ECOLOGICAL NOTES ON *SYMPETRUM MADIDUM* (HAGEN) IN BRITISH COLUMBIA, CANADA (ANISOPTERA: LIBELLULIDAE)

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Abstract — Some aspects of the biology of *S. madidum* in British Columbia are discussed and the habitat of its recently discovered larva is described. The sp. apparently is adapted to ponds that may dry up in midsummer.

Introduction

Although *Sympetrum madidum* is a widespread western North American species, little is known of its biology. The larva has only recently been discovered; information on its habitat is provided here for the first time.

Observations

S. madidum larvae were discovered at Spencer School Pond, Langford, British Columbia, 10 km west of Victoria, B.C. The pond is shallow. 250 m by 30 m and usually dries up by August; it is refilled by winter rains. On June 16, 1979, the greatest depth was 75 cm although over 80 per cent of its area it was less than 40 cm deep. On this date the surface conductivity was 160 micromhos/cm (at 25°C) and the pH was 7.0. The pond is in a trough in sandy soil forested with Douglas-fir (*Pseudotsuga menziesii* (Mirbel) Franco), lodgepole pine (*Pinus contorta* Dougl.) Garry oak (*Quercus garryana* Dougl.), and arbutus (*Arbutus menziesii* Pursh). Willow (*Salix* sp.) borders some of the high-water line. The pond is completely covered in emergent vegetation; the predominant plants are *Eleocharis palustris* (L.) R. & S., *Sium suave* Walt., *Polygonum amphibium* L., *Ranunculus aquatilis* L., *Nuphar polysepalum*

Engelm. and *Carex rostrata* Stokes. The latter two species grow in discrete patches while the others are rather evenly distributed over the surface of the pond. The bottom is firm.

On June 16 at 11.30 h the surface water temperature was 16°C and the air temperature was 14°C. Final instar larvae were estimated to reach densities of about 20 per m². Larvae of *Lestes disjunctus* Sel. and *Limnephilus* sp. (Trichoptera) were present in large numbers. No adult *Sympetrum* were seen.

Larvae collected and kept in the laboratory at a water temperature of 22°C (air temperature 23.5°C) emerged between 06.30 h and 13.30 h.

Sympetrum madidum adults were first observed emerging at Spencer School Pond in small numbers on June 18-21, 1979, and a few adults about one week old also were captured. A single exuvia found on June 3 indicates the initial emergence of the species occurred in the first week of June. *Lestes dryas* Kirby was the only other odonate emerging at this time. The major emergence of *S. madidum*, however, took place on June 23. Adults began transforming about 10.00 h, mostly at 5-10 cm above the water on the stems of *Nuphar*, *Sium* and *Carex*. Densities reached 10 per m². The water temperature was 19°C and the air temperature 20°C. After 11.30 h many teneral adults were flying, and at about 12.30 h a few fully mature adult males appeared at the pond and one pair in copula was observed. Other Odonata flying at the same time included *Lestes dryas* mating and ovipositing, *L. disjunctus* emerging in large numbers, and a few *Ischnura cervula* Sel., *I. perparva* Sel., *Enallagma cyathigerum* (Charp.) and *Libellula quadrimaculata* L. Cedar Waxwings (*Bombycilla cedrorum* Vieillot) nesting nearby were feeding their young on the teneral *S. madidum* and *L. disjunctus*.

Copulation and oviposition are recorded in British Columbia from June 23 (1979, Langford) to August 6 (1976, Clinton). At the latter locality females oviposited among emergent *Eleocharis palustris* growing in the soft bottom, dipping their abdomens into 4-5 cm deep water. The pond margin was heavily trampled and polluted by cattle. The surface conductivity of this pond was estimated at between 1000 and 1200 micromhos/cm (25°C). At a shallow temporary pond near Riske Creek, B.C., on June 29, 1978, a teneral female was found near what is now known to be an *S. madidum* larval exuvia. The dominant vegetation here was *Eleocharis palustris*; surface conductivity was approximately 600 micromhos/cm. On June 25, 1977, at Witty's Lagoon, Victoria, B.C., females were ovipositing in the dried up basin of a lagoon behind the beach. This pond is filled with brackish water from fall through spring by rainfall and water from the overflow of the nearby tidal estuary. *E. palustris* grew commonly in the pond basin. The eggs were dropped on the mud around the bases of the plants. Surface conductivity of this pond when it contained water on April 21, 1979 was 1045 micromhos/cm. At both this location and the Clinton pond, oviposition was accomplished either while the pair was in tandem or while the male hovered in a guarding position near the female.

In summary, *S. madidum* is known to oviposit and develop in waters with surface conductivities ranging from 160 to 1045 micromhos/cm (at 25°C); both athalassic saline ponds and coastal brackish waters are involved. In all four localities recorded, *Eleocharis palustris* was one of the predominant plants.

S. madidum, *Lestes disjunctus* and *L. dryas* were the only Odonata known to develop in Spencer School Pond in 1979. All were able to emerge before the pond completely dried in the first week of August. Individuals of *S. madidum* emerged rather synchronously. Although a very few adults appeared at this pond in the first three weeks of June, 1979, it is estimated that at least half the population transformed on June 23, the first day of concerted emergence. Evidently the whole population emerged by June 30.

Discussion

In British Columbia *S. madidum* apparently is adapted to temporary ponds; it has been observed ovipositing in dry pond basins and in shallow water that subsequently disappeared. Since only very early instar larvae were found at Spencer School Pond or Witty's Lagoon in

April, 1979, it is probable that the species overwinters in the egg and hatches in the spring, much as do *S. obtrusum* (Hag.) and *S. rubicundulum* (Say) in temporary waters (G.B. Wiggins, pers. comm.). Larval growth must thereafter be rapid. These same collections of larvae in April yielded very small, uniformly sized larvae of *Lestes disjunctus* and *L. dryas* which are known to diapause in the egg in winter and hatch in the spring (SAWCHYN & CHURCH, 1973).

Acknowledgements — I thank Dr. G.G.E. SCUDDER for reading the manuscript. Dr. G.B. WIGGINS identified the Trichoptera larva, and Mr. E. MANSFIELD helped with some of the field collecting.

Reference — SAWCHYN, W.W. & N.S. CHURCH, 1973. *Can. J. Zool.* 51: 1257-1265.

Received November 5, 1979.