in August 2023 (wet season), and it can hardly be separated from the d.s.f. from N. Indochinese region including N. Thailand, S. Yunnan (fig: 2, 17b4) and S.W. Guangxi (fig: 1, 17b3). It is a key specimen which made the present author to rethink the classification of *N. pulahoides* (Moore) and to promote this research. Judging from figures in Inayoshi (2023), the w.s.f. of *N. pulahoides pulahoides* (Moore) from N. Thailand with its underside is darker than the specimen from Lüchun, but both of them are easily distinguishable from the true darker, viz. *N. leechi* Okano & Okano **stat. nov.**
B) In this study, 1 ♂ (figs: 5, 17b1) from Sandu, S. Guizhou was examined, it is superficially similar to *N. leechi* Okano & Okano **stat. nov.**, but, however, its wide greyish discal fascia in the spaces 1b and 2 on the hindwing underside can separated it from the latter. On the

other hand, its humped tip of the uncus is similar to that of *N. p.* ***fudelii*** **subspec. nov.** Furthermore, the ♂ with its wing pattern likes the wet season form of *N. p.* ***fudelii*** **subspec. nov.** Therefore, the ♂ (figs: 5, 17b1) undoubtedly is *N. pulahoides* (Moore). Not far away from Sandu, a typical dry season form of *N. pulahoides pulahoides* (Moore) (figs: 4, 17b2) was obtained from Leishan, S. Guizhou. So, the two specimens should belong to their own corresponding seasonal forms of the population in S. Guizhou (the Miao-ling range) (fig: 22). Comparing with the population of N. Indochina (N. Thailand, S. Yunnan, S.W. Guangxi), the S. Guizhou population has a more discernible wet season form which is similar to *N. p.* ***fudelii*** **subspec. nov.** Therefore, the S. Guizhou population should be a transitional population between Indochinese *N. p. pulahoides* (Moore) and Sichuanese *N. p.* ***fudelii*** **subspec. nov.**

C) Huang (2002, 2003) emphasized the importance of the use of the apical process of the valva in the taxonomy of *Neope pulaha* (Moore) and its relatives. However, whether *N. pulahoides* (Moore) or *N. leechi* Okano & Okano **stat. nov.**, their apical processes are both shorter than that of *N. pulaha* (Moore). But it was found that the apical process can hardly worked as a reliable standard in this practice.

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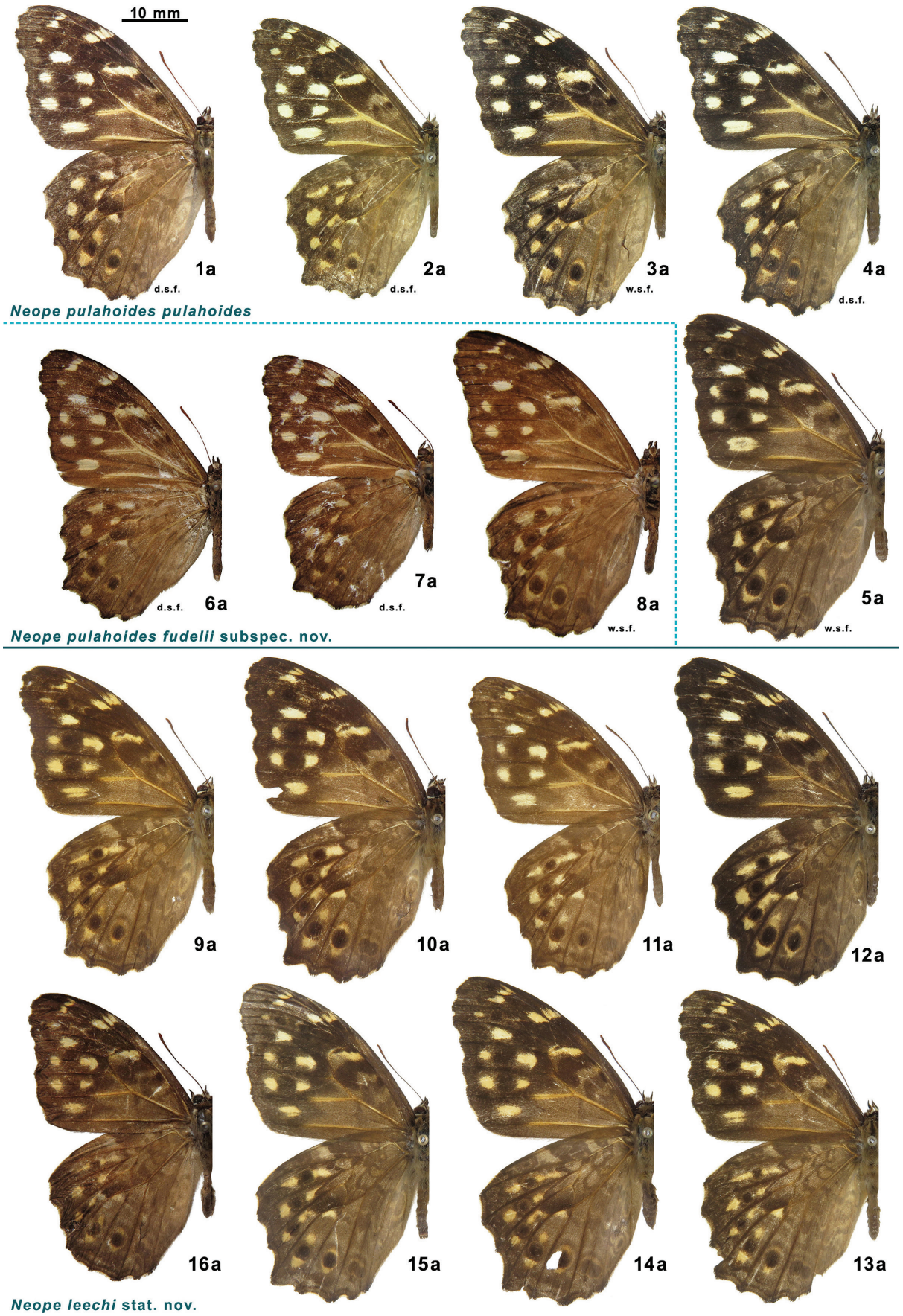

Fig. 1a-5a: *Neope pulahoides pulahoides* (Moore, [1892]): (1a) ♂, Guangxi, Tianlin, SATY0536, LSY; (2a) ♂, Yunnan, Xichou, SATY1225, LSY; (3a) ♂, Yunnan, Lüchun, SATY1212, LSY; (4a) ♂, Guizhou, Leishan, SATY1221, LSY; (5a) ♂, Guizhou, Sandu, SATY1230, LSY. **Fig. 6a-8a:** *Neope pulahoides* ***fudelii*** **subspec. nov.**: (6a) holotype ♂, [Chongqing], ginfu-shan [Jinfo-shan], APR-1929, SATY0012, CMNH; (7a) paratype ♂, ditto, MAY-1929, CMNH; (8a) paratype , ditto, JUL-1929, SATY0021, CMNH. **Fig. 9a-16a:** *Neope leechi* Okano & Okano, 1984 **stat. nov.**: (9a) ♂, Sichuan, Omei, SATY1219, LSY; (10a) ♂, Sichuan, Ebian, SATY1218, LSY; (11a) ♂, Chongqing, Jiangjin, SATY1227, CMNH; (12a) ♂, Guizhou, Shibing, SATY1222, LSY; (13a) ♂, ditto, SATY1223, LSY; (14a) ♂, Guizhou, Panxian, SATY1229, LSY; (15a) ♂, ditto, SATY1228, LSY; (16a) ♂, Guangxi, Jinxiu, SATY1213, LSY.

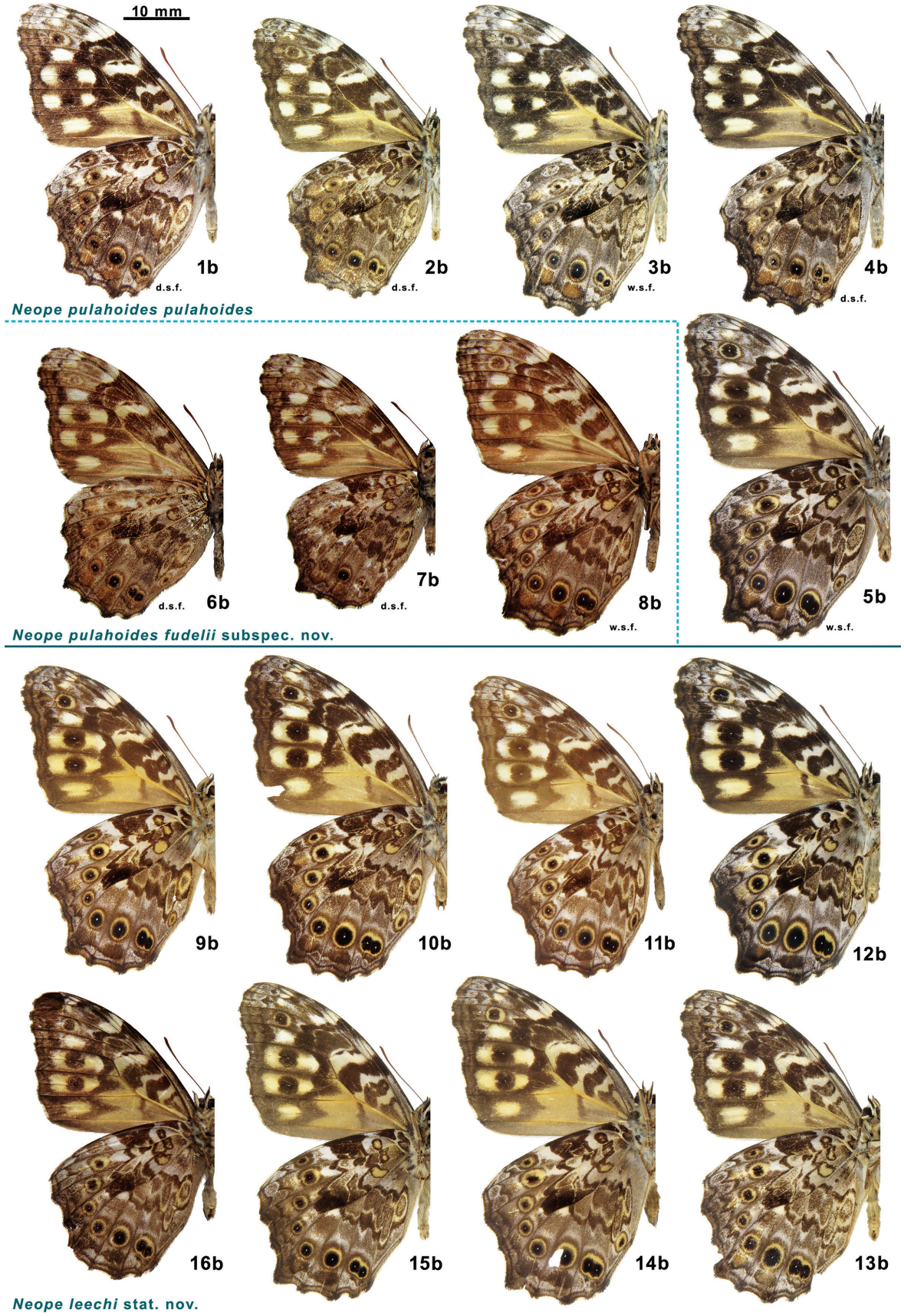

Fig. 1b-5b: *Neope pulahoides pulahoides* (Moore, [1892]): (1b) ♂, Guangxi, Tianlin, SATY0536, LSY; (2b) ♂, Yunnan, Xichou, SATY1225, LSY; (3b) ♂, Yunnan, Lüchun, SATY1212, LSY; (4b) ♂, Guizhou, Leishan, SATY1221, LSY; (5b) ♂, Guizhou, Sandu, SATY1230, LSY. **Fig. 6b-8b:** *Neope pulahoides* ***fudelii*** **subspec. nov.**: (6b) holotype ♂, [Chongqing], ginfu-shan [Jinfo-shan], APR-1929, SATY0012, CMNH; (7b) ♂, paratype, ditto, MAY-1929, CMNH; (8b) paratype ♂, ditto, JUL-1929, SATY0021, CMNH. **Fig. 9b-16b:** *Neope leechi* Okano & Okano, 1984 **stat. nov.**: (9b) ♂, Sichuan, Omei, SATY1219, LSY; (10b) ♂, Sichuan, Ebian, SATY1218, LSY; (11b) ♂, Chongqing, Jiangjin, SATY1227, CMNH; (12b) ♂, Guizhou, Shibing, SATY1222, LSY; (13b) ♂, ditto, SATY1223, LSY; (14b) ♂, Guizhou, Panxian, SATY1229, LSY; (15b) ♂, ditto, SATY1228, LSY; (16b) ♂, Guangxi, Jinxiu, SATY1213, LSY.

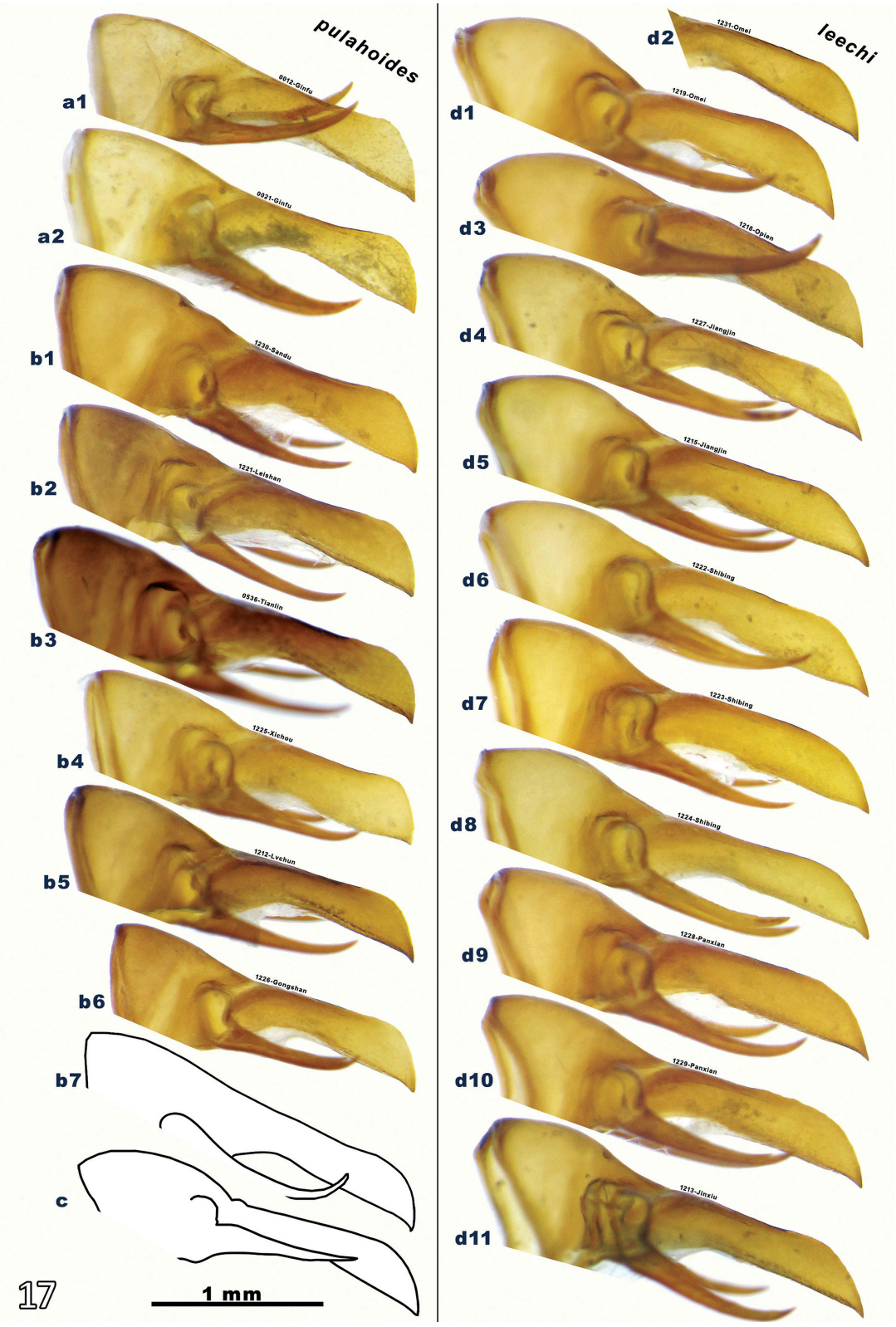

Fig. 17: ♂ tegumen+uncus+gnathos in lateral view. **a1-a2**. *Neope pulahoides* ***fudelii*** **subspec. nov.**: (a1) holotype, [Chongqing], ginfu-shan [Jinfo-shan], APR-1929, SATY0012, CMNH; (a2) paratype, ditto, JUL-1929, SATY0021, CMNH. **b1-b7.** *Neope pulahoides pulahoides* (Moore, [1892]): (b1) Guizhou, Sandu, SATY1230, LSY; (b2) Guizhou, Leishan, SATY1221, LSY; (b3) Guangxi, Tianlin, SATY0536, LSY; (b4) Yunnan, Xichou, SATY1225, LSY; (b5) Yunnan, Lüchun, SATY1212, LSY; (b6) Yunnan, Gongshan, SATY1226, LSY; (b7) Holotype of *N. chayuensis* Huang, 2002, Tibet, Chayu, traced from Huang (2002: fig. 160). **c.** *Neope pulahoides tamur* Fujioka, 1970, NEPAL, traced from Fujioka (1970: fig. 14A). **d1-d11.** *Neope leechi* Okano & Okano, 1984 **stat. nov.**: (d1) Sichuan, Omei, SATY1219, LSY; (d2) ditto, SATY1231, LSY; (d3) Sichuan, Ebian, SATY1218, LSY; (d4) Chongqing, Jiangjin, SATY1227, CMNH; (d5) ditto, SATY1215, CMNH; (d6) Guizhou, Shibing, SATY1222, LSY; (d7) ditto, SATY1223, LSY; (d8) ditto, SATY1224, LSY; (d9) Guizhou, Panxian, SATY1228, LSY; (d10) ditto, SATY1229, LSY; (d11) Guangxi, Jinxiu, SATY1213, LSY.

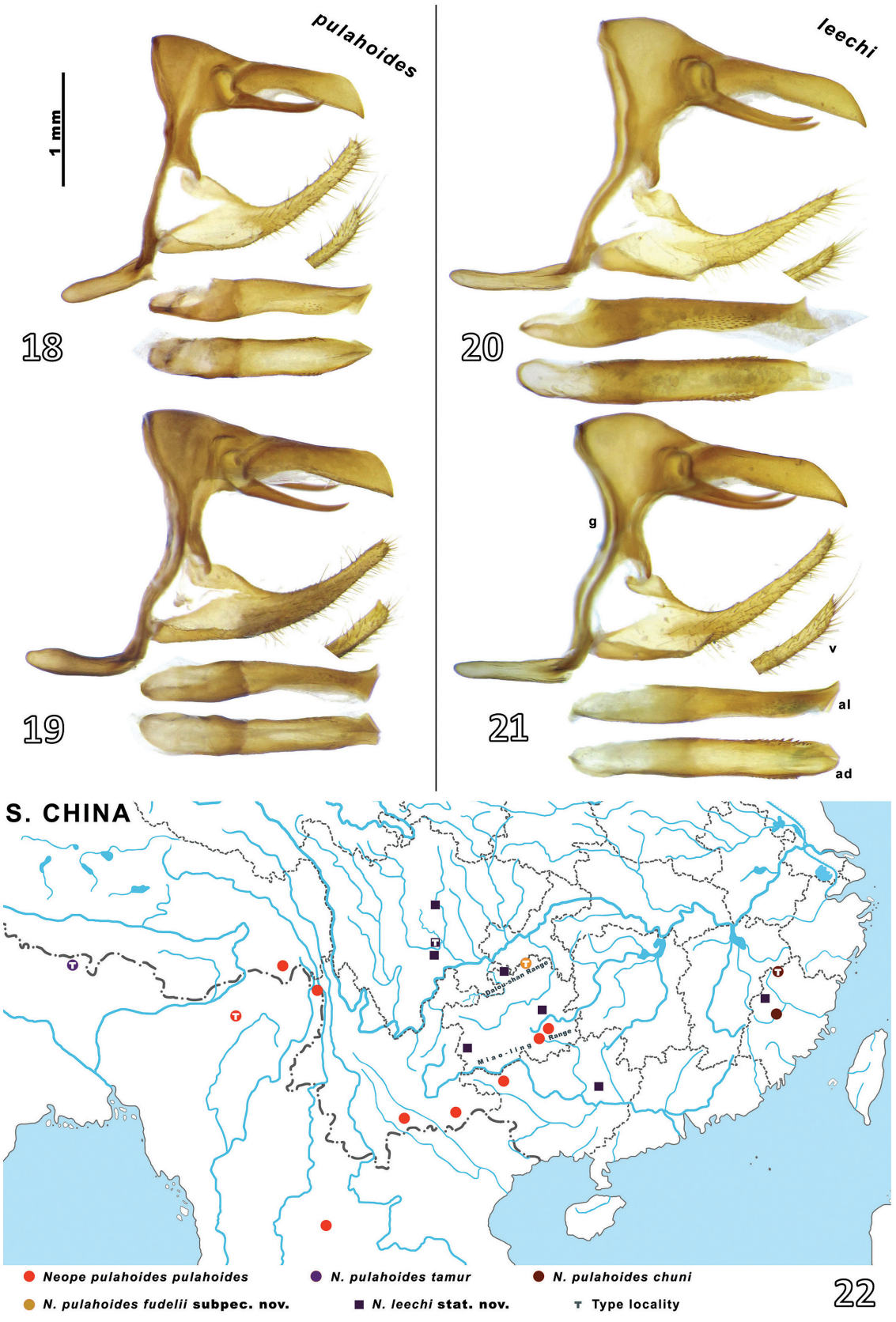

Fig. 18-21: ♂ genitalia. g: ♂ genitalia in lateral view with left valva and aedeagus removed; al: aedeagus in lateral view; ad: aedeagus in dorsal view; v: tip of valva in dorsal view. **Fig. 18-19:** *Neope pulahoides pulahoides* (Moore, [1892]): (18) Yunnan, Gongshan, SATY1226, LSY; (19) Guizhou, Leishan, SATY1221, LSY. **Fig. 20-21:** *Neope leechi* Okano & Okano, 1984 **stat. nov.**: (20) Guizhou, Shibing, SATY1224, LSY; (21) Chongqing, Jiangjin, SATY1215, CMNH.

Fig. 22: Distribution map of *Neope pulahoides* (Moore, [1892]) (round) and *N. leechi* Okano & Okano, 1984 **stat. nov.** (square) (Sources of data: Moore, 1892; Mell, 1942; Fujioka, 1970; Okano & Okano, 1984; Koiwaya, 1989; Huang, 2003; Wu & Hsu, 2017; Lang, 2017; Inayoshi, 2023; specimens kept in LSY, CMNH).