

for dating recruitment of the morphs determined into the adult population. The most useful criterion for indicating maturity of the larvae is that of the presence of a brown patterning in the folds of the pronotal and mesonotal tissue of the imago where it lies crumpled beneath the larval cuticle.

Newly moulted imagines. These are uniformly white with the wings soft and opaque. The normal and flightless morphs can be readily distinguished. In normal bugs the width of the median dorsal longitudinal muscles is about equal to the gap between them; in flightless bugs the muscles are less than half as wide as the gap.

Teneral imagines of the normal morph. A transitional stage between newly moulted and mature in which the muscles complete development and the pigmentation of the thoracic nota deepens from the white of newly mounted bugs to the black of mature bugs.

The teneral development of *A. assimilis* differs from that of *Sigara*, in a number of respects.

At moulting the cuticle is soft and opaque white, but within several hours becomes firmer and more transparent so that the tissues show beneath. The abdominal venter, thoracic sternites and leg bases are the first parts to darken. This occurs very soon after moulting and corresponds to the rapid pigmentation of the wings and pronotal disc found in the Corixidae. The relation between swimming posture in the water and the areas of first pigmentation on the body is most striking in these two families: in each the uppermost surface darkens first even though this is the ventral side in the Notonectidae, which swim upside down, and not the dorsal one as in other bugs normally oriented.

The way the pigment develops in the cuticle of the mesonotum is as described for corixids (Young, 1965c) except that the final stages, in which the pigment is intensified from an earlier uniform, light colouring, occurs in the reverse order, with the anterior areas completed first. From moulting, light colouring appears first on the posterior mesonotum and the insertion areas of the lateral dorsal longitudinal muscles before forming further anteriorly over the insertion areas of the median muscles. For a short period the whole surface is uniformly lightly pigmented. Darkening then begins, and is most intense, on the muscle insertion areas along the anterior and anterolateral border of the mesonotum spreading only gradually back over the rest of the surface. The flight muscles, already partly enlarged at moulting, are fully developed by the time the posterolateral areas are first pigmented but before any pigment shows on the insertion areas of the median muscles. Development of the muscles in relation to pigmentation is thus similar to that of *Sigara scotti* (Fieber) (Young 1965c, p. 162) but more advanced relative to pigmentation than *S. arguta*.

The normal morph. The flight muscles are fully developed and the cuticle of the mesonotum and metanotum uniformly darkened.

The flightless morph. The muscles are not enlarged from their condition at moulting. The pigmentation is variable but the thoracic nota are rarely much darkened.

The morphology and pigmentation of the mature morphs has been described by Young (1962b, p. 364).

THE POPULATIONS IN THE KAINGA AND LEITHFIELD HABITATS

The development of the overwintering adult population of this species is first described from collections made along the deep water bank at the Kainga pond. This cycle of development is considered typical for this species in moderately favourable habitats and is compared with the collections from the shallow beach area of the same pond, in which the life cycle was somewhat different, and from two parts of Leithfield Lagoon.

The changing frequencies of mature bugs of the two morphs taken from Kainga are shown in Fig. 3a. From a start about the middle of December, when the two morphs in the new population were equally common, the numbers of normal bugs increased (migration of the flightless morph was impossible and death unlikely at this stage), followed from the end of January by a steady increase in the flightless morph.