



Figs. 1-4.

have not been reported. From a comparison of the results it is apparent that the types of chromosomal aberrations induced by X-rays and γ -rays to a large extent are alike.

Extra chromosomes have been reported by Caldecott and Smith² in plants grown from barley seed previously subjected to X-ray irradiation. In one spikelet they observed a single isochromosome and a total of fifteen chromosomes in a cell instead of the usual fourteen. The increase in number, according to them, is the consequence of the formation of an isochromosome. In the present material there is an indication that the extra chromosome might be an isochromosome, because a ring of three was observed in two cells. The presence of an isochromosome also explains the formation of a ring of seven.

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¹ Krishnaswamy, N., and Rangaswamy Ayyangar, G. N., *J. Ind. Bot. Soc.*, XX, 3, 111 (1941).

² Caldecott, R. S., and Smith, L., *Cytologia*, 17, 24 (1952).

BIOLOGY

Resistance to Cold in *Ceratonia catalpae*

SALT¹ has reported resistance to frost and to being frozen in several species of arthropods. He has also reported on the synthesis and accumulation of a low molecular weight solute (glycerol) in insects and has suggested that this may explain resistance to cold². Lozina-Lozinsky³ stated that in the caterpillar, *Pyrausta nubilalis*, which can tolerate extremely low temperatures, the proteins and nucleoproteins can resist an increase in concentrations of the electrolytes. Asahina and Tanno⁴ found that the overwintering pre-pupal larvae of a sawfly, *Trichiocampus populi*, were able to survive freezing at -30°C for a full day, and withstand liquid nitrogen temperature (-195.8°C) provided they had been previously frozen at temperatures lower than -20°C .

Work in our laboratories has demonstrated freeze resistance in the larvae of the large American hawk moth, *Ceratonia catalpae*. Seven groups of ten larvae were cooled to $+4^{\circ}\text{C}$ for 21 days. During this period there was no apparent change in diapause. When brought to room temperature, they began to move and feed in a normal fashion. All survived to the pupal stage (about 72 h). In a group of thirty that were precooled to $+4^{\circ}\text{C}$ for 6 h and then taken to -20°C for 12 h, sixteen survived and went on to pupal stage. A further group of thirty was precooled to $+4^{\circ}\text{C}$ for 6 h, frozen at -20°C for 12 h and then immersed in liquid nitrogen (-195.8°C) for 5 min. After allowing this group to remain at room temperature for 15 h, movement was recorded in only two individuals. In the final group of fifty larvae taken to $+4^{\circ}\text{C}$ for sixty-four days, forty-six survived and went on to pupae. All individuals remained in diapause while at these temperatures.

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¹ Salt, R. W., *Ann. Rev. Entomol.*, 6, 55 (1961).

² Salt, R. W., *Canad. J. Zool.*, 37 (1959).

³ Lozina-Lozinsky, L. K., *Fed. Proc.*, 24, No. 2, Part III (1965).

⁴ Asahina, E., and Tanno, K., *Nature*, 204, 1222 (1964).

Occurrence of *Teleonemia scrupulosa* on *Sesamum indicum* Linn. in Uganda

Teleonemia scrupulosa (Stål) (Hemiptera, Tingidae) is a native of the tropical regions of the Americas and has been extensively used as an agent for the biological control of the noxious weed *Lantana camara* Linn. (Verbenaceae). It was introduced first into Hawaii¹; since then it has been introduced into Fiji², Australia³, Indonesia⁴ and other island groups in the Pacific. It is also established in India⁵, Mauritius, and South⁶, Central⁷ and East Africa. In general the level of control achieved in these areas has