Temperature Response and Heat Tolerance of Riparian Bembidiini Species (Coleoptera: Carabidae)

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The responses of riparian species of Bembidiini were tested in temperature [T] gradients under different relative humidity [r-H] conditions: The species tend to select lower T as time proceeds when there is an inverse gradient in T and r-H. However, with an exposure time of 2 h, the majority of the species selects the same main T region under varying r-H conditions. There are great differences in the preferred T ranges of the species, and this correlates with their degree of heat tolerance [H-T] (mainly tested by 1 h exposure in dry air at fixed T) and the T conditions prevailing in their microhabitats. No correlation between T preference/H-T and geographical distribution of Bembidiini species can be found, but general links between T preference, life cycle and geographical distribution of Carabidae are postulated.

Key words: Temperature response – heat tolerance – Bembidiini-Carabidae.

1 Introduction

Abiotic factors to a large extent determine the habitat selection of Carabidae. Among such factors, temperature [T] is emphasized as being important and, generally, a correspondence between the T reactions of Carabidae under laboratory conditions and the T prevailing in their preferred habitats is reported [Thiele 1977 and references therein, Kreckwitz 1980]. T and humidity [H] are intimately linked, however, and in many of the experimental studies made on temperature preferences [T-Pr] of Carabidae and other Arthropoda, H is an additional factor that may have affected the responses of the animals [Madge 1961]. The effect of T is therefore not well documented among Carabidae.

The present paper reports results of a study of T – H responses and heat tolerances [H-T] of members of the Carabidae beetle genus Bembidion Latreille 1802. The geographical distributions of these beetles vary between species. Bembidion spp. occupy most of the microhabitats [MH] on river banks and are often highly adapted to certain ones. MH on river banks differ widely in substratum type, type and density of cover, exposure, moisture and T. The species of Bembidion should, therefore, be well suited for studying the effect of T on MH selection and geographical distribution of Carabidae.

1 Temperature; in further text: T
2 Humidity; in further text: H
3 Temperature preference; in further text: T-Pr
4 Heat tolerance; in further text: H-T
5 Microhabitat; in further text: MH