The hawkmoths of Ladakh, Jammu & Kashmir, India (Lepidoptera: Sphingidae)

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Abstract: We report three additions to the list of known hawkmoths from Ladakh, Jammu & Kashmir, India: *Hemaris ducalis ducalis*, *Hyles gallii* and *Hyles nicaea lathyrus*. *Hemaris rubra* is removed from the list, the sole known specimen having proved to be a misidentified *H. d. ducalis*. This takes the total for the region to a modest six species. We also confirm that *Smerinthus kindermannii* breeds in the area.

Die Schwärmer von Ladakh, Jammu & Kaschmir, Indien (Lepidoptera: Sphingidae)

Zusammenfassung: Wir berichten über drei neue Nachweise von Schwärmerarten für Ladakh, Jammu & Kaschmir, Indien: *Hemaris ducalis ducalis*, *Hyles gallii* and *Hyles nicaea lathyrus*. *Hemaris rubra* wird von der Liste der bekannten Arten für das Areal gestrichen, da der einzige Belegfalter ein fehlidentifiziertes Exemplar von *H. d. ducalis* ist. Damit sind insgesamt sechs Schwärmerarten aus der Region bekannt. Von *Smerinthus kindermannii* werden Freilandraupenfunde aus der Gegend nachgewiesen.

Introduction

Ladakh comprises the eastern part of the Indian state of Jammu and Kashmir. One of the three major rivers of the Indian subcontinent, the Indus, which rises on the Tibetan Plateau, flows westwards through Ladakh on its way to Pakistan and the Arabian Sea. The general elevation in Ladakh is quite high. Peaks in the Zanskar and Ladakh ranges, which run east to west across Ladakh, rise to well over 6000 m a.s.l. The banks of the Indus in Ladakh are generally at more than 3000 m, and the lowest point is Kargil at an elevation of 2700 m. Ladakh lies in the rain shadow area north of the Himalaya, so that the climate is quite dry. Annual precipitation varies from 10 cm over most of the area to 100 cm in a few places. Therefore, away from riverbanks and irrigated areas, Ladakh supports a characteristic high elevation, xerophytic flora and fauna.

Background

Relatively few hawkmoth (Sphingidae) species have been reported from Ladakh.

Bell & Scott (1937) reported breeding only a single species, *Hyles nervosa* (Rothschild & Jordan, 1903), in the area.

Kitching & Cadiou (2000) reported a second species, *Smerinthus kindermannii* (Lederer, 1853), based on a single moth then in the collection of J.-M. Cadiou (now in the Natural History Museum, London, U.K.; BMNH) that had been captured at Lotsun, Ladakh. In addition, on 25. vii. 2008, the first author found a final instar (L_5) larva of this species feeding on a weeping willow tree (*Salix babylonica*) in the office compound of the Wildlife Warden, Badami Bagh, Leh (Fig. 1).

Further study of the BMNH collection revealed a specimen of *Hemaris ducalis ducalis* (Staudinger, 1887) from "Ladakh Chalsi, west of Leh, 4800 m, vi.". This specimen had been curated as *Hemaris rubra* Hampson, [1893] but it has clearly delineated, if small, transparent fenestrae on the forewings, while the hindwings are bright orange-brown and lack fenestrae. It thus closely matches specimens of *H. d. ducalis* from Tajikistan and NE Afghanistan and the record represents a large south-eastward extension to the known range of this species. Consequently, *Hemaris rubra* must be removed from the list of hawkmoths of Ladakh. In the same collection, there is also a specimen of *Hyles hippophaes bienerti* (Staudinger, 1874) from "Panomik" (= Panamik) in the "Nubro" (= Nubra) Valley, Ladakh, collected by A. Avinoff (= Avinov) in viii. 1912. This is the only known locality for this species in India.

Hyles gallii (von Rottemburg, 1775) is a well-known Holarctic species, which Bell & Scott (1937) reported from the Gurais Valley (= Gurez valley) in Kashmir and the Chumbi Valley in Tibet (= Xizang Zizhiqu). There are also records of this moth in the BMNH from the Nepalese Himalaya and SE Tibet ("Sikkim, Yatong [Yadong], Bingham"). The BMNH also holds apparently previously unreported specimens of *H. gallii* from the Tagalang Pass ("Himalaya Mts. Gya Ladakh Tagalang Pass 5000 m, vii.", and "Gya Ladakh Tagalang Pass 16000–17000 feet, vii.") and Stagmo (A. Avinoff vii. 1912) in Ladakh.

Material and methods

In addition to the specimens from Ladakh in the BMNH mentioned above, another large collection of Indian hawkmoths, at the University Museum, Oxford, UK, was studied by the first author in 1991. However, no specimens from Ladakh were found.

In vii. 2008, one of us (PS) had the opportunity to study the early stages of the hawkmoth genus *Hyles* Hübner, [1819] near Leh, Ladakh. Larvae of two species, *Hyles gallii* (Figs. 2a, 2b) and *H. nicaea lathyrus* (Walker, 1856) (Fig. 3), were found, feeding on a low (up to 25 cm high) local spurge, which the State Forest Department identified as *Euphorbia stracheyi* Boiss. More than three dozen larvae were found, of which a small number of each were reared through to the adult stage.

Observations

In the area around Leh, *Euphorbia stracheyi* is not difficult to find in the desert areas around villages, especially

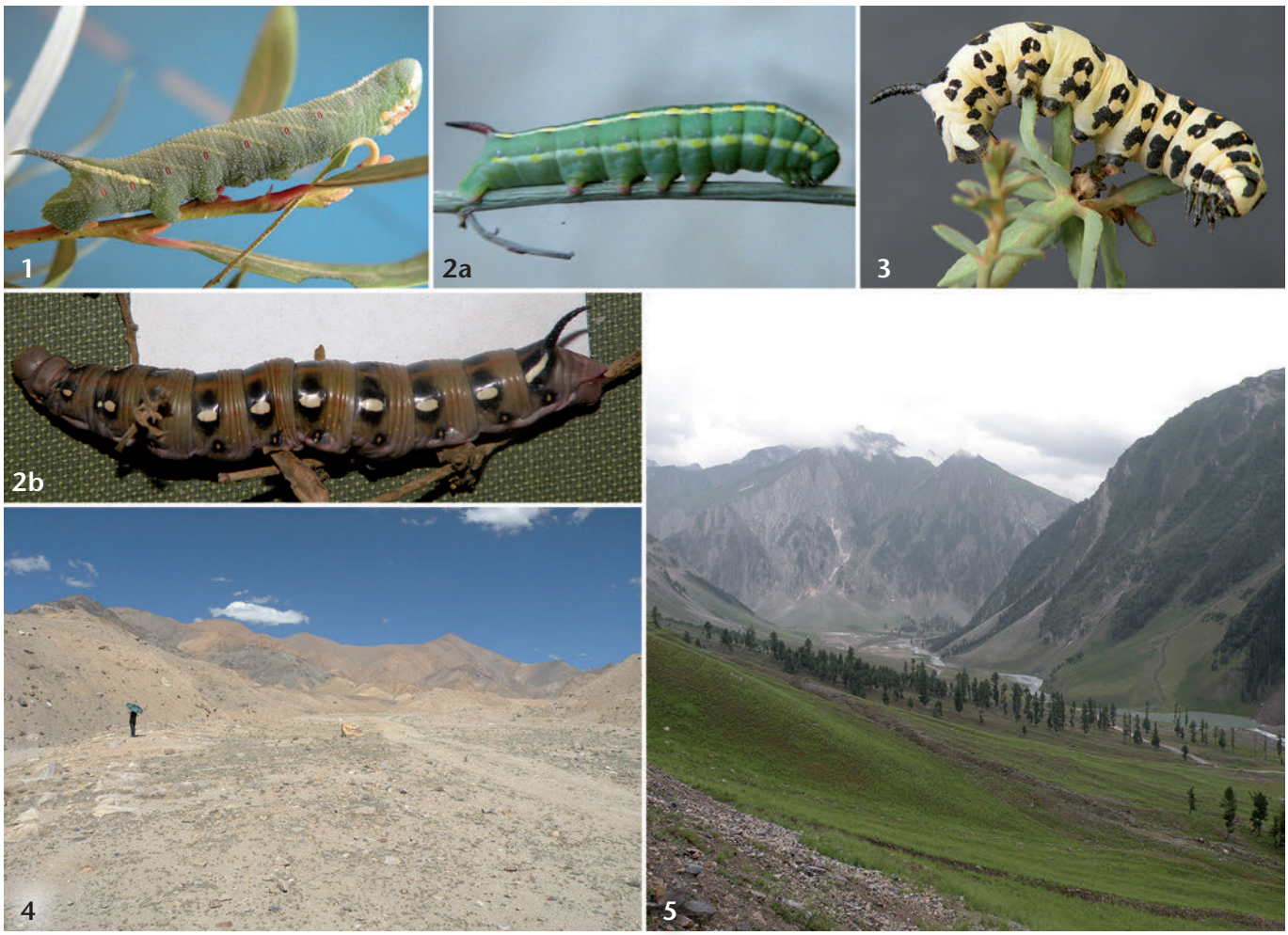

Fig. 1: Larva of *Smerinthus kindermannii*. **Fig. 2:** Larva of *Hyles gallii*. **Fig. 2a:** penultimate instar (L_4). **Fig. 2b:** last instar (prepupa). **Fig. 3:** Larva of *Hyles nicaea lathyrus*. **Fig. 4:** Habitat of *Hyles nicaea lathyrus* and *Hyles gallii* above Chubi, Leh, Ladakh, India (4500 m). **Fig. 5:** Baltal, Kashmir, showing the intense grazing pressure.

at elevations of between 3600 and 4000 m. Plants can be scattered, with the distance between the closest individuals varying from a metre to almost fifty metres, as in the desert along the road to the Khardung La (Fig. 4). In other localities, the plants grow much closer together and might conceivably be described as "gregarious".

In some areas where *E. stracheyi* grows singly, larvae of *Hyles gallii* and *H. nicaea lathyrus* were found in all instars. However, some valleys with scattered plants did not yield a single larva. Where they did occur, larvae were not rare, with one larva being discovered on perhaps every ten plants examined, but in one place where the plants could be described as growing gregariously, not a single larva was found, although more than a hundred plants were examined. The noteworthy point was that each plant generally supported only a single larva, whatever its stage of development. Only one plant with two larvae was found. It was not an exceptional plant in any other obvious way, but it harboured both a fully-grown (L_5) and a young (L_1) larva of *H. n. lathyrus*.

The larvae fed mostly at night. In captivity, they required no water so long as their fodder was fresh. This is in keeping with the climate, as practically no rain falls, nor is there any dew at night. When kept together in a box, they showed no reluctance to share their fodder or space with other larvae in every stage of development. When handled, larvae of neither species showed any overt indications of defensive behaviour, such as that which Bell & Scott (1937) described for larvae of *H. nervosa* (see the next section).

Both *H. gallii* and *H. nicaea lathyrus* pupated in a chamber formed of loosely woven sand and dry twigs of their hostplant, at or near the base of the plant.

Discussion

Bell & Scott (1937) stated that they bred *Hyles nervosa* in "Ladakh; foot of the Zoji La Pass, Kashmir; Changla Gali" at elevations of from 8000 feet (2438 m) to 9000 feet (2743 m). The former two localities are in the state of Jammu and Kashmir while the latter is near Murree in Pakistan. According to these authors, "the larvae are extremely local, but occur in very large numbers in a very restricted area in July and August ... The larvae live gregariously. They feed voraciously, and when they have stripped the leaves from one plant move on to another. The food-plant itself grows gregariously, and thus large numbers of the larva can be found in a very small area. Their colouring makes them very conspicuous on the green stems and leaves of the foodplant, which has

bright golden-yellow flowers and bracts, but they do not appear to make any attempt to conceal themselves, though when full-fed they lie stretched along the stem close to the earth. When alarmed they throw back the head and anterior segments and eject drops of greenish fluid from the mouth."

Polunin & Stainton (1984) give the range of *Euphorbia stracheyi* as Kashmir to SW China and Tibet between 3300 and 4700 m. This might exclude this plant from being a host plant of *H. nervosa*, which is stated to have been bred at a rather lower elevation. In addition, we can find no record for *E. stracheyi* in Pakistan. This leaves unanswered the question regarding where and on what plant Bell & Scott (1937) reared *H. nervosa* in Ladakh. Lacking any definite data, the only information we have is that Bell & Scott reared *H. nervosa* up to an elevation of 2743 m. The town of Kargil in western Ladakh at 2700 m is the lowest place in Ladakh, so it seems most likely that Bell & Scott reared their moths there. There is a specimen of *H. nervosa* in the BMNH with the data "Baltal v. 1922, T. R. Bell" and another from "Changlagali, Murree district, iv.–v. 1927 F. B. Scott", but no specimen from Ladakh. Baltal is a village on the western side of the Zoji La Pass, the second location where Bell & Scott (1937) reported they had bred *H. nervosa*. The Zoji La Pass separates the lush Vale of Kashmir from the cold desert of Ladakh.

Both Baltal and Changla Gali presumably have *Euphorbia wallichii* Hook. F., which is found from Afghanistan to SW China, between 2300 and 3600 m (Polunin & Stainton 1984). It has bright golden yellow flowers and bracts and is thus very conspicuous. However, PS searched the Baltal (Fig. 5) and adjoining areas as far as the ruined Buddhist temples of Naranag for both this plant and any other *Euphorbia* species in viii. 2009, but there is such tremendous grazing pressure there from sheep, goats and horses that the entire tract simply has no *Euphorbia* shrubs. Enquiries via photographs and verbal descriptions to local experts, namely the herb-hunters of the Government-run medicinal plant farm in Baltal, confirmed that neither *E. wallichi* nor any other *Euphorbia* had been seen by them in the area. One knowledgeable tourist asserted that four species of *Euphorbia* have been recorded from the Kargil area, but PS could not find any authority to support this view. There is a possibility that the "Ladakh Hawkmoth", *Hyles nervosa*, actually breeds only in a very restricted area in western Ladakh and not in the higher regions that constitute most of Ladakh.

Hyles nicaea lathyrus is a little known subspecies of a widespread Palaearctic hawkmoth. Pittaway & Kitching (2000–2007) report that the typical race is "an elusive, local and scarce species, disappearing from well known areas for many years only to appear suddenly in others. Frequents isolated, very sunny, well drained, stony limestone slopes with scattered clumps of *Euphorbia*." In the Himalaya, Bell & Scott (1937) reported it from "West Himalayas, as far east as Nainital". The only specimens of *H. n. lathyrus* in BMNH are from Almora and Nainital in the Kumaon Himalaya, which adjoins the western border of Nepal with India. There is also a specimen from Tibet, collected by Savage-Landour. PS has searched for this moth in the Nainital area for many years, but has been unable to find it. It has also been reliably reported from eastern Afghanistan by Ebert (1969).

Now that the larval habitat is known, it is possible to surmise that the only place in the Kumaon Himalaya with a similar habitat for this moth is the trans-Himalayan area. Individuals from there might conceivably have travelled to Almora and Nainital, which are in the middle and outer ranges of the Himalaya respectively.

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