

THE WING VENATION IN *Macrosteles sexnotatus*
(FALLÉN, 1806) (HOMOPTERA: CICADELLIDAE)
AND THE OCCURRENCE OF A SHORT WINGED FORM

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RESUMO

A venação das asas em *Macrosteles sexnotatus*
(Fallén, 1806) (Homoptera: Cicadellidae)
e a ocorrência de uma forma braquíptera

A venação da asa anterior e posterior de *Macrosteles sexnotatus* (Fallén, 1806) é descrita e ilustrada. A ocorrência de uma forma braquíptera, obtida em culturas de laboratório, é registrada e as asas são descritas e comparadas com a forma macróptera.

INTRODUCTION

Wing polymorphism is well known in many species of auchenorrhynchous insects. According to BEIRNE (1952) it does not occur in the tribe Macrostelini, all insects being macropterous with long, slender wings. The genus *Macrosteles* belongs to "Group 1" of WALOFF (1980) of "Macropterous (monomorphic) species" of leafhoppers in contrast to WALOFF's three other groups where species range from macropterous and submacropterous forms to species exhibiting clear alary polymorphism, or where ability to fly is linked with the ratio of lengths of the fore- and hind-wing.

There are only two records of unusual winged forms for the genus *Macrosteles* Fieber: WALOFF (1973) reports the presence of a few relatively short-winged *M. sexnotatus* males in field samples in Silwood Park, Berkshire, Britain, in 1970; SEVERIN (1940) reports

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the occurrence of an extra macropterous form of the common aster leafhopper *M. fascifrons* (Stal, 1858) in the canyons of the Monterey Mountains, California, USA. In both cases, no measurements or illustrations are given for these unusual winged form.

In the course of a population study on *Macrosteles sexnotatus* carried out in Silwood Park, Imperial College Field Station, Britain, a short winged form was obtained in a laboratory culture.

In the present paper the normal wing form is described and the short wing form compared to it.

MATERIALS AND METHODS

Measurements and illustrations of wings are based on laboratory reared specimens at 20°C on oats variety Condor illuminated for 16 hours/day.

Mass cultures were set up with 10 females and 10 males not older than 10-15 days. The breeding cage consisted of a flower pot topped by a closely fitted 13.5 cm in diameter and 32 cm high cellulose acetate cylinder ventilated by two opposing 9 cm x 9 cm muslin covered windows.

The short winged specimens were obtained in the second generation of a mass culture started with young nymphs from routine samples of the summer oatfield population in August 1972.

The description of the wings follows RIBAUT's (1952) terminology for the Cicadellidae.

RESULTS AND DISCUSSION

The normal fore wing (fig. 1.A): Radial and medial veins arising from a rather long common branch. Subcostal and cubital veins simple, as is characteristic for the Cicadellidae. Radial vein simple. Medial vein bifurcate, its external branch coalescent with the radial vein for the middle third of the wing length (subapical region). Regular transverse veins in the sense that their presence and position is constant for the species: discal vein or anterior medial-cubital, subapical vein or posterior medial-cubital, and radial-medial vein. Also present are apical cross-vein delimiting the apical cells. Four discal cells present. Discal cubital extending from base of elytra to apical region. Of the three subapical cells only the subapical central is present. Subapical internal (medial) cell missing, fusing with the discal; subapical external cell also missing in the Macrostelini.

The normal hind wing (fig. 2.A): Venation following the uniform pattern found in the Cicadellidae. Pair of vannal veins

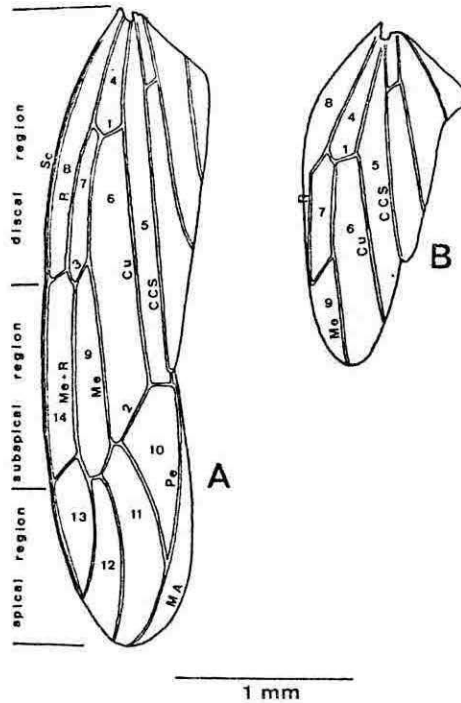


FIGURE 1 - The left fore wing of *Macrosteles sexnotatus*:

A, normal form; B, short form. (Cu, cubital vein; CCS, clavo corial suture; Me, medial vein; Me+R, fusion of radial vein and external branch of medial vein; MA, membranous appendix; Pe, peripheric vein; R, radial vein; Sc, subcostal vein; 1, anterior medial-cubital or discal cross-vein; 2, posterior medial-cubital or subapical cross-vein; 3, radial-medial cross-vein; 4, basal cell; 5, discal cubital cell; 6, discal medial cell; 7, discal radial cell; 8, discal subcostal cell; 9, subapical central cell; 10, apical internal or cubital cell; 11, apical subinternal or medial cell; 12, apical intermediate cell; 13, apical subexternal or radial cell; 14, apical external or subcostal cell.)

coalescent on the anterior region; cubital and medial veins simple; radial vein bifurcate. Internal branch of the radial vein coalescent or united to the medial by a short cross-vein. External branch of the radial coalescent for a short length with the subcostal vein. Subcostal emitting a short external branch adjacent to the frenulum hook. Peripheric vein and membranous appendix extending from the jugum-vannus limit up to the frenulumhook.

The fore wing in the short winged form (fig. 1.B): Remigium strongly reduced while the vannal and jugal areas remain unaltered. Membranous appendix and peripheric vein altogether absent. Five apical cells absent; posterior medial-cubital cross-vein missing: discal medial cell not defined as such. Subapical central cell in an extreme distal external position, not closed externally and posteriorly since the external branch of the medial extends only down to radial vein but is absent posteriorly; radial itself beyond this point is also absent, so that they do not occur in coalescence. Discal radial cell present, neatly defined; lying externally to it an ill-defined narrow extension of the discal subcostal cell. Therefore, the apical region of the fore wing is altogether suppressed and the subapical region reduced.

The hind wing in the short winged form (fig. 2.B): Jugum and vannus not altered except for the absence of the membranous appendix. Remigium severely affected. Membranous appendix totally absent, peripheric vein and frenulum hook vestigial. Area posterior to the contact of both branches of the radial noticeably reduced in size. As in the normal wing, contact of the internal branch of the radial with the medial vein is either by coalescence or by a short cross-vein. Contact of the external branch of the radial with the subcostal vein is by coalescence. Remigium so reduced that both branches of subcostal and radial veins are altogether suppressed after coalescence.

Both in the females and males with short wings the reduction in length was variable, ranging from a little shorter than the abdomen to half as long as the abdomen. Proportionately the reduction was more accentuated in the fore wings.

The measurements of males of the two winged forms are given in Table 1. The total body length though included is not regarded as a reliable index of size due to distension or contraction of the abdomen in preserved specimens. The head width across the eyes is considered as a better character for body size.

The short-winged specimens (7 females and 8 males) were found in a stock culture among a large number of normal winged adults. Three pairs were isolated in a breeding cage females probably having already mated with the more numerous normal winged males. The resulting offspring consisted of 174 normal winged adults and 3 short winged males. Fecundity and fertility seem to be normal as compared with that of the long winged form (BECKER,

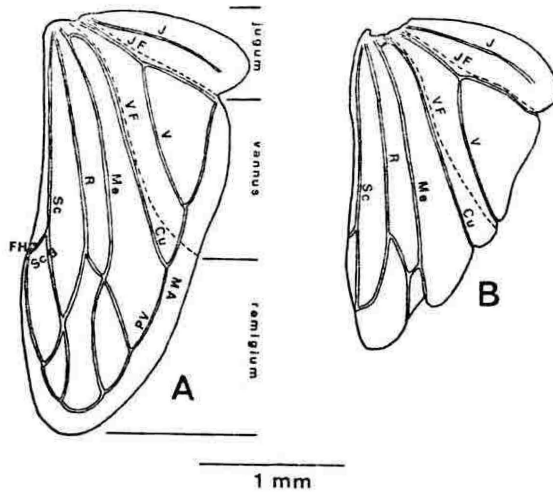


FIGURE 2 - The left hin wing of *Macrosteles sexnotatus*: A, normal form; B, short form. (Cu, cubital vein; FH, frenulum hook; J, jugal vein; JF, jugal fold; Me, medial vein; MA, membranous appendix; PV, peripheric vein; R, radial vein; Sc, subcostal vein; ScB, branch of subcostal vein; V, vannal veins; VF, vannal fold.

TABLE 1 - Measurements (mm) of two winged forms of *M. sexnotatus* males.

	Normal winged (N=15)		Short winged (N=6)	
	\bar{x}	s.e.	\bar{x}	s.e.
Total body length	3.13	0.036	2.9	0.056
Fore wing length	3.05	0.042	1.52	0.104
Hind wing length	2.65	0.029	1.84	0.052
Head width	0.88	0.009	0.88	0.29
Ratio fore wing to head width	1 : 0.29		1 : 0.58	
Ratio hind wing to head width	1 : 0.33		1 : 0.48	
Ratio of fore wing to hind wing	1 : 0.87		1 : 1.21	

1975). No further attempts were made to select for short winged adults. A few additional specimens (5 out of 943 and 1 out of 94) were obtained respectively from the third and sixth generation.

This was the only instance where an unusual wing form was observed. The incidence of brachyptery was extremely low. Breeding of *M. sexnotatus* in the laboratory was carried out for three consecutive years and only the normal winged form was ever obtained from weekly random samples in the oatfield from 1972 to 1975.

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ABSTRACT

The venation of the fore and hind wings of *Macrostelus sexnotatus* (Fallén, 1806) is described and illustrated. The occurrence of a short winged form from laboratory cultures is reported. The wings of this form is also described and compared to those of the normal winged form.