

Lee, R.E. 2003. Dormancy. In: *Encyclopedia of Insects*. V. Resh and R. Cardé (eds.), San Diego, Academic Press. pp. 334.

Knott's test or filtration. In some dog heartworm infections (occult heartworm infection), microfilaria are not detectable and diagnosis relies on serology and other diagnostic tools.

### MANAGEMENT

Treatment is effective. The goal is elimination of the primary disease agent, the adults. Two arsenical drugs are currently approved for use in dogs, melarsomine hydrochloride (Immiticide; Merial) and thiacetarsamide sodium (Caparsolate; Merial). Treatment requires concomitant restriction of exercise and use of anti-inflammatory support to reduce the possibility of pulmonary thromboembolism from the dead heartworms. Microfilaria are eliminated by secondary treatment with ivermectin or milbemycin. Prevention of heartworm infection is safer and more economical than treatment and is accomplished readily by routine administration of diethylcarbamazine (daily in the diet) or one of the macrolide anthelmintics (monthly treatment; ivermectin, milbemycin, moxidectin, selamectin) during the transmission season.

#### See Also the Following Articles

*Blood Sucking • Mosquitoes • River Blindness • Veterinary Entomology • Wolbachia • Zoonoses, Arthropod-Borne*

#### Further Reading

- American Heartworm Association (2001). <http://www.heartwormsociety.org/>.  
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 Bowman, D. D. (1999). "Georgis' Parasitology for Veterinarians," 7th ed. Saunders, Philadelphia.  
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## Dormancy

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Dormancy is an inactive state associated with metabolic depression and arrested development that promotes the survival of insects during periods of harsh environmental conditions, including high or low temperatures or moisture conditions and reduced food quality or availability. Diapause may occur in any life stage (egg, larva, pupa, or adult); however, for a given species it generally occurs in only one stage.

Dormancy may be manifested in a variety of forms that differ widely in their intensity and duration. Consequently, it has

proved difficult to classify these forms into discrete categories, and general agreement on terminology is lacking. Nonetheless, dormant states range from a moderate depression of short duration (quiescence) to a profound and extended period of metabolic suppression and developmental arrest (diapause).

Quiescence commonly refers to short periods of dormancy that are directly induced by adverse environmental conditions, principally low or high temperature. It also has the advantage of being quickly reversible upon the return of favorable conditions; this rapid response may be especially important in extreme environments, such as alpine regions or deserts, where access to food and favorable conditions are intermittent and unpredictable.

In contrast, diapause is not directly induced, but is triggered by genetically programmed responses to environmental cues that occur in advance of adverse conditions. Anticipatory induction allows time for substantial physiological changes prior to the arrival of adverse conditions. These changes may include accumulation of lipid and glycogen reserves, deposition of cuticular lipids that enhance desiccation resistance, suppression of gametogenesis, decreased metabolic rate, increased tolerance of anoxia, and low temperature.

Although moisture conditions, temperature, and host-plant quality may serve as cues for the induction of diapause, photoperiod is the factor that has been identified most commonly in this regard and is the one that has been the subject of the most investigation. Furthermore, these environmental conditions may interact to promote or inhibit the induction of diapause; an unusually cool autumn may induce diapause sooner than would be expected based solely on photoperiod. The cue for diapause induction need not be received by the life stage that enters diapause. For example, in many species adults that experience short daylengths produce diapause eggs, while those exposed to longer photoperiods do not.

#### See Also the Following Articles

*Aestivation • Cold/Heat Protection • Diapause*

#### Further Reading

- Danks, H. V. (1987). "Insect Dormancy: An Ecological Perspective." *Biological Survey of Canada (Terrestrial Arthropods)*, Ottawa.  
 Denlinger, D. L. (1986). Dormancy in tropical insects. *Annu. Rev. Entomol.* 31, 239-264.  
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 Tauber, M. J., Tauber, C. A., and Masaki, S. (1986). "Seasonal Adaptations of Insects." Oxford University Press, New York.

## Dragonfly

see *Odonata*