

Notes on the Odonate fauna of some brackish waters of Walcheren island

by

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RIVON-mededeling nr. 204

The Odonate fauna of some brackish waters on the island of Walcheren (Zeeland Prov., The Netherlands) was studied during an excursion of the Staff of the Dutch State Institute for Nature Conservation Research (RIVON) in June and July, 1964. So little is known of the dragonflies of the islands of Zeeland, that it seems worthwhile to record observations even as trivial as the following.

The Odonate fauna of Walcheren turned out to be an extremely poor one. On the other hand the populations of the few species represented have a rather high density but their distribution is surprisingly limited to certain localities and areas. The majority of the examined smaller pools, canals and other water bodies are without any dragonflies, being either too brackish or too polluted. The latter condition unfortunately occurs in too many instances. Populations of a high density were observed only in the following four localities examined: (a) a creek near Veere, (b) water supply canal in dune area near Oranjezon, north of Vrouwenpolder (Veere), (c) a pool near Zoutelande and (d) the ponds in the park of Westhoven castle (Domburg). Some other localities are supposed to provide good breeding conditions, though no larvae or exuvia could be found. The immature insects observed in the close vicinity indicate that they have emerged from them (i.e. a little pool west of Vrouwenpolder and others).

With the only exception of numerous penultimate instar larvae of *Aeshna mixta* Latr. found in a very distinctly limited locality at the creek near Veere and two adult specimens of *Orthetrum cancellatum* (L.) taken in dunes north of Vrouwenpolder, no anisopterous species could be observed.

The Zygoptera belong to the following species: *Erythromma najas* (Hansem.), *Ischnura elegans* (v. d. Lind.), *Enallagma cyathigerum* (Charp.) and *Coenagrion puella* (L.).

The Odonate fauna of the province of Zeeland has, in general, been studied very insufficiently but, as far as is known it seems to be very poor. LIEFTINCK (1925), in his splendid monograph, has given faunistical evidence only for the following zygopterous species: *Lestes barbarus* (Middelburg, Domburg), (*Pyrrosoma nymphula*), (*Ischnura elegans*), (*Coenagrion pulchellum*), and *Coenagrion puella*. (The species in parenthesis are stated to be distributed throughout the Netherlands, i.e. in the province of Zeeland as well, though no particular note in regard to this province has been made).

Specimens of *Erythromma najas* and *Enallagma cyathigerum* in our collection, are new additions to the fauna of Zeeland. A brief account concerning the appearance of the species observed in this area is given below. Special attention has been given to the concentration of the chlorine ions.

(1) *Erythromma najas* (Hansem. 1823).

Several males and females were taken at the creek in the park Westhoven on July 1st, 1964. Ultimate instar larvae were observed in the water supply canal north of Vrouwenpolder. The chlorine concentration at Westhoven is 280 mg/l, while in the canal (Oranjezon) it is 240—285 mg/l. Thus the species inhabits only fresh-water environments; it is faunistically new to Zeeland.

(2) *Ischnura elegans* (v. d. Lind. 1823).

This is by far the most common species in the area studied. It occurs in all types of water, except in an extremely brackish environment — provided they are not too polluted. As regards the chlorine concentration it was found to breed at the creek near Veere at a concentration as high as 2004 mg/l (!).

In various localities and environments we have observed that the species could to some extent be regarded as a rather useful indicator for pollution in the ecological and geographical conditions of the Netherlands.

Due to its resistance and broad ecological valence its absence regularly indicates a high degree of pollution. Not one dragonfly in the Netherlands is able to breed in environments as highly polluted as *I. elegans* does. According to our experience this phenomenon could be regarded as an important indicator in the biological analysis of water pollution, especially as the insects hardly move among from the water from which they have emerged. For that reason the evidence of the presence of adults in a great majority of cases is a sufficient indication of breeding localities.

The insects are on the wing from dawn to dusk, actively flying even in strong winds, though high concentrations of individuals could also be observed in sheltered areas. The sex ratio is practically 1 : 1.

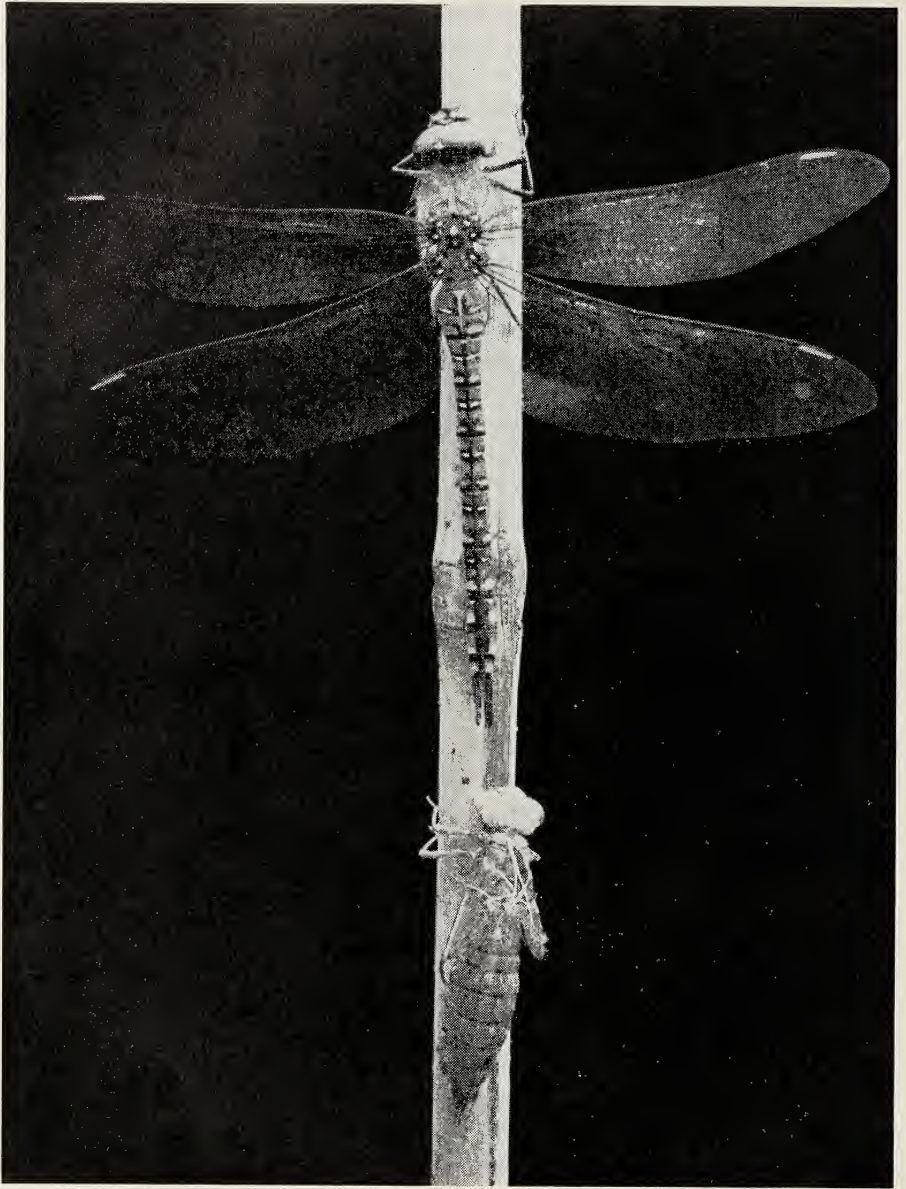
Hatching takes place on parts of a plant just above the water or in the very near vicinity. Individuals are emerging in a constant flow from 10 a.m. until 6 p.m.

Oviposition takes place preferably in the afternoon or in the early evening and apparently without male protection of any kind. It is interesting to stress in this connection that WESENBERG-LUND (1913) recorded male protection during oviposition in Denmark and consequently PORTMANN (1921) suggested that there are two ecological races within the species: one with protection in the north and a southern one without it.

It is a well known fact that the females of this and the allied species occur in several morphological forms. Andromorphic homochromatic and isochromatic are the terms applied to the "male like" forms, while the other ones have been termed heterochromatic or heteromorphic.

Andromorphic and heteromorphic forms each have two different varieties. They have been named and described by several authors, e.g. LIEFTINCK (1925), SCHMIDT (1929), LONGFIELD (1949), ROBERT (1959), etc. Var 1, as described by LONGFIELD (1949), is the dominant andromorphic form in all localities examined on the island of Walcheren. The form *I. violacea* Selys is scarce and one heteromorphic specimen of *I. rufescens* Stephan was found at the pool west of Vrouwenpolder.

The genetics of sex limited polychromatism in natural populations have been



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Aeshna mixta Latr. The perfect female dragonfly with wings spread and its exuvium. The ultimate instar larva was taken at the creek near Veere on June 28th, 1964, the emergence took place in the laboratory early in the morning on July 13th, 1964.

investigated in but a few species. JOHNSON (1964) has studied female dimorphism in the allied American species *Ischnura damula* Calvert and has proved that it does not vary with age and environmental factors.

Frequencies existing in natural populations occurred also in population samples cultivated by JOHNSON in a variety of constant laboratory environments and the characteristic dimorphic features in the species examined appear to remain constant throughout time intervals approximating life expectations in nature. JOHNSON came to the conclusion that sex controlled dimorphism is governed by a single allelic autosomal gene pair; females with the "male like" pattern are homozygous recessive and the heteromorphic ones are heterozygous and homozygous dominant.

(3) *Enallagma cyathigerum* (Charp. 1840).

One single female was caught in the park of Westhoven castle on July 1st, 1964. It is typical that the species does not occur in pools with a relatively high chlorine concentration. Faunistically it is new to the province of Zeeland.

(4) *Coenagrion puella* (L. 1758).

Many specimens of this widely distributed and typical freshwater species were caught in the park of Westhoven castle on July 1st, 1964.

(5) *Aeshna mixta* Latr. 1805.

Many penultimate instar larvae of both sexes were caught in a shallow, little bay of the large creek near Veere. The chlorine concentration at this locality is 2004 mg/l, being the highest concentration found in this body of water. We have also searched for this species at other locations along the shore of the creek where the concentration appears to be 1500—1800 mg/l. Due perhaps to the different character of the bottom (stones) it could not be found there.

(6) *Orthetrum cancellatum* (L. 1758).

Two mature males were observed in dunes near Oranjezon on July 2nd, 1964. The species is known from Middelburg, from dunes near Scheveningen, Wasenaar and 's-Gravenhage (all localities given by LIEFTINCK, 1926) from Oostvoorne (KIAUTA 1964a), in the Peel (KIAUTA 1964b) etc.

Specimens are kept in the collection of the Dutch State Institute for Nature Conservation Research (RIVON) in Zeist and in the Institute of Genetics, University of Utrecht (The Netherlands). In the latter Institute the specimens were used for cytological investigations. The chemical analyses of water samples with relation to the chlorine concentration were made on the spot in a provisional field laboratory.

Samenvatting

Zes soorten van Odonata werden op Walcheren gevonden. *Erythromma najas* (Hansem.) en *Enallagma cyathigerum* (Charp.) zijn nieuw voor de fauna van Zeeland.

Erythromma najas (Hansem.), *Enallagma cyathigerum* (Charp.) en *Coenagrion puella* (L.) schijnen zich alleen voort te planten in een omgeving met een uitgesproken lage chloride-concentratie (240—285 mg/l). Larven van *Ischnura elegans* (v. d. Lind.) en *Aeshna mixta* Latr. komen ook voor in plassen met een chloride-concentratie tot 2004 mg/l.

Op Walcheren zowel als op talrijke andere plaatsen in het land namen wij waar, dat onder de oecologische en geografische omstandigheden in Nederland de afwezigheid van *Ischnura elegans* een goede biologische indicatie is van een sterke watervervuiling.

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Beaumont, Jacques de, *Insecta Helvetica (Fauna)*, 3, Hymenoptera: Sphecidae, p. 1—168. Dit boek over de Zwitserse graafwespen is verschenen als derde deel in de serie „Fauna” van de *Insecta Helvetica*, gepubliceerd en uitgegeven door de Société entomologique suisse.

Uit de uitvoerige inleiding valt af te leiden, dat het werk vooral is geschreven voor de beginnende hymenopteroloog in Zwitserland. Zoals echter van een ervaren systematicus als DE BEAUMONT verwacht kon worden, zijn de determinatietabellen zeer goed en zij omvatten alle thans voor Zwitserland bekende soorten. Het boek is derhalve niet alleen van veel belang voor de plaatselijke entomologen, die zich met de Sphecidae willen gaan bezighouden, doch stellig ook voor specialisten buiten Zwitserland, die materiaal van dit gebied moeten determineren. De nadere beschrijvingen van de soorten zijn soms wel erg beknopt, doch binnen het kader van een dergelijke uitgave zal dit wel niet anders mogelijk zijn geweest. Soorten die misschien nog in Zwitserland kunnen worden gevonden, worden in een korte beschrijving ook vermeld; helaas zijn ze niet in de tabellen opgenomen. Uit het aantal voor sommige genera opgegeven soorten blijkt duidelijk, welk een vooruitgang er in de laatste decennia in de kennis van deze wespen is geboekt. Van *Psen* worden bijvoorbeeld 12 soorten beschreven tegenover 6 soorten in „SCHMIEDEKNECHT” (1930), van *Spilomena* 7 soorten, terwijl SCHMIEDEKNECHT daarvan slechts één vorm kende.

Bijzondere vermelding verdienen de vele fraaie figuren, in totaal 551, waardoor een vluigere en meer betrouwbare identificatie wordt bereikt. Het is een goede gedachte geweest om van een aantal genera (29) één soort in zijn geheel af te beelden, een werk waarin Mej. D. PETITPIERRE, die ook de meeste detailfiguren vervaardigde, voortreffelijk is geslaagd. Mede hierdoor is het een genoegen dit boek te gebruiken. Het kan besteld worden bij: Entomologisches Institut der Eidg. Techn. Hochschule, Universitätsstr. 2, Zürich. Dank zij een subsidie van het Zwitserse nationale fonds voor wetenschappelijk onderzoek is de prijs betrekkelijk laag (Zw. fr. 18,—). — J. P. VAN LITH.