

ON THE ODONATE FAUNA OF A FINNISH FOREST POND OCCASIONALLY DRYING UP

The author made some observations on the drag-onfly life of a forest pond (Finland, Ta, Kangasala, Grid 6821: 339) since 1979. Although the variations of the water level have been considerable there always was at least some water in the pond round the year. The summer 1983 was exceptionally dry in Finland and the pond dried up towards the beginning of August staying waterless until the first snow. This made it possible to observe the drought resistance of some dragonflies. This question is treated only very rarely in Finnish odonatological literature (K.A. VALLE, 1952, *Sudenkorennot*, Suomen eläimet 7, WSOY, Turku, p. 133). In the following only the most essential data and observations are given.

Spring melting waters are the main water source of the pond. These waters flow both from the southern knoll and from the gently sloping spruce forest in all other directions. The maximal measurements of the pond are some 60 m x 40 m corresponding to a water level of 120 cm. Because the pond lies in the shadow the evapora-

tion is so slight that summer rains are normally enough to prevent the drying up of the pond. Before the spring 1983 the southern knoll was totally harvested causing changed evaporation conditions. This and the exceptionally dry summer led to the total drying up of the pond. When the place was visited on 11.VII.1983, the pond was waterless and the bottom largely dry. Beneath a thin layer of mire the bottom consists of a waterproof clay. The dragonflies favour especially the West and North edges of the pond with dense *Carex rostrata* vegetation. Other vascular plants abounding in the pond are *Alisma plantago-aquatica*, *Potamogeton natans*, *Sparganium minimum*, *S. emersum*, *Juncus filiformis*, *Alopecurus aequalis* and *Potentilla palustris*. The spring values of the water level are usually rather stable (110-120 cm), but the variations in the water level during summers may be quite different, depending on the rains and on the overcast. In 1983 the pond was continuously waterless for some 3.5 months until it froze on November 10. In summer 1984 the following extreme values of the water level were measured: after melting (27.IV.), 115 cm, the minimum (14.IX.) 45 cm, in frozen state (17.XI) 120 cm.

In total, 12 odonata species have been met on the pond (I = imago, E = exuvia, L = larva): *Coenagrion hastulatum* (I, L), *Lesia sponsa* (I, E, L), *Aeshna juncea* (I, E), *A. grandis* (I, E), *A. cyanea* (I), 10 I.IX.1981, *Somatochlora metallica* (I) 10 29.VII.1985, *Cordulia aenea* (I), *Libellula quadrimaculata* (L), *Sympetrum flaveolum* (I, E, L), *S. danae* (I, E, L), *Leucorrhinia dubia* (I), 10 17.VI.1984, *L. rubicunda* (I, L). As evidenced by the occurrence of immature stages, at least eight species have been breeding in the pond. Species surviving the winter 1983/84 in the pond were without doubt *C. hastulatum*, *L. sponsa*, *S. flaveolum*, *S. danae* and *L. rubicunda*, most likely also *A. juncea* and *A. grandis*. The surviving species can be grouped according to their drought-resistant stage into egg-hibernators (*L. sponsa*, *S. flaveolum*, *S. danae*), and larva-hibernators (*C. hastulatum*, *A. juncea*, *A. grandis*, *L. rubicunda*, Y. ARAI (1983, *Gekkan-Mushi* 143: 17-22; — 1984, *Tombo* 27: 32-34), E.B. MONTGOMERY (1971, *Proc. Indiana Acad. Sci.* 81: 171) and T. KRING (1973, *Ent. Meddel.* 41: 159-160) have

reported similar observations. In autumn 1983 the search for odonate larvae gave no positive result. Therefore the survival of species was concluded from the observed emergence or from the population size in summer 1984. Of the species studied, egg hibernation is the rule in *L. sponsa* and *S. danae*. For *S. flaveolum* this is unusual (P.-A. ROBERT, 1959, *Libellen*, Kümmerley & Frey, Bern, p. 339). Because hatching in *S. flaveolum* normally occurs in the same season as the eggs are laid, the flying season begins early in the following summer, clearly earlier than in other species of the genus. In summer 1984 *S. flaveolum* emerged on the pond only at the same time with *S. danae*, and July - beginning of August. It is obvious that the early drying up of the pond in summer 1983 caused a dry diapause in the egg development of *S. flaveolum*, and hatching was delayed until the following spring. For comparison: in an other small water place (Grid 6819: 345) only some 7 km from the pond, *S. flaveolum* was seen in flight 26.VI.1984. Corresponding delay in hatching in the genus *Sympetrum* has been reported from Japan by ARAI (1984, cf. above). Also in Denmark *S. flaveolum* has been found to belong to the fauna of seasonally drying up small waters (KRING, 1973, cf. above). Yet, any delay in emergence has not been reported. It seems, therefore, that *S. flaveolum* can survive the dry season either at the egg or at the larval stage.

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