

## GENUS NADAGARA FROM JAPAN AND TAIWAN (Lepidoptera: Geometridae)

By Hiroshi Inoue

*Abstract:* All species of the genus *Nadagara* from Japan and Taiwan are listed with illustrations of moths and genitalia, including *N. subnubila* new species found on Amami-ōshima, Ryukyu, and on Formosa, and an unrecorded species from Formosa.

From Japan and Formosa only one species each of the genus *Nadagara* Walker (1862, List. lep. Ins. Brit. Mus. **24**: 1093), viz. *N. prosigna* Prout and *N. umbrifera* Wileman respectively, had been known. However, I found one new species occurring in both territories and one unrecorded species from Taiwan.

In writing this paper my hearty thanks are due Mr D. S. Fletcher, British Museum (Natural History) for his kind advice and the loan of specimens. Among the Ryukyuan and Formosan specimens recorded here, those collected by me in 1963 and 1964 are part of moth specimens secured in connection with U. S.-Japan Cooperative Science Programs through grants from the Japan Society for the Promotion of Science for which I would like to express my appreciation.

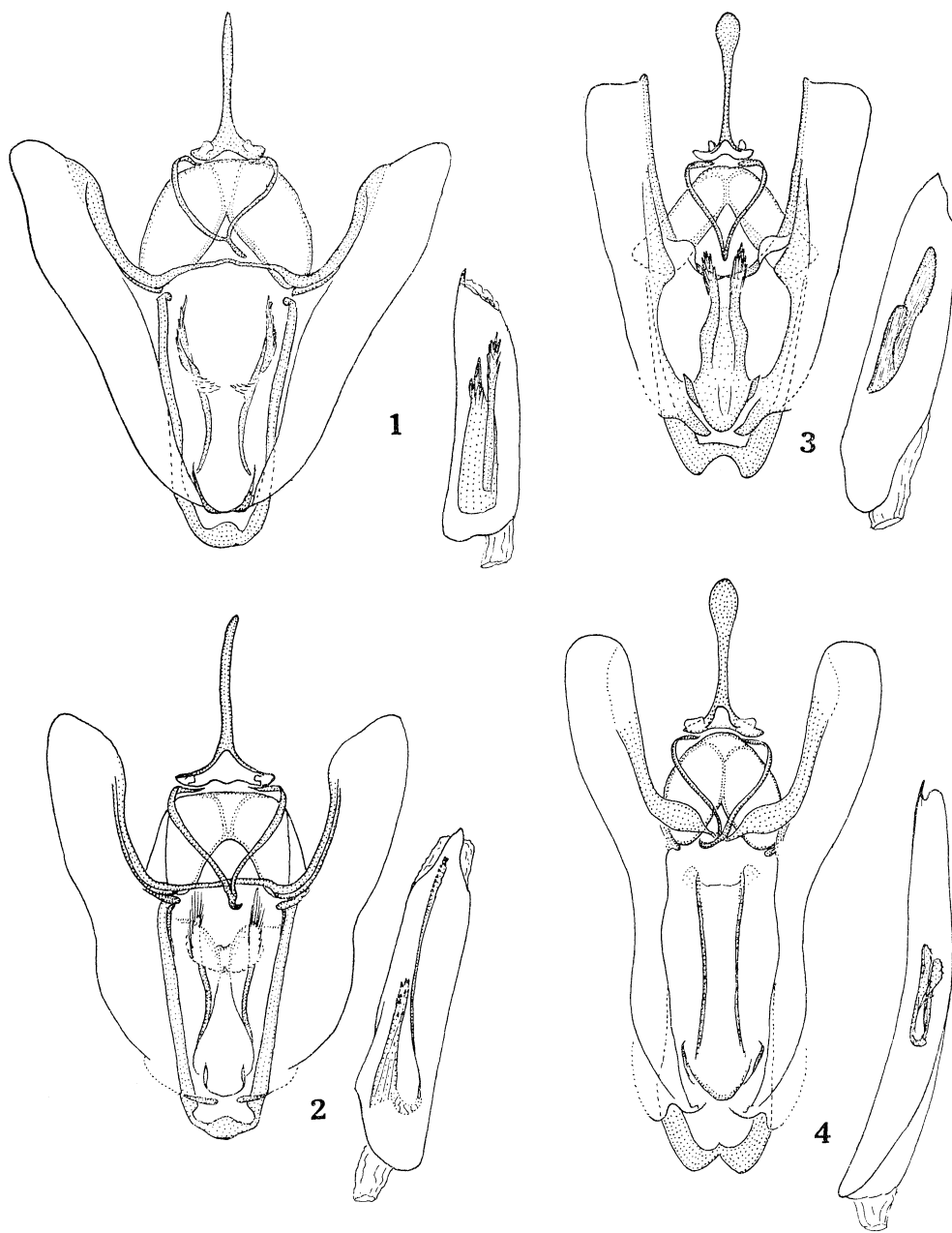
***Nadagara prosigna*** Prout, 1930      Fig. 1.

*Nadagara prosigna* Prout, 1930, Novit. Zool. **35**: 324 (type-locality: Takao-san, Tokyo).—Wehrli, 1940, *In* Seitz, Macrolep., Suppl. **4**: 380, t.30k.—Inoue, 1956, Trans. Shikoku Ent. Soc. **4** (7): 115 (Hiko-san); 1956, Check List Lep. Jap., **3**: 305; 1957, *In* Icones Het. Jap. Col. Nat. [1]: 241, pl. 46, f. 1263; 1959, *In* Icon. Ins. Jap. Col. Nat. Ed. **1**: 206, pl. 143, f. 6.

Quite distinct from other known species of the genus by the heavy costal spots of forewing from where ante- and postmedian line commence. ♂ genitalia are also peculiar in the short aedoeagus, well-developed vigorous cornuti and the structure of juxta. ♀ is unknown.

Specimens examined: Takao-san, Tokyo, 3.V.1952, 1♂; 28.IV.1957, 1♂; 25.IV.1958, 1♂ (K. Jinbo); ditto, 25. IV. 1954, 1♂ (T. Haruta). Odaru Spa (Nashimoto), Shizuoka Pref., 5.VII.1959, 1♂ (H. Inoue). Hiko-san, N. Kyushu, 13.IV.1955, 1♂ (H. Kuroko), recorded in my paper, 1956.

Presumably this species is widely distributed at the south-western half of Japan, but as recorded above very scarcely known, being secured only at the above recorded three places. The specimen collected at Odaru Spa in July seems to be the second generation; its wings are a little deeper in coloration than those collected in April and May.



Figs. 1-4. ♂ genitalia of *Nedeigera* species: 1, *N. prosigna* Prout; 2, *N. subnubila*, new species; 3, *N. vigaia* Walker; 4, *N. synocha* Prout.

***Nadagara subnubila*** Inoue, new species      Figs. 2, 5, 8a-c.

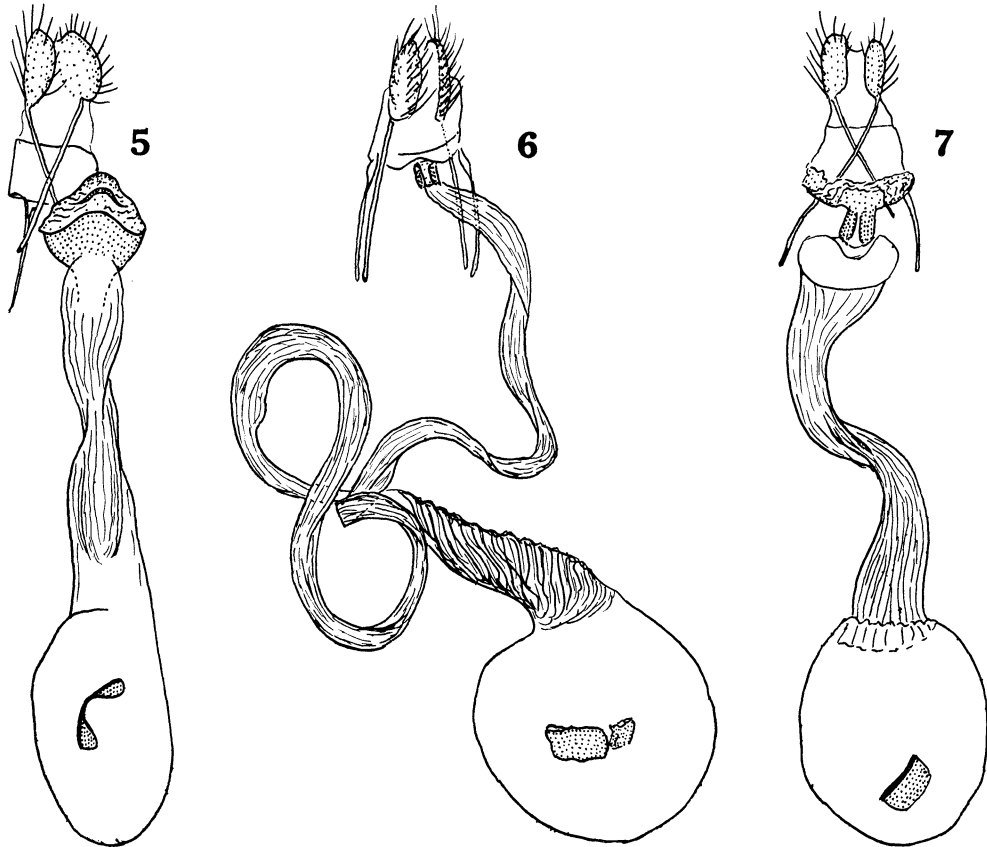
Very similar to *N. vigaia* recorded below, but distinguished from it as follows:

Forewing with termen not crenulate from apex to vein 6, discocellular spot larger, postmedian line punctuated on veins, placed more proximad at anterior 1/2, its distal shading near apex not developed. Both wings with postmedian lines more narrowly white edged distally, terminal area suffused with brown, white subterminal lines inconspicuous, terminal lines thinner, less blackish. Under surface with postmedian lines represented by vein-dots, while in *N. vigaia* both wings with strong postmedian lines, discocellular spots weaker, hindwing without straight median fascia developed in *N. vigaia*.

Somewhat similar to *N. synocha* Prout (1923, Novit. zool., 30: 312), from Malaya, Sumatra, Java and N. Borneo, but wings more ample, postmedian lines placed more proximal, discocellular spot on forewing heavier, while that on hindwing vestigial.

Length of forewing: ♂, 16-17 mm; ♀, 19 mm.

Venation normal, hindtibia in ♂ not dilated.



Figs. 5-7. ♀ genitalia of *Nadagara* species: 5, *N. subnubila*, new species; 6, *N. synocha* Prout; 7, *N. vigaia* Walker.

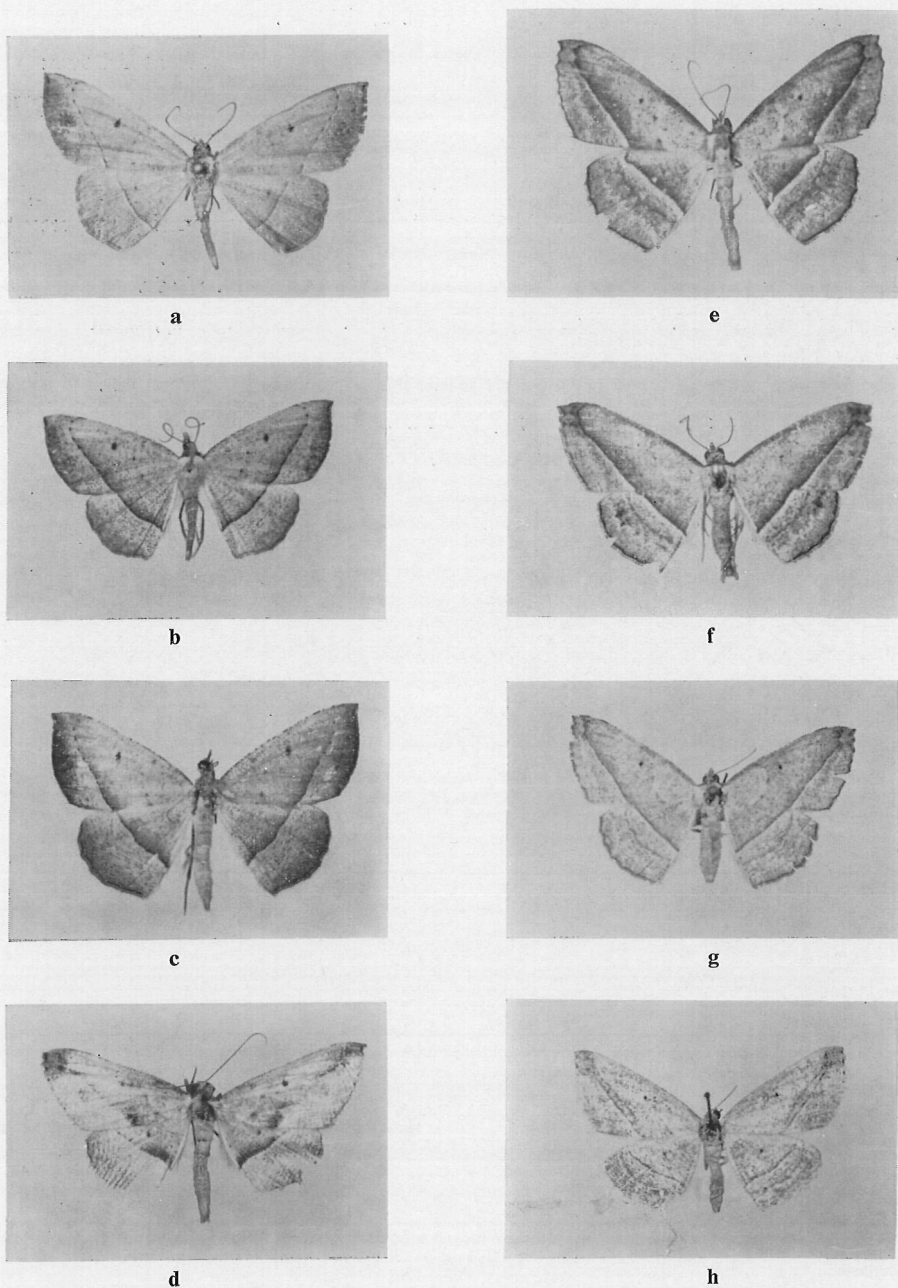


Fig. 8 a-h. a, *Nadagara subnubila*, new species, Holotype ♂ (Taiwan); b, same, paratype ♀ (Amami-Oshima); c, same, paratype ♂ (Amami-Oshima); d, *Nadagara synocha* Prout, ♂ (Gunong Ijan.); e, *N. vigaia* Walker, ♂ (Taiwan); f, same, ♂ (Bhutan); g, same, ♀ (locality unknown, probably N India); h, same, ♀ (Gunong Ijan.).

Genitalia. ♂, uncus slender, very long, not wide at apex as in *N. vigaia* and *synocha*, valva similar in shape to *N. prosigna*, aedeagus moderately long, a pair of serrated cornuti developed, one is extremely narrow and long, the other 1/2 its length. ♀, ostium well sclerotized, ductus bursae much shorter than in *N. synocha*, bursa copulatrix oval, signum quite distinct from the two species as shown in the figures.

Holotype ♂ [British Museum (Nat. Hist.)]. Ile Formose, 1908, Moltrecht.

Paratypes: Yuwandake, Amami-ôshima, 16.VI.1963, 1♂, 1♀ (Y. Mizusawa); ditto, 16-17.VII.1963, 1♂ (H. Inoue), in coll. H. Inoue.

DISTRIBUTION: Taiwan, Ryukyu (Amami-ôshima).

These species was already recorded by me from Amami-ôshima as "*Nadagara* sp." (1964, Kontyû, 32: 543).

This discovery of this new species adds further a proof that shows a close faunistic relationship of Formosa and the Ryukyu Islands. It is expected to be discovered from Okinawa and Yayeyama Islands lying between Amami-ôshima and Formosa in future.

***Nadagara vigaia*** Walker, 1862 Figs. 3, 7, 8 e-g.

*Nadagara vigaia* Walker, 1862, List Lep. Ins. Brit. Mus. 24: 1093 (type-locality: Ceylon).

—Hampson, 1895, Fauna Brit. Ind. Moths 3: 194, f. 107 (Nilgiris, Ceylon).

Specimens examined: Sun-Moon Lake, 727 m, Nan Tow, Taiwan, 14.VII.1964, 2♂♂ (H. Inoue).

DISTRIBUTION: Taiwan (unrecorded), Ceylon, Nilgiris, Bhutan [ex coll. Brit. Mus. (N. H)].

***Nadagara umbrifera*** Wileman, 1910

*Nadagara umbrifera* Wileman, 1910, Entom. 43: 347 (type-locality: Kanchirei, 300 m).

Only the holotype, a male, is known. According to the original description it seems to be distinct from both *N. vigaia* and *subnubila*.

DISTRIBUTION: Taiwan.

#### ADDENDUM

Shortly after submitting the manuscript to the editor, I obtained Insects of Samoa, Part III, Fasc. 3, Geometridae, 1928, in which Prout (pp. 164-168) describes an important note on the genus *Nadagara* by furnishing a key to all the species then known, with a new species from Samoa (20 species).

He divides the genus into two groups by the feature of the male hindtibia; not dilated (Group I) or dilated (Group II). All the species including the new one cited in this paper belong to Group I.

Concerning the Formosan *N. vigaia*, he gives the following note (pp. 165-166):

"Note (B).—I am coming increasingly to think that *N. vigaia* and *N. inordinata* are merely forms of a single species. The *vigaia* forms are not frequently (though not invariably) ♀, the *inordinata* forms more often ♂. Distribution, according to present determinations, somewhat confused: Ceylon, Nilgiris, Bhutan, Java, and Sumatra for *N. vigaia*; Sikkim, Assam, Formosa, Malaya, Bor-

neo, and Celebes for *N. inordinata*."

Since the Formosan specimens of the above complex examined by me are indisputably conspecific with *N. vigaia*, it will be justified to sink *N. inordinata* Walker (1862, List lep. Ins. Coll. Brit. Mus. 24: 1094, type-locality: Sarawak) into *N. vigaia*, which has page-priority and moreover seems to be better known.

Prout (pp. 164, 166) doubts the generic position of *N. umbrifera* Wileman, which, according to his key, is distinguished from the true *Nadagara* species by more weakly developed face-cone and anteriorly subconcave termen of forewing.

#### KEY TO JAPANESE AND FORMOSAN SPECIES OF NADAGARA

1. Forewing with termen subconcave anteriorly..... **umbrifera**  
Not as above ..... 2
2. Forewing with ante- and postmedian line starting from heavy blackish costal marks  
..... **prosigna**  
No blackish costal marks..... 3
3. Postmedian line on forewing bidentate in cellules 6 and 7 and that on hindwing  
below dentate on veins ..... **vigaia**  
Postmedian line on forewing evenly excurved anteriorly and that on hindwing  
below dotted on veins but not dentate..... **subnubila**