# Imaginal Diapause in the Bark Beetle, *Ips typographus*

*Petr. Doležal and František Sehnal*

Academy of Sciences and Faculty of Biological Sciences, University of South Bohemia, Branisovska 31,370 05 Ceské Budejovice, Czech Republic

## Abstract

In *I. typographus*, the development of immature stages can proceed at various day lengths, however ambient temperature must reach at least 5°C. In central Europe, the adults fly and reproduce only when temperatures are above 14°C and photoperiods are in excess of 15 hrs. of light. When the last instar larvae, pupae, or adults develop at a short photoperiod (SD, 12:12 hrs. in our experiments) and at a temperature of less than 23°C, only diapausing adults are produced. Imaginal diapause, which is characterized by a reproductive block, reduction of flight muscles, and behavioral changes, is a crucial adjustment to seasonal changes. In Central Europe, bark beetles terminate egg laying in August, just in time so that the already present immature stages can complete their development into adults before winter ensues. The gonads of diapausing adults may slowly develop at 5°C but reproduction does not resume even when the adults are transferred to conditions that normally favor development (20°C and 18 hr day length). After a couple of weeks at 5°C however, the adults initiate reproduction when they are transferred to a regime of 20°C and 18 hr day length. Long exposures at 5°C render the adults insensitive to photoperiod and they reproduce efficiently under conditions (12 hr day length and 20°C) that would cause the non-chilled beetles to induce or maintain diapause. Under field conditions, diapause is terminated sometime in January and reproduction is halted thereafter due only to low temperature. Diapause can be induced only after one reproductive cycle and in the new bark beetle generation.