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Miscellanea.

Observations on Feeding Habits of Adult Westermanniinae (Lepid., Noctuidae) in Cambodia.

By W. BÜTTIKER.

Field observations of feeding habits of adults of the genus *Arcyophora* (Westermanniinae) which were summarized by REID (1954) referred to Africa only, where moths were found feeding on the lachrymal secretions of cattle, horses, mules, donkeys and wounded antelopes.

REID (1954) describes his observations from the Sudan that "The probing must irritate the eye considerably as the host animal blinks frequently and there is a greatly increased lachrymal secretion by the blinking; sometimes the moth is dislodged to get sufficient liquid from one point; in these cases it then moves rapidly round the eye to another vantage point and immediately continues its probing."

An interesting observation was made by S. A. NEAVE (in REID, 1954), in South Africa where many moths were found sucking fluid, but no blood, from the eyes of a wounded animal.

There is still very little known of the larval host plants of the species in this genus. MUKERJEE (1941) recorded *A. dentula* from pomegranates (*Punica granatum*) (Lythraceae) at New Delhi (India), where he observed the caterpillars gnawing holes in leaves, leaving at first the epidermis of one side intact, in between veins but ultimately almost entirely defoliating the plant in considerable numbers from the middle of September to the middle of October.

Fully fed larvae of *A. longivalvis* were observed by PLATT (1921) in Natal, South-Africa, on *Combretum Gueinzii* in May and November. The same author recorded the adults mainly from well-wooded country characterized by the presence of *Terminalia* and *Combretum*¹.

A synonymic revision of the genus *Arcyophora* was made by FLETCHER (1954) and key to the species has been devised. The opinion was expressed that these moths will eventually be found to be of economic importance which was showed in the investigations on sheep by Drs. DU TOIT and S. STAMPA of the Department of Veterinary Services, Onderstepoort, Union of South Africa.

No observations regarding the eye-frequenting habits of the entire genus of *Lobocraspis* were made previous to our investigations; the same applies also to the Asiatic species of *Arcyophora*.

Records from Cambodia.

During a recent assignment to Cambodia entomological night collections were carried out and offered an opportunity for recording adult feeding habits of noctuid moths collected from two different regions of that country. The identification of the two species revealed *Lobocraspis griseifusa* Hampson and *Arcyophora sylvatica* sp. nov.²

¹ The genera *Combretum* and *Terminalia* both belonging to the family of Combretaceae, are represented in Cambodia by at least 7 species (viz.: *T. tomentosa*, *T. mucronata*, *T. chebula*, *T. nigrovenulosa*, *T. bialata*, *T. catappa*, and *C. quadrangulare*). These species all belong essentially to the open type forest ("forêt claire" or "savane pauvre") and were represented in more than 90% of a large series of plot enumerations in that country.

² *Lobocraspis griseifusa* was known from a single female only and had been

The main purpose of our night inspections was the collecting of mosquitos using water buffaloes and cattle as bait animals. The records which were obtained simultaneously refer, therefore, to bovines only. Observations on horses, ponies, donkeys were not carried out in connection with these studies.

The moths flew fairly directly to the face of the animals, only in some instances did we observe some circling around the bovines before alighting near the eyes. Occasionally it was a direct approach to the eyes and on several occasions the specimens arrived on the lateral or lower part of the face and made their way straight to the feeding place. As a rule the moths crawled to the lower edge of the eyes and after some probing the proboscis was extended between the cornea and the lid. We have noticed several times 6 to 8 moths clustered at the lower edge of the eyes and twice a maximum of 12 specimens were counted on a single eye.

As far as our observations on *Lobocraspis griseifusa* and *Arcyophora sylvatica* in Cambodia are concerned, very little irritation seemed to be caused by these insects. In almost all instances alighting moths were well tolerated and only in very rare occasions the bovines shook the head, which resulted in a take off of the specimens. However, sometimes even heavy shaking of the head did not disturb the moths. Neither did we observe a greatly increased lachrymal secretion (except in one case of an initial stage of ophthalmia) nor did we see moths settling on the nostrils or lower parts of the face.

Many specimens were observed for a considerable time imbibing the secretion of the eyes and in several instances periods over 10 and 15 minutes were spent by the moths feeding incessantly. When disturbed by our direct hand collecting operations on the cattle's face the specimens left the host quickly, took to their wings and flew slightly upwards, in the direction of the wind and somewhat faster than a good walking pace. A certain percentage returned, however, to the host animals and did so again after several disturbances.

It would appear that the two species observed in Cambodia attach themselves more firmly to the eyes of the hosts than do the African species and are very little disturbed by the normal or slightly excited movements of the cattle.

Collecting was a relatively easy matter and no force had to be used to detach the moths from the host animals. When kept alive in small cages, i.e. cups covered with muslin gauze, they were still very active in this type of confinement until early morning but during day time used crevices provided by folded blotting paper as hiding places. No specimens were kept alive in captivity for more than 12 hours as they were used for the precipitin test and for the specimens' collection.

The moths once attached to the eyes were not at all disturbed by strong light of our torches but were rather photophobic when on wings. In several instances observations with regard to preference for a single animal were carried out. On one occasion only did we notice a special preference for a water-buffalo out of a group of two (Kbal Trach, 29./30. 6. 58) in which case this animal attracted all the specimens present during the period of observation.

Relation to Cattle Diseases.

According to the owner of the waterbuffaloes at Kbal Trach, one animal had been blind in one eye for four weeks approximately; the moths were said to occur during the whole year round. No significance with regard to cattle diseases of any kind, as far as we could ascertain, is attached to this moth by the farmers in the two regions visited.

described from this single specimen by HAMPSON in 1895. The description of *Arcyophora sylvatica* sp. nov. will be published shortly (BÜTTIKER; in preparation).

TABLE 1.
Records of Adult Feeding Habits from Cambodia (night collections).

No.	Date	Locality	<i>Lobocraspis griseifusa</i>		<i>Arcyophora sylvatica</i>		Weather conditions	Hosts	Remarks
			observed	collected ♂ ♀	observed	collected ♂ ♀			
1	27./28. 5. 58 23.20 p.m. to 04.30 a.m.	Kbal Trach (Province Kratié, 7 km N/O of Snoul, 184 m./alt.)	> 100	5 19 ♂ ♀	0	0	cloudy, very hu- mid; warm and dark night (ap- prox. 35°C) light rain between 0.15 to 0.30	2 water- buffaloes, in a kraal	1 buffalo blind in one eye. Moths caught in centre of village. Region of dense forests
2	29./30. 5. 58 21.30 p.m. to 04.30 a.m.	ditto	less than 5	1 2 ♂ ♀	0	0	cloudy, slightly rainy	2 water- buffaloes, in a kraal in the near- by valley	moths caught 450 m. E of vil- lage; region of dense forest
3	6./8. 6. 58 21.15 p.m. to 23.45 p.m.	Beangtuik (7 km. W of Kampot)	0	0 0 ♂ ♀	0	0	cloud, slight rains	cattle	dense forest
4	7./8. 6. 58 21.15 p.m. to 22.45 p.m.	Champneul (6 km. N of Kampot)	approx. 5	0 0 ♂ ♀	0	0	cloudy	water- buffalo and cattle	one cow particu- larly preferred and one eye with cataracts
5	9./10. 6. 58 19.50 p.m. to 02.00 a.m.	Po Phnum Twea 19 km. N/E of Kampot, on Phnom Penh road	> 100	7 7 ♂ ♀	0	0	cloudy	2 water- buffaloes	police camp in centre of forest areas

6	10./11. 6. 58 22.45 p.m. to 0.00 a.m.	Sebau (5 km. N of Kep, near Kampot)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	clear, starry night	5 cows and 3 calves	locality close to hills and forests, seacoast 150 m., closest surround- ings open, culti- vated
7	11./12. 6. 58 22.30 p.m to 0.30 a.m.	Kep Tmai (8 km. N of Kampot)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	cloudy	10 cows	village away from forests, close to sea, open culti- vated area	
8	12./13. 6. 58 22.30 p.m. to 02.30 a.m.	Koc Cha Loch (24 km. NE of Kampot, on Phnom Penh road)	> 80	2	5	> 20	0	0	0	0	0	0	0	0	0	0	0	clear, starry night	2 water- buffaloes	small hamlet (type "cham- câr"), surround- ed with open forest. Foot and mouth disease in the district	
9	15./16. 6. 58 22.20 p.m. to 0.45 a.m.	Kep Tmai (2nd visit)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	rainy night	10 cows	village away from forests, close to sea, open cultivated area	
10	17./18. 6. 58 10.30 p.m. to 04.00 a.m.	Po Phnum Twea (2nd visit)	> 80	7	13	0	0	0	0	0	0	0	0	0	0	0	0	cloudy	2 water- buffaloes	precipitin tests	
Total			> 370	22	46	> 20	0	0	0	0	0	0	0	0	0	0	0				

Besides the one case of bovine ophthalmia at Kbal Trach no other records on the presence of this disease was obtained. However, when visiting the forest-village of Koc Cha Loch on the 17. 6. 58 we were informed that several cases of foot and mouth disease apparently occurred in that district. It would be of considerable practical and scientific interest to find out what rôle noctuid moths play in the transmission of the various contagious bovine diseases.

Occurrence of Moths during Night.

The moths are nocturnal and are found soon after sunset during the whole night up to half an hour before sunrise approximately. They never were seen in the daytime near the waterbuffaloes or cattle in the same place where the night catches were made. In the district of Snoul at Kbal Trach a first observation was made on the intensity of flight of *L. griseifusa*. Very many moths were found to be present during the night of 27./28. 5. 58 at 23.30 until 01.00. For half an hour or so only a few specimens were seen but afterwards large numbers were present again. At 04.30, at the end of the inspection and shortly before sunrise a fair number of specimens proved to be still present.

A second observation regarding the flight of *L. griseifusa* during one night was made at Po Phnum Twea on the 9./10. 6. 58. The records were taken at 19.50 when many moths were counted up to 23.00 approximately, but the flying and sucking activity seemed to be decreasing. By about 24.00 only occasional specimens were found to be present and by 01.30-02.30 only one moth or two (very rarely) were noticed at long intervals.

Another opportunity of recording the occurrence of *L. griseifusa* during the night was met at Po Phnum Twea on the 17./18. 6. 58, when specimens were very numerous from 22.30 to 24.00 approximately but were little in evidence after midnight and disappeared almost completely from 02.00 onwards.

The total number of *L. griseifusa* collected in the two regions of Cambodia amounted to 22 ♂ and 46 ♀. The actual number observed to be present on the eyes, however, were well over 300 specimens.

Arcyophora sylvatica was a rare species and only once 7 ♀ specimens were collected at Koc Cha Loch during the night of the 12./13. 6. 58.

Blood Smears and Precipitin Tests.

In order to obtain direct evidence of blood meals taken by the moths, dissections of stomach contents were carried out on the 29./30. 6. 58 at Kbal Trach where two series of specimens were used, i.e. at 21.35 to 21.45 consisting of 8 ♀. They contained no blood, but some watery fluid; the ovaries were very small. In a second series, at 22.30, two specimens were found with traces of blood. It appeared that the blood meal was diluted with fluid of the lachrymal secretion, as it was of pale reddish colour.

Twelve hours after collecting, the blood obtained from the intestinal system of two moths were used at Kbal Trach for microscopic slides which were kindly stained by Miss L. LOWY by employing the J.S.B. staining technique. The examination revealed the presence of red corpuscles, but no spirochaetes which might have been responsible for cattle ophthalmia were traced in these slides. The blood corpuscles, however, were already in an advanced state of digestion.

Other blood samples were obtained from the moths collected during night by subjecting them to anesthetizing with chloroform. During this procedure the digestive system was emptied by the dying moths and the ejected blood was used for the precipitin test.

Thus a total of 15 specimens were used for the performance of this test. It is of interest to note that the females as well as the males were actual blood feeders as also seen from our Table No. 2.

TABLE 2.

Precipitin Tests. Blood Meals Collected from Lobocraspis griseifusa.

Date	Place	Bloodmeals		Results	Remarks
		Specimens	Sex		
9./10. 6. 58	Po Phnum Twea (Kampot Distr.)	No. 1	♀	negative	Blood meals were tested for the presence of the blood of bovines, deer (Cervidae) and horses
		No. 2	♂	unidentified bovid	
		No. 3	♂	negative	
12./13. 6. 58	Koc Cha Loch (Kampot Distr.)	No. 1	♀	negative	
		No. 2	♀	unidentified bovid	
18./19. 6. 58	Po Phnum Twea (Kampot Distr.)	No. 2	♀	negative	The feeds contained very little serum which made possible the identification of three samples only
		No. 3	♀	negative	
		No. 4	♀	negative	
		No. 8	♀	unidentified bovid	
		No. 9	♀	negative	
		No. 10	♀	not suitable	
		No. 11	♀	negative	
		No. 12	♀	negative	
		No. 13	♀	negative	
		No. 14	♀	negative	

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