

Check-List of the Muscidae and Oestridae which cause Myiasis in Man and Animals in South Africa.

By G. A. H. BEDFORD, F.E.S.

Family CARCOPHAGIDAE.

Subfam. SARCOPHAGINAE.

Genus WOHLFAHRTIA.

1. WOLFAHRTIA MAGNIFICA, Schin.
Sarcophaga magnifica, Schin.

Porter (1) records two cases of native labourers becoming infected with the larvae of this fly on a farm in Natal. In one case intense earache was reported, and in the other an old wound that had refused to heal was found to contain about two hundred larvae.

The closely allied genus *Sarcophaga* contains a number of species, several of which have been known to cause destruction of tissue in wounds in man in various parts of the world. The larvae produce secretions that cause liquefaction of the tissues on which they feed, and considerable necrosis may appear.

These flies are commonly called flesh flies.

Family MUSCIDAE.

Subfam. STOMOXIDINAE.

Genus STOMOXYS, Geoffrey.

2. STOMOXYS CALCITRANS, Linné.

This fly is very common and widely distributed in South Africa. It usually breeds in horse manure and under cut grass. Porter (1) records removing these larvae from the neglected foot of a stable boy.

Subfam. MUSCINAE.

Genus MUSCA, Linné.

3. MUSCA DOMESTICA, Linné.

Porter (1) records larvae of this species, the common house-fly, having been collected on several occasions from the stools of children, under conditions that absolutely prevented any accidental contamination of the said stools. Also, on one occasion, some larvae were removed from a sore on the leg of a neglected white child living under bad conditions in a village near Durban.

Subfam. CALLIPHORINAE.

Genus CALLIPHORA, Robineau-Desvoidy.

4. CALLIPHORA CROCEIPALPIS.

Porter (1) records larvae of this species, a blue-bottle, having been received from Potchefstroom where they had been removed from a patient's ear; also larvae obtained from a freshly passed stool of a native child in Johannesburg.

Genus LUCILIA, Robineau-Desvoidy.

5. LUCILIA SERICATA, Meigen.

This common fly, popularly known as the "green-bottle," usually breeds in carcasses. We have known this species on one or two occasions to cause external myiasis in sheep at Onderstepoort, and Munro (2) has also recorded it producing myiasis in these animals in this country. Larvae have also been collected by H. H. Curson from the foot of a horse at Ntabanana, Zululand.

Genus CHRYSOMYIA, Fabr.

6. CHRYSOMYIA ALBICEPS, Wiedemann.

Pycnosoma albiceps, Wiedemann.

This fly is very common and widely distributed throughout South Africa. It normally breeds in carcasses, but has frequently been found causing external myiasis in sheep at Onderstepoort, and Munro (2) has also recorded it producing external myiasis in sheep along the coastal region in the neighbourhood of East London.

7. CHRYSOMYIA BEZZIANA, Villeneuve.

Pycnosoma bezziana, Villeneuve.

Pycnosoma megacephala, Bezzi, *née* F.

Pycnosoma flaviceps, Bezzi.

Larvae of this species, known as the "old world screw-worm fly," were taken from the foot of a horse and from around the anus of a bovine at Ntabanana, Zululand, in January, 1923. They were collected by H. H. Curson and determined by Major W. S. Patton.

Patton (3) states that in India and adjacent parts the larvae cause rhinal, oral, ocular, aural, vaginal, and cutaneous myiasis in man and animals, but they never cause intestinal myiasis. It has also been recorded in Africa from Rhodesia, Zanzibar, Belgian Congo, Ivory Coast, and French Guinea.

8. CHRYSOMYIA CHLOROPYGA, Wiedemann.

Pycnosoma chloropyga, Wiedemann.

Munro (2) has recorded this species producing external myiasis in sheep along the coastal belt in the neighbourhood of East London. It is a common fly at Onderstepoort, but has not been observed to attack sheep in this part of the country. The fly usually breeds in carcasses.

9. CHRYSOMYIA MARGINALIS, Wiedemann.

Pycnosoma marginale, Wiedemann.

This species is widely distributed in Africa, and is very common in South Africa. It mainly breeds in carcasses, but Patton (3) states that it will occasionally deposit its eggs in, or near, diseased tissues.

This and the two foregoing species are of further economic importance since they are capable of spreading the toxic saprophyte, which causes lamsiekte in cattle, from carcass to carcass.

Genus AUCHMERO MYIA, Brauer and Bergenstamm.

10. AUCHMERO MYIA LUTEOLA, Fabr.

The larva of this fly is a blood-sucker and lives in cracks and crevices of floors in native huts. It is widely distributed in Africa, and is popularly known as the "Congo floor maggot." We have received some pupae from Professor Faure collected in native huts in Pretoria. In October, 1924, the writer obtained some larvae from a native hut on the N'Kwaleni Cotton Estates, near Eshowe, and also caught some flies two or three evenings in succession in a house at Manyana, northern Zululand. I have also taken the fly on several occasions at Ntabanana, Zululand.

Genus CORDYLO BIA, Grünberg.

11. CORDYLO BIA ANTHROPHAGA, Grünberg.

This species, popularly known as the "Tumbu fly," is parasitic in its larval stage upon man and animals, causing cutaneous myiasis. It is widely distributed in Africa. In South Africa it is mainly parasitic in its larval stage upon wart-hogs and ant-bears, and is frequently very common where these animals occur. The writer has obtained larvae from a dog at Onderstepoort, and has taken numerous flies at the entrances of wart-hog burrows in the Waterberg and Zoutpansberg Districts, in the northern Transvaal, and also at the entrances of wart-hog and ant-bear holes in the Mfolosi Game Reserve and at the Mhlatuse River, Zululand. We have also received larvae from Dr. G. Schmid taken from a dog in South-West Africa. Fuller (3) records several instances of its attacking man in Natal, and numerous cases have been reported of its attacking human beings, especially children, in Rhodesia. Blacklock and Thompson (4), who have worked out the life-cycle of the fly in Sierra Leone, give the following list of hosts:—Man, dogs, guinea-pigs, wild rats, monkeys, cats, squirrel, mongoose, goat, and antelope. Burrowing animals are probably its favourite hosts.

Genus CHAEROMYIA, Roubaud.

12. CHAEROMYIA PRAEGRANDIS, Austen.

This species was originally included in the genus *Cordylobia*. The fly, which is much larger than *C. anthrophaga*, was described by Austen (5) from specimens collected at Deelfontein, C.P.; Durban, Natal; and from N.W. Rhodesia. The writer took a single male at the entrance of a wart-hog hole in the Zoutpansberg District, Transvaal, in July, 1924, and several specimens at the entrance of warthog burrows in the Mfolosi Game Reserve, Zululand, in October, 1924.

Family OESTRIDAE.

Subfam. HYPODERMINAE.

This subfamily contains a number of species parasitic upon mammals in their larval stage. The larvae was commonly called "warbles." The warble flies of cattle, *Hypoderma bovis* and *H. lineata*, deposit their eggs on the hairs of their host, chiefly on the legs, and the larvae on hatching penetrate the skin and gradually work their way through the body of their host to its back, where they remain until full grown. They then leave their host and burrow into the ground to pupate. Other species probably have similar habits.

13. DERMATOESTRUS OREOTRAGI, Scheben.

This species was described by Scheben (6) from larvae taken from *Oreotragus oreotragus* (Klipspringer) in South-West Africa.

Genus DERMATOESTRUS, Brauer.

14. DERMATOESTRUS STREPSICERONTIS, Brauer.

Larvae of this species have been recorded taken from *Strepsiceros strepsiceros* (koodoo) in the Cape Province, and from *Redunca arundinum* (reedbuck) in the Sudan. In the laboratory collection there are larvae obtained by Dr. G. Schmid from the subcutaneous tissue of *Raphiceros campestris* (? *tragulus*), Cape steenbok at Kalkfeld, South-West Africa, on the 14th May, 1924. and also specimens from a steenbok in the Pretoria District.

Genus STROBILOESTRUS.

15. STROBILOESTRUS ANTILOPINUS, Brauer.

Larvae of this species have been recorded taken from *Oreotragus oreotragus* = *O. transvaalensis* (Transvaal klipspringer) and *Pediotragus horstocki* = *Raphiceros campestris* (Cape steenbok) in the Transvaal and Cape Province (7).

In the laboratory collection there are larvae obtained from the subcutaneous tissues of the following hosts:—*Oreotragus transvaalensis* in the Rustenburg District, Transvaal (W. Powell); *Redunca arundinum* (reedbuck) near Nongoma, Zululand (D. T. Mitchell); and from a horse at Sir Lowry's Pass, Somerset West district, C.P., 1922.

16. STROBILOESTRUS OREOTRAGI, Scheben.

This species was described by Scheben (8) from larvae taken from *Oreotragus oreotragus* (klipspringer) in South-West Africa. Larvae have also been recorded taken from *Redunca redunca* in Senegal.

Genus HYPODERMA, Latreille.

17. HYPODERMA BOVIS, Linné.

Larvae of this species, the common ox warble fly, have frequently been found in the subcutaneous tissue of cattle imported into this country from Europe, but the fly does not appear to be able to breed in South Africa; larvae have never been found in South African cattle. In 1913 the writer collected a number of larvae at Onderstepoort immediately after they had left their hosts (imported Hereford cattle), and although the majority pupated, not one hatched. In the past we have

obtained large numbers of larvae of *Gasterophilus* spp. and kept them under precisely similar conditions, with the result the pupae have always hatched in due course, with the exception of one or possibly two.

18. *HYPODERMA LINEATA*, Villers.

Larvae of this species have also been found in this country in imported cattle.

19. *HYPODERMA CLARCKII*, Clarck.

This species has been recorded taken in the Cape Province.

20. *HYPODERMA* sp., Brauer.

Recorded taken from *Oreodorcas fulvorufula* = *Redunca fulvorufula* (mountain reedbuck) and *Redunca redunca* in the Cape Province and Senegal.

Subfam. OESTRINAE.

This subfamily contains a number of species, the larvae of which live in the nasal cavities, frontal sinuses, and at the base of the horns of their hosts. The majority are parasitic upon various species of antelopes. One species, *Oestrus ovis*, is a common parasite of sheep in various parts of the world, and probably occurs in all countries where these animals are bred. In South Africa the adult flies are present from the beginning of September to May. The female fly deposits eggs or living young at the entrance of the nostrils of the host, and the young larvae crawl up the nostrils to the nasal sinuses or even as far as the base of the horns in horned rams and goats, and there they attach themselves by their hooks to the mucous membranes. The number of larvae found in an animal may vary from one or two to a dozen or more. The larvae live in their hosts for about eight to ten months, but it would appear that at times they only take about six months to mature since we have received a full grown larvae from Mr. Spreull taken from an Angora kid in the Cape Province that was not more than six months old. When full grown the larvae either crawl out or are expelled by a violent fit of sneezing they cause their hosts by irritation. When the larvae reach the ground they burrow into it and there pupate. The life-cycles of the other species are probably similar to the above.

Genus OESTRUS, Linné.

21. *OESTRUS OVIS*, Linné.

This species, commonly called the "sheep nasal fly," is a common parasite of sheep in South Africa, and larvae have also been found in the nasal cavities of goats. Recently we received some larvae from Mr. Chalmers of the Veterinary Division taken from the nasal chamber and frontal sinuses of a *Pelea capreolus* (vaal rhebok) along with larvae of *Gedoelestia hässleri*; also some larvae from Dr. G. Schmid collected from the nasal cavity of *Antidorcas marsupialis* (springbok) at Omaruru, South-West Africa, in July, 1924 (14).

22. OESTRUS VARIOLOSUS, Loew.

Larvae of this species have been recorded from *Bubalis major* (western hartebeest), which occurs in west equatorial Africa and from *Bubalis jacksoni* (Jackson's hartebeest) (3). Gedoelst (7) gives the following distribution of the fly: Cape Province, Transvaal, Ivory Coast, Senegal, Sudan, and Kenya Colony.

Genus RHINOESTRUS, Brauer.

23. RHINOESTRUS PURPUREUS, Brauer.

This species is very rare in South Africa. A few larvae have been collected from the nasal cavity of a horse at Onderstepoort. It has also been recorded from horses in Algeria, Morocco, and Nyasaland, and from a mule in the Sudan (7).

Genus GEDOELSTIA, Rodhain and Bequaert.

24. GEDOELSTIA CRISTATA, Rodhain and Bequaert.

A single larva was collected by the writer in the frontal sinuses of a *Gorgon taurinus* (blue wildebeest) in the Waterberg District, northern Transvaal, along with larvae of *G. hässleri*, Ged. This species was described from larvae taken from *Bubalis lichtensteini* in the Belgian Congo. Pupae and adults were also obtained. It has also been recorded from *Bubalis major* in the Belgian Congo, and by Gedoelst from *B. cokei* and *Connochaetes albojubatus* in East Africa.

25. GEDOELSTIA HÄSSLERI, Gedoelst.

Described by Gedoelst (9) from larvae found in the cavities of *Damaliscus lunatus* (sassaby) in Uganda. It has also been recorded by the same author taken from the frontal sinuses of *Sigmoceros lichtensteini* in Nyasaland and Portuguese East Africa.

In September, 1924, the writer collected a number of larvae of various sizes in the nasal cavities and frontal sinuses of four *Gorgon taurinus* (blue wildebeest) in the Waterberg district, northern Transvaal. In one animal, a cow about 2 years old, 34 larvae were collected; in a cow in prime condition and in calf, 30 larvae were found; in a bull calf, about 9 to 12 months old, 20 larvae were found; and in an aged bull in poor condition only 6 larvae were obtained. In the laboratory collection there are some larvae which were received from Mr. Chalmers taken from the nasal chamber and frontal sinus of a *Pelea capreolus* (vaal rhebok) along with larvae of *Oestrus ovis*; they were probably collected in the Transvaal.

We have also received larvae from Mr. G. B. Purvis taken from the nasal cavities of a hartebeest in Kenya Colony.

26. GEDOELSTIA PARADOXA, Rodhain and Bequaert.

On the 19th August, 1920, the writer collected 120 larvae of this species in various stages from the frontal sinus and nasal cavities of a full-grown *Connochaetes gnu* (black wildebeest) at Clocolan, O.F.S. Several larvae have also been collected from the nasal cavities of a *Gorgon taurinus* by H. H. Curson near the Mkuse River, Ubombo, Zululand, 31st July, 1921.

Genus NEOKIRKIA, Townsend.

27. NEOKIRKIA MINUTA, Rodhain.

Kirkia minuta, Rodhain.*Kirkioestrus minutus*, Rodhain.

Several larvae were collected by the writer from the frontal sinuses of a *Gorgon taurinus* in the Waterberg District, northern Transvaal, in September, 1924. It has also been recorded from *Bubalis jacksoni* (Jackson's hartebeest) and the topi in the Congo.

28. NEOKIRKIA SP. NOV.

Several larvae of a species allied to *N. minuta*, Rodhain, were collected from the nasal cavities of a *Gorgon taurinus* by H. H. Curson along with the above.

Genus CEPHALOPSIS.

29. CEPHALOPSIS TITILLATOR, Clark.

Cephalopsis maculata, Wiedemann.

Larvae of this species have been found in the nasal cavities of *Camelus bactrianus* and *Camelus dromedarius* in Egypt, Tunis, and Mesopotamia. In the laboratory collection there are some larvae received from Dr. G. Schmid collected in South-West Africa. They were presumably taken from the nasal cavities of a camel, this animal being used in that country by the police for patrolling.

Subfam. GASTEROPHILINAE.

This subfamily includes several species that live normally in their larval stages in the stomachs of their hosts, chiefly equines. The larvae are commonly known as bots or papies. The females of the species of *Gasterophilus* lay their eggs on the hairs of their hosts, and in the case of *G. intestinalis*, *G. pecorum*, and probably the majority of other species the eggs are hatched by moisture and friction caused by the animals licking themselves. The larvae on hatching attach themselves to the tongue of their hosts and then find their way to the stomach, where they remain attached to the mucous membranes for about ten or eleven months. When full grown they detach themselves from the mucous membrane, and are then carried through the intestines and finally expelled with the faeces. They then burrow into the ground and pupate.

Genus GYROSTIGMA, Brauer.

30. GYROSTIGMA MERUENSE, Sjöstedt.

Several larvae taken from the stomach of *Rhinaster bicornis* (black rhinoceros) by Captain Taylor in Southern Rhodesia. It has also been recorded taken from the same host in Nyasaland, Kenya Colony, and Tanganyika Territory (7).

31. GYROSTIGMA PAVESII, Corti.

Several larvae taken from the stomach of *Rhinaster bicornis* (black rhinoceros) near Nongoma, Zululand, by D. T. Mitchell on the 13th September, 1915. It has also been recorded from Tanganyika Territory.

In addition to the above, two other species, namely, *Gyrostigma rhinocerotis bicornis*, Brauer, and *Stomachomyia*

conjugens, Enderlein, have also been recorded from rhinoceros in Tanganyika Territory. The former from *R. bicornis* and *Ceratotherium simum* (white rhinoceros), and the latter from *R. bicornis* (7).

Genus GASTEROPHILUS, Leach.

Gastrophilus, Rondani.

32. GASTEROPHILUS INTESTINALIS, De Geer.

Gastrophilus equi, Clark.

This is the commonest bot-fly found in horses, donkeys, and mules in South Africa. In the Transvaal the adult flies are found from January to May. The female fly deposits her eggs on the hairs of the host, usually on the legs or sides of the body. The larvae are invariably found attached to the cardiac portion of the stomach, and occasionally in the fundus and duodenum (10 and 11).

33. GASTEROPHILUS NASALIS, Linné.

This species is also very common in South Africa. In the Transvaal the flies have been found from December to the beginning of June, and in Natal from October to February. The female deposits her eggs on the hairs of the intermaxillary space between the mandibles. The larvae live in the duodenum, near the pylorus, of the horse (10 and 11).

34. GASTEROPHILUS PECORUM, Fabr.

This is another common bot-fly of horses in South Africa. The adult flies appear during the months of February to April. The larvae are usually found in the fundus and cardiac, or more rarely in the duodenum, oesophagus, pharynx, or attached to the epiglottis. Those attached to the pharynx, oesophagus, or epiglottis are often deeply embedded in the mucosa and sub-mucosa (10 and 11).

35. GASTEROPHILUS TERNICINCTUS, Gedoelst.

Described by Gedoelst (12) from specimens found in a zebra, presumably *Hippotigris burchelli crawshayi*, six miles west of Luapula, Belgian Congo. The same author has also recorded it from Nyasaland (7). Larvae have been obtained from the stomachs of *Hippotigris burchelli wahlbergi* (Wahlberg's zebra) in the Zululand game reserves by D. T. Mitchell, H. H. Curson, and the writer. In the laboratory collection there are also larvae taken from the same host in the Rustenburg district, Transvaal, and we have also received specimens from G. B. Purvis taken from the stomach of a zebra at Uasin Gishu, Kenya Colony.

36. GASTEROPHILUS SP. NOV.

Two larvae have been obtained from the stomach of *Hippotigris burchelli wahlbergi* in the Mfolosi Game Reserve, Zululand, and larvae have also been received from G. B. Purvis taken from the duodenum, intestines, and rectum of a zebra, *Hippotigris burchelli* var., at Uasin Gishu, Kenya Colony. This new species will be described by Gedoelst.

37. *GASTEROPHILUS* SP. NOV.

Larvae have been obtained from a *Hippotigris zebra* (mountain zebra) in the zoological gardens at Pretoria. The animal originally came from the Oudtshoorn District, Cape Province. These larvae will also be described by Gedoelst.

Subfam. COBBOLDIINAE.

Genus COBBOLDIA, Brauer.

38. *COBBOLDIA LOXODONTIS*, Brauer.

Larvae of this species were collected from the stomach of *Loxodon africanus* at Kenkelbosch, C.P., on the 9th September, 1919. Larvae have also been recorded from the same host in Uganda, Congo Free State, and the Ivory Coast (7). Two other species of *Cobboldia* have also been recorded from the African elephant, namely *C. parumspinosa*, Gedoelst, from the Zambia, and *C. roverei*, Gedoelst, from the Belgian Congo.

In conclusion we wish to tender our sincere thanks to Monsieur L. Gedoelst for his great kindness and courteous assistance in identifying a number of the species of Oestrids recorded in this paper.

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