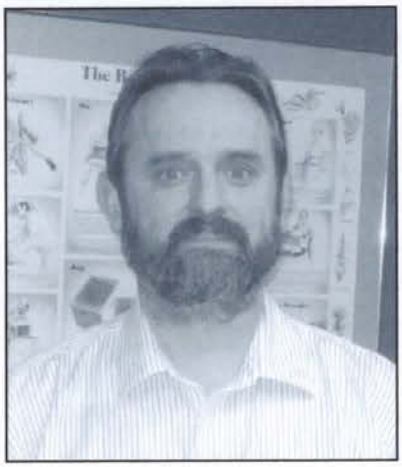
May 2008

groups.ucanr.org/WAS/

w.a.s. journal

The Journal of the Western Apiculture Society of North America



Message from the President

Spring on Vancouver Island has decided to be delayed this year and the honeybees are about a month and a half behind schedule. The weather has been unseasonably cool (coldest average monthly temperature on record for April) but as I write this, the weather is warming, the rains are diminishing, the blossoms are beginning and the bees are off collecting pollen -- a good sign of spring.

Being new to the beekeeping business -- May 4th was my first anniversary of managing a commercial operation -- I probably am looking at beekeeping from a very business/scientific viewpoint. It is my hope that this year's conference will convey some of that 'fresh' approach and have us re-examine, or at least question, some of our beekeeping practices. Coming from the wine-grape-vineyard business, which readily embraces new technologies and seeks easier ways to do things, I probably questioned every aspect of 'traditional' beekeeping, so much so that my staff probably think I should be shoved into a super! The business part of my experience -- I am a taxation accountant by training and am currently completing an MBA in 'agro-tourism' -- has me looking at beekeeping from a financial 'bottom line' approach -- another way to drive people crazy. With this in mind -- a 'newbie', a lunatic that questions everything and expects the apiary to be profitable (what a nutcake!) -- I trust you will find this year's conference enlightening, educational and full of surprises.

Firstly, we (my fantastic organizing committee, who have immensely aided me in not going off the deep end -- a phenomenal group of Vancouver Island beekeepers) have decided that South Vancouver Island in August is far too nice to be stuck in a hotel conference room all day, so every afternoon is dedicated to 'practical' beekeeping opportunities -- bee beard demonstrations, queen rearing, rain forest beekeeping, cidery, vineyards, honey plant/meadery/winery, orchards and urban beekeeping activities. We are still in the process of finalizing a few speakers, but thus far, the agenda examines: the past 150 years of beekeeping in British Columbia; honeybee value-added products (including a full morning on medicinal bee products -- apitherapy); a look at beekeeping from the (wet) West Coast perspective; bee breeding; and the latest in honeybee research.

It is going to be an exciting conference in "the greatest place on earth" (the British Columbia Tourism tagline). Please mark your calendars to be in Victoria BC, Canada, August 17th to 21st, 2008 for an apicultural conference not to be missed. I hope personally to meet and speak with every attendee, to learn of your beekeeping experiences.

See you soon.

Mark Pitcher, WAS President

Western Apicultural Society of North America

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(see Registrar)

Other states/provinces vacant

Each state/province in Western North America is entitled to elect one Director to the governing board of the Society. Directors meet before and after each general meeting and set policy and guidelines for the operation of the business of the Society. Throughout the year, they serve as the liaison between the Society officers and the members in their respective states/provinces. They are responsible for recruiting new members, keeping track of state/provincial concerns and advising the membership of their activities through this Journal.

MEMBERSHIP RATES

Individual	$ 10.00 US	Commercial	$ 50.00 US
Junior	$ 7.50 US	Life	$ 100.00 US
Senior	$ 7.50 US	Couple Life	$ 150.00 US
Couple	$ 15.00 US	Benefactor	$ 500.00 US
Associate	$ 10.00 US	Patron	$1000.00 US

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Full page (7.25" x 9.75") $150 per issue
Half page (7.25" x 4.5" or 4.5" x 7") 85
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Up to 25 words 10 US (incl header & contact info)
26 - 50 words 20 US

Make check payable to Western Apicultural Society and mail to Newsletter Editor/Publisher

NEWSLETTER

Editor/Publisher Fran Bach
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2 May 2008

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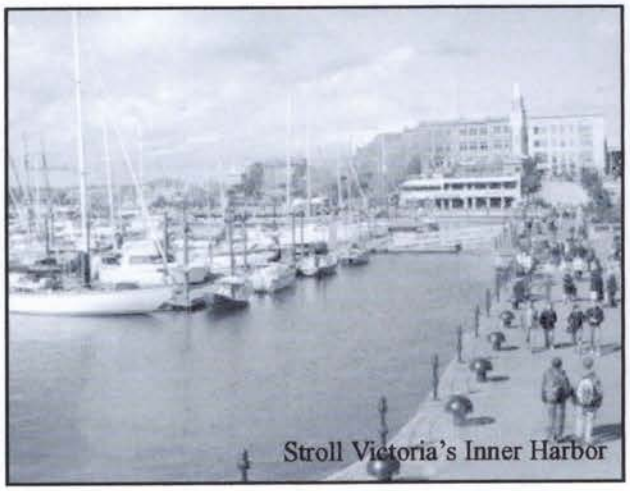
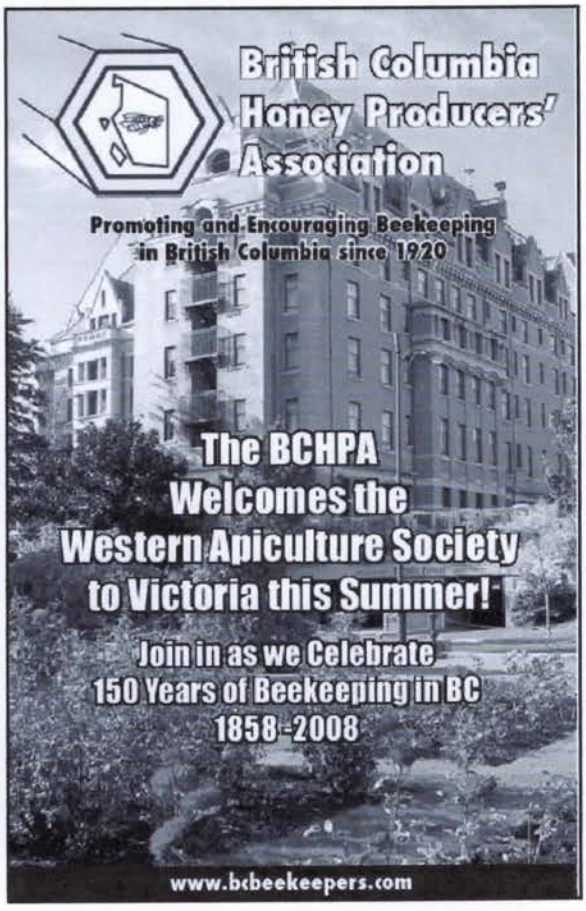

Stroll Victoria's Inner Harbor

TRAVELLING TO THE US (CANADIANS ENTERING, OR AMERICANS RETURNING)

If you are traveling by AIR between the United States and Canada, Mexico, Central and South America, the Caribbean and Bermuda, you must present a valid passport. If you are traveling by LAND or SEA between the United States and Canada and you are a U.S. or Canadian citizen age19 and older, you must present either a valid passport or proof of citizenship (such as a birth certificate or naturalization certificate), along with government-issued photo ID (such as a driver's license) as proof of identity entering the United States. Verbal claims of citizenship and identity alone will not be sufficient to establish identity and citizenship for entry into the United States. Children need their own passports or proof of citizenship.



Coming to the Holiday Inn, Victoria, BC
August 17 - 21, 2008 .....

WESTERN APICULTURAL SOCIETY OF NORTH AMERICA ANNUAL CONFERENCE

Agenda Highlights

Sunday August 17: "Bee Buzz" Social – Meet and Greet

Monday August 18: HISTORY OF BEEKEEPING

Conference opens with President Mark Pitcher, special guest (TBA) and the Victoria Town Crier

Dr. John Boone & Brian Scullion - 150 years of beekeeping in BC
John Gibeau - From Bee stings to the big screen, the honeybee is the value added product
Bob Liptrot - Fog to Quarantines to Corkscrews, a west coast beekeeping perspective.
John Gibeau - Bee Beard demonstration, Legislative Grounds (location to be confirmed)

Tuesday August 19: THE MEDICINAL USES OF BEE PRODUCTS (Speakers TBA)

Honey byproducts, salves, creams, tinctures, health uses
Honey Nutrition
Apitronics; bee venom products
Tour - Rod and Jo Moodys', Forest Tour, Merridale Cidery
Urban Beekeepers tour (limited availability- local beekeepers)

Wednesday August 20: TOURISM AND AGRICULTURE

WAS Annual Business Meeting and Delegates Meeting
Liz Huxter - BC Bee Breeding project results
Jim Bach - Latest breaking research and a vision for the future.
Tour – Babe's Honey Farm, Oldfield Orchards, Marley Vineyards, Seaside Cidery
Urban Beekeepers tour (limited availability- local beekeepers)
Social and Banquet – Awards – Silent auction

Thursday August 21: Special Guest Speaker

Meeting adjourned until 2009

VENDERS
Contact George Fields
250-743-9569 or
castlesg@telus.net
for exhibitor information

2008 is the 150th anniversary of the founding of the Crown Colony of British Columbia. Many celebratory events are taking place on Vancouver Island and the surrounding Gulf Islands so you may want to plan a little time pre- or post-conference to explore.

Watch the WAS website at http://groups.ucanr.org/WAS/ for more details as they become available or contact the organizing committee c/o Brian Scullion 250-385-7129 or scullion@shaw.ca.

Beekeepers' Calendar

June 9 - 12: APIMEDICA & APIQUALITY 2008, Villa Mondragone Congress Centre, Rome Italy

June 20: 55TH ANNUAL BEAVERLODGE FIELD DAY, Agriculture & Agri-Food Research Farm, Beaverlodge Alberta. Info Steve Pernal pernals@agr.gc.ca.

June 22 - 28: 2ND ANNUAL NATIONAL POLLINATOR WEEK, North America.

July 10-12: HEARTLAND APICULTURAL SOCIETY CONFERENCE, Marshall University in Huntington, WV. Info www.heartlandbees.com or Gabe Blatt, phone/fax 304-429-1268, gabeblatt@prodigy.net.

Aug 4 - 8: EASTERN APICULTURAL SOCIETY SHORT COURSE & CONFERENCE, Murray State U, Murray, Kentucky. Info www.easternapiculture.org.

Aug 17 - 21: WESTERN APICULTURAL SOCIETY ANNUAL CONFERENCE, Victoria BC. Info mpitcher@uvic.ca.

Oct 15 - 18: 2ND WORLD SYMPOSIUM OF QUEEN BEE BREEDERS AND ARTIFICIAL INSEMINATION, Nuevo Vallarta, Nayarit, Mexico. Info Enrique Carrillo enriqueabeja@hotmail.com or apicolaelite@hotmail.com.

Oct 23 - 25: BC HONEY PRODUCERS ANNUAL GENERAL MEETING & CONVENTION, Civic Centre, Prince George BC. Info Gerry Bomford 250-970-0228 or lbomford@netbistro.com.

Nov 3 - 5: ALBERTA BEEKEEPERS ANNUAL GENERAL MEETING, Fantasyland Hotel, West Edmonton Mall, Edmonton AB. Info Gertie.Adair@albertabeekeepers.org or 780--489-6949.

Nov 11 - 13: CALIFORNIA STATE BEEKEEPERS ASSOCIATION ANNUAL CONVENTION, Lake Tahoe.

Dec 3 - 5: SASKATCHEWAN BEEKEEPERS ASSOCIATION ANNUAL CONVENTION, Sheraton Hotel, Saskatoon.

Dec 10 - 13: CANADIAN HONEY COUNCIL, CANADIAN ASSOCIATION OF PROFESSIONAL APICULTURISTS & ONTARIO BEEKEEPERS ASSOCIATION ANNUAL CONVENTION, Niagara Falls ON.

Jan 6 - 10: AMERICAN HONEY PRODUCERS CONVENTION, Radisson Conference Centre, Fresno, California.

Jan 13 - 17: NORTH AMERICAN BEEKEEPING CONFERENCE, Nuget Resort & Casino, Reno/Sparks, Nevada.

Sept 2009: 41st APIMONDIA INTERNATIONAL APICULTURAL CONGRESS, Monpellier, France. Info www.api-

WESTERN APICULTURAL SOCIETY
Holiday Inn, Victoria, BC
August 17-21, 2008

PRE-REGISTRATION FORM

http://groups.ucanr.org/WAS/

Name(s) *For your name badge* _____

Current mailing address *Street, apartment #* _____

City _____ *State/Province* _____ *Zip/Postal code* _____

Phone No. _____ *E-mail* _____

CONFERENCE COST PER PERSON (CDN & US $ AT PAR)

Full (4-day) Conference Package (incl Bee Buzz snacks & Banquet) $150 x ____ = _____

Single Day (Monday, Tuesday, Wednesday) CIRCLE which day 50 x ____ = _____

Thursday Morning only 25 x ____ = _____

Banquet only (independent of Full Conference package) 60 x ____ = _____

LODGING: MAKE YOUR OWN RESERVATIONS:

Victoria Holiday Inn, 3020 Blanshard Street, Victoria, British Columbia, Canada. Phone 250-382-4400 or Fax 250-382-4053. SPECIAL RATE for WAS is $139.00 + tax per night, single or double occupancy. **You must specify the Western Apicultural Society Conference & book by June 30th to get this rate.**

Alternate accommodations -

BLUE RIDGE INN HOTEL - 3110 Douglas St, Victoria. Offers coffee shop, pool, sauna – close to shopping, bus routes. 1 800 997 6797 or: Stay@BlueRidgeInn.ca 5-minute walk to conference Rate: $109.00 per night (2 persons/king bed)

TRAVELLERS INN (#2 & #10), Douglas St, Victoria. 1 800 546 4432 or callus@travellersinn.com 5-minute walk to conference Rate: $139.55 per night (2 persons/king bed. *Internet booking $119.95

SUPER 8 HOTEL, 2915 Douglas St, Victoria. 1 888 385 6703 or www.super8victoria.com 10-minute walk to conference. Rate: $109.00 per night (2 persons/king bed)

TOURS (optional)

1. Tues: Half Day Tour (Rod and Jo Moodys', Forest Tour, Merridale Cidery) 40 x ____ = _____
2. Wed: Half Day Tour (Babe's Honey Farm, Oldfield Orchards, Marley Vineyards, Seaside Cidery) 40 x ____ = _____
3. Tues/Wed: Urban Beekeeping Tour (circle one)- limited availability 25 x ____ = _____

Annual Dues (US funds) _____

Individual.....$10.00	Commercial.....$50.00	Couple.....$15.00
Association...$10.00	Junior /Senior.....$7.50	Couple life.....$150.00
Life.....$100.00	Benefactor.....$500.00	Patron $1000.00

Total Payment (Cdn or US funds) _____

All W.A.S. registration forms and payments at full rate (no credit cards).
Make checks payable to **Western Apicultural Society** and mail to
Babe's Honey Farm, Attention Brandon
334 Walton Place, Victoria BC Canada V9E 2A4
All pre-registration forms should be received no later than **July 15, 2008**.

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Board Member Changes

Our WAS Treasurer, George Steffensen is retiring as of the 2008 annual meeting. George has served us for many years and withstood all challenges to the financial health of the Society. Thanks George, for outstanding service.

This brings to the forefront the issue of nominations for the 2008-2009 Board of Directors.

Our By-laws state that the Term of Office for the President, 1st and 2nd Vice Presidents is one year. The 1st Vice President is the second-in-command of the current year's President and stands in for him/her whenever necessary.

The 2nd Vice President is the Chair of the conference organizing committee for the following year and moves up to President a year before the conference in his/her territory. Ideally, the location is known two years ahead so this person has time to plan, but this has not always been the case.

Thus we need the following Officers to be elected at the 2008 conference meeting.

1st Vice President (by appointment of the new President)
2nd Vice President (when 2010 venue is chosen)
Treasurer

The Secretary and Treasurer each receive a stipend for their work on behalf of the Society.

The Board of Directors consists of the President, both Vice Presidents, Secretary, Treasurer (these are the Officers), the two immediate Past Presidents and state/provincial Directors. Each member (state or provincial) association is entitled to elect and send one Delegate/Director to the annual conference as is each affiliated (dues paying) club.

State/provincial Delegate/Directors are ratified in their positions at the annual meeting, attend the Board of Directors meetings and report back to their home associations. These Directors serve 3-year terms -- one-third are to be re-elected each year

Club Delegates are appointed by their clubs and are accepted without ratification.

In 2008, Directors in Alaska, California, Idaho, Oregon, Washington and the Yukon are to be elected and other regions without current Directors are to be appointed by the new President following the 2008 annual meeting. These people will sit only for the length of time required to complete unfinished terms.

Thus 2009 elections will be for BC, Colorado, Montana, Nevada, and Wyoming.

2010 elections will be for Alberta, Arizona, Hawaii, New Mexico and Utah.

The 2009 conference will be in California with Eric Mussen as Chair.

We are constantly in need of locations for future conferences, but to make it operational, we also need bodies in those locations willing to do the organizational work.

If you have a personal contact who might be willing to serve as WAS President for one year, near a location that would be fun and interesting for our Conference, please contact that individual and solicit cooperation. If such connections are made now, we can formalize them at our next Annual Business Meeting. We need suggestions for 2010 and 2011 as soon as possible.

So get on the phone and pry loose some nominees for these open positions, and for locations for future conferences. We're depending on you!

Update and Comments on Honey Bee Issues

By Jim Bach, WSDA (retired), Selah WA

Many of you may be subscribers to Bee Culture or the American Bee Journal and have seen this, however I think it prudent to give you some information I've gathered from various sources and some thoughts to provoke your minds to action in looking at bee issues differently than you may have done in the past.

Here is an update on colony loss data from the Apiary Inspectors of America received from Dennis vanEngelsdorp, PA State Apiarist, 05-02-08. Preliminary data can be found in Kim Flottum's Inner Cover article in the May 2008 issue of Bee Culture.

The AIA survey included data from 37 states in the US, with 569 beekeepers responding to the survey. These beekeepers managed 1,014,913 colonies (Sept. 2007 + increases). They reported total losses of between 7.6 percent to a high of 56.2% for an average loss of 31.27% or 317,363 colonies.

109 of these beekeepers kept bees in multiple states and reported between 8% and 100% losses with an average of 64.9%.

Also recorded in the survey results were 174 beekeepers that reported by email the loss of 6% to 83% with an average of 23.4%.

We do not know if these reported losses can be generalized across the entire honey bee population of 2.44 million colonies in the US. If so the 31.27% loss would mean we've lost 762,988 colonies since the fall of 2007. That is 1,766 semi-loads of bees, some of which may have been available for almond pollination in California.

The AIA survey form requested information about what beekeepers might term "normal loss" and the cause(s) of the losses. The data I've seen doesn't contain this information yet. From other literature the following have been discussed as probable causes: poor queens, drought, poor honey crop, too much rain, Varroa, Tracheal Mites, yellow jackets, Nosema(s), cell phone towers, small hive beetle, poor nutrition, lack of pollen stores and robbing. Beekeeper management could have reduced or eliminated most of these alleged causes. They include weather issues – drought, too much rain; robbing, mites, yellow jackets, small hive beetle and nutrition issues. That leaves poor queens and mites that are resistant to miticides. Beekeeper economics and poor planning in beekeeping management resulted in these losses. Poor queens are the result of the propagation of poor queen genetics, poor mating weather resulting in losses caused by propagators selling poor queens at $20 each. If poor queens and mite resistance didn't cause the colony losses then they are the result of unknown causes.

As an aside, I installed two queens from one source in top nucs on hives. Sixteen days later both queens were still present but one was not laying eggs. Emergency queen cells suggest that the bees knew their queen wasn't any good. I've replaced her with another from the same source. Beekeepers can't accept 50% failure of randomly selected queens. While 50% may not be the norm, I've been told repeatedly that 25% to 50% of queens don't make it past 90 days in a colony even if they were propagated during good mating weather.

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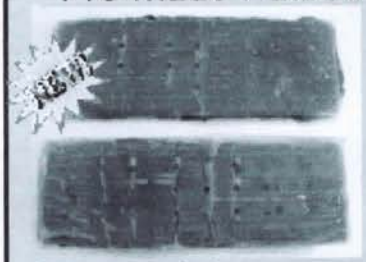

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A Drop of Nectar....

by Dr. Ulf Soehngen, Victoria BC

.....is all a worker bee can carry home from the field. And yet, under the right conditions, a colony can produce several hundred pounds of honey over a season. As you stand watching one of your bees gather nectar from a flower, remember the many beekeepers, who -- over several thousand years of beekeeping history -- have similarly marveled at the industriousness of their bees, and perhaps offered a small prayer to Aristaios (Greek God of beekeeping), or another deity, asking for a bountiful crop of honey.

The oldest workers in a colony, the forager bees, collect propolis, pollen, water, honeydew and nectar in the fields, and bring these commodities back to their colony. While there is some overlap with reference to the specific crop being collected by any given individual, most foragers tend to specialize, at least, until the commodity they collect becomes scarce, or, such as water, may no longer be required by the colony.

Nectar foragers obtain their "drop of nectar" primarily from floral nectaries, and from the area surrounding them, usually near the base of the flower. Nectaries consist of bundles of specialized plant cells that change the plant sap (phloem sap) into nectar. The dominant sugar of phloem sap is sucrose.

Nectar, however, normally contains a mixture of sugars. The dominant sugars are sucrose, glucose and fructose, which may occur in different proportions. A high proportion of glucose (as in Canola nectar) will lead to early granulation of the honey made from it, while a preponderance of fructose will retard or prevent granulation (such as nectar from tupelo, a Florida swamp plant). Small amounts of up to 7 other sugars have also been identified in nectars.

The concentration of sugar in nectar varies between less than 10% and more than 70%. Honey-bees are opportunists; when several plant species with nectars of different sugar concentrations flower at the same time, the bees tend to favour blossoms yielding nectar with high sugar concentrations over those with low. Practically, this means that when dandelions bloom in a pear orchard, the bees will visit the dandelions, rather than the pear blossoms that yield nectar with a sugar concentration of 10% or less, which may not then be adequately pollinated as a result. However, if no 'high concentration' nectar is available, the bees will accept nectar with a lower sugar concentration.

Unlike a number of other bee species, honeybee foragers tend to remain faithful to their chosen crop until its nectar and/or pollen are no longer freely available. Only after they have been in the ranks of the unemployed for some time, will most foragers show any interest in the messages provided by dancing foragers working on more profitable crops.

When a nectar forager has collected her load (which may range in weight from less than 10 mg

to 70 mg), she returns to her colony. By transferring the contents of her honeysac (crop) to other workers, usually on the bottom combs of the hive, near the colony entrance, she sets in motion a complex set of behavioral and physiological processes, that serve to maintain normal functions and cohesion within the colony.

On entering the colony, the forager usually first heads for the 'dance floor' near the hive entrance. Here she encounters workers of various ages, including other ' temporarily unemployed' foragers, and the younger housebees (receivers), who are there to relieve returning nectar and water foragers of their loads.

By the time the forager enters the dance floor, a 'decision' on whether she will dance will have been made. This decision is based on the integration of a number of factors, including the distance between hive and food source (taking into consideration the wind speed), the quality of the food source in terms of sugar concentration, and the time required to obtain a full load. Another important part of the equation is the quality of the carbohydrate food currently circulating within the colony at the time.

If the forager assesses the nectar source to be a good one, and that it is being under-exploited by the colony, she will dance the waggle dance (or round dance, if the source is nearby), and by movements and sound will indicate the direction and distance of the crop. She will pause periodically to offer small drops of her honeysac contents to interested foragers, who are following her dance, thereby offering information about the nectar source. If the source is good, but is being visited by adequate numbers of foragers, she may not dance, but try to unload by transferring her nectar load to one or -- more often -- several receivers.

The rate at which a nectar forager is able to unload at home provides her with information regarding the need within the colony for the particular commodity she has gathered. Thus, if elevated hive temperatures increase the need for water in the colony, foragers returning with dilute nectar or even water will be preferred by the receivers, while those bringing nectar with higher sugar concentrations may have more difficulty in finding willing receivers. At other times, more concentrated nectar will be preferred. In general, the more rapidly a forager can transfer her load, the more eager she will be to return to the fields for more, and the less time she will spend in the colony between trips to the field. Moreover, it seems that they appear to use stimuli from the nectar receivers, enabling the foragers, in turn, to set the dance thresholds relative to the nectar influx into the colony.

Before a forager returns to the field, she will beg a small quantity of food from the other workers. This appears to have two functions: it will inform her of the quality of food circulating within the colony, and it will provide energy for the trip to the crop.

There is a third alternative. Sometimes, a forager returns to the colony with a full nectar load and experiences a long unloading delay, because she is unable to find nectar receivers able to take her load. In this event, she may proceed to the brood area and perform a 'tremble' dance, lasting up to 30 minutes. During her dancing, the forager may emit short bursts of sound, labeled 'piping' by several researchers.

The trembling dance and the short bursts of sound appear to have two functions. The trembling dance has the effect of recruiting large numbers of nectar receivers from a part of the colony population, that had not been engaged in the handling and processing of nectar at this time. Whether these bees were working at other tasks or whether they had been 'resting', i.e. constitute a 'reserve force', apparently has not been explained so far.

During experiments designed to elaborate the function(s) of the tremble dance, it was noted that the dance, together with the piping sounds produced by some of the dancers and some followers appeared to retard the performance of waggle dancing, and that -- at the same time -- the numbers of new recruits to the food source was very much reduced. On the basis of these experiments, the researchers concluded that the functions of the tremble dance were a) to increase the numbers of nectar receiver bees in the hive, and b) to curtail the number of foragers being recruited to the crop, thereby ensuring that the colony efforts are not being wasted.

There is yet another food-related regulatory feedback mechanism, which ensures that, should a colony lose much of its field force in an environmental disaster (such as a pesticide spray), it will not lack the foraging bees needed to assure the colony's survival.

Most beekeepers are aware that worker honeybees perform a series of age related tasks. Thus, very young bees 'clean house', older bees care for brood, then become nectar processors, comb builders, and finally, foragers.

Recent research has shown that older workers, i.e. foragers, synthesize a fatty acid, ethyl oleate, which acts as a 'primer pheromone' by slowing down the behavioural maturation rate of young worker bees. Ethyl oleate is thought (but has not yet been shown) to be passed to the younger bees through trophallaxis (mutual feeding). Thus, if suddenly most of the field workers are lost, the reduced level of ethyl oleate among the young bees will allow many of them to skip one or more job categories and advance to the forager level. It has been shown experimentally, for example, that under such conditions workers may go out to collect water at a very young age.

This mechanism within the colony ensures that the appropriate proportion of field workers relative to house bees is maintained, and that a colony is not endangered by the sudden loss of its field force.

Two other food related mechanisms, trophallaxis and nectar processing, are of extreme importance to the colony.

Trophallaxis (also known as "interfeeding") occurs when a loaded field workers is approached by a receiver from the front. The forager opens her mandibles wide, and forces a droplet of nectar into the area between the mandibles, on the upper surface of the proboscis (tongue), near the head. The receiver stretches out her proboscis full length and sips the nectar from between the mandibles of the feeding bee. Not only does interfeeding serve to exchange food (and information), but also it acts as a mechanism to distribute pheromones and other compounds throughout the colony. Trophallaxis occurs throughout the colony at all times, usually from older workers to those who are younger.

Nectar processing is no less important in that it converts the unstable (due to fermentation) and highly indigestible (sucrose must be converted to glucose and/or fructose to be assimilated) nectar into the stable honey, which can be stored in combs for months, or even years.

Foragers typically transfer their loads of nectar to one, or -- more often -- to several housebees. These return to the brood areas or to areas with empty cells, usually above the broodnest. The nectar forager already added invertase, the enzyme that breaks the complex sugar sucrose into the 'simple' 6-carbon sugars, glucose and fructose, which can be utilized by the human body and by bees ('instant energy'), as well. Nectar processors are also thought to add enzymes to their honeysac contents.

In addition to the chemical changes, water must be evaporated from nectar, to 'ripen' it into honey. To this end, a nectar-processing bee exudes a drop of crop contents into the 'crook' formed by the proboscis when it is held under the body in the normal position. By alternately exuding and sucking in the droplets of honeysac contents and by moving the tongue, the bee changes the shape and size of the droplets, exposing water in the crop contents to evaporation. She may also share crop contents with other bees similarly engaged. Eventually, the ripening honey is placed into empty cells or cells containing some ripening honey, where further water evaporation takes place.

When there is a heavy nectar flow, droplets of nectar are often hung from the upper cell walls of brood cells for a limited time. At such a time, anyone not handling brood combs carefully may be subjected to a shower of the sweet, sticky liquid.

To be continued .....

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A Drop of Nectar: Part 2

by Dr. Ulf Soehngen, Victoria BC

In order to obtain a profitable crop of honey, it takes the cooperation of both honeybees and beekeeper, working in tandem. In Part 1 of A Drop of Nectar, we reviewed some of the interrelationships and activities that occur within the colony in relation to the gathering of nectar and its 'ripening' into honey. By his actions during the nectar flow, the beekeeper can either help or hinder his bees in producing a honey crop.

In part 1, it was also shown that many of the behaviours of individual worker bees, and interactions between individuals are related either directly or indirectly to the acquisition, processing and storage of food. Thus, foragers collect nectar with sugar concentrations ranging from 10% to 70%. They bring home loads weighing between less than 10 mg to 70 mg., from distances of up to 12 km. Normally, however, most of the nectar is collected within 3 km of the hive.

Foraging requires energy. (In fact, the amount of energy required on a trip to the food source is used by the forager to 'measure' the distance flown.) It is of advantage to the beekeeper, therefore, to place his honey producing colonies as close to the nectar source, as possible.

When a forager returns to her colony, she has several options: she may recruit other foragers to the same source by 'waggle-dancing' and emitting sound pulses; she may enlist more nectar receivers within the colony by 'tremble-dancing' and/or piping, or she may inhibit other nectar foragers working the same source from returning to the fields, by the same means.

Regardless of whether or not she dances, the forager will pass her load of nectar to other bees in the hive. Some of the nectar being brought in will be shared with other foragers, but most will be transferred to nectar receivers who are still too young to have achieved foraging status. These nectar receivers move to the brood area or other parts of the colony where there may be empty cells.

Presumably, each worker bee that handles the nectar, adds enzymes (notably invertase, which breaks the 'complex' sugar, sucrose, into the 'simple sugars', glucose and fructose.) Pheromones, as well, may be added. However, the main preoccupation of the bees in 'ripening' nectar into honey is with the reduction of the nectar's water content.

The Canadian Honey Regulations (Schedule I) specify that honey graded as 'Canada No. 1' may contain no more than 17.6% moisture -- or, if pasteurized -- no more than 18.6% moisture. Canada No. 2 honey may contain no more than 18.6% moisture, or if pasteurized, no more than 20% moisture. If one considers that the bees must remove up to 75% of the water brought into the colony as part of the nectar, the Herculean task of removing water from the colony, as part the process of ripening nectar into honey, can be appreciated.

To that effect, bees involved in the nectar ripening process 'massage' droplets of nectar with their tongues, thereby facilitating the evaporation of water in the warm atmosphere of the hive. After manipulating the nectar for some time (which can take up to 20 minutes), the worker will approach an empty cell, and paint the nectar to the upper cell wall. If the cell is already partly full, and no suitable empty cells are available, it appears to simply add its honeysac contents to those already in the cell. During a heavy nectar flow, nectar processing bees often suspend droplets of ripening nectar on the upper walls of cells containing larvae, sometimes resulting in an unexpected shower for the unwary beekeeper inspecting his colonies.

According to Krell, when the average environmental relative humidity is not much higher than 60% (as in Victoria, BC -- most of the time), a moisture content below 18% can be achieved. In more humid climates, even sealed cells can contain honey with a moisture content of up to 28%. Depending on the atmospheric RH and the amount of nectar coming into the colony, it takes between one and three days to ripen nectar into honey.

Nectar and ripening honey may contain microorganisms, including yeasts and bacteria of several genera, which also can occur in the digestive tracts of the bees. Tests have shown that these disappear gradually as the water concentration of the ripening honey decreases toward 18%.

Particularly for the small-scale beekeeper, it is important therefore, never to remove honeycombs in which fewer than 75% of the cells have been sealed. Too much 'unripe' honey will dilute and can spoil the entire crop -- unless the purpose of harvesting the honey is to produce honey beer or mead.

Some commercial operations, however, pull the honey just as the bees are beginning to cap the cells. They place the supers into so-called hot-rooms, where the honey can dry out further. The beekeeper saves the labour of uncapping the combs and of processing the wax from the cappings.

It would appear that the excess water brought into the hive in the nectar can be considered to be a 'useless by-product', which is removed from the colony by the bees at considerable energy expenditure. However, the evaporation of water within the hive absorbs heat, and thereby assists the bees in maintaining the appropriate temperature within the colony. As well, it appears to supply part of the water needs of adult bees and brood in the hive. This has been shown in flight rooms and flight cages, where the number of workers at the water feeders increased as the sugar syrup available to the bees became more concentrated.

Another aspect of a strong nectar flow, accompanied by warm summer temperatures, is that the young bees of the appropriate age groups involuntarily secrete wax, even when they are not actively building comb. The small wax plates then drop to the hive floor, and are carried out of the hive on air currents -- a waste for the beekeeper. Under such conditions, the observant beekeeper will add frames of foundation, to encourage the bees to utilize the wax already being secreted, and to create additional brood or honey storage space at the same time. The number of frames to be given will depend on the strength of the colony and that of the flow. A small nucleus may require only a frame or two with foundation. A strong colony, on the other hand, may easily build out 10 or 20 sheets of foundation or more.

During the main nectar flow, there are several ways in which the beekeeper can help his producing colonies.

• Open the hive entrance. During the main nectar flow, the hive entrance should be opened as wide as the bees of the colony will cover and defend. (Although robbing by honeybees during the flow is rare to non-existent, wasps and other predators and parasites may try to enter the hive via an undefended corner). Not only will an open entrance relieve traffic congestion, but it will also provide a large area for the fanners, who pull the moisture laden air from the hive.

• Provide storage room. As was stated above, colonies need considerable 'temporary' nectar storage room, beyond that required to store the finished product, honey. Honey storage supers are usually provided when the colony is very strong (to provide a 'parking space' for a large population of workers), and when the nectar flow starts. The bees often indicate the need for additional storage space by whitening the top bars of the frames with new wax.

Supering can be achieved in several ways.

a) Hive bodies containing frames with foundation will enable the bees to utilize wax that is being secreted during the main nectar flow, for the construction of new combs. In general, hive bodies containing foundation are given directly over the brood nest, where the young bees, which have graduated from brood rearing to comb building and nectar processing, have easy access. Under some circumstances however (such as very strong colonies and a heavy nectar flow), colonies have been known to successfully 'draw out' foundation in standard Langstroth hive bodies, in the fourth or fifth position (counting upward from the bottom board).

Frames containing foundation should be spaced tightly together (10 to a hive body), in order to ensure straight combs, with a minimum of burr or cross comb. They should not be alternated with drawn comb in honey supers.

b) Except during a heavy nectar flow, 'drawn combs', (combs of cells) are preferred by the bees over foundation. Supers containing empty combs may either be added to the top of the colony ('top supering'), or directly over the brood area, under partly filled honey supers ('bottom supering').

While there is a study that suggests that the method of supering has no effect on the amount of honey ultimately produced by a colony, most beekeepers tend to prefer one method to the other.

Thus, many commercial beekeepers will top super, since it avoids the lifting of partly filled honey supers (less strain on the back), and requires less time, especially, when operating with semi-skilled help. And -- on a commercial basis -- time = money! Moreover, since laying queens usually hesitate to travel over sealed combs of honey, partly sealed honey combs often act as 'queen excluders' and prevent brood rearing in the honey supers.

On the other hand, beekeepers with colonies that are less than extra-strong may do well to bottom super, by inserting the empty super directly over the brood area, and placing partly filled supers over the new one, with the heaviest one on top.. This entices the bees into the empty super, to clean out and polish the cells prior to storing honey in them, and may get them to occupy the combs more quickly, than if they had to run to the top of the hive.

Weak colonies are sometimes known to develop a 'mind-set', by which a certain number of hive bodies defines the hive -- no matter how much space is added. Such colonies are unlikely to become productive until the next season.

Queen excluders have been the source of much controversy in the beekeeping community. Many beekeepers depend on them to keep brood out of the honey supers. Others see them as 'honey excluders' and do not use them. They can increase their chances of keeping the queen out of the honey supers by reversing the brood nest shortly before supering, placing the queen and the youngest brood directly onto the bottom board; the emerging older brood over the young brood, followed by the honey supers. The ring of honey that often accumulates when the older brood emerges may act as a 'queen excluder', as long as the queen has open cells into which she can lay.

It has sometimes been said that 10 beekeepers will have 12 different opinions on the same topic, hence, the following advice to the reader: If your method works, USE it! Happy Honey flow!

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