Imaginal Diapause in the Bark Beetle, *Ips typographus*

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**Abstract**

In *I. typographus*, the development of immature stages can proceed at various day lengths, however ambient temperature must reach at least 5ºC. In central Europe, the adults fly and reproduce only when temperatures are above 14ºC 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 23ºC, 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 5ºC but reproduction does not resume even when the adults are transferred to conditions that normally favor development (20ºC and 18 hr day length). After a couple of weeks at 5ºC however, the adults initiate reproduction when they are transferred to a regime of 20ºC and 18 hr day length. Long exposures at 5ºC render the adults insensitive to photoperiod and they reproduce efficiently under conditions (12 hr day length and 20ºC) 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.