

INDIVIDUAL VARIATION AND SEXUAL DIMORPHISM IN *THAMNOECHA UNIFORMIS* (BUTLER 1875), LEPIDOPTERA: SPHINGIDAE

Key Words: Lepidoptera Sphingidae, hawkmoths, *Thamnoecha uniformis*

Existing information about *Thamnoecha uniformis* (Butler 1875) is examined and the range of individual variation and sexual dimorphism in the species discussed.

INTRODUCTION

The hawkmoth *Thamnoecha uniformis* (Butler 1875) is a Himalayan endemic. The genus is monobasic and little is known about the species. Since the original description by Butler in 1875, only males of the species were known until Dierl (1970) described a single female from Narkanda (Himachal Pradesh).

Although Dierl (op. cit.) observed some differences between the sexes, he did not appear to have more than a single pair to hand on which he based his observations. The present study developed out of the need to place the sexes correctly without resorting to genitalic examination, a task that has caused some confusion in the past. The confusion was caused by the relatively great individual variation in such a sparingly marked species. This moth has been recorded from Sabathu near Shimla, which is the type locality, and Narkanda in Himachal Pradesh: Katarmal and Bhimtal in Kumaon and Nagarjong and Godavari in Nepal. It ascends to 2,700 m (Narkanda) and has been recorded from as low as 1,280 m (Katarmal). It will probably be found even lower in suitable localities, i.e. chir pine (*Pinus roxburghii* Sarg.) forests.

The larval food plant of *Thamnoecha uniformis* is thought to be chir pine by a process of elimination. Dierl (op. cit.) found a larva with the characteristic form and stripe of a conifer-feeding hawkmoth close to the *Sphinx* L. genus on chir pine in Nepal.

This larva was subsequently parasitized and no moth developed out of it. Since no Indian hawkmoth as known to feed on conifers and *uniformis* was, at the time, the only known representative of the group in the area, and lastly, a male *uniformis* was found by Dierl (op. cit.) in the daytime settled on a chir pine trunk in Nagarjong, it was assumed that the larva was that of *uniformis*. This has, however, not been confirmed by actual breeding experiments. Although there is little reason to doubt that chir pine is the larval food plant of *uniformis*, it is pertinent that *Sphinx ligustri* L. has been recently reported from Kumaon (Smetacek 1994). While *ligustri* is not known to feed on conifers, the point is that *uniformis* is not the only representative of the group in the Western Himalaya.

In the present study, *T. uniformis* has been recorded in every month from March through August. It is always extremely scarce, no more than one individual appearing at a time. The southwest monsoon, which dictates the flying period of most Hawkmoths in this area, does not perceptibly affect the emergence pattern of *uniformis*. Nor has this moth been found to be affected by climatic anomalies such as drought or unusually warm winters. It has always been very scarce, even though its presumed larval food plant, chir pine, covers vast tracts in Kumaon. It

may be added that the assessment of its scarcity is based on its attendance at artificial light, rather than actual examination of chir pine forests at appropriate times.

The only factor which seems to affect populations of this moth, besides larval parasites, is forest fire, which is an almost regular phenomenon in chir pine forests. None were recorded after major fires. However the same can be said for all other Hawkmoths and insects that happen to live in or near chir pine forests.

Both sexes are attracted to mercury vapour lamps of 125 – 160 W. They are active at dusk and during the early hours of darkness, almost never appearing after 2030 hours in summer. Their activity at dawn has not been assessed. Unlike most Hawkmoths that are active and nervous for some time after being attracted, both sexes of *uniformis* settle directly upon arrival and rarely change position. Usually they select a dark surface to settle upon, but will do so on a white-washed pillar if no other convenient perch is available. They rarely settle under the glare of the lamp, preferring a shady corner. At rest, they hold their wings draped laterally over the abdomen, the blunt wings giving them the appearance of Notodontids rather than hawkmoths. They closely resemble the European *Sphinx pinastri* L., especially at rest. Although *pinastri* is known to visit flowers at dusk, *uniformis* has never been seen visiting flowers. The following is a description of the sexes:

Thamnoecha uniformis (Butler)

1875. *Hyloicus uniformis* Butler. *Proc. zool. Soc. Lond.*: 261.

1903. *Thamnoecha uniformis*. Rothschild & Jordan. *Rev. SpHING.*: 153.

Male: Length of forewing: 23 – 25 mm (*mih*).

Expanse: 50 mm (Dierl op. cit.; Hampson 1892; Bell & Scott 1937) to 54 mm (Hampson 1892).

Forewing to antenna ratio: 1.76 : 1.

Material examined: 2 exs.: 5.vii.1989, Katarmal 1280 m *Leg. P. Smetacek*; 21.iii.1994, Jones Estate, Bhimtal, 1500 m *Leg. P. Smetacek*.

Diagnosis: Palpi, vertex of head, thorax and abdomen brownish-grey. The sides of head black. Vertex of thorax cinereous grey. Collar and tegulae proximally fringed with black. Antennae fasciculate, terminally swollen into a club and narrow at base. Antennae more than half the length of the forewing.

Forewing grey with a proximally curved ferruginous medial band and two similar postmedial bands. The bands are distinctly marked in some individuals, nearly obsolete in others. One prominent black streak in the interspace between veins 4 (Cu2) and 3 (Cu1) and another above it in the interspace between veins 4 (M3) and 3(Cu1). Rarely, there is a short black streak in the interspace between veins 5 (M2) and 4 (M3) as in the Nepalese specimen figured by Allen (1993). These marks are variable, one or the other might be longer or more heavily marked or one might be altogether obsolete. Dark points on the cilia at the veins. Hindwing reddish-brown, cilia grey. The *verso* surface is uniform grey, the cilia as on the *recto* surface except that on the hindwing, there are faint dark points discernable at the veins.

In the Katarmal specimen, the medial area of the forewing *recto*, between the rufous bands, is darker than the rest of the wing.

Female: Length of forewing: 23 – 29 mm (*mihi*).

Expanse: 53 mm (Dierl op. cit.) to 66 mm (*mihi*).

Forewing to antenna ratio: 2.15: 1 to 2.4: 1.

Material examined: 6 exs.: 2.vi.1974; 18.v.1989. 6.iv.1982; 5.vi.1998; 22.viii.1997, all collected at Jones Estate, Bhimtal 1500 m, Coll. P. Smetacek; 7.vi.1925 Bhimtal, Maxwell Coll., BM 1967-553 (Coll. Natural History Museum, London) (Photograph of *recto* surface examined).

Diagnosis: Palpi pale grey, sometimes nearly white, contrasting with the rest of the head. Vertex of head, vertex of thorax and abdomen grey. Collar and tegulae brownish-grey and defined proximally by a narrow black fringe. Antennae simple, narrow, terminally swollen into a prominent club, the tip tapering to a point but not hooked. Antennae less than half the length of the forewing.

Forewing uniform grey, the inner area faintly ferruginous or darker grey. Traces of one medial and two postmedial ferruginous bands on the costa of some individuals. These bands never reach below vein 4(M3). The two black streaks in the interspaces between vein 4 (M3) and vein 2(Cu2) are usually faint and often one or both are entirely obsolete. Cilia of forewing with prominent dark points at the veins. Hindwing uniformly brownish-grey in some individuals, grey in others. *Verso* surface uniformly grey with a fine marginal dark line to both wings.

DISCUSSION

From the above, it is evident that there are modest but consistent differences between the sexes, both in the external structure as well as in the pattern. The structure and length of the antennae are the most evident external structural differences. Dierl (1970) noted that the antennae of the female are thinner than those of the male. This is due to the fascicles of the male's antennae rather than their actual thickness, which is more or less the same as those of the female. Dierl also stated that the antennae of the female are shorter than the male, reaching only a little over half the length of the forewing costa. In the specimens examined in the present study, the antennae of the female are less than half the length of the forewing costa, while those of the male are more than half the length of the forewing costa.

Contrary to Dierl's (op.cit.) observation, size is not a distinguishing factor between the sexes. The usual expanse given for males by most authors is 50 mm. However, in Hampson's (1892) description of *Protoparce uniformis* Butler, he gives an expanse of 54 mm for the material examined by him. Since only males were known at the time, it follows that this measurement applies to males. In the same work, Hampson described *Pseudosphinx concolor* for the first time and gave a measurement of 50 mm. *P. concolor* turned out to be a synonym of *uniformis*. Bell & Scott (1937) used Hampson's (1892) description of *concolor* in their description of *uniformis* and apparently overlooked the measurement of 54 mm given by Hampson (op. cit.) for *Protoparce uniformis*. This presumption is strengthened by the fact that *Protoparce uniformis* is not mentioned in the synonymy by Bell & Scott (op. cit.), although *Pseudosphinx concolor* is included.

It is noteworthy that in Hampson's (op. cit.) description of *Protoparce uniformis* males, there is no mention of the horizontal black streaks on the forewing *recto* between vein 2 (Cu2) and vein 4 (M3). Kitching (*in litt.*) notes that these are three males and four females in the collection of the Natural History Museum in London (U.K.). All are somewhat worn and faded, with the pattern difficult to distinguish. A specimen from the collection has been figured by D'Abrera (1986), and it is of interest that, on the basis of the characters of the antennae, the specimen is likely to be a female, not a male as stated. The specimen in the same collection from Bhimtal, of which a photograph was examined, is slightly worn, particularly on the distal half of the forewing *recto*. It lacks the horizontal black streaks on the forewing *recto*. Rothschild & Jordan (1903) note that in all the specimens examined by them, which are the three male specimens mentioned above, the tips of the antennae were broken off.

The ferruginous bands on the forewing *recto* are usually more strongly developed in males than in females. Besides this, only females appear to have the black marginal line on the *verso* surface of both wings.

The black streaks on the forewing are variable, but despite Hampson's (op. cit.) description of male *Protoparce uniformis* mentioned above, which lacks these streaks, I am of the opinion that these streaks are prominent in males, while in females, they may be present, or one or more might be absent. I have a female in good condition, which entirely lacks both these streaks.

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REFERENCES

- Allen, M. (1993): Marvellous Moths of Nepal. Know Nepal Series, No. 6. Rohit Kumar, Lashkar, Madhya Pradesh. Pp. 13, pl. 10.
- Bell, T.R.D. & F.B. Scott (1937): The Fauna of British India including Ceylon and Burma, Moths, Vol. 5, Sphingidae. Taylor & Francis, London. Pp. xviii + 537; xv pl.; 1 map.
- D'Abrera, B. (1986): Sphingidae Mundi. E.W. Classey, Faringdon, U.K. Pp. 8 + 226.
- Dierl, W. (1970): Grundzuge Einer Okologischen Tiergeographie der Schwaermer Ostnepals. *Khumbu Himal Ergebn. Forsch. – Unt. Nep. Him.* 3/3: 319 – 320.

Hampson, G.F. (1892): The Fauna of British India including Ceylon and Burma, Moths, Vol. 1. Taylor & Francis, London. Pp. xiii + 527.

Rothschild, W. & K. Jordan (1903): A Revision of the Lepidopterous Family Sphingidae. *Nov. Zool. 9 (Supp.)*: 972 pp., 67 pl.

Smetacek, P. (1994): An Annotated List of the Hawkmoths (Lepidoptera: Sphingidae) of Kumaon, N. India: A probable Case of Faunal Drift. *Rec. zool. Sur. Ind., Occ. Paper 156*: 1-55.

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