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## Lachryphagous Lepidoptera recorded for the first time in Laos and China

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Near Luang Prabang, N. Laos, adult *Lobocraspis griseifusa*, *Tarsolepis sommeri*, and *Pionea aureolis*, and in the extreme south of Yünnan, S. W. China, *Hypochrosis hyadaria* and *P. aureolis* were seen feeding on lachrymation at eyes of water buffalo. A further 15 species in China and 7 in Laos tried to settle at the eyes, or imbibed other body fluids (especially mosquito-exuded blood-droplets), or were attempting to alight on water buffalo. They are mostly species well-known to be lachryphagous in Thailand. The different feeding habits of such zoophilous moths imbibing mammal body fluids (urine, sweat, wound exudates, mosquito-exuded blood-droplets, lachrymation, etc.) directly from the host and/or from vegetation contaminated with them, are discussed together with the observation that the moths prefer lachrymation in drier biotopes and periods.

Observations in Laos and China were undertaken in order to widen knowledge about the geographical distribution of lachryphagy in Lepidoptera, i. e. the feeding on lachrymal discharge by adult moths, of which as yet there has been no record in the two countries. Notwithstanding that for some species lachryphagy is the main if not only feeding habit, it is but a specialized aspect of a much broader zoophilous behaviour in many Lepidoptera which are attracted to a broad variety of mammal body fluids. For this reason, detailed attention was also given to this type of feeding.

Lachryphagous moths have been known from tropical America (SHANNON, 1928), Africa (e. g. REID, 1954), and several countries in Asia, especially the S. E., as Cambodia (BÜTTIKER, 1959), Thailand (BÜTTIKER, 1964; BÄNZIGER, 1973), and Malaysia (BÄNZIGER, 1973).

The study in Laos dates back to March 1973 when parts of the country were still open to Westerners.

The recent visit to China was possible thanks to her new «open door» policy towards the West. But travelling there can still be arduous: the author had to travel some 10 000 km (Fig. 2), a total of 5 days and nights by train, twice by bus, 4 times by plane; this being one of the shortest permitted ways to reach the observation sites, admittedly well off-the-beaten-track but only about 400 km from Chiangmai as the crow flies (Fig. 1).

### OBSERVATION SITES

#### *Laos*

Ban Kok Ngiew, 14 km S of Luang Prabang (Fig. 1). Checked 25 water buffalo, 6 swine, 2 pony on 4 nights (28.-31.3.73) at 6 spots adjacent to a Kha Mu village, bordered by hills with pineapple, banana, rice fields and, higher up, by deciduous forest.

<sup>1</sup> On a Thai-Swiss research and teaching program

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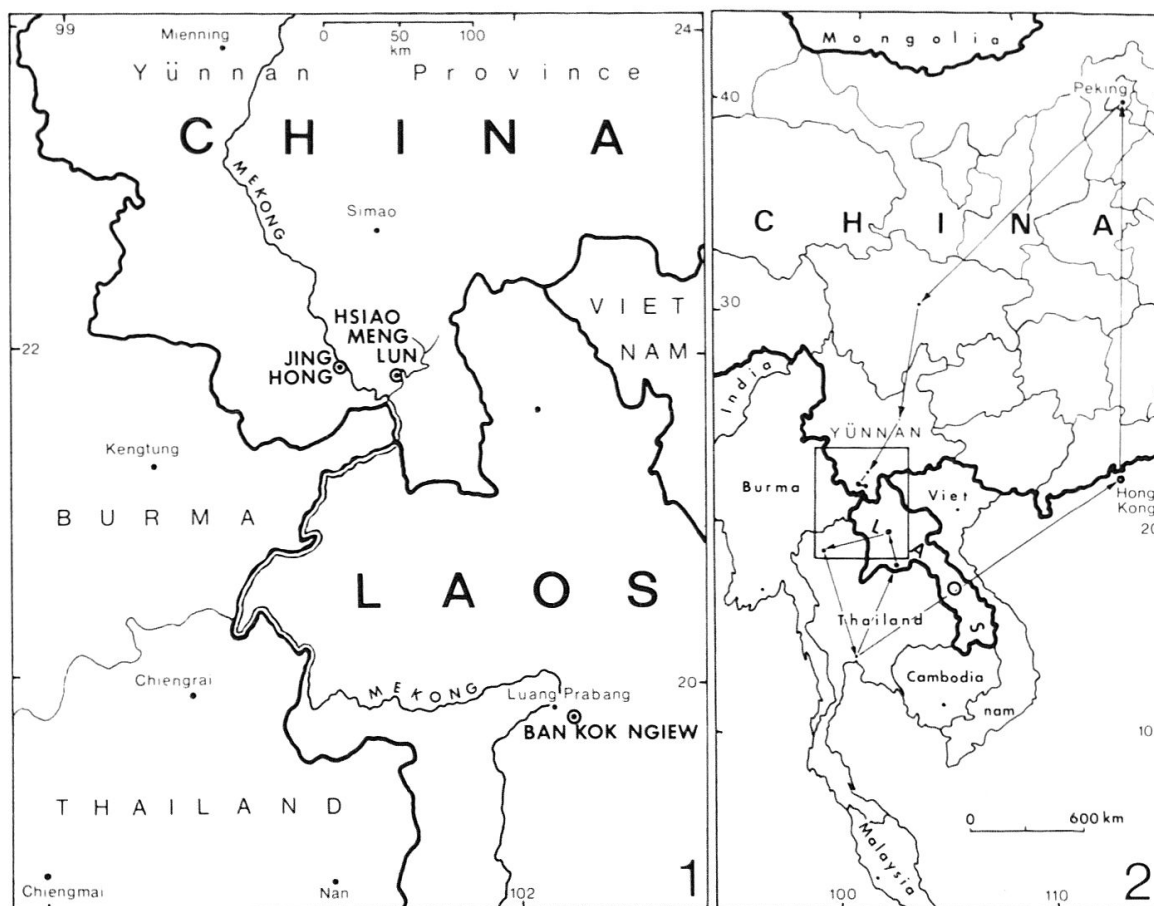


Fig. 1: Detailed map of observation sites in China and Laos.

Fig. 2: General location of map area shown in Fig. 1, with travelling routes.

### China

Hsiao Meng Lun, 560 m a.s.l., Meng La County, some 100 km SE of Jing Hong, capital of the Hsi Shuang Banna Autonomous District in the southernmost area of Yunnan Province (Fig. 1). Seen 10–30 water buffalo, 5–7 zebu, 3–4 swine over 7 nights (13.–19.6.81) between 20.30–01.00 h. Animals were kept in open shed, under thatched roof or typical stilt house of a Dai village 100 m from the Luosuo river, with rice fields, some secondary vegetation (and also some primary vegetation on nearby hills) besides rubber plantations. Vegetation not unlike that of N. Thailand but climate more humid, allowing rubber cultivation; fog is said to be frequent during the cool season.

Jing Hong. No zoophilous moth was seen on over 20 water buffalo and 30 zebu in town vegetation on the Mekhong river, 11. and 20.6.81.

### LEPIDOPTERA OBSERVED IN LAOS

#### Noctuidae

##### *1. Lobocraspis griseifusa* HAMPSON (fig. 3–5)

Some 40–50 specimens, mostly sucking lachrymation at eyes, or flying off or to the eyes of water buffalo.

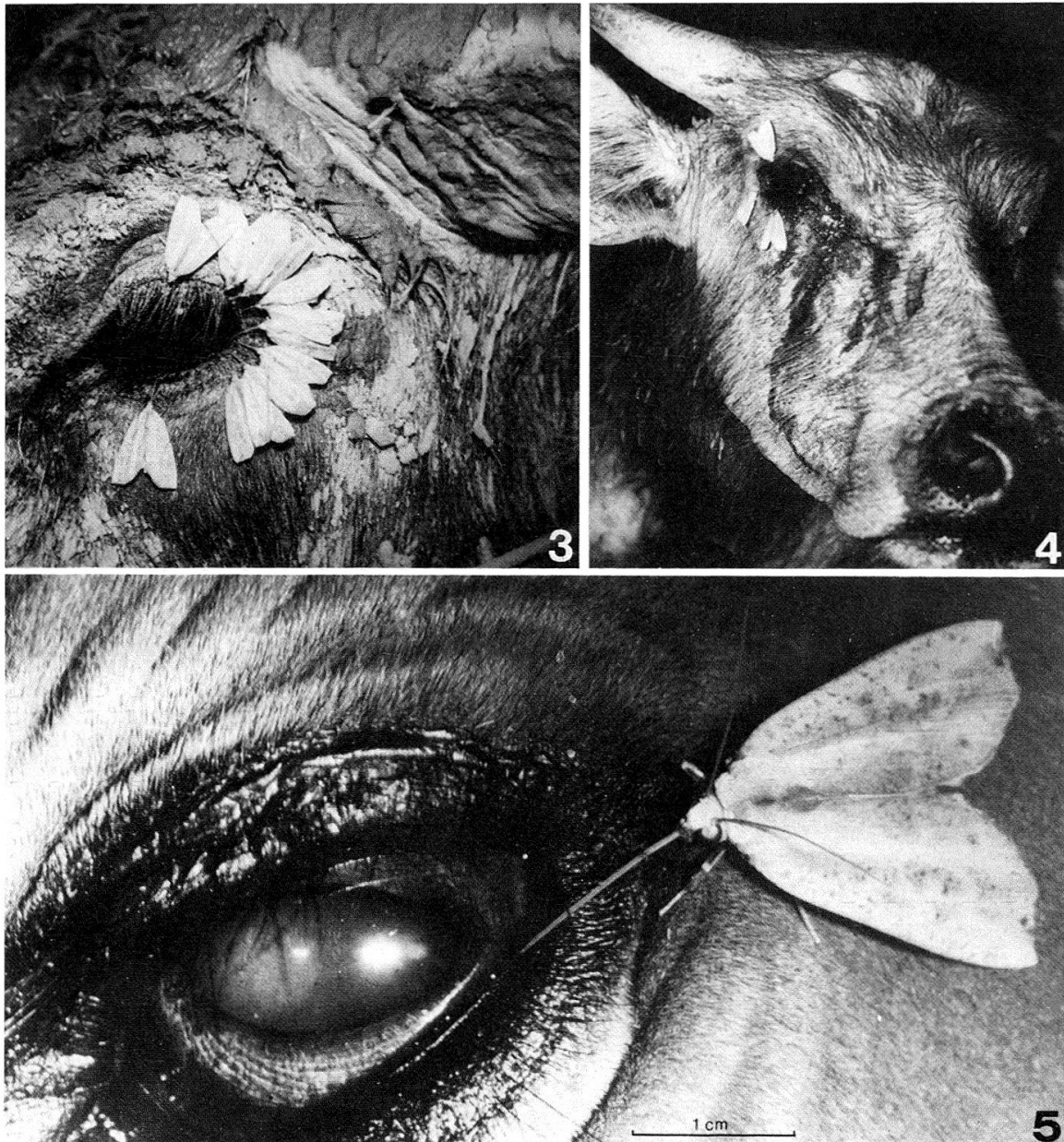


Fig. 3: Nine *Lobocraspis griseifusa* sucking lachrymal fluid from the eye of a water buffalo. Chiangmai, 1967.

Fig. 4: Three *L. griseifusa* sucking lachrymation from the eye of a water buffalo. The inner corner of the eye and part of the lachrymation rills flowing down the cheek are purulent. Leucocytes were nearly always found in the moth's midgut. Saraburi, C. Thailand, 1975.

Fig. 5: *L. griseifusa* imbibing lachrymation from the eye of a zebu. Note the long soft proboscis laid onto the lower eye lid of the host. Chiangmai, 1972.

## *Geometridae*

### 2. *Hypochrosis baenzigeri* INOUE

One specimen flew around water buffalo. This species, recently described by INOUE (1982), was referred to as *Hypochrosis* sp. 2 (sp. nov.) in BÄNZIGER (1973; fig. 13, 19), a frequent visitor of elephants' eyes in forested areas in N. Thailand.

3. *Hypochrosis iris* BUTLER

Two specimens flew around water buffalo.

4. *Hypochrosis pyrrhularia* GUENÉE

One specimen flew around water buffalo.

5. *Problepsis vulgaris* BUTLER

One specimen imbibed skin secretions and probably mosquito-exuded blood-droplets on water buffalo.

6. *Sabaria* sp. aff. *incitata* WALKER

One specimen tried to alight on face and eyes and another flew around water buffalo.

This species had formerly been identified as *Sabaria incitata* at the B.M. However, genitalic examination of Thai and Lao specimens show that these are different from *S. incitata* illustrated in HOLLOWAY (1976, Fig. 563).

7. *Scopula* sp.

One specimen sucked mosquito-exuded blood-droplets on water buffalo.

*Pyalidae*

8. *Pionea aureolalis* WALKER (cf. Fig. 6)

One specimen imbibed lachrymal fluid just below the eye where it flowed down the cheek of a water buffalo.

9. Unidentified *Pyalid* (probably *Pionea damastesalis* WALKER)

One specimen sucked mosquito-exuded blood-droplets, one flew nearby a water buffalo, another nearby a pony.

*Notodontidae*

10. *Tarsolepis sommeri* ssp. aff. *dinawensis* BAKER

6-8 specimens, two of which sucked lachrymation, while the remainder tried to settle on head of water buffalo.

LEPIDOPTERA OBSERVED IN CHINA

*Geometridae*

1. *Hypochrosis flavifusata* MOORE (Fig. 7)

10-12 specimens, 1 of which settled on face, 3 on body, 2 attempted to land on head, remainder flew persistently around water buffalo.

2. *Hypochrosis hyadaria* GUENÉE (Fig. 9)

15-21 specimens, 1 of which imbibed lachrymal fluid for some 2 minutes at eye, 1 settled twice on face but was flicked off, 6-9 attempted to land on head, 3 settled on body, remainder flew around water buffalo.

3. *Hypochrosis iris* BUTLER

2 specimens settled on body, 1 flew nearby water buffalo.

4. *Problepsis albidior* WARREN (Fig. 8)

1 specimen avidly sucked mosquito-exuded blood-droplets (Fig. 10) for some 5 minutes on water buffalo.



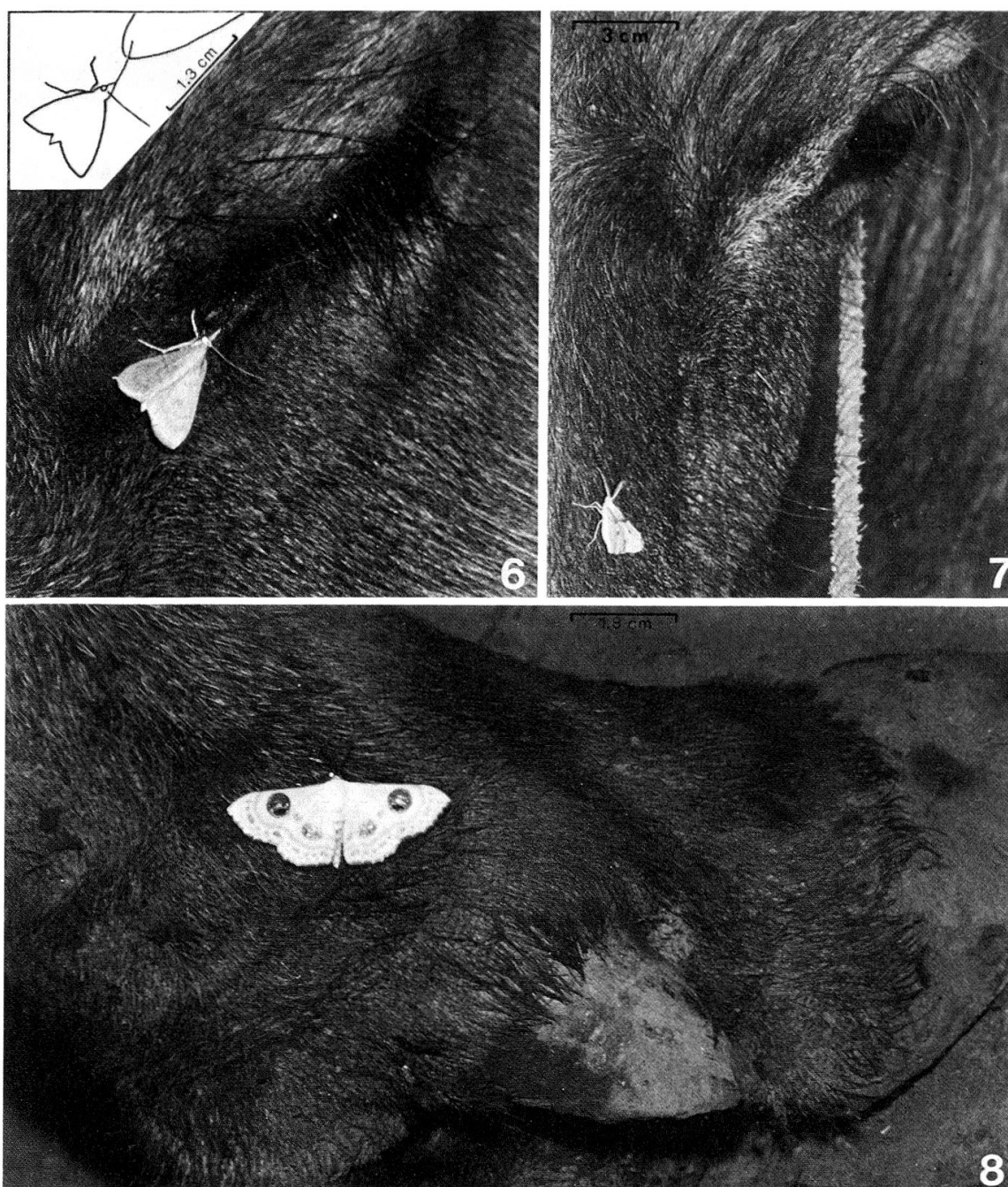


Fig. 6: *Pionea aureolalis* sucking lachrymation at the eye of a water buffalo. Insert showing the short proboscis reaching the inner corner of the eye. Hsiao Meng Lun, 1981.

Fig. 7: *Hypochrosis flavifusata* crawling on the face of a water buffalo in search of lachrymation. Hsiao Meng Lun, 1981.

Fig. 8: *Problepsis albidior* imbibing mosquito-exuded blood-droplets on a water buffalo's leg. Hsiao Meng Lun, 1981.

##### 5. *Scopula lacriphaga* sp. nov.

2 specimens attempted to settle on body of water buffalo. This and the following species were caught in numbers on or near mammals in N. Thailand during the past few years. They will be described soon.

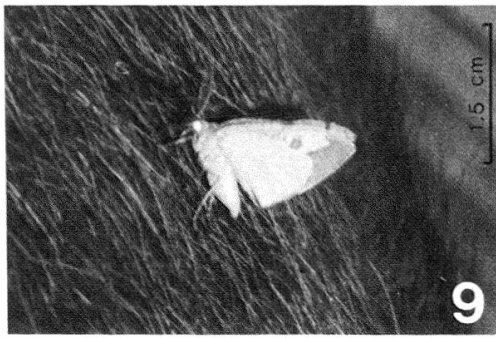


Fig. 9: *Hypochrosis hyadaria* sucking mosquito-exuded blood-droplets and perspiration on a water buffalo. Hsiao Meng Lun, 1981.

Fig. 10: Engorging mosquito on a water buffalo exudes a blood-droplet at the anus. Padang Rengas, Perak, N. W. Malaysia, 1972.

Fig. 11: *Filodes mirificalis* sucking mosquito-exuded blood-droplets on a water buffalo. Note engorging mosquitoes (oblique arrows), droplets of blood (horizontal arrows) and the moth's extremely long proboscis (small arrows) reaching a group of hairs contaminated with blood (blood-droplets already ingested to a wide extent). (Drawn from the original colour slide). Padang Rengas, Perak, N. W. Malaysia, 1972.

6. *Scopula haematophaga* sp. nov.

1 specimen imbibed mosquito-exuded blood-droplets on water buffalo.

7. *Scopula* sp. aff. or same as *actuaria* WALKER

1 specimen imbibed mosquito-exuded blood-droplets on water buffalo.

8. *Semiothisa nora* WALKER

1 specimen persistently sucked mosquito-exuded blood-droplets, 1 flew nearby water buffalo.

The *S. nora* reported here from S. W. China is a good species distinct from *S. «nora»* reported by the author earlier as a lachryphagous species in Thailand and Malaya (BÄNZIGER, 1973) and actually represents the first record of the species as a zoophilous, blood-licking species.

In the above-mentioned paper (*l. c.*) *S. fasciata* and *S. «nora»* have been listed as two separate species, though it was commented that their genitalia were not distinguishable. During a recent visit by the author to the British Museum (Nat. Hist.), London, to carry out new and to check old identifications with the invaluable help of the specialists there, it became clear that our «*nora*» should indeed go under *fasciata* FABRICIUS. However, Dr. J. D. HOLLOWAY (*in press*) recently found that *S. fasciata* is invalid (*preoccupied*) and that the correct name for this species is *S. eleonora* STOLL.

9. *Semiothisa khasiana sinotibetaria* WEHRLI

1 specimen flew near water buffalo. The species was caught in considerable numbers on or near mammals in N. Thailand.

*Pyalidae*

10. *Filodes mirificalis* LEDERER (Fig. 11)

1 specimen tried repeatedly to settle on head and body of water buffalo.

Re-identification at the B. M. showed that what had formerly been mentioned as *F. fulvidorsalis* HÜBNER (BÜTTIKER, 1964; BÄNZIGER, 1973) actually should go under the above *F. mirificalis*. The present observation from China thus does not represent a new record. *F. fulvidorsalis* is a much smaller species also found to be attracted to mammals. So far, however, it has not been proven to suck lachrymation and/or body fluids on mammals, quite unlike *F. mirificalis*.

11. *Pagyda salvalis* WALKER

1 specimen sucked mosquito-exuded blood-droplets on body, another on leg, 4–6 attempted to settle on head and body of water buffalo.

12. *Pionea aureolalis* LEDERER (Fig. 6)

20–25 specimens, of which 3 imbibed lachrymation directly at the eye (1 case after several unsuccessful attempts), 1 imbibed it at a few cm below the eye where lachrymation had flowed down, 4 settled and 3 made attempts to settle on head, and remainder tried to settle on body of water buffalo. One specimen settled on the author's hand, arm and face in three separate landings, sucking perspiration but not lachrymation.

*P. aureolalis* as understood here may actually consist of 2–3 different species or subspecies. Also, the generic status is likely to change but as Mr. M. SHAFFER (*in litt.*) confirmed, the present name is still the best placement until a revision of this and related genera is carried out.

13. *Pyrausta nigrescens* MOORE

2 specimens imbibed mosquito-exuded blood-droplets on the body and 3 flew nearby a water buffalo.

As with the above, the generic status is not correct (SHAFFER, *in litt.*).



14. *Mabra haematophaga* sp. nov.

4 specimens tried to settle on head and body of water buffalo.

Both this and the following species have been found in numbers on or near mammals in N. Thailand and Malaysia. They will be described soon. As with the above, the generic status of both species is not correct (SHAFFER, *in litt.*).

15. *Mabra elephantophila* sp. nov.

2 specimens sucked mosquito-exuded blood-droplets on water buffalo.

16. «*Pionea*» sp.

1 specimen sucked mosquito-exuded blood-droplets on water buffalo.

*Notodontidae*

17. *Tarsolepis sommeri* HÜBNER

One specimen fell off the face of a water buffalo where it must have been sucking lachrymation when it was caught by the author's torch light beam. The specimen belongs to the same large, typical subspecies which was found to be lachryphagous in Malaya. In N. Thailand, and Laos, there is a rather smaller subspecies, similar to *T. sommeri dinawensis* BAKER from Papua New Guinea.

DISCUSSION

As already implied, in forest biotopes in S. E. Asia the vast majority of probably several hundred species of zoophilous Lepidoptera which may be encountered at night in the close neighbourhood of ungulate and proboscideate mammals, never, or some of them only rarely, imbibe lachrymation from such hosts. Lachrymation is used here in the sense of lachrymal discharge which contains varying amounts of leucocytes, microorganisms and epithelial cells besides the lachrymal secretion proper. The moths may feed upon excreta or much more often on secretions such as sweat, sebum, wound exudates (blood, serum, etc.) or the tiny blood-droplets expelled anally by mosquitoes feeding on the host (Fig. 10). Occasionally these mosquito-exuded blood-droplets may be present by the hundreds on the host, mostly buffalo or cattle, or may form literally a red band on the ground outlining the body of the sleeping host. Most species «lick» off these fluids from the vegetation which has come into contact with the mammals and hence is contaminated with such body fluids; these species are not considered here further. A number of species may additionally settle directly on the host to suck the fluids. Only a minority also feed on lachrymation as oligo- and hemilachryphagous moths, depending on whether they do so occasionally or more frequently. So far the only species for which there is reasonable evidence that it normally feeds exclusively on eye discharges is the therefore eulachryphagous *Lobocraspis griseifusa*.

*Filodes mirificalis* (as *F. fulvidorsalis*), *Pagyda salvalis*, *Pionea aureolalis*, *P. damastesalis*, *Problepsis albidior*, *Tarsolepis sommeri*, and the 5 *Hypochrosis* sp. are all known from Thailand and/or Malaysia where they feed on lachrymation as well as on mammal body fluids of several ungulates (BÄNZIGER, 1973). But while *F. mirificalis* was nearly always seen feeding only at the eyes, *P. albidior* was rather less frequent; and *H. pyrrhularia* and *P. salvalis* where rare at the eyes, more often seen attempting to settle, successfully or not, on the body of mammals, and most

frequently on the vegetation contaminated with these fluids. *H. baenzigeri* was frequent at elephants' eyes and body, as the other species of the genus were on other hosts, while *Pyrausta nigrescens*, *Mabra haematophaga*, *M. elephantophila*, *Scopula lachryphaga* and *Semiothisa khasiana sinotibetaria* have only recently been seen feeding on lachrymation in Thailand, though they far more often fed upon the mentioned body fluids (in prep.).

Of *Sabaria* sp. aff. *incitata*, «*Pionea*» sp., *Problepsis vulgaris*, *Scopula haematophaga*, *S.* sp. aff. *actuarial*, *Scopula* sp., and *Semiothisa nora* there is no lachryphagous record as yet, but the first has repeatedly been observed trying to alight on the body of mammals in Thailand, while for the latter six the first published records showing them to have zoophilous tendencies are presented here. Closely related as they are to well-known lachryphagous species it is likely that these are also at least oligolachryphagous.

The zoophilous Lepidoptera observed in S. W. China in June exhibited a rather weaker lachryphagous propensity and a more pronounced preference for the various mammal body fluids than in N. Thailand during the same season. In humid areas and seasons a shift from lachryphagy towards feeding upon different mammal body fluids has been repeatedly observed, but this change generally seemed more pronounced in China than elsewhere. In respect to the moths' weaker lachryphagous propensity, China is nearer to Malaya than to N. Thailand. This «inconsistency» is also reflected in the rubber cultivation (present in the former two, absent in the latter), in the distribution of the large subspecies of *T. sommeri* (present in the former two, lacking in the latter) and possibly that of *L. griseifusa* (lacking in the former unless it was overlooked, rare in S. Thailand, common in the latter).

The above-mentioned shift in food preference may be induced by an increased need for watery fluids (e. g. lachrymation) in dry climates when, in addition to water deficiency, skin exudates are probably too concentrated because of water evaporation to be acceptable. In humid climates there is less need of water, there are generally more mosquito-exuded blood-droplets, wounds tend to be more persistent, skin secretions do not dry up so quickly and dew on the vegetation makes it possible for the secretions to be imbibed from this.

While the presence in Laos of *L. griseifusa*, the most frequent, specialized and advanced lachryphagous species of S. E. Asia, came as no surprise, its absence from S. W. China was unexpected. The author found the species up to at least 1150 m altitude near Chiangmai and to 20.2° N latitude (near Mae Chan, Chiangrai Province, only some 250 km south of Hsiao Meng Lun) in N. Thailand. Since climate, vegetation and orography are not too dissimilar from those of N. Thailand, it is assumed that failure to observe the species at the study site in China is possibly accidental.

With the exception of *L. griseifusa*, as usual only males were found to be zoophilous.

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## ZUSAMMENFASSUNG

*Lacriphage* Lepidopteren zum ersten Male in Laos und China nachgewiesen – 6 Arten von Geometriden, 2 von Pyraliden, 1 von Noctuiden und 1 von Notodontiden wurden beim Befallen von Wasserbüffeln bei Luang Prabang, N. Laos, gesehen. *Labocraspis griseifusa* wurde oft, *tarsolepis sommeri* und *Pionea aureolalis* wurden nur gelegentlich an den Augen des Wirtes gesehen, während die anderen Falter andere Säugetier-Körperflüssigkeiten am Wasserbüffelrumpf (vor allem die von Stechmücken anal ausgeschiedenen Bluttröpfchen) aufnahmen, obwohl sie mit Ausnahme von 3 Arten bekannte lacriphage Falter in Thailand sind.

9 Arten von adulten Geometriden, 7 von Pyraliden und 1 von Notodontiden, mit 4 Ausnahmen alles bekannte lacriphage Nachtfalter in Thailand, wurden beim Befallen von Wasserbüffeln im extremen Süden von Yünnan, S. W. China, beobachtet. Nur *Pionea aureolalis* und *Hypochrosis hyadaria* wurden beim Saugen von Tränenflüssigkeit gesehen, während die restlichen versuchten, an den Augen zu landen, oder sie nahmen die oben genannten Körperflüssigkeiten auf, oder sie versuchten, sich auf den Rumpf der Tiere zu setzen. Die häufigste und typischste lacriphage Art S. O. Asiens, *L. griseifusa*, wurde nicht beobachtet, obwohl sie in der Gegend zu erwarten wäre.

Die verschiedenen Ernährungsweisen dieser zoophilen Nachtfalter, die Säugetier-Körperflüssigkeiten (Urin, Schweiß, Serum und andere Wund-Flüssigkeiten, die von Stechmücken ausgeschiedenen Bluttröpfchen, Tränenflüssigkeit etc.) direkt vom Wirt aufnehmen, oder indirekt da, wo sie an der Vegetation abgestrichen wurden, wird diskutiert, zusammen mit der Tendenz, in trockenen Biotopen und Perioden Tränenflüssigkeit vorzuziehen.

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