A CONTRIBUTION TO THE KNOWLEDGE OF BIOLOGY OF THE SPECIES EUSIMULIUM SECURIFORME RUBZOV, 1956

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Abstract. The period of occurrence of larvae and pupae, population dynamics and some other ecological factors (requirements for pH values, water temperature, stream velocity etc.) in the species E. securiforme Rubzov were studied. Under conditions of South Bohemia the species may produce as many as three generations per year, the most numerous being the third late summer generation. Larvae of different instars and pupae may be encountered in nature throughout the year. E. securiforme belongs to those blackfly species which first colonize the newly aneciated brooks.

Eusimulium securiforme Rubzov, 1956 was first reported from the Czechoslovak territory by Knoz (1963), from Slovakia alone by Haligová (1971), Zwick (1974) considers this species to be conspecific with E. angustipes (Edwards, 1915). According to the latest research carried out by Knoz (1963), Knoz and Šašinková (1969) and Knoz and Pejsdov (1977) this hematophagous species feeding on man is very abundant and considerably widespread particularly in the fishpond regions. Because the data on the biology of this species are still incomplete, this problem has been studied in two localities in the environs of České Budějovice between 1978 and 1979.

MATERIAL AND METHODS

Larvae and pupae were collected in two localities in the environs of České Budějovice (South Bohemia) — in the basin of the Homolský brook (14 sites) and in the area of the outlets of the Bezdvěd fishpond (4 sites). The sites were visited at least once, more often twice or more times per month. The two localities are described in detail in the paper by Olejniček (1982), provided with charts of the localities studied. Out of the total number of 18 A. securiforme was encountered in the following ten sites:

A. The basin of the Homolský brook
1. Safety spillway of the Černodubský fishpond; 2. Stillung basin of the Černodubský fishpond; 3. The Homolský brook between the Závratek and Černodubský fishponds; 4. The Homolský brook before the Závrate village; 5. Outlet from a small forest fishpond before the Závrate village, having its own source (Material collected about 100 m below the fishpond); 6. Stream interconnecting two small fishponds near the village Dvůr Korosy.

B. The Bezdvěd fishpond
7. The outlet from the fishpond about 1.5 km below the stilling basin; 8. The brook flowing along the left shore at the Bezdvěd fishpond; 9. the safety spillway, the collecting done 10—15 km down the spillway; 10. the brook about 1.5 km away from the said spillway. Some abiotic characteristics of these sites are presented in Table 1.

During each visit paid to a particular site the water temperature, pH and stream velocity were measured.

While collecting larvae and pupae in the field mainly artificial substrates were used, i.e. grey-green unglazed ceramic tiles 10×10 cm large and plastic ribbons measuring 2.5×20 cm, so that the samples obtained could be relatively easily converted to an area unit, in our case 1 dm². Larvae and pupae were placed in 96% alcohol directly in the field and in laboratory they were
Table 1. A survey of abiotic parameters in the localities from the study area

<table>
<thead>
<tr>
<th>Site No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean width cm</td>
<td>50</td>
<td>300</td>
<td>75</td>
<td>50</td>
<td>35</td>
<td>45</td>
<td>300</td>
<td>100</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>mean depth cm</td>
<td>15</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>30</td>
<td>10</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>character of site</td>
<td>O p</td>
<td>O p</td>
<td>M p</td>
<td>M p</td>
<td>F st</td>
<td>M p</td>
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<td>M e</td>
<td>O st</td>
<td>F st</td>
</tr>
</tbody>
</table>

F = forest brook, M = brook in meadows or fields, O = pond outlet, c = clay bed, st = stony bed, p = paved bed

identified, counted and their body measurements taken with the precision of 1 mm. Also calculated was the percentage of particular site categories represented in a sample. In all regularly visited sites a total of 3156 specimens of the E. secutoriforme species were obtained. In expressing the dominance I adhere to the concept of Kruger (1952) i.e. as dominant I consider those species whose amount to more than 5 %, as infrequent those which occur in 2—5 % and as recessive those numbering less than 2 % within all species.

RESULTS

The species E. secutoriforme was encountered in 10 sites of the area studied, in all outlets from fishponds or brooks which somehow communicate with the fishpond system. The occurrence of E. secutoriforme larvae and pupae is recorded in Fig. 1. The species was found to be dominant in streams with paved or stony beds, interconnecting particular fishponds (sites 3, 6, 8 and 10), to be infrequent below the stilling basin of the Besdrev fishpond and to be recessive below the spillway dam in the outlets from the fishponds in places immediately below the fishpond (sites 1 and 9) and in sites 4 and 5 as well. In places immediately below the fishpond the E. secutoriforme populations happened to be mostly suppressed by masses of the species S. argyraeum (Mg.), or (as in the case of site 1) only overwintering generation was encountered here.

An interesting situation occurred in two sites, where larvae and pupae of E. secutoriforme were found as late as the second half of 1978, beginning with July. In the first site (No. 3), representing an ameliorated brook with a trapezoidal profile, paved with granite plates, the species Ophagra ornata (Mg.) and Eusimulium angustilae (Lund.) were dominant in the first half of the year. In May—June 1978 a considerable quantity of fine clay penetrated into the brook from the outlets of soil drainage system which covered the bed of the brook with a consistent fine film and the blackfly populations were suppressed here to a minimum. After heavy showers at the end of June the clay was washed out of the brook and of the species previously occurring here only O. ornata was encountered in relatively low numbers. On the other hand, a massive development of the species E. secutoriforme was found here (as many as 78 larvae per 1 dm²). A similar situation developed in the second site (No. 6). The fishpond situated above this site was drained at the end of April 1978, the brook bed (ameliorated, with trapezoidal profile, paved with concrete blocks) dried up and was cleaned up mechanically in its entire length. After the fishpond was filled with water again at the end of June, only the species E. secutoriforme was found in this site, in the abundance of 785 larvae per 1 dm² (mostly 1st and 2nd instar larvae). The species O. ornata and E. angustilae which had been dominant here before the fishpond drainage, were not encountered in this site till May 1979.
DISCUSSION

Knöz (1963, 1965, 1969) and Knöz and Pejčóch (1977) reported 1–2 generations of E. secundifera annually, depending on the climatic conditions of locality. As the histogram depicting the percent composition of different size categories of populations of this species in the site No. 8 reveal (these categories may be considered characteristic of this species), E. secundifera produced at least 3 generations per year in the area studied, the overwintering generations of larvae pupating during April and May. In the same period that portion of generation which overwintered at the stage of egg started its development and completed it about one month later. The development of the second (summer) generation started during July and the development of the third (late summer) generation — during August and September. If we assume that a portion of population overwinters as larvae and another portion — as eggs, the development of the entire spring generation is then prolonged and this fact causes a considerable overlapping of the next two generations. According to the numbers of pupae in the site, presented in Fig. 2, it may be assumed that the most numerous is the third, late summer generation. A similar situation occurred in the remaining sites where the species was encountered.

The example of the two sites (Nos. 3 and 6) showed that E. secundifera may be included in the species which first settle the newly anemolized brooks and are able to colonize rapidly such substrates as the paved beds of the anemolized brooks and canals in the fishpond systems.

REFERENCES


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