

# MUSCIDAE (DIPTERA) ASSOCIATED WITH CATTLE IN PAPUA NEW GUINEA

K.R. Norris\* and I.L. Owen†

## ABSTRACT

*Flies (Muscidae; Diptera) were netted from above the backs of groups of cattle in Papua New Guinea, chiefly from the Eastern Highlands. The most frequently taken species was Musca conducens, followed by Morellia hortensia. Also occurring in the samples were Musca inferior, M. domestica, M. vetustissima, M. ventrosa, Stomoxys calcitrans and Haematobia irritans exigua.*

*The importance of these flies in relation to cattle, and the significance of their possible further dispersal from country to country are discussed.*

## INTRODUCTION

Undoubtedly the most serious dipterous pest of cattle in Papua New Guinea is the screw-worm fly, *Chrysomya bezziana* (Calliphoridae) (e.g., Norris and Murray 1964), but a number of muscoid flies of lesser importance also occur on cattle, worrying and injuring them to varying degrees, and in some cases transmitting diseases. Some Papua New Guinea flies of this type were discussed by Norris and Ferrar (1974). Other notes were given by Pont (1973) and Ferrar (1974). The survey reported in the present paper extends the above information on cattle-frequenting muscid flies in Papua New Guinea.

## METHODS

Insects associating with cattle were monitored at irregular intervals in Papua New Guinea between 1976 and 1980 in the course of a continuous survey to

check on the distribution and spread of the buffalo fly, *Haematobia irritans exigua* (de Meijere), from the lowlands to the central highlands of the country. In the Eastern Highlands Province, where most of the samples were taken, the monitoring was carried out between the Kassam Pass and the Daulo Pass within the Goroka, Henganofi and Kainantu districts, an area of about 6,200 sq. km (see inset, Figure 1). Sampling was confined largely to the region that straddles the main highway through the province, at an altitude of 1500-1600 m. The time and frequency of sampling was dependent on the requirements of the buffalo fly control and eradication programme. The cattle sampled, a mixture of British breeds and Brahmans and their crossbreds, were those considered at risk of buffalo fly infestation through their proximity to roads over which cattle were transported. A few other areas were sampled as opportunity offered.

Samples were collected by sweeping an entomological net several times over the heads and backs of groups of cattle held in yards or a crush. The groups usually comprised a few animals only, but in some cases there were several hundred animals. All insects caught were preserved for later examination.

\* Formerly Associate Chief, C.S.I.R.O. Division of Entomology, Canberra, Australia. Present address: 11 Gormanston Crescent, Deakin, A.C.T., 2600, Australia.

† Parasitologist, Department of Primary Industry, National Veterinary Laboratory, P.O. Box 6372, Boroko, Papua New Guinea.

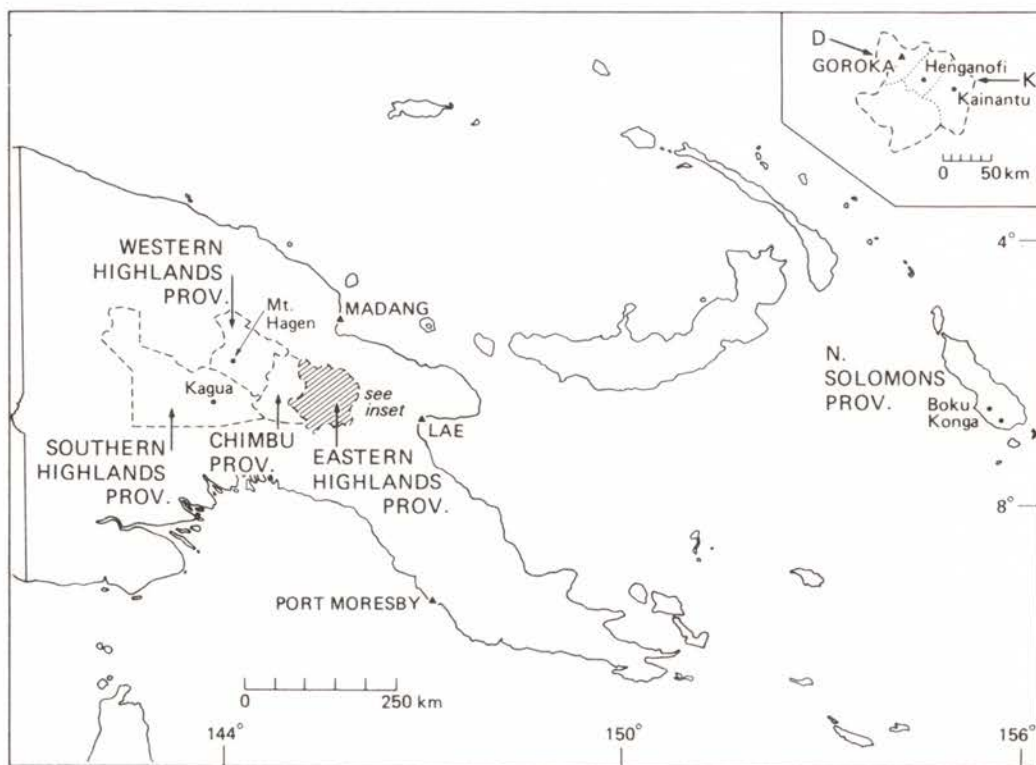


Figure 1. — Map of Papua New Guinea showing the areas and places mentioned in the text. In inset, K = Kassam Pass and D = Daulo Pass.

## RESULTS

### EASTERN HIGHLANDS PROVINCE

The area provides a fairly uniform environment for muscid flies. Temperatures range from an average daily maximum of about 25°C to an average daily minimum of about 13°C, with only small variations throughout the year. There is a distinct 'dry' period mid-year, but some precipitation in all months.

A total of 441 samples of flies were collected in 20 of the months of the five years involved. Notes on the species of flies secured are as follows:

*Musca domestica* Linnaeus, the cosmopolitan housefly. This fly is not strongly attracted to cattle, but it is

almost always common around cattle yards. The few specimens taken occurred in 11 samples, and on 6 of the monthly sampling occasions.

*Musca vetustissima* Walker, known in Australia as the bushfly. This insect sometimes causes serious worry to cattle in the drier regions of Australia, but it is generally scarce in Papua New Guinea. The few specimens caught occurred in 35 of the samples, and in 6 of the months sampled.

*Musca ventrosa* Wiedemann. Like *M. vetustissima*, this species shows a moderately strong attraction to cattle. It was present in small numbers in 49 samples, and in 9 of the months.

*Musca conducens* Walker. There were

more specimens per sample, on the average, than of any other fly, and it was represented in 361 samples (82%), and in 17 of the months sampled.

*Musca inferior* Stein. This blood-sucking fly was present in 12 samples, and in 7 of the months. Its predilection for attacking the lower parts of cattle, combined with its habit of clinging tight, deeply ensconced in the hair, would make it a poor candidate for capture by sweeping above cattle with a net.

*Morellia hortensia* (Wiedemann). An abundant fly, which was present in 209 of the samples (47%), and in 19 of the months sampled.

*Stomoxys calcitrans* (Linnaeus), the blood-sucking stable fly, was present in small numbers in 12 samples, and in 7 of the months sampled. Like *Musca inferior*, its tendency to feed principally on the legs and belly of cattle would make it less likely than most of the other species to be caught by the method used.

*Haematobia irritans exigua*, the buffalo fly, was present in 19 samples, in 8 of the months, and in all years. The habits of this fly would make it highly likely to be taken by the sampling method used, but its high specificity to cattle make it much more susceptible to insecticide deposits on the cattle than the other, less specific flies. Thus its absence from many samples could well have been due to the operation of the control and eradication programme.

*Other species.* A number of species of Diptera and a few other insects in the samples were obviously in no way associated with the cattle. However, several species of Muscidae taken are known to breed in cattle dung, though not to infest cattle, other than as casual resting places. They included *Hebecnema uniseta* Hennig, *Gymnodia ruficornis* Malloch, *Orthellia timorensis* Robineau-Desvoidy and *O. australis* Macquart. The *Orthellia* species occurred in 11 samples, in 7 of

which no other flies were present, a circumstance suggesting that the samples in question were swept from dung, not cattle.

## OTHER AREAS

Three samples from Mount Hagen, Western Highlands Province, July 1976, each contained only *Musca conducens* and *M. inferior*.

One sample from Kagua, Southern Highlands Province, contained only *Musca conducens*.

A 'January' sample from Konga, south North Solomons Province, contained only *Musca inferior*, and a similarly labelled sample from Boku contained *Musca conducens* and *M. inferior*.

## DISCUSSION

*Musca domestica*, *M. vetustissima* and *M. ventrosa* are only minor nuisances of cattle, and of little veterinary importance, especially in Papua New Guinea. Of somewhat greater economic consequence (e.g., Fadzil 1973) is the abundant and more closely cattle-oriented *Musca conducens*, which, although having only incipient adaptations for direct blood-feeding, is nevertheless more efficient than the above species in feeding on and enlarging sores and wounds, and is a proven vector of *Stephanofilaria* species (Nematoda) (Fadzil 1973). Though it is possibly now of general occurrence in Papua New Guinea, its dispersal to Australia and other South Pacific countries should be guarded against.

The probably recent introduction of *Musca inferior* to Papua New Guinea was pointed out by Norris and Ferrar (1974). This active blood-sucker causes great irritation to cattle, and, though it may be too late to prevent further inter-island dispersal in Papua New Guinea, Australian



and other South Pacific authorities should make every effort to exclude it.

Although an efficient blood-feeder at wounds and a rasper of scabs, *Morellia hortensia* is considered a minor pest of cattle: a nuisance, but not known to be a vector of any disease. Ferrar (1974) pointed out that *M. hortensia* may well have been introduced to Papua New Guinea from Australia, where it had been resident long enough to have undergone slight anatomical differentiation from Asian stocks (Pont 1973). Prevention of further spread, if this is possible, is, of course, desirable.

*Stomoxys calcitrans* is virtually cosmopolitan, but restriction of interchange between countries is still desirable because of the possibility that blood-fed adults could spread animal diseases.

There are several notable absences among the flies from the samples: (a) *Musca cassara* Pont (Pont 1973), a species described from material collected from the Solomons, Sarawak, Sri Lanka and Prince of Wales Island, Torres Strait. It is also present in Cape York Peninsula, where Colless (1981) suggests it is a recent arrival. In view of this distribution it is highly probable that it also occurs in Papua New Guinea, though it may be restricted to lowland areas. (b) Another absentee from the samples was *Hydrotaea australis* Malloch, which is widespread in the warmer parts of Australia, and also occurs in Malaysia and Sri Lanka. This fly associates closely with cattle, licking sweat and blood and infesting eyes and body orifices. Its exclusion from Papua New Guinea and South Pacific countries is desirable. (c) Papua New Guinea also appears to lack the Australian *Musca terrae-reginae* Johnston and Bancroft, though it is known from several Torres Strait islands. Detection of this fly as a new invader would be difficult because of its similarity to *Musca domestica*, but if it does become established it is unlikely to become of significant veterinary import-

ance. (d) *Hippobosca equina* Linnaeus. Though belonging to a different family of Diptera (Hippoboscidae) from the other flies (Muscidae) dealt with in this paper, it is worthwhile to record that this fly has not been encountered by either author in Papua New Guinea, nor was it reported by Anderson (1960), Egerton and Rothwell (1964) or Talbot (1969). This fly might not be easy to sample by the method used, but it is a very conspicuous insect, and unlikely to be overlooked. Its absence from Papua New Guinea is surprising, in view of the fact that it is widespread in Indonesia (e.g. Stekhoven 1926), and it was recorded from Vanuatu (New Hebrides) by Maa (1963) and also collected there recently by government officers.

## ACKNOWLEDGEMENTS

Thanks are due to personnel of the Livestock Section, Department of Primary Industry, Papua New Guinea including Dr D. Banks, Dr R. Nelson and various field officers for the collection and despatch of the material, and to Mr Columba Awui and Mr Moses Abari of the National Veterinary Laboratory. The authors also wish to thank Mr A.C. Pont, British Museum (Natural History) and Mr M.D. Murray, C.S.I.R.O. McMaster Laboratory, Sydney for the identification of some of the material. Mr P. Ferrar and Dr D.H. Colless made useful comments on the draft.

## REFERENCES

- ANDERSON, J.L. (1960). Animal Health picture of the Territory of Papua New Guinea. *Papua and New Guinea Agricultural Journal*, 13:52-8.
- COLLESS, D.H. (1981). *Musca cassara* Pont (Diptera: Muscidae): a first record for the Australian mainland. *Australian Entomological Magazine*, 8:23.
- EGERTON, J.R. and ROTHWELL, T.L.W. (1974). The distribution of infectious and parasitic diseases of animals in Papua New Guinea. (Papua New Guinea) Department of Agriculture, Stock and Fisheries Research Bulletin No. 1.
- FADZIL, M. (1973). *Musca conducens* Walker 1859 — Its prevalence and potential as a vector of *Stephanofilaria kaeli* in peninsular Malaysia. *Kajian Veterinaire, Malaysia-Singapore*, 5:27-37.

- FERRAR, P. (1974). *Morellia hortensia* (Wiedemann), a new livestock fly in Australia. *Journal of the Australian Entomological Society*, **13**:71-77.
- MAA, T.C. (1963). Genera and species of Hippoboscidae (Diptera): types, synonymy, habitats and natural groupings. *Pacific Insects Monographs*, **6**:1-186.
- NORRIS, K.R. and FERRAR, P. (1974). *Musca inferior*, a livestock fly new to Papua New Guinea. *Australian Veterinary Journal*, **50**:363-364.
- NORRIS, K.R. and MURRAY, M.D. (1964). Notes on the screw-worm fly, *Chrysomya bezziana* (Diptera: Calliphoridae) as a pest of cattle in New Guinea. *Commonwealth Scientific and Industrial Research Organization, Australia. Division of Entomology Technical Paper No. 6*. 26 pp.
- PONT, A.C. (1973). Studies on Australian Muscidae (Diptera) IV. A revision of the subfamilies Muscinae and Stomoxyinae. *Australian Journal of Zoology Supplementary Series. Supplement Number 21*:129-296.
- STEKHOVEN, J.H.S. (1926). Studies on *Hippobosca maculata* Leach and *H. equina* Linnaeus in the Dutch East Indian Archipelago. *Parasitology*, **18**:35-50.
- TALBOT, N.T. (1969). New recordings of animal parasites in Papua New Guinea. *Papua and New Guinea Agricultural Journal*, **20**:89-94.