

Washington State Beekeepers Association

Keep the "Bee" in Business



Publication of Washington State Beekeepers Association

www.wasba.org

January 2007

President's Message

Another year's gone by and everyone seems so busy. There are lots of tasks ahead for the bees and we begin our planning for the association for the year.

Every year I struggle with goals for our association. Every year we have wanted to get the State Apiary Advisory Committee going and that has been a real test of everyone's patience but the letters are going out now and we should have a list to recommend to the Washington State Department of Agriculture. See our Web site for more information. We should be ready to go by early summer. Thanks to Eric Olson, John Timmons and Jim Bach.

Our next board meeting is March 3 at the Bar 14 Ranch House in Ellensburg. Meeting will be from 10 till 2pm. We will be in another room not the Banquet room this time so ask at the counter where we will be. Remember the first hour will be committee meetings. The Master Beekeepers will be meeting and there will be several others going on. The rest of the group will be working on activities and setting the calendar for the rest of the year.

One item you can put on your calendar now: the convention for this year will be at Sun Mountain Oct 25-27th. The convention is being sponsored by the Methow Valley Beekeepers Association. We will need to work on the speakers and program.

Early reports out of California seem to be guarded. Hive clusters are being reported as small and some combining and added of bees to the hives to get them ready for pollination is taking place. There are starting to be reports of some major losses in California and of major colony losses on the East Coast. This might be another rough year for pollinators.

Major agenda items for the March meeting are resolution of issues on joint conventions, State Apiary Advisory Committee formation, and 2007 WSBA Convention program.

Jerry Tate

Washington State Updates

Program Calendar for the Association.

March 3, 2007:

WSBA Executive Board Meeting
Bar 14 Ranch House Restaurant
1800 South Canyon Road, Ellensburg, WA
10 AM to 2PM

October 25 to 27, 2007:

WSBA Convention at the beautiful
Sun Mountain Lodge in
Winthrop, WA
www.sunmountainlodge.com

It's a new year and time for membership renewal. In this newsletter, you will find the 2007 application for membership. It's also on the web site!



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Executive Board Meeting Agenda

March 3, 2007

Reports:

- The Secretary's Report-minutes in last newsletter
- The Treasurer's Report
- Membership Report
- Individual Membership
- Association Membership
- Master Beekeepers Certification Committee Report
- Area Reps

Old Business:

- Mt Baker Beekeepers Convention report-Jo Miller
- WSU Report-Steve Sheppard
- Report on Apiary Board Formation-Voting-Eric Olson

New Business:

- Discussion to resolve issues over joint conventions-Jerry Tate
- Sam Hapke Grant Request-Scholarship Committee
- Pesticide Commission Hearing-Grants-Jerry Tate
- WSU Field day discussion-Jerry Tate and Steve Sheppard
- 3 -Bee yard reports-Tim Bueler, Louis Matej, Bob Arnold
- Discussion of Options for improvements Bee yards support
- Goals for 2007 WSBA

Research

Genetic variation in U.S. honey bees: Historical constraints and future possibilities

The honey bee kept by U.S. beekeepers is native to Africa, Europe and western and central Asia. Across this vast range, 26 distinct geographic races or "subspecies" of the honey bee occur, reflecting adaptation to a variety of climatic and ecological conditions. Until recently, U.S. populations were derived solely from 8 subspecies that were introduced into North America between 1600 and 1922. These included 4 from Europe, 2 from the Middle East and 2 from northern Africa. In 1990, Africanized honey bees (derived from yet another African subspecies) became established in the U.S. One historical constraint of this pattern of introduction is that our honey bees reflect only a partial sampling of the original diversity contained within the species (only 9 out of 26 subspecies were ever brought to the U.S.). This limitation in genetic variability due to the importation process reflects a specific type of founder effect known as a "genetic bottleneck".

Genetic studies in the early 1990's showed that managed populations of honey bees were derived primarily from the European races favored by beekeepers (Carniolan, Caucasian, Italian). In contrast, the feral or wild population of honey bees also exhibited genetic contributions from the other introduced subspecies. Thus, the individuals in the feral popula-

(Continued on page 4)

Classified Ads

FOR SALE: 60-frame Hubbard Extractor, Cowen Uncapper with Conveyor, Capping Spinner, jacketed sump with pump & motor, two 200-gallon, jacketed stainless tanks with legs, one 300-gallon, jacketed stainless tank with legs, one low pressure steam boiler.
ALL for \$15,000.00. Please call Gary Scott
1202 Juniper St., Milton, WA 98354
253-922-7940

Honey Vendor needed for Cle Elum, WA Farmers' Market.

The market is in full swing from now until October. We understand local honey is in short supply right now, so if you can sell honey at our market later in the summer, please contact us! If you have honey right now, please contact us! Our Market is on Saturdays on the grass lot next to "Pioneer" Coffee, from 10 a.m. to 2 p.m. We are on Cle Elum's main street, so we get ALOT of traffic due to our "recreation" location.
Please contact: Cathy Carroll, Market Manager
trademark@iezpc.com
(509) 674-4681

Wanted: Honey harvesting equipment for new beekeeper. Still small potatoes (one hive!) Would like to beg-borrow-steal-**BUY** a hand-cranked extractor, capping knife, and anything else that I might need to harvest honey.
Whatcom/Skagit/Lower BC area. I'm in Bellingham.
Michael Jaross 360-676-9214 or michaeljaross@gmail.com

For Sale: Honey Extractor, Dadant & Sons, model # 90-7E, 60 frame, stainless steel. \$1850 or best offer. Photos available. Contact Ron Green at nichaela@yahoo.com. Additional contact information: Ron Green, 1382 Willard Rd., Bingen, WA 98605; phone 509-538-2568

Shallow supers, in lots of 100, \$5.00 each box. Nine frames each with fully drawn comb.
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2007 Beekeeper's tour [beEcotour] to Turkey.

The itinerary for 2007 is at:

<http://turkeyhiking.com/trav/tours/2007beekeepers.asp>

Although beekeeping is the primary point of interest, there are many more wonderful sights on the itinerary, so both beekeepers and their non-beekeeping friends will find the trip of interest.



**Do not forget to
renew your dues!**

National Honey Board

Beekeeper for a Day – Pure Honey Label Design Contest for Kids

Earlier this year, NHB launched a contest for kids called "Beekeeper for a Day," as part of its Hispanic marketing program. The contest asked elementary school children to design and submit a honey label. The top prize is a day with a beekeeper for the child and his or her family. The finalists and winner will be announced soon. In the meantime, check out some of the hundreds of entries NHB received!

<http://www.honey.com/consumers/kids/beekeeperday.asp>

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Research

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tion at the time represented a separate "gene pool", or diverse collection of genes, that remained following the introduction event. However, in 1987, a parasitic mite (*Varroa destructor*) became established in the U.S. and rapidly spread. Untreated colonies often died within 2 years and the feral population was probably largely eliminated. Large annual winter losses of managed colonies also occurred due to the mite, although beekeepers could usually recover numbers by making colony splits in the spring. The mite-induced loss of the feral "gene pool" and mite-associated overwintering losses of managed colonies represents a second tier "genetic bottleneck" endured by U.S. honey bee populations.

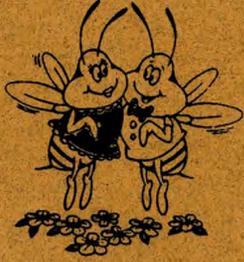
Commercial queen production in the U.S. is based on methods of grafting developed in the 1880's by Gilbert Doolittle. Through the use of grafting, larvae from selected queens can be collected and reared to produce new queens. This innovation permitted the development and growth of an industry that today provides close to 1 million queens per year to US beekeepers. The genetic basis for these 1 million colonies is determined by the number of queen mothers used by queen producers (currently less than 600 per year) and the total genetic diversity of males to which they mate. The use of the Doolittle method to produce annual replacement queens for 1/3 of the managed colonies in the US represents a third tier "genetic bottleneck" for U.S. honey bee populations.

Beekeepers are faced with many challenges to keep healthy and viable honey bee colonies. They must balance finding effective mite control methods vs. maintaining hive product quality and determining the economics and timing of running bees for pollination vs. honey production. Those beekeepers that produce queens have an additional burden (shared by all animal and plant breeders) to strike a balance between the need to "narrow" the gene pool (to fix the desired genetic traits in the selected population) and the concurrent requirement to maintain adequate genetic diversity (i.e., keep the gene pool "broad enough") to prevent negative inbreeding effects. Fortunately queen producers and beekeepers can directly assess their success in this balancing act by monitoring brood viability with a relatively simple test.

While the future remains to be written, the discussion will no doubt include whether there is a need to revisit the importation of genetic stocks for breeding purposes. Given their own history of genetic bottlenecks, honey bees from other recently colonized locations, such as Australia, Chile and New Zealand, would be less suitable sources from which to introduce additional genetic variation into US honey bee populations, than honey bees taken from original endemic locations (e.g., Italy, Austria, Caucasus Mountains).

Steve Sheppard
Thurber Professor of Entomology
Washington State University

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An Important Letter from WSBA President Jerry Tate



Washington State Beekeepers Association

Keeping the "Bee" In Business

December 30, 2006

Dear: Washington Registered Beekeeper,
Beekeeper Association Presidents

The Washington State Beekeepers Assn. (WSBA) is considering ways to fund research of interest to beekeepers in the state. As President I have asked Vice President Eric Olson, John Timmons and Jim Bach to work with the Washington State Department of Agriculture (WSDA) to form an Apiary Advisory Committee (AAC) per RCW 15.60.010 and a process to use the beekeeper hive registration funds (currently at \$73,500) for bee research.

Former Deputy Director Bill Brookreson and recently Mary Toohey, Assistant Director, advised us that WSDA will support the formation of an AAC which "shall advise the director on administration of this chapter and issues affecting the apiary industry," and the use of registration fees for "funding research projects of benefit to the apiary industry that the director may select upon the advice of the apiary advisory committee" as provided in RCW 15.60.040.

WSBA will recommend to the director that only registered beekeepers be appointed to serve on the AAC to advise how their registration fees should be spent. But any person and beekeeper may attend AAC meetings, provide testimony under the state's Open Public Meetings Act and serve on committees appointed by the AAC. However, as provided for in RCW 15.60.010, the WSDA director may appoint persons representing the major segments of the apiary industry and others to the AAC.

WSBA invites ANY interested registered beekeeper, and local beekeeper associations, to nominate one or more registered beekeepers they would like to represent them on the AAC. You do not need to belong to any beekeeper association to be nominated or appointed to the AAC. You may volunteer yourself as a nominee. You must have paid your registration fee by April 1st of the current year and remain a registered beekeeper during your period of service on the AAC. Nominees must complete the attached biographical statement, travel to attend meetings, participate in the discussions, and communicate back to beekeepers in the area they represent. We will suggest to WSDA that it appoint at least one beekeeper from each of the six geographical areas on the enclosed map.

Please send your completed and signed nomination form / biographical statement to the following address by February 15, 2007:

AAC Nominations,
PO Box 397,
Selah, WA 98942-0397

You may also download a Nomination / Biographical e-form from our web site at www.wasba.org.

If you have questions please call Eric Olson at 509 952 6925 or Jim Bach at 509 910 6861 or by e-mail at: jcbach@fairpoint.net.

Thanks for your participation in this effort.

Sincerely,

A handwritten signature in cursive script that reads "Jerry Tate".

Jerry Tate
WSBA President

Cc: Mary Toohey, Assistant Director, WSDA

Apiary Advisory Committee Nomination / Biographical Form

I, _____ (print name) volunteer as a Nominee to be considered for appointment to the Apiary Advisory Committee of the Washington State Department of Agriculture. I submit the following for the director's consideration:

I started beekeeping in the year _____.

I have kept up to _____ (no. of hives) per year since I started beekeeping.

I am currently keeping _____ (number of) registered hives of bees.

I have been a member of the _____ and _____ Beekeepers Association(s) for ____ and ____ years.

I am not currently a member of any beekeeper association.

I currently subscribe to the *American Bee Journal* , *Bee Culture* , the *Speedy Bee* .

I also subscribe to _____

_____ (other beekeeping periodicals).

I have served as a News Letter Editor , Trustee , Board Member , Secretary , Treasurer , Vice President , President of the _____

_____ Beekeepers Association(s).

I have written letters , articles for beekeeping publications (newsletters, journals).

I have helped staff the beekeeping display booth at the local agricultural fair .

I have made educational presentations at local area schools .

I operate a business of selling beekeeping equipment and supplies to beekeepers .

I operate a business engaging in agricultural pollination , as a bee broker .

I, the undersigned, do solemnly affirm that the above statements are factual and true to the best of my knowledge.

Signed: _____ Dated: _____

A Beekeeper's Turkish Vacation

Jerry Mixon and Dawn Corl, WSBA members, traveled in Turkey this last summer and had the rare opportunity to spend several days with Turkish beekeepers in the western Black Sea area of Turkey near Zonguldak.

One of the outcomes of this trip is that an organized tour is going to be offered next summer to other beekeepers interested in traveling to Turkey that includes spending some time with Turkish beekeepers and their bees, in addition to seeing some of the historic and natural wonders of Turkey. Dawn and Jerry had a wonderful trip that can now be shared with others.

If you would like to read an account of their visit with beekeepers in Turkey, please visit <http://cascoly.com/trav/turkey/Beekeeping-Journal.asp?l=1>



Beautiful bees on a terrific Turkish site.



Inspecting a log hive colony.

New Pacific Northwest Beekeeping Publication

How to Reduce Bee Poisoning from Pesticides

PNW0591

Author(s): Helmut Riedl, Erik Johansen, Linda Brewer and Jim Barbour

Commercially managed honey bees pollinate a variety of crops in the Pacific Northwest, valued at over \$1.5 billion annually. This publication discusses methods and techniques to protect bees from hazards associated with pesticide application. Tables provide specific information regarding toxicity of insecticides, miticides and blossom and fruit thinning agents to honey bees; to alfalfa leafcutting bees; to alkali bees; and to bumble bees.

Publisher: Oregon State University

Published: December 2006. 25 pages.

Here is a link to the Washington State University (WSU) publications catalog for information on purchasing the updated version of "How to Reduce Bee Poisoning from Pesticides" PNW0591. This publication is an updated version of PNW518, which was authored by Dan Mayer, Carl Johansen and Craig Baird.

<http://cru84.cahe.wsu.edu/cgi-bin/pubs/PNW0591.html>

The publication is also available for free as a pdf from this link:

<http://extension.oregonstate.edu/catalog/pdf/pnw/pnw591.pdf>

Erik W. Johansen
Special Pesticide Registration Program Coordinator
Phone: (360) 902-2078
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E-mail: ejohansen@agr.wa.gov

Master Beekeeper Program, Certification Update

Master Beekeeper Certification Course: Category #3
By: **By: Louis A. Matej, (Pierce County Beekeepers Association)**
Date: 2 January 2007
Name: Genetic Control of Colony Traits

Subject: **A look at the recently published Honey Bee Genome (*Apis mellifera*), it's uses and potential ramification for the Beekeeping Industry and Human Health.**

PROPOSAL

What is the Honey Bee Genome?
The present uses of the Honey Bee Genome
The potential uses and ramifications of the Honey Bee Genome on the Beekeeping Industry and Human Health.

ABSTRACT

Honey Bee Genetics: A look at the recently published Honey Bee Genome (*Apis mellifera*), it's uses and potential ramification for the Beekeeping Industry and Human Health.

In October 2006, Nature Magazine announced and published the completion of the Honey Bee DNA Genome Project. This means that the entire genetic code of the honeybee is known. From it we can determine, analyze and compare the conserved areas of DNA that do not change within species of honeybees with those areas which are not conserved. These conserved areas of DNA can tell us many things about *Apis mellifera* and what is common among all the species of honeybees and how they relate to other insects, animals, and man. The non-conserved areas can tell us a lot about the differences not only between physical characteristics of honeybees but also the differences in their behavior. Using specific DNA markers and techniques, scientists can determine whether a bee from a particular colony is an African bee or European bee, as well as many other differences. There are many ongoing and potential research studies, which will determine what areas of the genome determine particular physical characteristics, biochemical processes, and behavioral patterns. Once these are determined and further studied, we can obtain more information on better management and breeding techniques. Beneficial physical features and behaviors of the honeybee can be promoted while unwanted properties can be eliminated. Although the ramifications of the Honey Bee Genome are virtually unlimited, I hope to give a brief overview of some of the present and potential uses derived from the publishing of this genome.

A look at the recently published Honey Bee Genome (*Apis mellifera*), it's uses and potential ramification for the Beekeeping Industry and in the study of human behavior

What is the Honey Bee Genome (*Apis mellifera*)?

The Honey Bee Genome Consortium and it's History

The Honey Bee Genome Consortium is a group of researchers who were dedicated to the completion of the draft genome sequence of the Honey Bee. This consortium was led by Richard Gibbs, Ph.D. and George Weinstock, Ph.D., co-directors of the Human Genome Sequencing Center at Baylor College of Medicine in Houston, Tx. Their efforts were supported by the National Institute of Health's (NIH) National Human Genome Research Institute (NHGRI) along with the U.S. Department of Agriculture and other NIH components. The analysis team involved consisted of more than 170 investigators representing nearly 100 research groups from 13 different countries. Dr. Steve Sheppard, a WSU entomologist, was a member of this sequencing team. Baylor College began the sequencing in 2003 with the assistance from Texas A&M, Australian National University and other universities. Dan Weaver (Bee Weaver Apiaries) of Navasota, Texas, with the help of Dr. Spencer Johnston, entomologist with the Texas Agricultural Experimental Station, initiated in 2001 interest in the need for and potential benefits of sequencing the genome. Their "white paper" to the National Institute of Health (NIH) was accepted and provided funding to Baylor College for research. Weaver also provided the honeybee queen for the research. Drones from this queen, being genetically identical, gave enough DNA to completely sequence the entire honeybee genome.

After much DNA sequencing, the entire genome was completed in March 2006 and published in Nature Magazine in October 2006. This Bee Genome information is housed at Texas A&M University.

The honeybee is only the 4th insect whose complete genome was been sequenced. The other 3 are the silkworm, the malaria-carrying mosquito (*Anopheles gambiae*), completed in 2002 and fruit fly (*Drosophila melanogaster*), completed in 2000. "This research puts the honey bee center stage as the first agricultural animal that's been fully sequenced," said Joseph Jen, USDA Undersecretary for Research, Education and Economics.

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Master Beekeeper Program Certification Update, continued.

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Weaver said: "Once you have an assembled sequence, then you have to make sense of it. You have to identify which are genes, where are they located, what are the regulatory elements that control the genes, how are these genes are turned on and off, what are the genes they lie adjacent to, how they compare to similar organization of common functionality in the mouse or human or fruit fly."

What is the Honey Bee Genome?

Every living plant or animal cell nucleus contains long strands of DNA (genetic code). DNA contains all the information to reproduce, maintain and control each cell in the organism. The molecules of DNA resemble a long spiral ladder called a helix, and the rungs of the helix are made up of chemical units called nucleotide bases. There are only 4 different nucleotide bases, which make up the entire DNA of all living organisms. Sequencing all of this genetic information consists of identifying the bases and determining their order out of millions of bases present in the genome. Genes are organized clusters or working sub-units of DNA, which contain particular sets of instructions, usually coding for a particular protein or you can say that genes dictate the physical and behavioral traits of an organism. Genes are located on chromosomes, which are larger compact spools or packages of DNA which allow these long strands of DNA to fit within each cell. The object of mapping the honeybee genome is to show where genes are located on the chromosomes.

The honeybee genome consists of about 270 million base pairs of nucleotides making up the entire genetic code. This is only 9% as many as the 3 billion base pairs found in the human genome. Even with only 9% of the number of base pairs, the honeybee genome contains 10,157 genes, which is nearly half as many genes, 20,000, contained in the human genome. This is a significant discovery. The honeybee genome is twice as large as the fruit fly but contains about the same number of genes. Again, the object of mapping the genome is to find where the genes are located on the bee chromosomes so we can study physiological and behavioral similarities and differences within all honeybees and with other organisms.

What are the present uses of the Honey Bee Genome?

Honeybees are very valuable to scientists as model research organisms. Knowing and analyzing the honeybee genome and which areas or genes that correspond to certain inherent physical and behavioral traits, researchers have been able to come up with DNA markers to use to study different bees. DNA markers are small sections of DNA specific to a certain area in the entire genome that correspond to particular traits. These areas may be present in the genome of all honeybees (conserved DNA), such as number of legs, wings, etc. or these areas of DNA may be present or absent between honeybees depending on differences within honeybees (non-conserved DNA), such as color, or various behaviors. Using primers to these markers and various amplification techniques, scientists determine whether honeybee DNA has come from a Carniolan, Caucasian or Italian bee (Genotyping honeybees). They can compare bees that have better hygiene with bees that do not. A number of these markers have already been discovered and continue to be discovered and are being used to study the honeybee for various differences on many physical, behavioral and metabolic levels. For example: It was found from studying the honeybee genome and using markers that the African, Asian and European Honey Bee had a common origin in Africa. The genome contains information about the many similarities and differences of these subspecies of honeybees.

According to Dr. Steve Sheppard of WSU, scientists have developed new techniques for tracing honeybee relationships by analyzing "single-nucleotide polymorphisms" (SNP's), which are single base changes within the DNA code. He says by analyzing 1000's of these SNP's researchers have tracked the invasion of Africanized bees in the United States.

Even though the honey bee genome contains a similar number of genes as other insects, it has been found that bees contains fewer genes involved with innate immunity, detoxification enzymes and taste receptors while containing more genes for olfactory receptors and novel genes for nectar and pollen utilization. These scientists found that the honeybee genome is more similar to vertebrates than other insects for genes involved with rhythm and biological processes involved with turning genes on and off.

As stated in Nature Magazine, it was discovered that the honeybee genome contains 9 genes involved in the "royal jelly protein family", not present in the mosquito genome. Genes involved with development are similar to other insects but this is not so for genes that influence sex determination, brain function and behavior.

At the North Carolina Honey Bee Research Consortium (NCHBRC), they are using microarray technology to determine candidate genes that are involved in foraging behavior and the regulation of reproduction (nursing, feeding and caring for brood). Microarray technology allows these scientists to use thousands of different primers to various genetic markers simultaneously on one sample of DNA to determine the presence or absence of specific sequences of DNA involves with a thousands of different traits. These scientists can compare the presence or absence of non-conserved regions on genes responsible for better or worse foraging behavior and/or with better or worse regulation of reproduction. They are also using Quencher-Tether-Ligand (QTL)

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Master Beekeeper Program Certification Update, continued.

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analysis to determine the genetic architecture of colony-level foraging behavior.

Gene Robinson, professor of entomology at the University of Illinois and his team are using microarray technology to look at how American Foulbrood is affecting bees, which genes are involved in the process, and more importantly, what kinds of immune responses the bee can mount.

The map of the honey bee genome has, in addition to helping understand the foraging behavior of the honey bee, also helped in uncovering the genes that control the very important and accurate thermoregulation of the nest allowing the honey bee to withstand winters well below freezing. It has helped and will further help understand the dance language, hygienic behavior, and the allocation of different workers tasks corresponding to different stresses on colonies.

One of the things discovered from sequencing of the honeybee genome is that the honeybee has the highest rate of genetic recombination of all known animals. Recombination is the process by which genetic material is physically mixed during sexual reproduction. According to the research team headed by Dr. Martin Beye the honeybee had an average of 5.7 chiasmata (crossovers) per chromosome as opposed to an average of only 1.6 in bumble bees, parasitic wasps, fruit flies, worms and humans. This is because the queen is the only reproductive female in the colony. This high recombination rate boosts the genetic diversity of the population. This in turn helps speed changes in selectively advantageous traits including the slowdown of the spread of parasites and task specialization leading to social complexity, colony performance and fitness.

The potential uses and ramifications of the Honey bee Genome on the Beekeeping Industry and Human Health.

Any scientist interested in a particular physical, biological or behavioral trait of the honeybee, would want to know what gene or genes are involved with these traits. Some of these genes are turned on or off due to changes in colony needs or normal or abnormal environmental changes. Dr. Christine Elsik, an expert in genomics at Texas A&M University said, "Honeybee biologists would have to go to a lot of trouble to sequence in their labs every single gene they are interested in."

The map of the honeybee genome has stimulated much new collaboration between researchers involved in many areas of comparative genomics.

The newly published honeybee genome opens up a new branch of the insect world since it will have implications not only for agriculture, but also honeybee and human health and behavioral research.

As stated earlier, genetic markers pertaining to certain areas of the genome are being discovered to analyze certain characteristics of the bees.

Once more of these markers are determined, more studies can be done to discover new knowledge about how some bees react to certain stimuli, how some bees have better hygiene, why some bees are black and others yellow (which genes cause this), why some bees swarm more than others, why some bees have better resistance to disease than others, and almost any unlimited number of other attributes to be studied.

One of the discoveries from the genome is that the innate immune system of the honeybee is relatively simple. This means that there is a great deal of room to improve the bee's resistance and with more study, manipulation and research of the honeybee genome, pathogens such as varroa mites, hive beetles and viruses can be better controlled. There are a number of researchers whose primary interest is defining the responses of bees to a range of diseases. They want to characterize genes that are key in the honeybee immune response and then use this information to improve bee breeding and management. Specific genes code for the production of specific proteins; scientists are discovering new genes responsible for an array of these protein and how they are involved with keeping bees healthy.

It was also found that there is a reduced number of genes for insecticide resistance which means that there is a lot of room for improvement in the bee's ability to resist certain insecticides. This will potentially allow beekeepers to have fewer losses from unwarranted use of insecticides.

Studying the honeybee genome will also help in the analysis of different disease resistant pathways and metabolic adaptations to various diets. Also, it will give insights into the longevity of queen honey bees and the sperm stored in the spermatheca.

Honeybees contribute an estimated \$15 billion per year in agricultural value through pollination of fruit, nut and vegetable crops. Weaver said, "It's also estimated that one out of three bites on your table is a direct consequence of honeybee pollination." With this information, you can see that using the knowledge of the honeybee genome, even with small improvements in pollination or foraging behavior, the bee potentially could make a definite difference in increasing food production.

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Master Beekeeper Program Certification Update, continued.

(Continued from page 10)

A technique in molecular biology known RNA interference (RNAi) can potentially change genes (and the corresponding action the gene is specific for) within a population of honeybees. This would make a significant advance in agriculture. RNA (Ribonucleic Acid), similar to DNA, is a molecule used by DNA as a template to translate genetic information (Transcription) into proteins (Translation).

RNAi, recently discovered, and for which two scientists (Craig Mello and Andrew Fire) won the Nobel Prize, effectively silences certain genes by administering or injecting into certain regions of the honeybee short double-stranded RNA (dsRNA) complementary to the gene a scientist wants to turn off. This can be used to study honeybee behavioral changes when certain genes are turned off. Better bees can be bred, using RNAi associated with knowledge of the genes discovered within the genome. Bees can be changed by eliminating unwanted attributes or improving more desired attributes, such as, more efficient pollination, increased honey production, decreased swarming behavior, increased hygienic behavior, decreased defensive behavior or a number of similar attributes. Weaver says: "Ultimately, it's about more and better food on your table, easier and better ways to control Africanized honeybees, improving human health and providing new tools for medicine." If scientists can develop techniques to improve the honeybee without the use of potentially dangerous or toxic chemicals in preventing pathogens from destroying colonies, not only would this protect beekeepers but also the environment.

The honeybee is an insect with an incredibly complex social behavior. This makes it an important model for understanding how genes regulate behavior. Studying the genes responsible for different aspects of this social behavior, may lead to knowledge about common mental and brain disorders, such as depression, schizophrenia or Alzheimer's disease in humans. Other honeybee genes can be studied to help understand the mechanisms of their ability to communicate and this may help us better understand human communication, aging, social dysfunction and even infectious diseases.

One of the most interesting things about honeybees is that each bee has a specific function in the hive based on age or the needs of the colony (nurse bees, forage bees, wax secretors, pollen gatherers, guard bees, etc.). When stress is placed on the colony, these functions change to maximize the survival of the colony. Job transition involves changes in thousands of genes in the honeybee brain. Some genes turn on and other turn off. This involves particular molecules called transcription factors. Study of these changes in genes and transcription factor binding can help in the study of stress not only in the honeybee but also in humans. Scientists can potentially discover which of these genes on the honeybee genome turn on or off corresponding to bee job transition.

There are many present uses of the honeybee genome and I couldn't even begin to cover all the things scientists are discovering from it since it was published, let alone all the potential discoveries the genome will help bring about. There are many diverse areas including allergic diseases, gerontology, neuroscience, social behavior and venom toxicology which can be added to the list of areas the honeybees genome will hopefully be of great value.

Hopefully we will see many new strains of honeybees having better properties which will improve the Beekeeping Industry and the development of a number of new beekeeping management tools to increase honey and pollen production, all derived from the knowledge and study of the newly sequenced and published entire honeybee genome.

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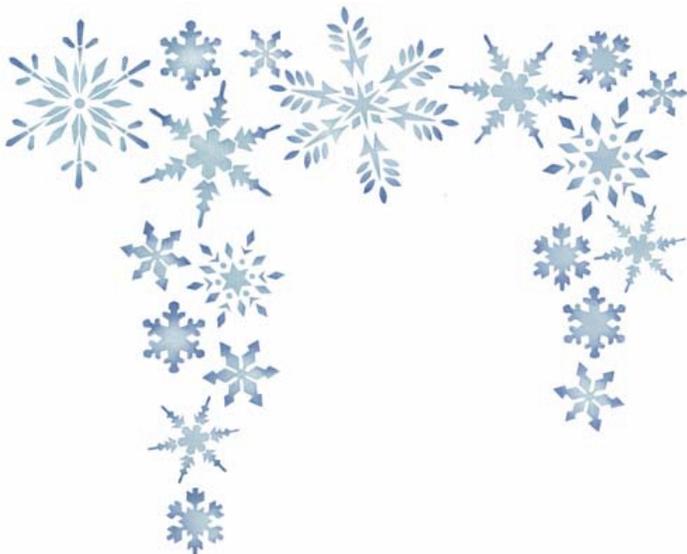
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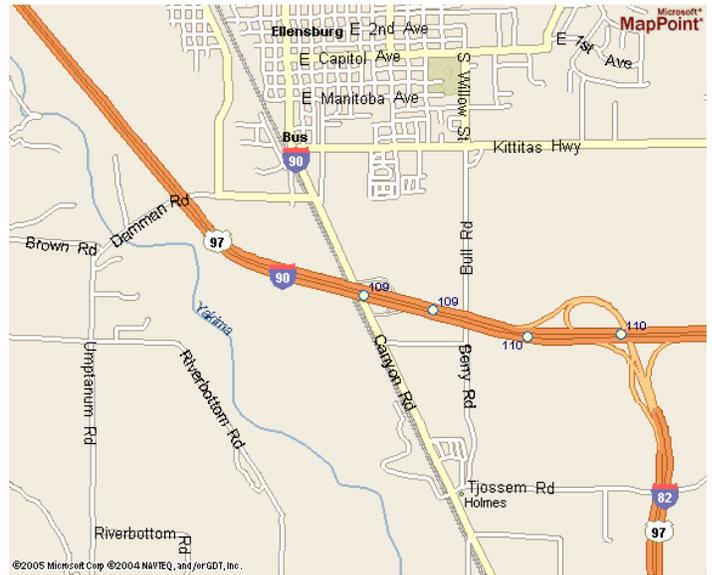
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10 AM to 2PM

Everyone is welcome.

Committees meet from 10 AM to 11 AM.



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