

HOOFDSTUK 16 SUMMARY

THE ACULEATE WASPS AND ANTS OF THE NETHERLANDS

The wasps en ants (Hymenoptera Aculeata exclusive of the Apidae) constitute a significant portion of the Dutch fauna comprising in all some 469 species. This book gives a general account in the Dutch language of the current knowledge of the ecology, behaviour, evolutionary history, diversity, threats and conservation aspects of this group, as well as an identification key to all families and genera. Data on the taxonomy, faunal status, distribution and ecology are provided for each species and genus.

Below follows a brief summary of the contents of the various chapters.

CHAPTER 1 Introduction

This chapter provides an overview of the contents of the book, and describes how this book came about and describes the tasks of the eleven main authors, and acknowledges the sponsors, photographers and artists and other persons who contributed in one way or the other.

CHAPTER 2 History of the study on wasps and ants in The Netherlands

Aculeate wasps and ants have received the attention of Dutch entomologists since the middle of the 19th century. The first checklist of Dutch Hymenoptera appeared in 1858 and had been compiled by Snellen van Vollenhoven. In the next decades, Dutch entomologists like Oudemans, Ritsema and Six made important contributions to the study of Dutch aculeate wasps. In the first half of the 20th century, the increasing knowledge of taxonomy led to the publication of a number of identification keys by - among others - Benno, Bouwman and Wilcke. Some entomologists took an interest in the biology rather than taxonomy, studying behaviour and orientation of e.g. digger wasps (TINBERGEN, ADRIAANSE, BAERENDS). The study of the faunistics of aculeate wasps was stimulated by the foundation of the European Invertebrate Survey (EIS-Nederland). In 1979 Virgilius Lefebvre published the first distribution atlas of a limited portion of the Dutch Aculeata species, marking the start of an increase in faunistic work that would eventually lead to the publication of this atlas.

The first important Dutch entomologist who worked on ants was Erich Wasmann (1859-1931), who is also internationally acknowledged for his contributions to the study of commensals and parasites in ant nests. In the first half of the 20th century, the study of ants was continued by Bos, Reclaire and Stärcke. The latter studied the social behaviour of ants and published identification keys, which stimulated further faunistic studies of the Dutch ants species. Van Boven and Mabelis, who also studied the biology of ants, wrote new identification keys. In recent years, a number of Dutch biologists (BOOMSMMA, DE BRUYN, ELTON AND MABELIS) took an interest in the study of ant ecology. Distributional data were collected by members of the ant study group of the Dutch Entomological Society, like De Boer, Van Hengel, Van Loon and Smits.

CHAPTER 3 Phylogeny, nomenclature and diversity

This chapter describes the knowledge of the systematics and phylogeny of the Aculeata. A systematic list of the aculeate wasp and ant species of the Netherlands is presented.

There are now 408 species of aculeate wasps recognised in The Netherlands, which are distributed over the families as follows: Bethyridae (13), Chrysididae (52), Dryinidae (40), Embolemidae (2), Tiphiidae (5), Sapygidae (4), Mutillidae (3), Pompilidae (66), Vespidae (54), Ampulicidae (1), Sphecidae (6), Crabronidae (162). The taxonomic status of some taxa, notably within the Chrysididae and Dryinidae, are still unsettled. 61 species of ants are known from The Netherlands.

CHAPTER 4 Morphology and identification

An overview is given of the main morphological features of Hymenoptera Aculeata, including that of the sting apparatus. The largest and most important part of this chapter is the illustrated key to all genera of wasps and ants in The Netherlands. Never before has such a key been published.

CHAPTER 5 Biology of wasps

This chapter provides a review of the current knowledge of the biology of the various families of aculeate wasps. Different paragraphs deal with topics like reproduction, larval development, food and feeding behaviour, nest building and relations with other organisms.

CHAPTER 6 Biology of ants

The biology of ants is very different from that of aculeate wasps, because of the complicated social colonies in which they live. This chapter deals with subjects like the number of queens in a nest, social parasitism, slavery, nest building, food and feeding behaviour and the many relationships with other invertebrates that live inside ant nests. Special attention is paid to the relationships between ants and butterflies of the family Lycaenidae.

CHAPTER 7 From solitary to social

Describing and explaining social behaviour of wasps and ants has always had special attention of researchers. This chapter discusses the interesting and often complicated theories that have been developed on this subject. The different levels of sociality are described and the most important theories about the evolution of social behaviour are discussed, including mutualism, manipulation and kin selection. A brief account is given of social behaviour in other groups of insects, like termites and aphids.

CHAPTER 8 The making of this book

The distribution maps presented in this book are mostly based on data of specimens that were collected or sighted by amateur entomologists and stored in the database of the Dutch European Invertebrate Survey (EIS-Nederland). This database contains 111.437 records of aculeate wasps and 19.575 records of ants from the period between 1808 and 2004. This chapter discusses the composition and some technical aspects of the database and the methods used for some calculations.

CHAPTER 9 Wasps and ants in seven districts

The Netherlands can be divided into seven districts according to physical and geographical properties like soil type. In this chapter, the wasp and ant faunas of these districts are discussed. For each district, the most common and the most characteristic species are determined.

CHAPTER 10 Changes in the wasp and ant fauna

Trends of the aculeate wasps and ants of The Netherlands are assessed by comparing the percentage of occupied 5x5 km squares in two periods. The wasp families Bethyridae, Dryinidae and Embolemidae were not considered because of insufficient data, especially in the pre-1980 period, and taxonomic difficulties. Several species of Chrysididae have also been left out of the trend analysis because of taxonomic difficulties. For the remaining wasps, the calculations were based on a comparison of the periods 1950-1979 and 1980-1999. For ants, the entire period before 1980 was compared with the period 1980-1999. The periods compared were not exactly the same, because of differences in recording intensity between these groups.

Special attention is given to disappeared and threatened species. Species that have not been recorded since 1980 or that have strongly declined are indicated as candidates for a future Red List. Of these, 26 wasp species are considered to have disappeared ('verdwenen') from the country. The most striking example is the digger wasp *Dinetus pictus*, which used to be fairly common and widespread before 1950. Eight out of 52 species of Chrysididae seems to have disappeared from The Netherlands, a remarkably high proportion. A total number of 42 species has strongly declined, 38 of which thereby became rare and thus are to be regarded as being threatened ('bedreigd'). Only 11 species have shown a strong increase, the vespid *Dolichovespula media* being the most remarkable example. Before 1950 this large and conspicuous species was common, but in the period 1950-1979 it was reported from a few localities only; in the recent-most period the number of records have strongly increased again, however.

Two Dutch ant species are considered to have disappeared since 1980. Both these species are at the northern limit of their distribution, being known from only one or two localities in the southeastern part of the country. Six species of ants have strongly declined in The Netherlands. Three species, *Camponotus ligniperda*, *Polyergus rufescens*, and *Myrmica sulcinodis*, are considered to be threatened. Remarkably, there are no ant species for which a strong increase has been observed.

The overall conclusion to be drawn from this chapter is that there is reason for concern: in all families of wasps and ants considered, the number of species with a negative trend far exceeds the number of species with a positive trend.

CHAPTER 11 Wasps, ants and nature management

For the occurrence of wasps and ants, three factors are important: microclimate, the availability of nesting sites and the availability of food for both larvae and adults. A major threat for wasps and ants in The Netherlands is nitrification. This causes a strong degradation of habitats because bare patches of ground - very important microhabitats for aculeates - tend to get overgrown by grasses. Other environmental factors, like fragmentation and drying out of habitats, are probably important for a few species only, like the ant *Formica transcaucasica*. Owners of nature areas can use several methods to reduce nitrification of the soil. The effects of these methods on the wasp and ant fauna are discussed. The chapter concludes with brief accounts on the management of microhabitats and species.

CHAPTER 12 Investigating wasps and ants

This chapter aims to stimulate future research, and deals with the possibilities of faunistic, ethological, ecological and taxonomical studies. Attention is paid to faunistic surveys, collecting methods, preparation and conservation of specimens and the construction of artificial nests for wasps and ants.

CHAPTER 13 Species accounts

This part of the book presents the information on the individual species of aculeate wasps and ants in The Netherlands. The families are placed in systematic order: Bethyridae, Chrysididae, Dryinidae, Embolemidae, Formicidae, Mutillidae, Sapygidae, Tiphiidae, Pompilidae, Vespidae, Ampulicidae, Crabronidae, Sphecidae. Each family and genus is introduced by a general overview of the taxonomy, distribution, biology and (merits of) available identification literature. Within each family, genera and species are treated alphabetically. For each species, a brief account is given of the morphology (and - if relevant - taxonomy and identification), distribution and biology. This is illustrated by distribution maps showing the distribution in different periods, and by flight diagrams for males and females (except for Formicidae, because they are present year-round). In the upper left corner of each map, a qualitative indication of the present occurrence in The Netherlands as well as the faunal trend are given, based on the data provided in appendix 2 (an explanation is provided in chapter 10).