Report on an investigation of the sandfly problem at Gladstone District Hospital (January, 1947). Appendix B Ann. Rep. Hlth. Med. Servs. Qd. 1946-47:108-109.

Appendix B.

REPORT OF AN INVESTIGATION OF THE SANDFLY PROBLEM AT GLADSTONE DISTRICT HOSPITAL (JANUARY, 1947).

By

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At the request of the Department of Health and Home Affairs, acting on a report that the Gladstone District Hospital was infested with sandflies to such an extent as to make it unsuitable for the nursing of sick patients, a visit was made to the hospital in an endeavour to find out the actual breeding place of the sandflies in the vicinity.

The hospital authorities provided all facilities for the investigation, and their assistance is gratefully acknowledged.

The species responsible for the infestation was found to be *Culicoides ornatus* (Taylor) (Fam. *Ceratopogonidae*), which is the common coastal sandfly in Queensland. The life history of none of the Australian species of *Culicoides* has been worked out.

DESCRIPTION OF THE AREA.

(See sketch map and photographs I., II., III.)

The hospital is situated on the western outskirts of the town of Gladstone, on a hill overlooking the tidal creek, known as Auckland Inlet. To north and north-west of the hospital the creek banks form extensive tidal mud flats. These are mainly bare of vegetation, except along the edge of the creek itself and its small tributaries, which are bounded by mangroves (*Avicennia, Ceriops* and *Rhizophora*) and patches of *Suaeda,* a plant growing about 1 foot in height. To west and south-west, the hospital is separated from the creek by a hill clothed with open timber and bush, but cleared within about 200 yards of the hospital, except at the southern end, where there is bush to within about 30 yards. This portion of Auckland Inlet winds between extensive and dense, almost impenetrable, forests of mangroves, mainly the spider mangrove, *Rhizophora.*

INVESTIGATION OF POSSIBLE BREEDING PLACES.

In spite of every endeavour, the breeding place of the *Culicoides* sp. was not located. A brief account of the methods used and sites examined may, however, be useful. These were adapted from accounts given in the available literature of similar investigations in other parts of the world.

Water, mud and organic debris were collected from the following sites:—

1. Pools and puddles, particularly amongst short tufts of grass, left by receding tide at edge of wide, exposed tidal mud flats and also along banks of tidal creek.
2. Around base of mangroves, occurring as isolated trees or scattered clumps, the mangroves concerned being *Avicennia, Ceriops* and *Rhizophora,* the latter occurring also in dense forests. Mud, also mud-coated bark and lichen, was taken actually against the base of the trees and mud and water from pools, crab holes, &c., beneath the trees, also from around the pneumatophores or "cobblers pegs" of *Avicennia.*
3. Mud and debris from crevices in the mangrove trees, or in their dead stumps.
4. Bottom mud coated with green alga from a large, semi-permanent, shallow sunlit pool left by very high tide at landward edge of tidal mud flat. Larvae and pupae of unidentified species of *Ceratopogonid* (not *Culicoides*) were found here.
5. Mud round the roots of the small low-growing plant, *Suaeda,* which occurred on the tidal mud flats.

The samples were examined by breaking up the mud, &c., in water, either in a jar or in small quantities in a white enamel pie dish or glass petri dish, and examining it a little at a time for larvae, pupae, or pupal skins. Description and figures of *Culicoides* larvae and pupae were available, but the only specimens found which nearly resembled them were those of the *Ceratopogonid* mentioned above and, in fact, insect life of any kind was uncommon in the samples. Numerous representative samples were taken for laboratory examination, and many others were examined in the field.

All sites examined lay between the levels of the highest and lowest tides. Conditions at the time of the visit were exceedingly dry and no other damp situations affording potential breeding places were apparent.

ADULT INFESTATION.

Adults were most numerous at the hospital when conditions were humid and there was no wind, and were practically absent when the wind was from the east or south-east. Infestation appeared to be worst during the night and early morning.

They were stated to be particularly troublesome in the nursery, and the walls of this room were examined, but no resting *Culicoides* were observed.

On the open mud flats adults were not taken biting. Amongst scattered mangroves on the mud flats they were present on still days in moderate numbers. Along the banks of Auckland Inlet, amongst scattered mangroves and open timber, they were very numerous on still days, but rare on windy days. In the dense forests of *Rhizophora* which lined the south bank of Auckland Inlet, near the Sanitary Depot,

they occurred in tremendous numbers. It was observed that in such places adults were apparently resting either on or close to the ground, rather than on the foliage, as feet and legs were the first parts of the body to be attacked.

Whether or not *Culicoides ornatus* will subsequently be found breeding amongst the mangroves, there is no doubt that the shade, shelter and humid atmosphere of the dense forests of mangroves make them ideal resting places for tremendous numbers. From these areas, particularly during the night, the sandflies will emerge in search of a blood meal. The hospital is separated from these areas by ⅜ mile or more, mainly of open timber and, with nearby houses, would afford the first site where abundant blood meals were available.

The occurrence of the worst infestation in the nursery is probably accounted for by the fact that this is situated at the south end of the hospital building and nearer than any other part to the bush.

Notes on Culicoides Infestation in America.

The following information is taken from the literature cited below.

The Atlantic and Gulf Coast littorals of the United States are faced with a similar problem due to *Culicoides* and the species concerned there favour shaded places for breeding. The adults require 3-4 blood meals before they deposit eggs. Drying out of breeding places destroys larvae and methods suggested for control are the use of drainage or the cutting or trimming of trees on the edges of marshes.

It is considered likely that most of the marine species live within the tide zone.

Culicoides furens, a pest species in Honduras, is reported to fly at least 630 yards in search of blood. Remedial measures adopted, apart from the treatment of breeding places, include removal of bush and weeds that provide shelter for the adults.

Culicoides adults are attracted to lights. Paris green and oil films, as used for mosquitoes, appear to have no effect on the larvae.

Conclusions.

Sandfly infestation caused by *Culicoides ornatus* is a serious problem at the Gladstone Hospital. As the breeding places of this species are still undiscovered, control measures cannot be directed against the larval and pupal stages, and attention must be directed to reducing the adult population.

Infestation is severest in the nursery. This could probably be reduced to the level of the rest of the hospital by clearing the bush and undergrowth within 200 yards.

The United States Department of Agriculture reports that D.D.T. residual sprays are effective against sandflies and "Considerable relief from *Culicoides* can be obtained by the treatment of window screens with a heavy oil containing 5 per cent. of D.D.T., as well as by application of a residual spray inside of quarters."

Application of D.D.T. to outdoor resting places should be effective, but might not be practicable in the dense areas of mangroves within the tide zone.

The dense forests of mangroves to the west of Gladstone Hospital, along Auckland Creek, form an ideal harbourage for sandflies and it is most likely that those infesting the hospital come from this site. Though the range of flight would be partly determined by the proximity of sources of blood meals, and by the prevailing breeze, the fact that the main portion of the town of Gladstone is stated to be relatively unaffected by sandflies suggests that the range of flight may be not much more than the distance from the mangroves along Auckland Inlet to the hospital —i.e., under a mile. It therefore appears unlikely that, if these harbourages were destroyed, serious infestation might come from further afield.

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