two morphs had been determined from external pigmentation differences they were released back into the pond. Very few bugs were found in the deeper water away from the bank and the whole population appeared to be readily sampled from the shore. During summer, however, the important part of the year for the study of the polymorphism, the population became broken into local swarms dotted through the vegetation and became almost impossible to sample quantitatively. During this period only broad indications of changing population size were obtained. Most collections for the analysis of changing structure of the population came from two areas. The first was about the mid-point of the inner side of the curve of the pond where the bank dropped away sharply under water and where the bugs clung closely to the shore edge (the deep area). The second was along the southern edge where the beach shelved out gradually to no more than half a metre deep three metres from the shore (the beach area). Notonectids were dispersed throughout the clear water patches among the vegetation over the whole of this beach.

Sampling stations for *S. arguta* were also established in the channel from the pond but were abandoned after clearing when reduced numbers of bugs required more extensive netting.

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No attempt was made in this habitat to estimate numbers of any of the species there. Collections were taken by sweep netting, along the edges of the weed for *A. assimilis* and through the vegetation and along the bottom for *S. arguta* and *D. zealandiae*.

First and second instar larvae of both *A. assimilis* and *S. arguta* tend to congregate in the shallowest, most sheltered water often partly separated from the rest of the larval population and are not adequately sampled in general sweep netting. Moreover, nets fine enough to retain these stages move too slowly through the water to catch the older ones. This failing has been recognised in the account and analysis of changes in the life cycle stages has been confined to the later larval stages and imagines. To a certain extent also, netting for the faster swimming imagines tends to miss the younger larvae. For this reason comparison between numbers of larvae and imagines in the population, although useful for a general summary of the development of the adult population, cannot be drawn too finely. These shortcomings in sampling technique would need to be overcome in a more detailed study of the life history.

THE LIFE CYCLES OF THE TWO SPECIES

Corixids and notonectids pass through five larval stadia before moulting to the imago. The last moult is followed by the teneral period in which the flight musculature develops fully and the cuticle hardens and darkens. This period may be prolonged in cold conditions or when food is restricted. The bugs are active throughout the teneral period but flight cannot occur until the flight musculature matures. This delay in ability to fly ensures that even in habitats where emigration is taking place the normal morph is recorded in regular sampling.

In New Zealand the two families overwinter as adults, although in the north of the country larvae from one year may persist far into the winter. Ovarian growth in overwintering corixids begins about the shortest day, varying from habitat to habitat, and may even precede it by as much as three weeks in some habitats about Christchurch. Oviposition begins during the coldest part of the year in late winter, often while the ponds are ice-covered. The testes in corixids are inactive in early spring and sperm for the fertilisation of eggs laid at this time is stored overwinter in the seminal vesicles of the male. Transfer of sperm to the spermathecae of the female takes place as the eggs are developing in the ovaries and mostly before the first eggs ripen.