A CASE OF NASAL MYIASIS CAUSED BY THE LARVAE OF *TELMATOSCOPUS ALBIPUNCTATUS* (WILLISTON) 1893 (DIPTERA : PSYCHODIDAE)*

E. M. NEVILL AND P. A. BASSON, *Veterinary Research Institute, Onderstepoort,* AND J. H. SCHOONRAAD AND K. SWANEPOEL, *Ear, Nose and Throat Clinic, H. F. Verwoerd Hospital, Pretoria*

Early in January 1966 two psychodid larvae, preserved in formalin, were brought to Onderstepoort for identification. They had been found by an elderly Pretoria woman on discharging her nose into water on 31 December 1965.

On 5 and 14 February 1966 two live larvae were collected in the same way and brought to Onderstepoort. They were reared to the adult fly on cottonwool impregnated with a solution of bovine manure. Both larvae were in the third instar when collected. Adult flies were thereafter collected from the residence of the patient and used to establish a colony at Onderstepoort. Larvae, pupae and adults were sent to the British Museum and were identified as *Telmatoscopus albipunctatus* (Williston) 1893.

Material discharged from the patient's nose on 14 February 1966 was embedded, sectioned and examined in the Pathology Department at Onderstepoort. Microscopical examination revealed what appeared to be first instar larvae and an unidentified fungus.

On 26 February 1966 the patient was interviewed at her home. She had been suffering from a nasal condition characterized by a black nasal discharge, since about March 1965. Movements were felt in the nose at times and the first larvae were recovered on 31 December 1965. A few days earlier she had discharged from her nose what appeared from her description to be a newly emerged adult fly with wings not yet expanded. According to the patient, moth-flies had on several occasions flown towards her face so that she had had to wave them away.

It was recommended that the flies be controlled in the house by hanging Vapona† strips. These are resin strips impregnated with 0,0-dimethyl 2,2-dichlorovinyl phosphate. Strips were hung in the bedroom, kitchen and bathroom. No breeding places could be found on this or adjacent properties. Within one month of hanging the insecticide strips no more larvae were discharged from the patient's nose and she has remained free of infection during the 2 years which have since elapsed. Adult flies, however, are still present. The disappearance of the infection following the hanging of insecticide strips may thus be purely coincidental. Efforts are being made to control the probable breeding of these flies in drains and waterpipes.

MORPHOLOGY AND CLINICAL PATHOLOGY

Telmatoscopus albipunctatus (Williston) 1893

Recent descriptions of this species have been given by Del Rosario,[1] Quate,[2-4] Tokunaga and Komyo,[5] and Tokunaga.[6] From a survey of the literature the following synonyms have emerged:

Psychoda albipunctata Williston 1893.[2,3,7]
Telmatoscopus meridionalis Eaton 1894.[2,6,8,9]
P. snowii Haseman 1907.[6,9]
P. albonigra Brunetti 1908.[3]
T. albipunctatus Tonnoir 1921.[2,3]
P. erecta Curran 1926.[6,9]

T. albipunctatus is cosmopolitan in distribution.[2] Members of the sub-family Psychodinae are commonly called moth-flies because of their dense covering of scales. *T. albipunctatus* are very dark furry flies about 3 mm. long. At rest they hold their wings in a horizontal position. They are weak fliers, and walk in a brisk, jerky manner. Williams[7] has published a very comprehensive description of their appearance and biology with drawings of the various developmental stages. These drawings are reproduced in this paper (Fig. 1), as they provide an excellent visual description of the various stages. The larvae and pupae have also been figured by Johannsen[10] and Satchell.[11]

The adult flies are often seen in moist places, especially bathrooms and toilets. At Onderstepoort they have been found breeding under a dripping tap in a laboratory and in effluent from animal paddocks. Williams[7] records them breeding in sinks and drains, in dark places such as lavatories, and in Hawaii in very wet mud, water in tree-holes, rain barrels, and pools filled with leaves and debris. Efflatoun,[12] in Egypt, found larvae in a water-tank used for macerating bones, and in a small well containing foul drainage water. Macfie[8] considered that since these flies breed in filthy collections of water and thrive on faecal matter, they should be considered a sanitary danger signal. In Japan, Tokunaga[9] found them breeding in sewers and sinks.

Williams[7] determined that the life-cycle could be completed in a minimum period of 17 days (larval period 12 - 15 days). The colony at Onderstepoort was reared at 26°C on a medium consisting of fresh bovine manure, soil and vermiculite, with fresh manure and water added at intervals. This colony supplied material for a study of the life-cycle. Females were allowed to lay eggs on manure-soaked cottonwool in separate glass tubes. The maximum egg batch was 315, while the average was 290. This is considerably more than the 167 dissected from a single female by Williams.[7] Development periods found at Onderstepoort appear in Table I.

TABLE I. *Telmatoscopus albipunctatus*—DEVELOPMENTAL PERIODS

	Minimum	*Maximum*	*Optimum*
Pre-oviposition period	24 hrs	48 hrs	41 hrs
Incubation period	2 days	4 days	2 days
1st stage larva	2 ,,	5 ,,	3 ,,
2nd stage larva	1 ,,	5 ,,	2 ,,
3rd stage larva	2 ,,	6 ,,	3 ,,
4th stage larva	3 ,,	10 ,,	4 ,,
Pupal stage	2 ,,	5 ,,	4 ,,
Total life-cycle	13 ,,	37 ,,	20 ,,

Human Myiasis due to Psychodid Larvae

So rare are cases of myiasis due to psychodid larvae that in a report by Scott[13] on myiasis in North America

*Date received: 22 July 1968.
†Shell Chemical Co.

between 1952 and 1962, no cases caused by psychodid larvae were recorded. At the time of writing, only 7 cases could be found in the literature, viz.:

1. Larvae of *P. sexpunctata* Curtis (syn. *P. alternata* Say) vomited by a 17-year-old girl in Japan.[9,14-16]

2. Urogenital myiasis in a 3-year-old boy in Edinburgh caused by *P. albipennis* Zetterstedt.[9,15-17]

3. Larvae of *Psychoda* sp. B. from the urine of a female patient in Louisiana, USA.[9,10]

4. Psychodid larvae (2 mm. long) from the urine and genital organs of a young girl in Kyoto, Japan (probably *P. alternata*).[18]

5. Intestinal myiasis in a 48-year-old woman: live larvae and pupae were excreted. Tokunaga identified these as *T. albipunctatus* (Williston).[9]

6. Larvae of *Psychoda* sp. from the urine of a boy in Shenyang, China.[16,19,20]

7. Mature larva (estimated 11 - 17 days old) of *P. alternata* from the sputum of a man in Macon, Georgia, USA.[20]

Tokunaga[9] concluded that 'the known myiasis-producing moth-flies belong to the following three species: *Psychoda alternata* Say (= *sexpunctata* Curtis = *schizuru* Kincaid = sp. B. of Johannsen), *P. albipennis* Zetterstedt and *Telmatoscopus albipunctatus* Williston. Of these species the first causes urinary, intestinal and genital myiasis, the second urinary myiasis and the third intestinal myiasis of man.'

Mode of Infestation

In the first case Zumpt[16] believes that the larvae were swallowed in an already advanced stage and that no development took place in the stomach as suggested by Okado.[14]

In case 2 Patton and Evans[17] believed that larvae had migrated from the rectum to the bladder after being ingested with earth eaten by the boy. Zumpt[16] cannot accept this explanation, and suggests that the larvae reached the bladder via the urethra. Tokunaga[9] also suggests that urogenital myiasis results from entrance of larvae via the genital opening and mentions his experience in case 4 where all larvae were very small, suggesting immediate migration from the genital opening.

Tokunaga[9] ascribes the intestinal myiasis recorded in case 5 to swallowing eggs or early stage larvae which then developed in the intestine. He feels it highly improbable that fully grown larvae or pupae could be ingested without being seen. Zumpt,[21] however, rejects the theory that ingested larvae may live as facultative parasites in the alimentary tract and believes that the larvae are continually ingested with polluted food.

The last record of psychodid larvae infesting humans is case 7, where a mature larva of unknown origin was recovered from the sputum of a man. No theories as to the mode of infestation were put forward.[20]

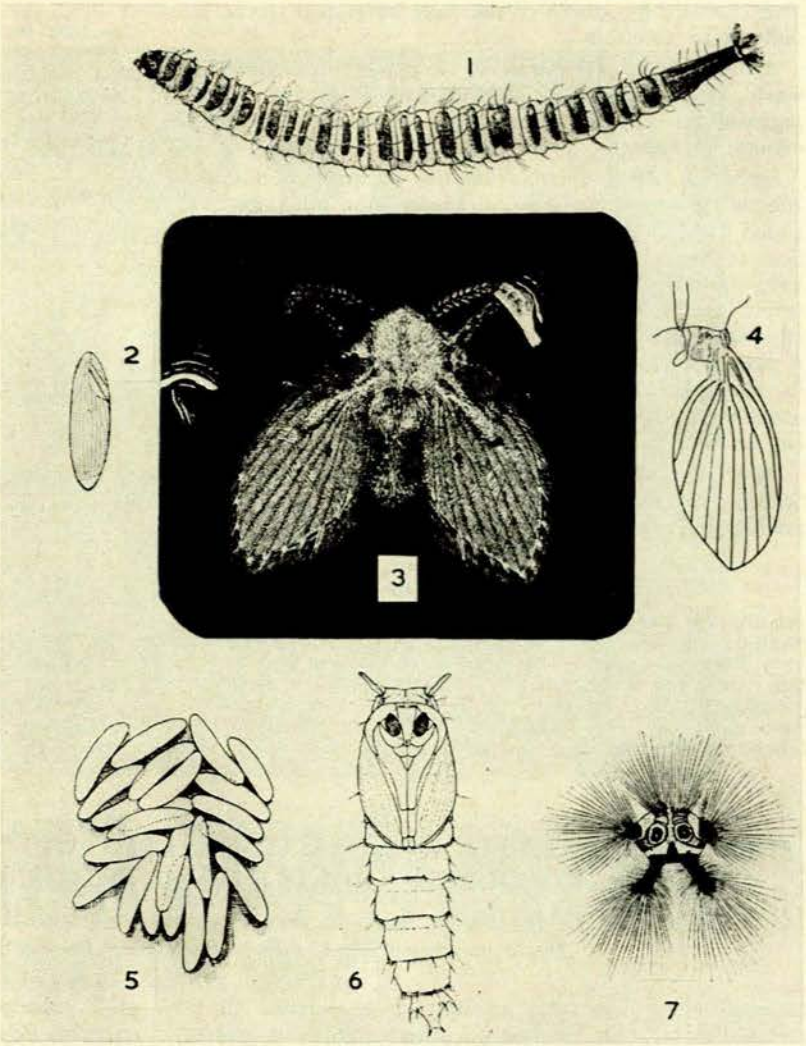

Fig. 1. Telmatoscopus albipunctatus. 1: Full-grown larva, dorsal view (length 11 mm.). 2: Hatched egg. 3: Adult female. 4: Wing and haltere. 5: Batch of eggs. 6: Pupa. 7: Posterior end of body of larva (after Williams, 1943).

DISCUSSION

A search through the literature reveals no previous cases of nasal myiasis attributed to a psychodid larva. As live third stage larvae were recovered when the patient discharged her nose and first stage larvae were found in sections of wax-embedded mucus, true parasitic development appears to have taken place. The infestation was apparently present over a period of about a year and, since in the laboratory the life-cycle can be completed in 13 - 37 days at 26°C, reinfestation must repeatedly have taken place.

It has now been seen that psychodid larvae are able to develop to at least the third instar in the nasal cavity of a human host, so that these larvae can quite conceivably migrate into the mouth and be recovered in the sputum or be swallowed and be recovered alive in the faeces. This case may thus provide an explanation for cases 5

and 7, where the origin of the fully developed larvae was difficult to ascertain.

Although *T. albipunctatus* is found throughout the world, this is, as far as is known, the first case of nasal myiasis and only the second time this species has caused myiasis in humans.

Since no other member of the patient's family was affected, it was thought that the infestation might be associated with some special condition of the patient. Examination of her medical history shows 5 operations between 1935 and 1955, and several illnesses since then. Only a severe attack of influenza involved the nasopharyngeal area and this resulted in the loss of her sense of smell. A recent examination indicated that she is still sensitive to intranasal stimulation and no abnormalities of the nasopharyngeal region could be detected, even with the aid of X-rays.

Apart from loss of the sense of smell, therefore, these findings revealed no special condition which could have predisposed the patient to this unusual type of myiasis.

SUMMARY

An unusual case of nasal myiasis caused by the larvae of the moth-fly *Telmatoscopus albipunctatus* (Williston) is reported in a Pretoria woman. This appears to be the first case of this type in the world. The larvae apparently live as facultative parasites in the nasal cavity, since first and third stage larvae were recovered. The biology of this fly was studied in the laboratory and the life-cycle can be completed in 13 - 37 days at 26°C. The patient appears to have been suffering from this condition for about a year.

Seven cases of myiasis due to larvae of this sub-family have been recorded from different parts of the world. The mode of infestation in cases where larvae have been found alive in the sputum and in the faeces can be explained if the larvae developed initially in the nasal cavity and were afterwards swallowed.

We wish to thank the Director, Veterinary Research Institute, Onderstepoort, for permission to publish this article, and Miss K. Roos who made a detailed study of the life-cycle of this fly in the laboratory.

REFERENCES

1. Del Rosario, F. (1936): Philipp. J. Sci., **59**, 85.
2. Quate, L. W. (1954): Proc. Hawaii. Ent. Soc., **15**, 335.
3. *Idem* (1962): *Ibid.*, **18**, 155.
4. *Idem* (1962): Pacif. Insects, **4**, 219.
5. Tokunaga, M. and Komyo, E. (1955): Philipp. J. Sci., **84**, 205.
6. Tokunaga, M. (1959): *Ibid.*, **88**, 453.
7. Williams, F. X. (1943): Proc. Hawaii. Ent. Soc., **11**, 313.
8. Macfie, J. W. S. (1921): Report of the Medical Department, Government of the Gold Coast, p. 39.
9. Tokunaga, M. (1953): Jap. J. sanit. Zool., **4**, 101.
10. Johannsen, O. A. (1934): Cornell University Agricultural Experimental Station Memoirs, No. 164.
11. Satchell, G. H. (1947): Parasitology, **38**, 51.
12. Efflatoun, H. C. (1921): Bull. Soc. ent. Égypte, **6**, 22.
13. Scott, H. G. (1964): Fla Ent., **47**, 255.
14. Okado, J. K. (1927): Ann. Parasit. hum. comp., **5**, 105.
15. James, M. T. (1947): US Department of Agriculture Miscellaneous Publications, No. 631, p. 142.
16. Zumpt, F. (1965): *Myiasis in Man and Animals in the Old World*. London: Butterworths.
17. Patton, W. S. and Evans, A. M. (1929): *Insects, Ticks, Mites and Venomous Animals of Medical and Veterinary Importance*, part I. Croydon: H. R. Grubb.
18. Tokunaga, M. (1943): *Medical Entomology*. Tokyo.
19. Chin, Y. (1959): Acta ent. sin, **9**, 96.
20. Scott, H. G. (1964): Fla Ent., **47**, 53.
21. Zumpt, F. (1963): S. Afr. Med. J., **37**, 305.