

## Improving Strains of Bees by Artificial Insemination

**T**HE application of artificial insemination of queen bees at the Department of Agriculture's Animal Research Station, Wallaceville, to a project for the improvement of strains of bees in New Zealand is described in this article by T. Palmer-Jones, a Research Officer at the station, and G. E. Miller, Horticultural Cadet, Auckland. Artificial insemination is the only method showing promise of being of practical value in the removal of the element of chance from the mating of queen bees and its replacement by a controlled method. Application of the method is still in the experimental stage, but great possibilities of improving strains of bees are evident.

**C**OMMERCIAL beekeepers have long realized that the progeny of queen bees vary a great deal in their capacity to gather honey, tractability, swarming tendency, and other qualities. Selective breeding of queen bees for desirable qualities is the accepted practice, but in the past it has been much handicapped by the fact that the queen bee mates only in the air and not necessarily with drones from her own hive.

Commercial breeders of queen bees usually attempt to overcome this difficulty by placing their queen-rearing apiaries in isolated localities and stocking them entirely with what they regard as suitable bees for breeding. Under these conditions the air surrounding the apiary is saturated with drones of the right type and mismating is unlikely to occur. At best this method gives somewhat haphazard results and does not permit improvement of strains of bees by the methods which have been used with success in the breeding of domestic animals.

Many unsuccessful attempts were made to remove the element of chance from the mating of queen bees and to replace this with a controlled method. These attempts included mating the queen with approved drones in enclosures, mating the queen with a drone by the manual manipulation of the

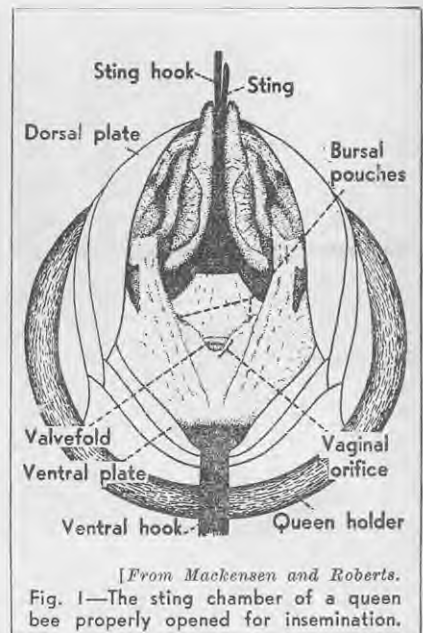
operator, and early attempts at artificial insemination. Artificial insemination was the only method which showed promise of being of practical value. After much painstaking work, Watson in America was able to demonstrate in 1926 a satisfactory method of artificially inseminating queen bees. Since then many American workers have gradually improved the instruments used and the technique of insemination.

The apparatus now used for artificial insemination, the technique of the method, and sufficient of the anatomy of the reproductive organs of bees for its understanding are described in a manual by Mackensen and Roberts (1) from which the following account is largely taken.

### Anatomy of Queen Bee

In brief, instrumental insemination consists of removing semen from selected drones with a microsyringe and injecting it into the oviducts of a virgin queen bee. To make the process clear it is necessary to describe the anatomy of the queen bee in some detail.

1. Mackensen, O., and Roberts, W. C. (1948): "A Manual for the Artificial Insemination of Queen Bees," United States Department of Agriculture.



The tip of the abdomen of the queen consists of an upper, or dorsal, plate and a lower, or ventral, plate, which close at the tip like the two halves of a shell. The cavity enclosed by these plates is called the sting chamber. In Fig. 1 the tip of the abdomen is shown in proper position for artificial insemination, with the dorsal plate and the ventral plate drawn apart to expose the sting chamber and its structures, including the sting and the vaginal orifice.

**HEADING PHOTOGRAPH:** The apiary used in the insemination project at the Animal Research Station, Wallaceville.