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Abstracts

LAKOVAARA, S., J. LUMME and A. OIKARINEN, Department of Genetics, University of Oulu, Finland. Genetics and evolution of diapause in European species of the *Drosophila virilis* group. — An adult diapause induced by daylength and modified by temperature has been found in all populations of four species: *D. littoralis*, *D. lummei*, *D. ovivororum* and *D. lakovaarai*. We have studied the physiology, genetics and evolution of diapause mainly in *D. littoralis*. Females having completely undeveloped ovaries at the age of three weeks after eclosion are classified as diapausing. The following *D. littoralis* strains were used: Ticino, Switzerland (46° 10′ N), Kuopio, Finland (62° 55′ N) and Rovaniemi, Finland (66° 10′ N = Arctic Circle). These strains were reared at 16°C and under light-dark cycles LD 12:12, LD 18:6, LD 20:4 and LL. Under these conditions the strains were never completely diapausing (this does not hold true for *D. ovivororum*). The Ticino strain had minimum diapause at LD 12:12, the Kuopio strain at LD 20:4 and the Rovaniemi strain at continuous light. These responses are correlated with the daylengths prevailing during the reproductive seasons at the localities of origin of these strains. The adaptive significance of a mechanism measuring daylength is obvious; it is a means of obtaining a dependable forecast of the approach of the cold season. Crosses between strains indicate that the factors maintaining diapause are highly polygenic, but those are not closely linked. On the other hand, genes determining diapause may be partly epistatic over genes determining the non-diapause condition. Since the mechanism responsible for diapause is polygenic and complex, this gives the species a reservoir of evolutionary flexibility facilitating its spreading from one latitude to another. The factors responsible for diapause in *D. littoralis* populations may be subject to a stabilizing selection, maintained by local environmental conditions.