Abstracts

Evidence For Nonthermal Effects of Microwave Radiation: Abnormal Development of Irradiated Insect Pupae

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Several investigators have reported experiments in which microwave radiation caused biological damage at tissue temperatures which were not harmful when brought about by means other than microwaves. To study the effects of 10-GHz CW radiation on a poikilothermic invertebrate animal, we irradiated early pupae of the mealworm beetle, Tenebrio molitor. Each pupa was inserted in a waveguide and irradiated therein at waveguide powers of 80 mW for either 20 or 30 min or at 20 mW for 120 min, after which their subsequent development was observed. In control groups similarly treated, except that no microwave power was applied, 90 percent metamorphosed to become normal adult beetles. In the irradiated groups only 24 percent developed normally; 25 percent died and 51 percent developed abnormally. In half of the abnormal animals, the front half had undergone metamorphosis to form a normal beetle head and thorax but the hind part remained in the pupal state. Temperature increases within pupae were recorded during irradiation. When these thermal conditions were duplicated by means of radiant heating, subsequent development of pupae was normal in 80 percent of the experiments. We therefore concluded that the abnormalities induced by microwave radiation were not a thermal effect.

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