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TICKS IN THE EUROPEAN INVERTEBRATE SURVEY, A CHOICE BETWEEN AN INVERTEBRATE AND A VERTEBRATE SURVEY ?

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The basic philosophy of the European Invertebrate Survey (EIS) calls for the collection of zoogeographical data and their interpretation (Heath 1977). The collection of the ecological data needed for the interpretation of the distribution is emphasized by the workers of the Dutch version of the EIS (van Tol 1979). Changes in population sizes should also be documented and the data collected are supposed to be used, among other things, as a support for movements aiming at the preservation of the biotopes of rare invertebrates in the country (Lefeber 1979).

Some countries have published EIS-atlases of invertebrates belonging to the parasites: Gasterophilidae (Belgium), Hippoboscidae (Belgium), Oestridae (Belgium) and Siphonaptera (Great-Britain) (George 1974, Leclercq 1979). In those studies main hosts of the parasites have been mentioned, but the host relationships could not be analysed statistically.

Hosts and host relationships, however, are of prime importance for the population size and distribution of parasites. This is shown by the distribution of two ticks in the Netherlands, *Ixodes ricinus* (L.) and *I. trianguliceps* Birula.

The known distribution of the species *I. ricinus* suggests its presence in the whole of the country of the Netherlands (Fig. 1). As main hosts this tick uses almost any bird or mammal species (Table 1, see also Garben 1981). Therefore, in general, hosts are not limiting.

Table 1

Main hosts for the different life stages of the tick *Ixodes ricinus* in the Netherlands (Garben 1981).

Stage	Host
Larva	Rodents
	Insectivores
	Birds
Nymph	Birds
	Medium-sized mammals
Adult	Ruminants
	Dog
	Cat
	Hedgehog

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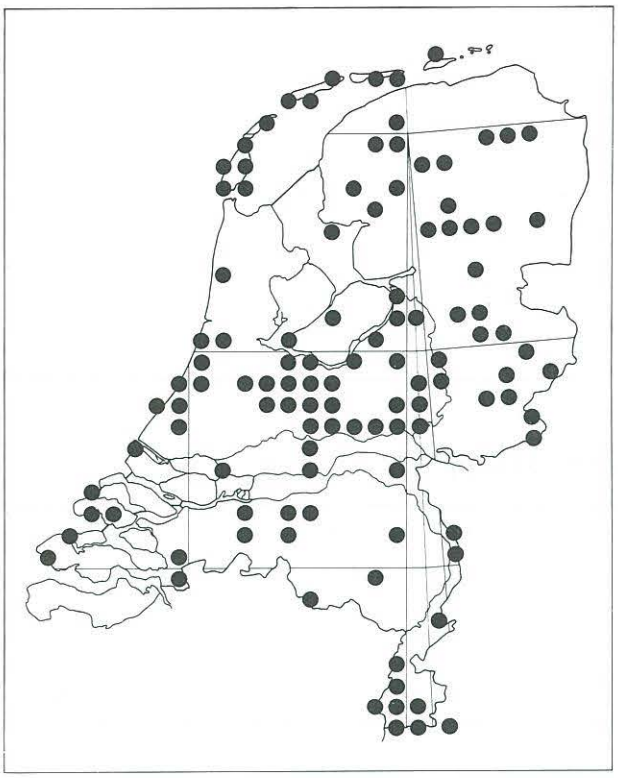

Fig. 1. *Ixodes ricinus* (after Garben 1981)

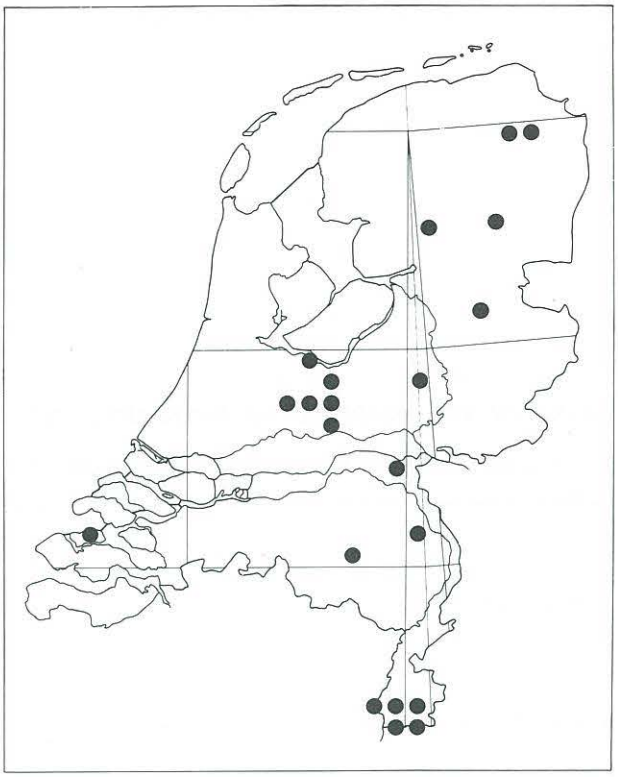

Fig. 2. *Ixodes trianguliceps* (after Garben 1981)

Fig. 3

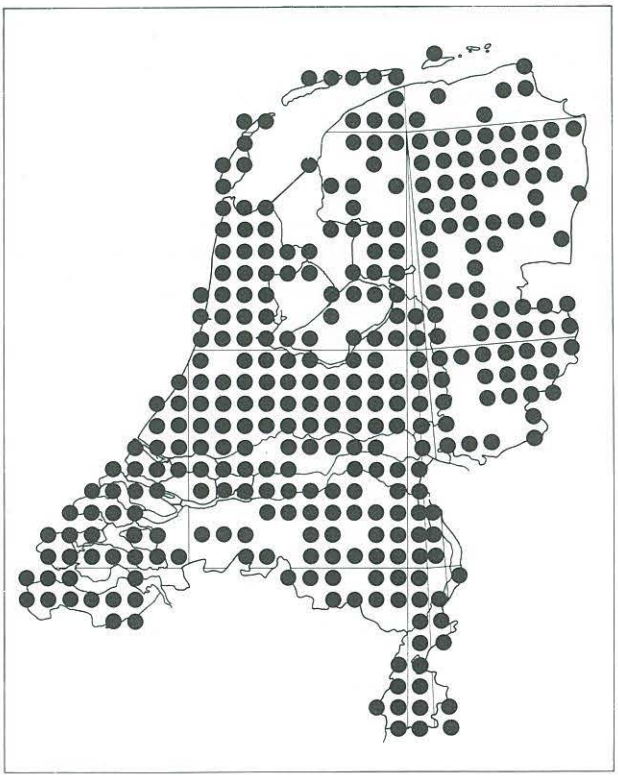

Fig. 3

Distribution map of the main hosts of *Ixodes trianguliceps: Apodemus sylvaticus, Clethrionomys glareolus, Crocidura russula* and *Sorex araneus* (After van Wijngaarden et al. 1971 and Garben unpublished).

In case hosts are limiting for the survival of a population of parasites, knowledge of the distribution patterns of the hosts is imperative. This would mean the need for an European Vertebrate Survey ((EVS). An EVS as such does not seem to exist, but in the Netherlands some starts were made to map the geographical distribution of vertebrates. Drs G.H. Glas (Research Institute for Nature Management, Arnhem) started a mammal survey (FZN = Faunistiek van de Zoogdieren van Nederland) in November 1980. Data on birds have been collected in a project of SOVON (Stichting Ornithologisch Veldonderzoek in Nederland) (Teixeira 1979). Besides a start is made with the mapping of birds on a European scale. A project on the mapping of amphibians and reptiles of the Netherlands is forthcoming.

Let us review now the distribution of the tick *I. trianguliceps*, a parasite of rodents and small insectivores (Fig. 2). This species lives well protected in burrows (Garben 1981). The distribution of its main hosts (Fig. 3) shows a possible presence in the whole of the Netherlands. However, the preliminary distribution map of *I. trianguliceps* suggests its absence in the most maritime part of the country (Fig.2, Garben 1981). More research is needed of course, but it is clear that to understand population dynamics of the parasite, ecological data of the hosts as well as the parasite are needed.

As is stated before, the Dutch version of EIS has included a number of ecological data. It even opened the possibility to denote parasitism (van Tol 1979). However, only from vegetable hosts the identity may be included. The vertebrate surveys in the Netherlands that were mentioned earlier, do not include parasites and collect not enough parasitological meaningful ecological data. For the succesful investigation of parasites we actually need a sort of 'double database' with data on the parasitological meaningful ecological data of hosts as well as parasites.

Since EIS-Nederland was much more advanced than the above mentioned vertebrate surveys, we decided to work with the EIS set-up. For the tick survey changes were made. Amersfoort coordinates were deleted. Substrates of the parasites, parasitope, identity, stage and environment of the (potential) host were added. The accent of the study shifted slowly from the preparation of distribution maps to an analysis of ecological data. This gave problems in retrieval, since only a flexable retrieval system would allow us to get answers on ecological questions.

The database had to be transferred to the CYBER 175 computer of the ACCU (Academisch Computer Centrum Utrecht). On this computer the program SIR (Scientific Information Retrieval) is installed (Robinson et al. 1979). This program answered our needs for a flexable retrieval system.

It became also clear that a database fitting the needs of invertebrates in general, such as EIS-Nederland, is actually not very suitable to study vertebrate parasites. A new type of database was devised in our laboratory, MINIZOO. This database is described by van Bronswijk (1981).

Concluding we may say that our results indicate that to reach the goals of the European Invertebrate Survey (Heath 1977) for vertebrate parasites, a special type of database is needed with flexable retrieval possibilities and the inclusion of ecological data of host and parasite. We hope that in the future, parasites will be treated more parasitological in Invertebrate Surveys.

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