



Honey Bee Stock Improvement Program: Importation, Preservation & Utilization of Honey Bee Germplasm

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Objectives

1. Continue the cooperative Industry/University based breeding project to incorporate, evaluate and maintain imported honey bee germplasm into domestic breeding stocks.
2. Continue collection and importation of germplasm from endemic populations of European honey bees to enhance genetic diversity of domestic honey bee breeding stocks.
3. Cryopreservation of honey bee germplasm for immediate and long-term breeding purposes.
4. Continue to offer specialized Technology Transfer short courses.

Background

Early importations of honey bees into the U.S. sampled only a subset of several European honey bee subspecies, which were then propagated and expanded to establish the existing U.S. beekeeping industry. A strong queen production industry exists in the U.S., but queen producers continue to be limited by the genetic diversity of available breeding stock. With very limited exceptions, there has been little effort to introduce additional genetic material for breeding purposes in the 90 years following the passage of the 1922 Honey Bee Act (Sheppard 1989). In addition, the introduction of Varroa mites to the U.S. caused a major decline in the feral honey bee population that had been previously widespread in the U.S. This loss eliminated a potential source of genetic variability for queen breeders, as the feral population was genetically distinct from U.S. commercial honey bee populations (Schiff et al, 1994).

Project Summary

To increase the overall health of domestic honey bee stocks, our ongoing project is focused on increasing genetic diversity of U.S. honey bee breeding programs through the importation of germplasm from endemic European populations. We are working closely with CA queen producers to incorporate these imported stocks into domestic breeding stocks. This program includes the implementation of practical programs to test, select and maintain breeding stocks for commercial propagation. Collaboration between Industry, University, USDA-APHIS and the California Technology Transfer Team represents a partnership that will assure long term benefits from this program.



Research team, Steve Sheppard (WSU), Cecilia Costa (CRA-API, Italy), Sue Cobey (WSU), Jackie Park-Burris (California Queen Breeder), and Brandon Hopkins (WSU).

Our 2012 collecting trip focused on collections of *A. m. ligustica* from Italy. This year we invited CA queen producer Jackie Park-Burris to help in the selection of stocks. Semen was collected from queen producers in the Bologna area and also from the beekeeping institute Agricoltura Unità di Ricerca di Apicoltura e Bachicoltura in Reggio Emilia. Fresh semen was collected for immediate use and aliquots were also cryopreserved for future use.



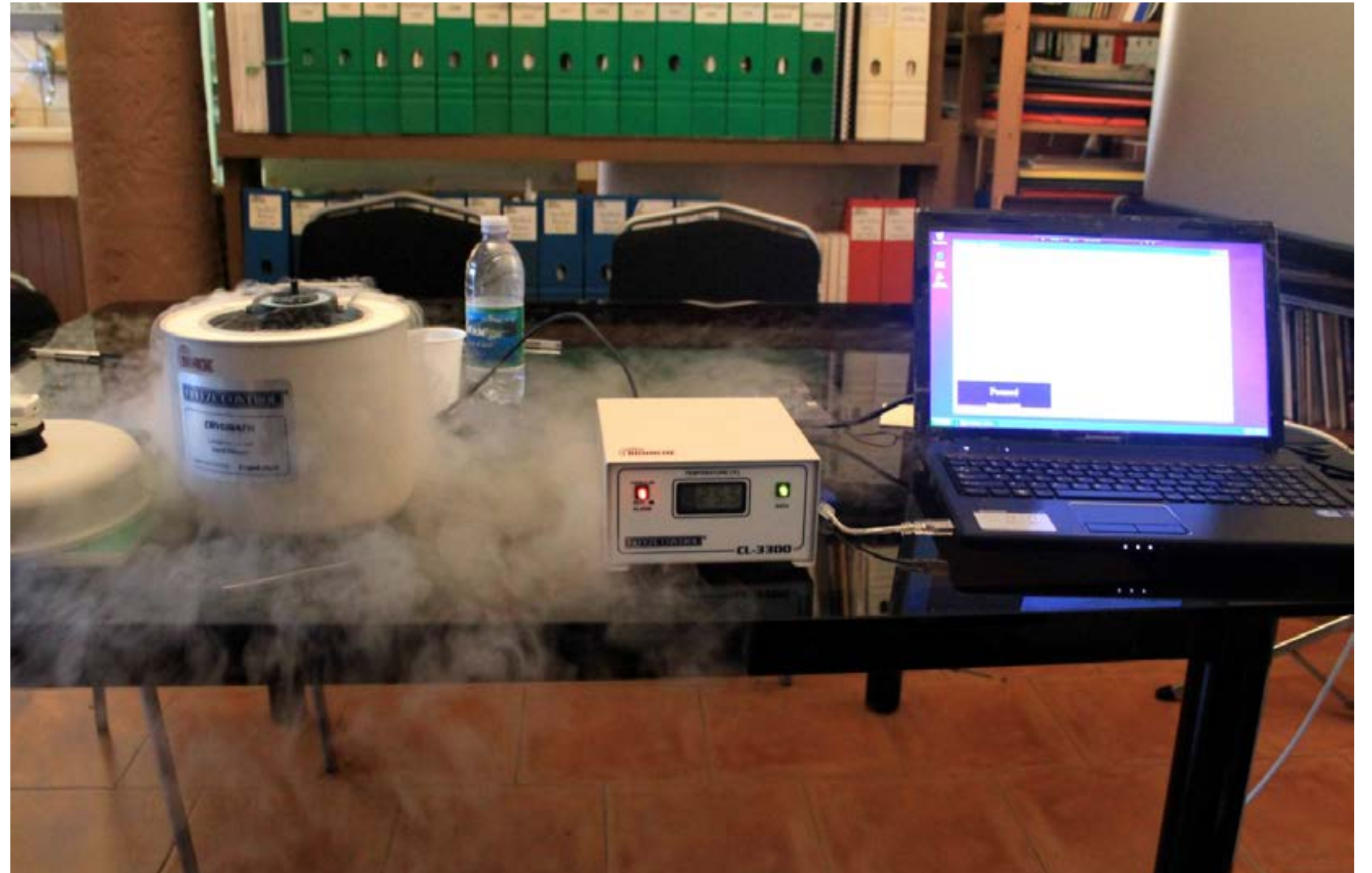
Imported breeding stock established at the USDA approved Honey Bee Quarantine station in Pullman, Washington.

Stock Evaluation & Maintenance Program

A stock evaluation and maintenance program with cooperating CA bee breeders has been implemented on a fee-based membership. This program incorporates stocks resulting from imported germplasm into domestic breeding stocks, with long term plans to evaluate and maintain these over time.

An insemination program with cooperating queen producers has been realized to annually establish the next generation of breeders. For evaluation and stock maintenance purposes, a subset of these queens are also established in WA. The CA Tech Team assists the CA producers in the selection and evaluation process.

The selected breeding stocks, incorporating the three imported subspecies, are propagated by CA queen producers and available to commercial beekeepers nationwide. This year *A.m. caucasica* breeder queens were released for commercial production. We have reestablished this subspecies in the U.S., known for its gentle behavior and collection of plant resins and production of propolis. Recent research has shown that propolis serves as a barrier against pathogens and may serve to augment the immune system of honey bees.



Process of cryopreservation of semen for long term storage.

Specialized Beekeeping Short Courses

We continue to conduct classes designed to provide beekeepers with the skills required to develop and maintain honey bee stocks. These are structured to provide "hands on" field and classroom training. The specialized short courses will continued to be offered at WSU Mt Vernon and Pullman campus locations. Classes are very popular and attract beekeepers from across the U.S. and abroad.



Queen Rearing Class. Pulling brood to set up cell builders.

Literature Cited

Schiff, N.M., W.S. Sheppard, G.M. Loper and H. Shimanuki. 1994. Genetic diversity of feral honey bee (Hymenoptera: Apidae) populations in the southern United States. *Ann. Entomol. Soc. Am.* 87:842-848.
 Sheppard, WS. 1989. A history of the introduction of honey bee races into the United States, I and II. *Amer. Bee J.* 129: 617-619, 664-667.



Propolis collected by bees is used within the hive as a self medication against various pathogens.

Importation of Honey Bee Germplasm

We continue to identify and import sources of European Old World stocks of three subspecies; *Apis mellifera ligustica* (the Italian honey bee), *A. m. carnica* (the Carniolan honey bee) and *A. m. caucasica* (the Caucasian honey bee). Importations are made under a USDA-APHIS permit to WSU which is subjected to virus screening by the USDA-ARS. The imported semen is instrumentally inseminated to U.S. produced virgin queens supplied by CA queen producers. Colonies headed by the resulting queens are initially established in a quarantine apiary, and released for propagation following USDA-APHIS release.



Semen collection and insemination of the honey bee queen.

