# Bacillus thuringiensis

## FROM BEGINNING TO END

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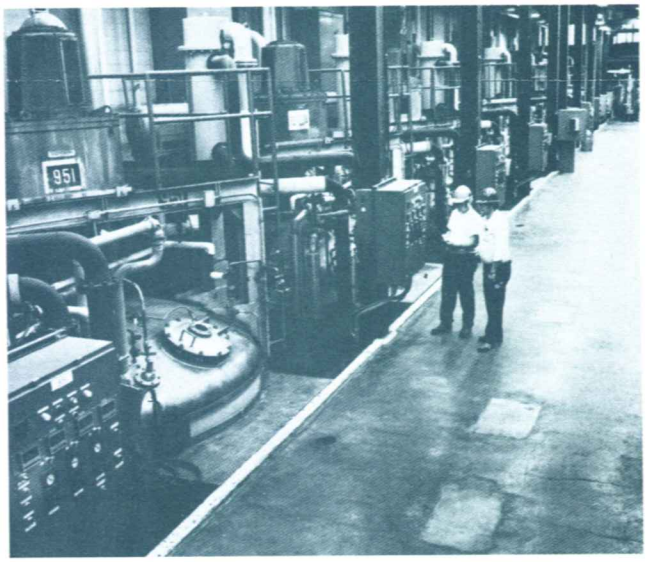
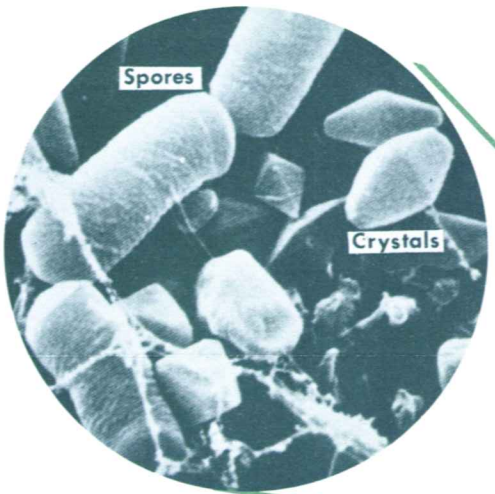
***Bacillus thuringiensis (Bt)*** is widely used as an insecticide to control many caterpillar-type pests. The insecticide produced from this very small (two ten-thousandths of an inch long) rod-shaped bacterium is one of the safest on the market. It causes no harm to pets, birds, wildlife, fish, beneficial insects, plants, or man.

Production of the insecticide begins with the fermentation of the ***Bt*** bacteria under strict sanitary conditions. After fermentation is completed, the bacteria are processed into a dry powder which is used for making different types of the insecticide.



**FERMENTOR** (Photo Courtesy of Abbott Laboratories)

At this time, the bacteria are in a dormant stage consisting of a dormant spore and a toxic crystal.




**MAGNIFICATION** of spores and crystals
(Photo Courtesy of Abbott Laboratories)

The toxic crystal is the secret to ***Bt***'s ability to act as an insecticide. When eaten by a caterpillar, the crystal dissolves in the insect's stomach and breaks down the stomach wall.

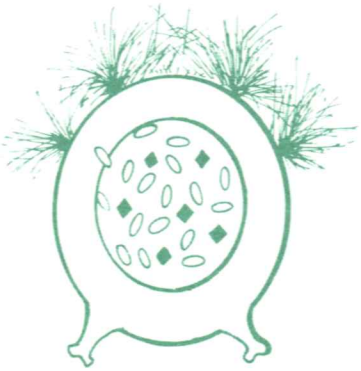
The crystal can only dissolve in those insects whose stomachs contain the correct combination of pH, salts, and enzymes. It can not dissolve in the highly acidic stomachs of humans. Because of this selectivity, the U.S. Environmental Protection Agency permits food crops sprayed with ***Bt*** to be eaten immediately after spraying.

1 To control the gypsy moth, the ***Bt*** insecticide is mixed with water and sprayed on the trees with a helicopter.

2 The caterpillars feed on the leaves containing the ***Bt*** spores and toxic crystals.

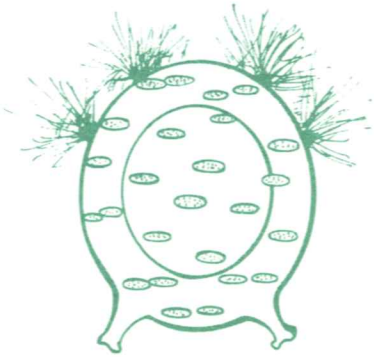
3 The spores and crystals enter the stomach and the crystals begin to dissolve.

4 Within 24-48 hours the stomach wall is broken down, the spores begin to invade the body, and the caterpillar stops feeding.



5 At this point, the weakened caterpillar is likely to be attacked by certain parasites.

6 During the next 48-96 hours, the spores completely invade the body and germinate, causing an infection that kills the caterpillar.



The new bacteria which grow from the germination of spores within the caterpillar are unable to form additional spores or toxic crystals. When the dead caterpillar falls to the ground and decays, the ***Bt*** bacteria also decay. Therefore, there is no insecticide build-up in the environment, and the death of the caterpillar can really be called . . .

**THE END**