THE BITING MIDGE *STYLOCONOPS MYERSI* (TONNOIR) (DIPTERA: CERATOPOGONIDAE), DESCRIPTION OF MALE AND REDESCRIPTION OF FEMALE

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Summary

The previously unknown male of *Styloconops myersi* (Tonnoir) is described, the female is redescribed and the habitat of the species is discussed.

INTRODUCTION

Biting midges breed in a variety of habitats. Different species breed in organic matter in tree-holes, in decomposing plant material, in cow pats, in peaty and other soils, in the sandy or muddy margins of fresh water pools or rivers, on the margins of brackish estuaries and lagoons, and in mangrove swamps.

The females of some species feed only on nectar. Others apparently require no meal of vertebrate blood, though some are ectoparasitic on various other insects. The females of some species of the cosmopolitan genera *Culicoides* Kieffer (Ceratopogoninae), *Lasiohelea* (Forcipomyiinae), *Leptoconops* Skuse and *Styloconops* Kieffer (Leptoconopinae), take blood meals from vertebrates. Several haematophagous species of *Culicoides* are present in Australia and another occurs on several islands in the south-west Pacific but the genus is not represented in New Zealand. A haematophagus species of *Lasiohelea* is present in the Solomon Islands (L.J.D. coll., det. British Museum, Natural History, London) and the genus is also represented in Fiji and Samoa (Edwards, 1928) though there is no evidence that the species present is haematophagous. The genus is not present in New Zealand. Several haematophagous species of both *Leptoconops* and *Styloconops* are present in Australia. Though 28 species of Ceratopogonidae have been described from New Zealand (Miller, 1950) only *Styloconops myersi* (Tonnoir) is known to be haematophagous.

Haematophagous species of *Culicoides* have been incrimated as vectors

of organisms or agents that cause several diseases of man and other mammals and birds. In tropical regions they transmit filaroid worms of the genera *Dipetalonema* and *Mansonella* to man, and the virus of African horse sickness. In more temperate areas they transmit filaroid worms of the genus *Onchocerus* to horses and cattle, the virus of blue-tongue disease to sheep, and protozoan parasites of the genera *Akiba* and *Parahaemoproteus* to birds (Bennett *et al.*, 1965). Species of the genera *Leptoconops* and *Styloconops* have not so far been incrimated as vectors but all haematophagous species must be regarded as potential vectors of disease..

The ♀ type specimen of *S. myersi* was collected in 1924 but a male was only obtained recently during collecting near the type locality and is described here.

Styloconops myersi (Tonnoir)

Tonnoir 1924 Bull. ent. Res. 14: 443–4.

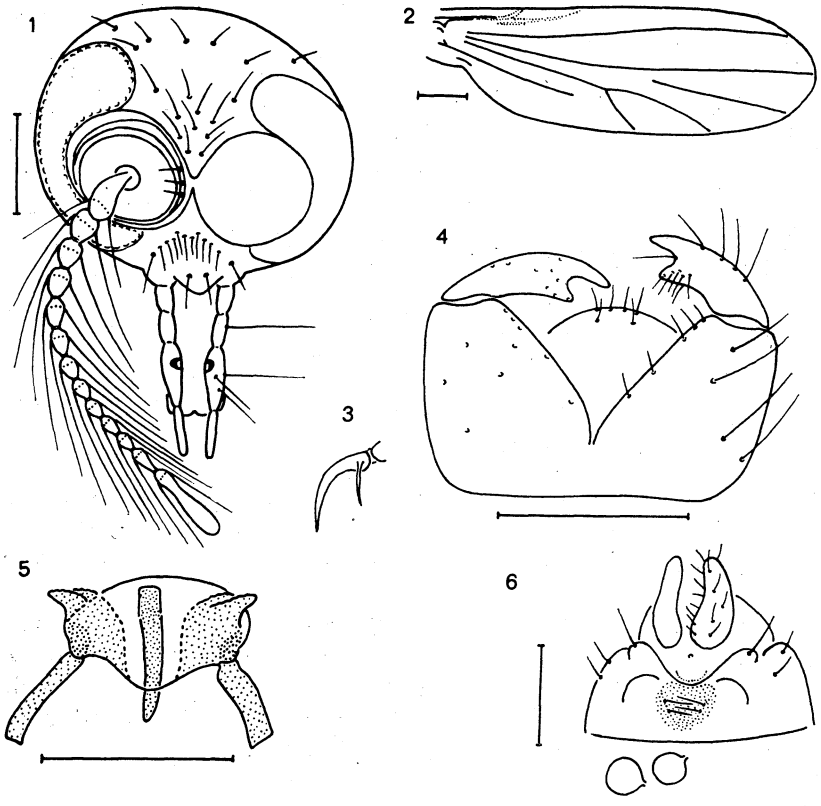
MALE

Head, thorax and legs dark brown to black, antennae dusky, basal segments of abdomen pale, segmentx 6-9 and claspers dark brown to black.

HEAD (Fig. 1): Width of frons about one-third head-width; setae hair-like, 2 post-orbital, 5 supra-orbital, 11 frontal, and 13 clypeal. Antennae about 1·4 times as long as head width, 15-segmented; segment 1 narrow, annular, with 3 setae; 2 short, and very wide; 3 pyriform, with sub-apical ring of long hairs; 4 sub-spherical; succeeding segments about same length but decreasing in width, 14 slightly longer; 4-15 plumose each with ring of very long hairs; 15 swollen basally, narrowed sub-basally, increasing in width to apex, slightly clubbed, as long as preceding 4 segments. Proboscis about half as long as head-width. Palpe 4-segmented; segments 1 and 2 sub-equal in length; 3 slightly swollen basally, narrowed apically, with a well defined sensory pit occupying 2nd quarter; 4 cylindrical, slightly shorter than 3.

THORAX: Metanotum with median acrostichal line of about 6 short hairs and 2 similar lines of dorsocentral hairs, 4 larger hairs across posterior margin and about 5 lateral hairs on each postero-lateral angle. Scutellum with transverse row of 6 hair-like setae, paramedian pair longest. Wing (Fig. 2), length 0·9 mm, width 0·3mm, without macrochaetae on disc or veins, venation as in female. Haltere knob white.

Legs—Femora without spical spine; tibiae with apico-ventral spine; hind tibia about 1·6 times as long as basitarsus, with row of 4 long setae on one side of apex and 2 shorter stout spines on the other. Basitarsus of



FIGS 1–6—*Styloconops myersi* 1–5 Male: 1. Head 2. Wing 3. Tarsal claw 4. Claspers, ventral view 5. Aedeagus and parameres, ventral view. 6. Female: Terminal abdominal segments, ventral view.

fore legs with about 5 pairs of ventral spines, those of one side smaller, segments 2 and 3 each with 1 large apical spine and 1 smaller; basitarsus of middle leg with about 7 slender spines, largest apically and basally, other segments without spine-like setae; basitarus of hind legs with about 16 pairs of setae or slender spines, segment 2 with about 7 pairs of slender spines longest apically, segment 3 with about 6 pairs of setae some spine like. Each tarsus with 2 curved claws sub-equal in length, without basal tooth, posterior claw on each tarsus with a strong curved lateral spine arising from base and about half length of claw (Fig. 3).

ABDOMEN: Segments 2-5 with faintly pigmented sub-rectangular tergites; segment 6-9 strongly pigmented dorsally; posterior margin of tergite 9

rounded, without lateral digits, with 3 setae and 1 small tubercole on each side.

Genitalia (Fig. 4)—Basistyle stout, without sub-basal medioventral lobe, narrowed distally, with long setae. Dististyle 5/6 length of basistyle, wide in basal half, with prominent sub-actute ventral lobe at half-length, apex pointed, with long setae but without apical tooth or spine. Aedeagus (Fig. 5) rod-like, without lateral projections, slightly widened distally with trough-like apical piece. Parameres (Fig. 5) joined mesally, another arm rod-like; single posterior process directed laterad, bluntly pointed, with serrate posterior margin.

LOCALITY

1 male, swept with females from sandy margin of brackish lagoon at mouth of Waitangi Stream at west end of Tom Bowling Bay (North Cape), 15.ii.67, L. J. Dumbleton.

REMARKS

The absence of the *r-m* cross vein in the wing identifies this male as a member of the subfamily Leptoconopinze. It conforms with the known males of the genus *Styloconops* in having more than one or two hairs on the frons, in lacking digits on the posterior margin of the 9th tergite and lateral projections of the aedeagus, and in having only one distal lobe on the paramere. It is readily separable by characters of the male genitalia from the three Australian species of *Styloconops* described by Smee (1966).

FEMALE (redescription)

HEAD: Antennal segment 1 with 3-5 setae. Mandibles with 10-12 teeth. Maxillae with 19 teeth. Palps with well defined sensory pit occupying 2nd quarter of segment 3. Hair-like head setae: 2 post-orbital, 4-6 supra-orbital, 15-20 frontal 12-14 clypeal.

THORAX: Legs—basitarsus of front legs with 7 or 8 pairs of stout spines, 2nd tarsal segment with 2 basal and 2 longer apical spines, 3rd tarsal segment with 1 apical spine; basitarsus of hind legs with 15 16 pairs of spines, 3rd segment with 2 apical spines. Tarsal claws expanded basally but without basal tooth or lateral spine or bristle as described for Australian species by Smee (1966).

ABDOMEN: Genitalia (Fig. 6)—post-genital plate poorly developed or absent; sub-genital plate lightly sclerotised, defined by regular aramature of small tubercles or papillae, slightly folded about a median longitudinal trough but transverse-ovoid when mounted flat, bearing 2 mesally directed sub-marginal setae antero-laterally on each side; 2 subspherical sepr-

mathecae, latitudinally wrinkled, without pores; pigmented only at junction with duct. The 8th sternite is without the discal plate and lateral extensions illustrated by Smee (1966) for *Leptoconops longicornis* Carter.

The female is most like those of *S. albiventris* de Meijere (New Guinea) and *S. setosifrons* Smee (Northern Queensland), both of whose males are unknown, but it differs from both in the wholly brown femora and in the hind tibiae being less than twice as long as the basitarsus.

DISTRIBUTION, HABITS, HOSTS AND CONTROL

The type locality is Taputaputa, immediately east of Cape Reinga, where the type material was collected on 11.xii.24 by Dr J. G. Myers. The species was collected on 14.iii.51 by Dr R. A. Cumber at Tom Bowling Bay Cape Reinga and North Cape and later (5.ii.52) on Rabbit Island between Nelson and Mapua in the South Island, by Mr E. S. Gourlay. The species was located at Tairua Bay and Whangamatata by Dr J. Timlin and the author. Mr R. Zondag (pers. comm.) informs me that it is present on Matakana Island near Tauranga.

Taputaputa is a small sandy bay and the stream which enters the sea at the eastern end is tidal and has some mangrove trees upstream. Tom Bowling Bay is a much larger sandy bay which has streams at both ends and another which breaks through the sand dune at mid-length. There is no mangrove present in any of these streams. Rabbit Island has no streams on it but blocks the head of Tasman Bay and creates estuarine conditions along its inland shores. Matakana Island is rather similar. Both these islands probably have subterranean lenses of fresh water which would create brackish water conditions where they meet the sea water at the shore.

During a short visit to Taputaputa on 18.ii.67 I observed no females under the pohutukawa trees where Myers had collected his specimens. At Tom Bowling Bay a few females were biting in the evenings behind the sand dune and a few were noted during the day near the Tewakewake Stream at the eastern end of the bay. At the western end of the bay the large Waitangi stream is nearly impounded by sand on the east and forms a brackish lagoon which is probably entered by the sea periodically. Females of *S. myersi* were abundant and biting freely throughout the day in bright sunshine, especially along the sandy eastern margin of the lagoon, on 15.ii.67. Many females were collected while biting and more were collected by sweeping with a net just above the moist sand of the lagoon margin. With these latter was a single male which, in conjunction with the abundance of females, suggests that this was near the actual breeding place. On the two succeeding days very few females were present. A Californian

species *Leptoconops kertezi* Keiffer has a similar breeding place (Smith & Lowe, 1948). No midges emerged, however, into 12 traps which were placed along the margin of the lagoon and left for two days.

It is possible that the fluctuations in the abundance of the female midges are due to periodic emergence peaks which are related to tidal conditions as has been reported for *Culicoides peleliouensis* Tokunaga which breeds in similar habitats in the Palau Islands (Dorsey, 1947).

The shore of the lagoon was regularly frequented by a number of Pied Shags (*Phalacrocorax varius*) and these and perhaps gulls, are a possible principal source of blood meals. Small numbers of rabbits, sheep, cattle and horses were present, however, in adjoining areas. The occurrence of a sickness in gulls which was observed by Dr Cumber at Tom Bowling Bay in 1951 might suggest an epizootic of some insect transmitted disease but may have been purely coincidental. Should blue tongue disease of sheep gain entry to New Zealand and *S. myersi* prove to be the only vector the incidence of the disease would be restricted to the relatively few coastal localities in which the insect breeds.

Satisfactory control of *Culicoides* in inter-tidal breeding places has been achieved by the use of granulated insecticides such as DDT, benzene hexachloride and dieldrin at dosages of up to 0·31lb/ac (Wall & Doane, 1965). The feasibility of controlling the species discussed above, should this become necessary, cannot be assessed without more precise information on their habits and breeding places.

LITERATURE CITED

BENNETT, G. F.; GARNHAM, P. C. C.; FALLIS, A. M. 1965: On the Status of the Genera *Leucocytozoon* Ziemann, 1898 and *Haemoproteus* Kruse, 1890 (Haemosporidiida: Leucocytozoidae and Haemoproteidae). *Canadian Journal of Zoology 43:* 927–932.

DORSEY, C. K. 1947: Population and Control Studies of the Palau Gnat on Peleliu, Western Caroline Islands. *Journal of Economic Entomology 40:* 805–814.

EDWARDS, F. W. 1928: Nematocera. *In* "Insects of Samoa" Pt 6. Fasc. 2. British Museum, London.

MILLER, D. 1950: Catalogue of the Diptera of the New Zealand Sub Region. *New Zealand Department of Scientific and Industrial Research Bulletin 100.*

SMEE, L. 1966: A Revision of the Subfamily Leptoconopinae Noe (Diptera: Certatopogonidae) in Australiasia. *Australian Journal of Zoology 14:* 993–1025.

SMITH, L. M.; LOWE, H. 1948: The Black Gnats of California. *Hilgardia 18:* 157–182.

TONNOIR, A. L. 1924: A New Biting Ceratopogonid from New Zealand. *Bulletin of Entomological Research 15:* 443–444.

WALL, W. J.; DOANE, O. W. 1965: Control of *Culicoides mellus* (Coq.) (Diptera: Heleidae) with Granular Insecticides and the Effect on Other Fauna. *Mosquito News 25:* 191–196.