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PARASITES OF DOMESTIC AND WILD ANIMALS IN SOUTH AFRICA. III. *OESTRUS* SPP. AND *GEDOELSTIA HÄSSLERI* IN THE BLESBOK*

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ABSTRACT

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Four blesbok culled in the Rietvlei Nature Reserve, Pretoria, District during May 1972 were found to harbour large burdens of 1st instar *Oestrus* spp. larvae and from 16–37 3rd instar larvae of *Oestrus macdonaldi*. They were also infested with large numbers of 1st instar *Gedoelstia hässleri* larvae but only 2 harboured 3rd stage larvae of this species.

During an 18-month period 34 blesbok were culled in pairs in the Percy Fyfe Nature Reserve, Potgietersrus District. These antelope harboured peak numbers of 1st instar *Oestrus* spp. larvae during February, July and December but few if any during early October. Third instar *Oestrus variolosus* larvae were generally recovered from July–February and those of *O. macdonaldi* during July 1972 and from May–September 1973. Some 1st instar larvae of these flies appeared to undergo a pulmonary migration before returning to the naso-pharyngeal area to mature. The pupal period of *O. variolosus* varied from 67 days during the spring to 35 days during the summer.

G. hässleri larvae reached peak numbers from October 1972–January 1973 and during May and June 1973. The lowest numbers were recovered from August–October 1973. Recovery and measurement of 1st instar larvae indicated that they either undergo an ocular-cranial or ocular-vascular-pulmonary migration before reaching the naso-pharyngeal area. Pupal periods varied from 46 days for flies hatching during October to 22 days for those hatching during December.

Résumé

LES PARASITES DES ANIMAUX DOMESTIQUES ET SAUVAGES EN AFRIQUE DU SUD. III. OESTRUS *SPP. ET* GEDOELSTIA HÄSSLERI *CHEZ LE BLESBOK*

*Les auteurs ont mis en évidence d'importantes infestations du premier stade de larve d'*Oestrus *spp. ainsi que* 16–37 *larves du troisième stade d'*Oestrus macdonaldi *chez* 4 *blesbok éliminés du Parc de conservation de Rietvlei aux environs de Pretoria. Ces antilopes étaient également infestées de grands nombres de larves du premier stade de* Gedoelstia hässleri, *alors que* 2 *animaux seulement hébergaient des larves du troisième stade de cette espèce.*

*Ils ont également mis en évidence de grandes quantités de larves du premier stade d'*Oestrus *spp. aux mois de février, juillet et décembre mais très peu en octobre chez* 34 *blesbok éliminés du Parc de conservation Percy Fyfe près de Potgietersrus. Des larves du troisième stade d'*Oestrus variolosus *ont été retrouvées de juillet à février et celles d'*O. macdonaldi *au cours de juillet* 1972 *et de mai à septembre* 1973. *Certaines de ces larves du premier stade de ces mouches semblaient faire une migration pulmonaire avant leur retour aux régions naso-pharyngiennes pour achever leur développement. Le stade pupal d'*O. variolosus *durait de* 67 *jours au printemps à* 35 *jours en été.*

Le nombre de larves de G. hässleri *a atteint un maximum depuis octobre* 1972 *jusqu'en janvier* 1973 *et encore pendant mai et juin* 1973. *La mise en évidence et la mesure de larves du premier stade montrent qu'elles font soit une migration oculo-craniale soit une migration oculo-vasculo-pulmonaire avant d'arriver aux régions naso-pharyngiennes. La durée des stade pupaux variait de* 46 *jours dans le cas des mouches écloses en octobre à* 22 *jours dans le cas des mouches écloses en décembre.*

INTRODUCTION

Species belonging to the genus *Gedoelstia* have evoked considerable interest in recent times. In Southern Africa the natural hosts for the larvae of these flies are the blue and black wildebeest, common and Lichtenstein's hartebeest, blesbok, tsessebe and korrigum (Zumpt, 1965; Basson, 1966).

Infestations apparently cause little trouble in these natural hosts but the deposition of larvae in the eyes of cattle and sheep leads to specific oculo-vascular myiasis, commonly known as "uitpeuloog" (Basson, 1962 a; b; c; 1969). This condition is usually encountered when cattle or sheep are grazed near wild antelopes and disappears about 2 months after they migrate out of the area (Basson, 1962c). It has generally been confined to certain regions of South-West Africa, but, with the increased interest in commercial game farming throughout South Africa, its spread is almost inevitable.

Although Basson (1966) has tentatively described the migratory routes followed by *Gedoelstia* spp. larvae in the natural hosts, further confirmation of his theories is necessary. In addition, a knowledge of the seasonal incidence of infestations in antelopes would not only facilitate the control of the parasite in these animals, but possibly also indicate the seasons during which game and domestic livestock could be grazed together with comparative safety.

Many of the abovementioned antelope species are also parasitized by *Oestrus macdonaldi* and *Oestrus variolosus*. The differential taxonomy of the mature larvae of these species and *Oestrus ovis* has been described by Wetzel & Bauristhene (1970), but some of the immature stages of these flies are unknown and little is known of their life cycles and seasonal incidence (Zumpt, 1965).

An opportunity to study these parasites presented itself when a number of blesbok rams were culled in the Rietvlei Nature Reserve, Pretoria District. In addition, seasonal incidence patterns were studied in blesbok slaughtered over a period of 18 months in the Percy Fyfe Nature Reserve, Potgietersrus District.

* This survey was conducted while the authors were employed at the MSD Research Centre, Hennops River

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TABLE 1 SURVEY 1. The numbers of oestrid larvae recovered from blesbok slaughtered in the Rietvlei Nature Reserve

Blesbok No.	No. of larvae recovered and stage of development							
	Oestrus spp.				*Gedoelstia hässleri*			
	1st	2nd	3rd*	Total	1st	2nd	3rd	Total
1.....	357	8	37	402	104	9	5	118
2.....	307	3	16	326	328	10	0	248
3.....	159	5	24	188	85	5	3	93
4.....	466	10	22	498	83	14	0	97

* *O. macdonaldi*

SURVEY 1. THE INCIDENCE OF *Oestrus* SPP. AND *Gedoelstia hässleri* IN 4 BLESBOK CULLED IN THE RIETVLEI NATURE RESERVE

MATERIALS AND METHODS

During 2 consecutive weeks in May 1972, the heads and internal organs of 2 blesbok rams culled in the Rietvlei Nature Reserve (25°53′S; 28°17′E, Alt. ±1 500 m) were obtained for parasitological investigation. The heads were processed as for the recovery of *O. ovis* larvae (Horak, 1977), while the tracheae and bronchial trees were opened and thoroughly washed over a sieve with 38 micron apertures for the recovery of oestrid larvae.

RESULTS

The numbers of oestrid larvae recovered from the individual blesbok are listed in Table 1.

Three of the 4 antelope each harboured more than 500 larvae. *Oestrus* spp. larvae recovered from the lungs of one of the animals are included in the total.

Third instar larvae of both *O. macdonaldi* and *G. hässleri* were recovered from the antelopes, but most of the larvae were in the 1st instar. All 4 animals harboured more *Oestrus* spp. larvae than *G. hässleri* larvae.

DISCUSSION

Although all the *Gedoelstia* spp. larvae could be identified specifically, according to the descriptions of Basson (1962 c) and Zumpt (1965), specific identification of the 1st and 2nd instar *Oestrus* spp. larvae was not possible. All the 3rd instar *Oestrus* spp. larvae were identified as *O. macdonaldi*, according to the description of Wetzel & Bauristhene (1970), but it cannot automatically be assumed that the 1st and 2nd instar larvae (which have not yet been described) also belonged to this species.

The recovery of *Oestrus* spp. larvae from the lungs of one of the buck was a mystery at the time, but the findings in Survey 2 subsequently confirmed that the lungs are a normal site in the blesbok.

SURVEY 2. THE INCIDENCE OF *Oestrus* SPP. AND *Gedoelstia hässleri* IN BLESBOK IN THE PERCY FYFE NATURE RESERVE

MATERIALS AND METHODS

The blesbok in the Percy Fyfe Nature Reserve (24°01′S, 29°07′E, Alt. 1 475 m), grazed a 1 631 ha camp until April 1973; this was then added to another 430 ha camp containing a herd of roan antelope.

The first 2 blesbok in the survey were shot on 31 July 1972 and thereafter 2 antelope were culled at approximately 4–5 weekly intervals until December 1973. During August and September 1973, however, the interval between slaughter was only 10 days and, during October 1972, 2 separate pairs of buck were shot. On each occasion an attempt was made to cull only male antelope, but this was not always possible.

Immediately after death the bucks' eyes were examined for the presence of larvae in or on the corneae. From January 1973 onwards to forestall any larval migration, the corneae were removed at slaughter and placed separately with the remainders of the eyeballs in 70% alcohol. Thereafter the carcasses were transported to a central point where the heads were severed at the atlanto-occipital junction and placed separately in plastic bags. The gastro-intestinal tracts, lungs, hearts and livers were also removed, placed in plastic bags and transported to the laboratory for further processing.

Each head was then divided sagittally with a handsaw and from 30 October 1972 onwards the 2 halves of the brain were removed, cut into thin slices and incubated for 3 h in 0,9% saline at 42 °C in a modified Baermann apparatus in a waterbath. The cranial cavity, the pericardial sac, the large arteries and veins entering and leaving the heart, the heart chambers and the trachea were all carefully washed and the washings retained. The bronchial tree was cut open as far as possible and the lungs with the bronchial tree facing downwards were incubated for 3 h at 42 °C in 0,9% saline in a modified Baermann apparatus in a waterbath.

The saline in which the brain and lungs had been immersed was poured separately through sieves with 38 micron apertures and the contents of the sieves retained for examination. All the washings and sievings were preserved in a 4% formaldehyde solution.

The heads of the blesbok were examined for oestrid larvae as described for *Oestrus ovis* larvae in sheep (Horak, 1977). With the exception of some of the mature 3rd instar larvae, all larvae from the heads and eyes were collected and stored in 70% alcohol.

The mature larvae were immediately examined microscopically and after identification, placed according to species in vermiculite in glass jars with nylon gauze tops. These jars were placed on a tray containing sand on the laboratory verandah. The larvae pupated and a record was made of the lengths of the pupal periods and the minimum and maximum atmospheric temperatures on the verandah.

The larvae stored in formalin or alcohol were examined under a stereoscopic microscope. After 1st and 2nd instar larvae had been identified generically and 3rd instar larvae specifically, they were measured, and, in the case of 1st instar larvae, the numbers and sizes of larvae recovered from a particular organ were recorded.

Results

Larvae

The mean numbers of *Oestrus* spp. and *G. hässleri* larvae recovered are graphically illustrated in Fig. 1 and the mean lengths of the various stages are summarized in Table 2.

Oestrus spp.

Peak burdens of 1st instar *Oestrus* spp. larvae were recovered from the antelope slaughtered during winter and mid- to late summer. Mean burdens of less than 10 larvae were encountered in the antelope culled during early October 1972 and 1973.

Peak burdens of 3rd instar larvae of *O. variolosus* were recovered from midwinter–spring in both 1972 and 1973. This species was absent from all animals slaughtered from March–June and during November 1973.

Third instar *O. macdonaldi* larvae were recovered from only one antelope culled during July 1972 but from every animal shot during the winter in 1973.

More than 20 1st instar larvae were recovered from the lungs of each antelope slaughtered from December 1972–February 1973 and during December 1973. Fewer than 5 larvae were recovered from the lungs of each buck slaughtered from winter to early spring.

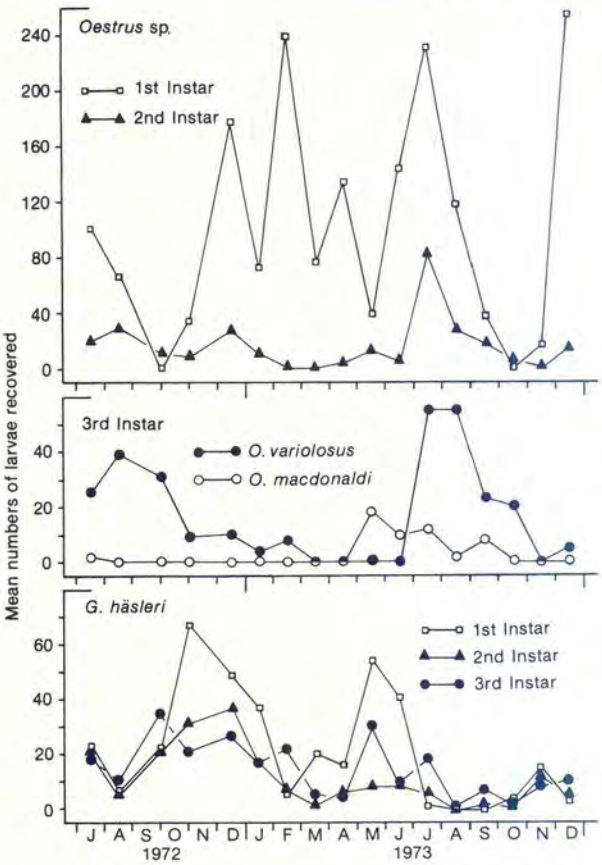

FIG. 1 The mean numbers of *Oestrus* spp. and *G. hässleri* larvae recovered from blesbok. During October 1972, 2 pairs of blesbok were culled, these are shown separately in the graph

TABLE 2 SURVEY 2. The mean and range in length in mm of oestrid larvae recovered from blesbok

Oestrus spp.

1st Instar larvae recovered from			1st Ecdysis
Lungs	Trachea	Head**	
1,5(1,0–2,9)×233	1,5(1,0–5,0)×440	2,5(1,4–5,5)×1 611	4,6(4,2–5,2)×4
2nd Instar larvae	2nd Ecdysis	3rd Instar larvae	
		O. variolosus	*O. macdonaldi*
9,1(3,9–18,4)×455	13,8(11,0–18,4)×23	20,9(10,7–29,3)×436	20,4(11,6–28,0)×76

Gedoelstia hässleri

1st Instar larvae recovered from				
Eyes	Brain*	Heart	Lungs	Head**
0,8(0,8–0,9)×15	1,6(1,1–2,0)×24	1,2(0,9–1,5)×18	1,4(1,1–1,7)×6	4,7(1,2–7,9)×512
1st Ecdysis	2nd Instar larvae	2nd Ecdysis	3rd Instar larvae	
6,5(5,9–7,9)×9	11,1(4,5–18,8)×332	16,3(13,5–18,8)×35	21,3(10,3–31,0)×380	

Brain* =Brain and cranial cavity
Head** =Nasal conchae and passages, pharyngeal area and sinuses
× =Number of larvae measured

The greatest mean numbers of 1st, 2nd and 3rd instar larvae recovered were 253, 82 and 66, respectively.

The mean and range in length of 1st instar larvae recovered from the trachea and lungs were less than those for larvae recovered from the naso-pharyngeal region. The 1st and 2nd moults occurred when the larvae had reached mean lengths of 4,6 and 13,8 mm, respectively. The largest mature 3rd instar *O. variolosus* larva (29,3 mm) was slightly longer than the corresponding *O. macdonaldi* larva (28,0 mm).

Fairly large numbers of larvae were recovered from the pharyngeal pouches of some animals, indicating that some of them may have completed a tracheal or pulmonary migration prior to returning to the naso-pharyngeal area. Of the 3 460 1st instar larvae recovered, 2 355 were found on the nasal septum, ventral turbinate bones and ventral and middle nasal passages.

Gedoelstia hässleri

Peak mean burdens of 1st instar larvae were recovered from the antelope culled from 30 October 1972–January 1973 and during May and June 1973.

Peak burdens of 2nd instar larvae were recovered from the animals culled at the end of October and during December 1972, while 3rd instar larvae were at peak in the animals shot at the beginning of October 1972 and during May 1973. The greatest mean numbers of 1st, 2nd and 3rd instar larvae recovered were 67, 37 and 35, respectively.

Small numbers of 1st instar larvae were recovered respectively from the eyes, brain, heart or lungs from 30 October 1972–March 1973, May–July 1973 and during November and December 1973. Peak numbers of these larvae were recovered from the heads from 30 October 1972–January 1973 and May–June 1973.

First instar larvae recovered from the eyes were the smallest, while those recovered from the brain, heart or lungs were larger than those in the eyes but smaller than the majority of such larvae recovered from the head. First and 2nd ecdyses took place when the larvae had reached mean lengths of 6,5 and 16,3 mm, respectively. The largest mature 3rd instar larva (31,0 mm) was longer than the corresponding larva of either of the *Oestrus* species.

The recovery of larvae from the pharyngeal pouches of some animals indicated that they had probably completed a pulmonary migration prior to returning to the head.

Only 35 of the 720 1st instar larvae recovered were encountered on the nasal septum, ventral turbinate bones and ventral and middle nasal passages.

Pupae

The lengths of the pupal periods of *O. variolosus* and *G. hässleri* and the mean atmospheric temperatures on the laboratory verandah are presented in Fig. 2.

The shortest pupal period for *O. variolosus* larvae collected during December 1972, was 35 days and the longest, 67 days for larvae collected during August 1973. Many larvae collected during both summer or winter failed to hatch.

One of the *O. macdonaldi* larvae collected during May 1973 emerged as an adult 135 days later, namely, during September. The larvae collected during June and July 1973 failed to develop into flies.

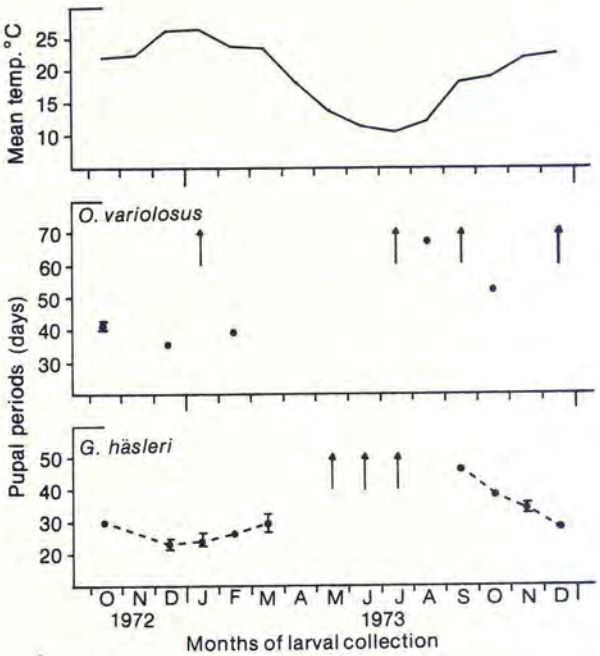

FIG. 2 The means and ranges in length of the pupal periods of *O. variolosus* and *G. hässleri* recovered from blesbok. (↑ = Flies failed to hatch)

The longest pupal period for *G. hässleri* larvae collected during September 1973, was 46 days, and the shortest, for larvae collected in December 1972, 22 days. No larvae collected from May–July developed into adults. The remaining 39 larvae collected gave rise to 21 flies.

Discussion

Oestrus species

Life cycle

First instar larvae are deposited on the blesbok, probably on the nostrils, although the exact site was not determined in these surveys. Female flies of both *O. macdonaldi* and *O. variolosus* probably deposit considerably more larvae than do *O. ovis* females. The greatest number of *O. ovis* larvae recovered by Horak (1977) from a single sheep was 105, whereas 13 of the 38 blesbok examined in the 2 surveys harboured more than 200 *Oestrus* spp. larvae each. These greater burdens may be due, however, either to greater concentrations of flies or to better initial survival of the larvae deposited. Few inflammatory lesions were found even in heavily infested blesbok, indicating that they react less to *Oestrus* infestation than sheep to *O. ovis*. In blesbok many of the oestrid larvae immediately enter the trachea and lungs, as shown by the fact that the smallest larvae are recovered from these organs (Table 2). They grow and then migrate back to the naso-pharyngeal area where they undergo the first moult, probably on the ventral, median or dorsal turbinate bones, once their length exceeds 4,2 mm. It is probable, however, that this pulmonary migration is not a prerequisite for further development and that the larvae remaining in the naso-pharyngeal area develop normally. The larvae of *O. ovis* apparently do not undergo a pulmonary migration; during surveys in sheep Horak (1977) examined 132 sets of sheeps' lungs without recovering any larvae of this species.

The 2nd instar larvae migrate to the frontal sinuses where they grow and undergo the second ecdysis once they exceed 11,0 mm in length. They leave the host as mature 3rd instar larvae and pupate in the soil.

A striking feature is the very large number of 1st instar larvae recovered compared with only modest numbers of 2nd and 3rd instar larvae (Fig. 1). This indicates that many 1st stage larvae are lost before they moult to the 2nd stage. As the majority of these larvae are present on or in the nasal septum, ventral turbinate bones and nasal passages they would easily be dislodged by sneezing or snorting, some being expelled and others inhaled into the lungs, thus accounting for the depletion in larval numbers.

The pupal period of *O. variolosus* is shorter in midsummer than in spring or autumn. In general it exceeds that of *O. ovis* pupae kept under the same conditions by approximately 14 days (Horak, 1977). *O. macdonaldi* may be able to overwinter in the pupal stage because a larva collected during May emerged as an adult during September. This overwintering phenomenon does not occur with *O. ovis* maintained under the same conditions (Horak, 1977).

Seasonal incidence

Third instar larvae of *O. variolosus* were generally present from July–February. Those of *O. macdonaldi* occurred during July one year and from May–September the following year. These peaks were preceded by 1st larval instar peaks from December–April and from June–August (Fig. 1).

The latter peak (Fig. 1) suggests that, as in the case of *O. ovis* in sheep (Cobbett & Mitchell, 1941; Kettle, 1973), some *Oestrus* spp. larvae overwinter in the blesbok at this stage of development. Apparently very little overlap occurs between overwintering 1st instar larvae and fresh larvae deposited during the following spring: the former larvae develop to the 2nd instar from July–September, while the latter infestation is only acquired from late October–December (Fig. 2). Similar observations were made by Bennett (1962) on the pharyngeal bot fly *Cephenemyia phobifera* in the white-tailed deer in Ontario, Canada.

In surveys on the incidence of *O. ovis*, the fact that spring infestations in sheep occurred in early October (Horak, 1977), may be the result of the shorter pupal period of *O. ovis*, as discussed earlier, and because the flies hatch earlier in the season.

The extended peak for 3rd instar larvae of *O. variolosus* suggests that more than one generation of this fly occurs anually, whereas the limited peak for *O. macdonaldi* indicates a single generation of flies per year.

The blesbok culled during May in the Rietvlei Nature Reserve harboured 3rd instar larvae of *O. macdonaldi* only. In the light of the findings at the Percy Fyfe Reserve it is possible that 3rd instar larvae of *O. variolosus* may be encountered in blesbok in the former reserve at other times of the year.

Gedoelstia hässleri

Life cycle

Basson (1966) suggested what is probably correct that "*Gedoelstia* larvae either use several normal migratory routes towards the nasal cavities or they show a very regular aberrance in their migratory pattern".

The female deposits her young in the eyes and they either migrate via a vein or possibly via the optic nerve tract or artery to the subdural cavity. The most likely routes from the subdural cavity and dura mater to the nasal cavity appear to be through the vascular system, the foramina of the cribiform plate or those foramina permitting passage to the nerves, entailing migration through both tissues and blood vessels. Some larvae, however, regularly migrate down the jugular veins to the heart, and the detection of a few larvae in the trachea and lachrymal duct could denote either further normal routes or possible deviations.

The observations made in the present survey substantiate Basson's findings. The recovery of the smallest larvae from the cornea suggests that the eye is the site of larval deposition. A batch is probably squirted into the eye in the manner described for the nose botfly *Cephenemyia jellisoni* when depositing larvae in the nostrils of black-tailed deer (Anderson, 1975). The larvae grow during their migration from the eye and the fact that larger larvae are recovered from the brain, heart, lungs or trachea suggests that these sites are all favourable for larval growth.

Those larvae present in the dura mater and subdural cavity could enter the nasal cavity through the foramina of the cribriform plate, as suggested by Basson (1966). Those in the heart could be transported to the lungs by the pulmonary artery, break through the alveoli and migrate via the bronchioles, bronchae and trachea to the pharyngeal pouches and thence to the median turbinate bones. First stage larvae grow rapidly on arrival at the latter site via either migration route.

The 1st ecdysis probably occurs on or in the convolutions of the median turbinate bones and the 2nd moult in the frontal sinus. Mature 3rd instar larvae leave the host via the nostrils and pupate in the soil.

The fact that, during this migration, there is little difference in the numbers of 1st, 2nd and 3rd instar larvae recovered (Fig. 1), is not surprising as very few 1st instar larvae are recovered from the nasal septum, ventral turbinate bones and ventral and middle nasal passages from which they might be sneezed or snorted out.

The pupal periods of *G. hässleri* are the same as those of *O. ovis* pupae maintained at the same temperature (Horak, 1977). Under the conditions prevailing on the laboratory verandah overwintering in the pupal stage did not take place.

Seasonal incidence

If the presence of small 1st instar larvae in the eyes or brains of the antelope is accepted as evidence of recent infestation, larval depositions take place from October–May. This period corresponds with that during which flies will hatch (Fig. 2).

Since the larvae continue to mature throughout the year, there would be a continuous formation of pupae, but only those produced from late winter until early autumn would give rise to flies. Because of this continuous development and the absence of new infestations in winter, total larval burdens tend to decrease in late winter and increase again in spring when the flies become active.

The seasonal incidence of *G. hässleri* in blesbok in the Percy Fyfe Nature Reserve therefore closely corresponds to that of *O. ovis* in sheep slaughtered at the Pretoria Municipal Abattoir and at Hennops River (Horak, 1977).

The effects of stock reduction

Blesbok are not indigenous to the Lunsklip area of the Northern Transvaal where the Percy Fyfe Nature Reserve is situated, but, after 1933, when 6 blesbok were introduced, these had increased to approximately 780 by 1972.

In order to stock the reserve with indigenous species only, the Department of Nature Conservation, Transvaal Provincial Administration, decided to transfer these animals to other reserves. Approximately 600 buck were moved during August 1972 and a further 150 in September, leaving 34 animals for survey purposes.

This reduction in the number of blesbok in the Reserve does not appear to have affected the incidence of *Oestrus* spp. as a comparison of the larval burdens of the blesbok slaughtered from July–December 1972 with those in the antelope slaughtered during the same period in 1973 shows.

It would seem, however, that the incidence of *G. hässleri* was affected. The total larval burdens of the buck slaughtered from July–December 1972, when the numbers of antelope were still comparatively large or had only recently been reduced, were greater than those in the buck slaughtered a year later, when only the survey animals were still present. Nevertheless the fact that the fly actively seeks its prey to deposit its larvae helps the species to survive even when severe stock reductions have occurred.

The possibility of infestation being maintained in other host species, such as in the tsessebe in a neighbouring paddock and in the roan antelope that were initially in an adjacent camp and later in the same camp, cannot be excluded.

The effect of stock reduction on the incidence of *Cephenemyia stimulator*, the pharyngeal botfly of European roe deer, has been discussed by Dudzinski (1970). He ascribes the decrease in infestation to decreased contact between the host and parasite and suggests planned stock reduction as a possible method of control.

Geographical distribution of infestation

The recovery of *G. hässleri* larvae from the blesbok slaughtered in the Rietvlei and Percy Fyfe Nature Reserves as well as from blesbok in the Ventersdorp district of the western Transvaal (Snijders & Horak, 1972), Dealesville district of the Orange Free State (Horak, unpublished data, 1971) and Marble Hall district of the Transvaal (Horak, unpublished data, 1974) indicates that this fly will probably be found wherever blesbok are kept. The aetiology of ophthalmia in domestic livestock in close proximity to blesbok must therefore always be carefully determined.

Control

Domestic livestock and blesbok can probably graze together from June–August as the likelihood of infestation is lowest during these months. The livestock should, however, be removed during September and October from any camp in which blesbok have grazed because large numbers of flies are likely to hatch during these months from pupae formed from August onwards.

All blesbok captured for transport to other localities should be treated with rafoxanide to prevent the spread of infestation (Snijders & Horak, 1972).

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