THE HIVE TOOL

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President Frame

SEASON'S GREETINGS! Let me be the first to wish you Happy Holidays! Yes, it's that time of the year when the days and weeks seem to fly by in a flurry of preparations and partying - family, friends, co-workers, far-flung relatives and yes, even your local beekeeping association. Please join us for our biggest social event of the year, our holiday dinner. . . Saturday, December 6th, at 6:00pm, Oregon Ridge Nature Center. This is a pot-luck dinner so bring a covered dish of some kind (your favorite recipe using honey?) along with the entire family. Table service and drinks will be provided. All are welcome! Bring along anything bee-related you'd like to donate to the free, fun raffle (an annual tradition).

CONGRATULATIONS! to CMBA's newly elected officers who will begin their one-year terms of office on January 1st. David Gill-Boucher is our new President, Alex Flannigan - Secretary, John Harmon - Treasurer, (the office of V.P. remains vacant). My thanks and gratitude go out to the other retiring officers - Steve McDaniel (V.P.), Mary Thulman (Secretary), and Bob Crouse (long-time Treasurer). Thanks also to Linda Allman who recently stepped down as Librarian (replaced by her assistant, Jeff Nelson). I appreciate very much your support during my tenure as President, in my efforts to revitalize our organization, and to utilize our wealth and resources in the advancement of our goals and objectives. I expect the revisions of CMBA's By-Laws to be completed and approved by the membership in short order and that, by doing so, our organization will continue to support, promote, and preserve beekeeping well into the future.

My bees look pretty good going into the winter (how about you?). And I'm optimistic about successfully overwintering my colonies. All are heavy with honey (and/or sugar syrup), most look strong and healthy. No, don't look for mouse guards on my colonies despite my good intentions (I'll deal with the results later, I'm sure). For my New Year's beekeeping resolution, I've resolved to convert to screen bottom boards next year (no small task with 80+/- colonies) and to use powdered sugar for mite control rather than thymol which I've used for a few years. My ultimate goal is to keep bees without mite treatments, without the use of sugar of any kind, and without purchasing foundation. Of course, everyone has their own ideas, ways and means of beekeeping. I've shared mine with you simply because I've had the forum (and the audience?). I've always enjoyed reading about and listening to other beekeepers' methods and approaches to beekeeping. And I've learned a lot from them, be they experienced or novice beekeepers. I like the fresh ideas and unencumbered attitudes of many new beekeepers I've met. Their enthusiasm and optimism can be contagious, their willingness to try something new. Too often "experienced" beekeepers have a "we've tried that before and it doesn't work" attitude which can be deadening. I'm going to try a top bar hive next year; never had one before and I'd like to try something new - what do you say?

GOOD LUCK and BEST WISHES to all of you in your New Year's beekeeping endeavors, whatever they may be. May you and your bees thrive and be healthy and happy. Keep an eye on your hive tool and may your smoker never go out when you need it! Hope to see you all on the 6th. HAPPY HOLIDAYS!

2008 Stewardship Report for CMBA Delivered by President David Papke at the November 4th Annual Meeting

As President of CMBA, it is my responsibility according to our By-Laws to present a stewardship report to the membership at our annual meeting along with a financial report given by our Treasurer. The purpose of the stewardship report is to review CMBA's activities during the past year while I have been in office. It is also an opportunity for the President to make recommendations for the future of our organization.

We've had ten regular membership meetings this year, skipping only the months of July and December when we hosted our summer picnic and holiday pot-luck dinner. Our meetings have started and ended more or less on time and the open-hive demonstrations before the May through September meetings have been popular, especially with new beekeepers, and I recommend their continuance next year. Although we'd like to have name tags and refreshments at every meeting, this has been irregular lacking someone to take charge of making it happen. On the other hand, the library has been available to the members (and well utilized) at every meeting thanks to Linda Allman and Jeff Nelson. $500.00 of new acquisitions were added to the library this year and the same amount is budgeted for next year so make your suggestions to Jeff, our new head librarian. Our annual picnic in July brought 45 beekeepers and their families together along with several beekeepers from Harford County and York County, PA. We spent an hour in the bee yard, enjoyed a great picnic dinner, and then spent another hour or so in the honey house demonstrating extracting and processing honey. Judging from last year's successful holiday dinner, I'm sure we can look forward to another opportunity to share a wonderful meal and socialize at next month's pot-luck dinner.

Of course, CMBA sponsored another successful Short Course In Beekeeping last spring lead by Instructor Jerry Fischer. 64 people completed the short course, most of them starting with bees this year. This is one of our most successful endeavors and we owe our thanks to Jerry, Jeff Nelson, and Lloyd Snyder for their participation and look forward to another well-run, well-attended short course this year.

Many CMBA members volunteered to work at the MD State Fair and ORNC Honey Harvest Days. Although the fair was profitable for CMBA, we'd like to see more members participate by entering honey and hive products in the state fair competition and by volunteering to give demonstrations related to beekeeping from the stage in the honey exhibit area.

Some other highlights from this past year was the publication of a CMBA Membership Directory (which will be revised and republished next year) thanks to Mike Spencer, Jon Bealer and Lloyd Snyder. CMBA hosted the MSBA June meeting at ORNC with Kim Flottum as the main speaker and with open-hive demonstrations lead by CMBA members. Morning refreshments and a fine lunch was arranged by CMBA. We have had many fine program speakers this year, notably Ann Harmon, Wyatt Mangum, Warren Seaver, Mike Embrey and Keith Wellemeyer. Of special note was our June meeting with Ross Conrad which drew a record 85 beekeepers interested in alternative methods of beekeeping.

Last year in this report I proposed revising our By-Laws to better reflect how we operate as a non-profit, educational and service organization and to clarify our procedures for future officers and members. A mission statement has been drafted and work on the revisions will be completed at our next board meeting. Early next year these revised By-Laws will be presented to the membership in the newsletter and then voted upon. I encourage your feedback and finally acceptance of these revisions. My other proposal last year was to begin to utilize our considerable wealth to promote the values and pleasures of beekeeping, to further our educational efforts and to support research and extension. Many proposals have been submitted and, while we continue to discuss some, we have funded several. Cylburn Arboretum received $400.00 for an outdoor educational bulletin board for their apiary; Jody Johnson received $500.00 for a research project at the Beltsville Beekeeping Lab on the effects of chemicals in colonies exposed to miticides; Wyatt Mangum received $500.00 for research support in his on-going project to breed and protect mite-resistant colonies in North Carolina; York County Beekeeper's Association received $200.00 in books and DVDs for their new library; Baltimore County 4H received $100.00 for savings bonds to award in beekeeping competition; a $300.00 donation was made to the Apiary Enhancement Fund at the MD Dept. of Agriculture; and a donation of $500.00 was made to the Oregon Ridge Nature Council. I am pleased we are moving in the right direction with requesting and funding proposals. But I wish this was a higher priority among our members and the Board of Directors. Perhaps we need to do a better job at getting the word out, that these funds are available. It has become abundantly clear that the success of a project (and our willingness to fund it) depends on an individual taking the lead and following through on a project. Several worthy ideas have come our way, but without someone to handle all o f the details it does not seem to be within our power to bring these ideas to fruition.

In a few minutes, you will elect the next CMBA President to whom I wish good luck. As I leave office, I'd like to think I'm leaving the organization a little bit better than when I took office two years ago. I thank you all for your encouragement and support. Bee well. May your bees thrive. And I wish you success in all your beekeeping endeavors.

Replace That Old Comb Here's Why!

By Jennifer Berry
Reprinted from Bee Culture December 2008

Some time ago I completed a project on the effects of old comb versus new comb on honey bee colony growth, brood survivorship and adult mortality. This paper was originally published in the *Journal of Apicultural Research* 40(1): 3-8 (2001). (To read it in its entirety go to our website **www.ent.uga.edu/bees** and click on the research archives icon.) Here is a shortened version of that research.

This topic is still timely because of the more recent findings regarding chemical residues in wax and pollen in colony comb, and, because this is the time of the year it is easiest to remove that old, disease-ridden, chemical laden junk, and replace it.

Honey bees use structures like trees and man-made hives for shelter, but it is the beeswax that provides the basic building material for the interior nest substrate. Adult worker bees secrete oval shaped wax scales from glands located on their abdomen and then modify these scales with mandibular gland secretions in order to construct the comb. Wax secretion usually occurs during peak foraging times because large quantities of honey or nectar must be consumed by the worker bees in order to produce these wax scales (Gary, 1992). The comb, made up of an array of hexagonal cells placed back to back, is the site where immatures are reared and food is stored. The comb also plays an important role in communication by providing the substrate on which dances are performed and chemical messages transferred (Winston, 1987).

New comb cells are lighter in color and larger.(Jaycox photo)

When comb is first constructed it is pliable and nearly white in color but changes over time due to constant use and incoming resources. Comb used for food storage takes on a yellowish hue due to the accumulation of pollen (Free & Williams, 1974). As comb used for brood rearing ages, it becomes darker, almost black, and more brittle (Hepburn, 1998) because of accumulated fecal material (Jay, 1963), propolis and pollen (Free & Williams, 1974). The darker color may also be a result of numerous contaminants that are collected and absorbed in the wax over time.

Wax comb consists primarily of hydrocarbons and ester components with a small percentage of free acids and alcohols. These minor components are believed to give wax its plasticity (Tulloch, 1980) and ability to absorb many types of materials. Some of these materials include fungal and bacterial spores, pesticides and heavy metals which may be detrimental to a colony's welfare. Here is a list of some biotic and abiotic contaminants found in wax.

Biotic: American and European foulbrood spores, Chalkbrood spores, Nosema

Abiotic: Amitraz, Arsenic, Azoxystrobin, Boscalid, Bromopropylate, Captan, Carbaryl (Sevin), Chlordimeform, Chlordane, 2-chloroethanol, Chlorpyrifos, Chlorothalonil, Chromated copper arsenate, Copper naphthenate, Coumaphos (CheckMite+®), Diazinon, 4,4'-dibromobenzophenone, 1,4-dichlorobenzene, Dicofol, Endosulfan, Esfenvalerate, Ethion, Ethylene dibromide, Fenthion, Fluvalinate (Ap is tanr»}, Malathion, Menthol, Methomyl, Organochlorine (multi-residue), Organophosphorus (multi-residue), Methyl parathion

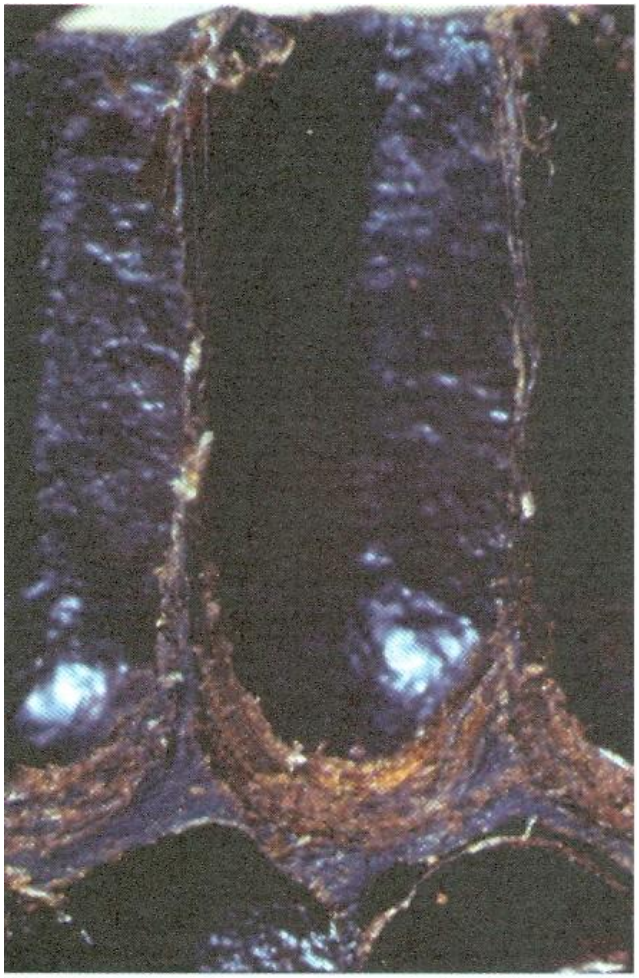
(Penncap-M), P-dichlorobenzene, Pentachlorophenol, Phenkapton, Phenol, Phenothiazine, Polychlorinated biphenyls, 2,4,5-T,Tributyltin oxide (TBTO), Vinclozolin

As materials accumulate in wax comb the diameter of cells becomes smaller (Winston, 1987). Each time a larva pupates, it spins a silken cocoon, parts of which remain in the cell after the adult emerges (Jay, 1963). Over time, the mass ratio of silk to wax increases, and thereby wax comb goes from a single-phase material to a fiber-reinforced two-phase composite product (Hepburn & Kurstjens, 1988). The bees, along with the cell size in old comb, are smaller.

Pheromones also are absorbed and transferred in the wax comb and, depending on their volatility, may remain for a considerable time (Naumann et al. 1991). One pheromone group relevant in the current context is brood pheromones. These contact pheromones are emitted by brood and communicate to nurse bees the immatures' presence, age and nutritional needs (Free, 1987). Nurse bees, responsible for brood care, detect these pheromones more readily in older comb, and feed the brood more often. Therefore, larvae reared in comb with a previous history of brood rearing may receive somewhat better care with resultant higher survivorship (Free & Winder, 1983).

Prior to the presence of *Varma destructor* (Anderson and Trueman) in the United States, wild, temperate honey bee colonies were known to survive for about six years (Seeley, 1978). Once the colony died, wax moths, mice and other nest scavengers usually removed the wax comb, leaving an empty cavity for the next colony to inhabit (Gilliam & Taber, 1991). Modern beekeeping practices disrupt this natural recycling process by housing bees on semi-artificial comb that may be years or even decades old. Advances in beekeeping equipment, like the Langstroth hive and wire-reinforced foundation, have added years to the longevity of wax comb.

In the United Kingdom, beekeepers are encouraged to replace old combs as part of good husbandry practices (Brown, 1999). In the United States, Bonney (1990) recommends replacing two of the oldest combs each year to ensure that the hive body will not contain comb over five years old. Nowadays this may even be too old. Even so, many beekeepers believe that it is not economically feasible to regularly remove and replace old comb. Not only is the new foundation expensive and time consuming to replace, there is an energetic cost for the bees who must draw out the foundation into a functional comb using metabolicallyderived beeswax. The typical nest contains around 100,000 cells (Seeley & Morse, 1976) which takes about 1,200 g of wax to construct. The amount of sugar required to secrete the wax is energetically equivalent to 7.5kg (16.5lbs.) of honey, about onethird of the honey stores consumed by a colony over winter (Seeley, 1985). Therefore, beekeepers believe they lose money, time and honey yields by replacing old comb.



Would you raise your young in this environment? (Jaycox photo)

However, it is possible that the economic savings of using long-lasting comb may be offset by deleterious effects of old comb acting as a biological sink for toxins and pathogens or as a physical constraint on larval development. This question led me to investigate the effects of comb age on honey bee colony growth, brood survivorship and adult mortality.

In a three-year field study, we compared the quantity of brood produced, brood survivorship, average body weight of adult bees and population of adult bees in colonies housed on brood combs comprised of either old beeswax or newly drawn, first-year beeswax.

Outcome for this particular study resulted with colonies maintained on new comb having a significantly higher area of total brood, area of sealed brood and higher young bee weight. Comb age produced no statistically significant treatment effects in ending adult bee population or change in

adult bee population; however, the trend was for higher ending bee populations in new comb and, correspondingly, a greater loss of bees in old comb. Brood survivorship was either unaffected by treatment or higher in the old comb class.

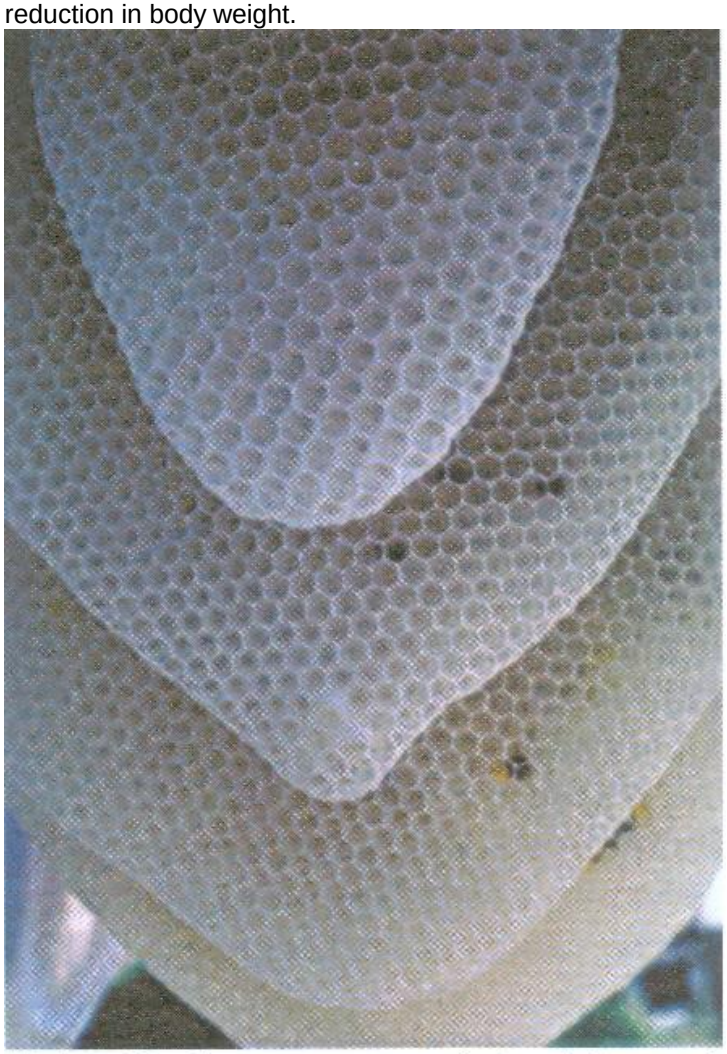
The increased brood production measured in the new comb may have been the result of several different events taking place inside the colony. It may have been due to the survivorship of the brood, quality of brood care delivered by nurse bees, or the queen's egg production. Let's review the latter. Queens are able to distinguish between worker cells and drone cells by appraising the width of the cell with their forelegs (Koeniger, 1970). The cell diameter in old comb become smaller over time (Abdellatif, 1965); thus, an average reduction of cell diameter in old comb may have a negative effect on a queen's egg-laying productivity.

Older comb is also known to harbor numerous pesticide residues and diseases which" may be detrimental to the brood's health. They're spread from colony to colony by tainted wax and materials brought into the hive. The queen may be sensitive to these contaminants and not lay eggs in particular cells. Also, the old comb may harbor brood pheromones (Free & Winder, 1983) that act as egglaying inhibitors to the queen because she perceives the cell to be already occupied.

Another phenomenon relevant to this study is the observation that bees prefer to store honey and pollen in cells that have been previously used for brood rearing. In the wild, as a colony grows and continues to add new comb, brood rearing gradually shifts into this new comb and the honey is stored in the old brood comb (Free & Williams, 1974). In unmanaged colonies this behavior may serve to avoid the negative effects of old comb on brood production. However, modern beekeeping practices inhibit this natural process by forcing bees to reuse old brood comb for brood rearing and to store honey in comb usually only used for honey storage.

Higher weight of emerging young bees in new comb is best explained by differences between the average diameter of cells in the two comb age classes. As mentioned before, while brood comb ages, the diameter of the cells decreases due to accumulated cocoons and fecal material that are deposited by the larval and pupal instars developing within the cell (Jay, 1963). The body weight of a worker bee is mediated by genetics (Ruttner & Mackensen,1952) as well as by environmental effects such as the amount of food fed to larvae (Daly & Morse, 1991; Fyg, 1959) and the size of the natal cell (Jay, 1963; Abdellatif, 1965). Buchner (1955) determined that the mean weight of newly emerged bees from old comb in which 68 generations had emerged was about 19% smaller (96.1 mg) than the controls (118.3 mg). Morphological characteristics of European worker bees reared in smaller Africanized comb were smaller than those ofEuropean bees reared in the larger European comb (Rinderer et al., 1986). Daly & Morse (1991) found that larger worker bees could be reared from the large cells of drone comb. Glushkov (1958) discovered that bees reared in enlarged cells were heavier and larger resulting in more honey being produced by the colony and larger cells constructed. Worker larvae reared in enlarged cells received more food (21% more protein and 39.7% more glucose) than worker larvae reared in normal worker cells (Volosevich & Kulzhinskaya, 1953). The bulk of the evidence suggests that the weight of newly emerged bees is proportional to the volume of the cells in which they are reared (Nowakowski, 1969) and the amount of food fed to them by the nurse bees.

In this study bees reared in new comb weighed about 8.3% more than those reared in old comb, which is similar to Abdellitif's (1965) finding that worker bees reared in old comb in which 70 generations had been reared have an 8% reduction in body weight.



Naturally drawn new comb is white, and generally quite fragile

Lower bee populations in the old comb may result from an accumulation of foreign contaminants sequestered in the older comb causing higher mortality. Also, contaminants in the wax comb may mask hive signature and nestmate recognition cues, making it difficult for foraging bees to return to their own colony. Some nestmate recognition cues are obtained from the wax comb (Breed & Stiller, 1992), and Breed et al. (1988a) discovered that colony odor acquired from wax comb can mask the genetic differences between bees. Colony odor is transferred to the adult bees by exposure to the comb substrate and can alter the recognition phenotype in as little as five minutes (Breed et al., 1988b).

Brood communicate to the worker bees their presence in the cell, caste, age and hunger levels through mechanical and chemical signals (Free, 1987). The chemical signals are the brood pheromones that may be the causative agent responsible for the increased survivorship found in old comb in this study. Wax comb acts as a reservoir for absorbing and

transmitting pheromones which may explain why honey bee swarms are more attracted to older comb (Naumann et al., 1991). The presence of brood pheromones stimulates pollen foraging (Pankiw et al., 1998), enhances brood recognition (Le Con teet al., 1994) and stimulates nurse bees to feed larvae (Le Conte et al., 1995), all of which are important factors in brood survivorship. Free & Winder (1983) determined that brood survival was greater in cells which had been used previously for brood rearing than in comb cells never used before. Taken together these studies demonstrate that pheromones incorporated in wax comb may improve brood survivorship. The differences in brood survivorship noted in this study may be partly explained by more optimal concentrations of brood pheromones in older comb. In this study we found the seemingly paradoxical results of higher brood production in new comb but higher brood survivorship in old comb. We believe that this is best reconciled, internally and with the literature, by positing that the egg-laying rate of queens is highest in new comb, but once placed in a cell the chances of a larva's survival are best in old comb. Nevertheless, overall brood production is highest in new comb. Apparently the benefits of maximized egg production exceed the benefits of maximized brood survival.

Over three years of field study, honey bee colonies housed on new comb had higher area of total brood, area of sealed brood, and weight of newly emerged bees. Brood survivorship was the only variable significantly higher in old comb. And finally, mortality of adult bee as affected by the age of comb in which they were reared or maintained was lower in new comb but not significantly. The bulk of the evidence suggests that new combs optimize overall honey bee colony health and reproduction. These findings suggest that beekeepers should eliminate very old brood combs from their operations.

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Water – Plain and Simple

By James E. Tew

Reprinted from Bee Culture December 2008

I'm struggling here

I've written my introductory paragraph several times. So far, nothing has worked. How can I explain to you why I am writing about summer issues during Winter months? Because, by next Spring/ Summer when colony water supplies are once again an issue, we still will not have the answers we need. Right now, we should be thinking and planning about how to help our bees be better neighbors next Summer.

Last October I attended a City Council meeting in Cleveland, Ohio. They were discussing the practicality of keeping bee colonies within innercity Cleveland. Naturally some councilors were concerned while others embraced it. A fundamental tenant was that supplemental water could be provided thereby reducing the peskiness of water-foraging bees. This was the right answer, but I squirmed as I tried to conceptualize exactly how this watering device would work. I will discuss some possibilities below.

Last July, during a typical Ohio drought, a hot issue arose between two homeowners - one with a pool and one with forty colonies of bees. Neither were doing anything wrong, but one couldn't comfortably use their pool during hot weather and the other was being stressed to move his colonies somewhere else. I was asked what kind of watering device should the beekeeper install to prevent water foraging bees from going to the neighbor's pool. I didn't have a good answer.

Some more truth

Issues like this are definitely going to come up next Summer. Bees and their keepers are quickly moving to town. Traditional answers like, "Use Boardman feeders filled with water," or "provide a shallow pan filled with water," are not going to continue to carry the day. Beekeepers need practical information on how, where, and when to provide supplemental colony water. Should such water be scented? How much water should be provided to adequately compete with neighborhood pools? How does a beekeeper keep supplemental water free of algae and scum? How does the beekeeper discourage birds and other animals from contaminating supplemental water with fecal droppings? These are some of the questions for which I still don't have good answers; therefore, I am writing a summer article during a cold month. As an industry, we need a plan for next season.

First, what makes up a water source?

It has been postulated that bees sense water by perceiving a humidity change as they approach a body of water. Exactly what makes up a "body" of water - a 50-acre freshwater lake or an animal watering trough? Both. Though both types of water sources will be readily worked; bees that don't have access to large bodies of water will find much smaller water sources. I don't know how they do it. On hot Summer months, I have noticed bees working sources so small that the total quantity of water would not fill a teaspoon. I can't imagine how they found it. Imagine how easy it is for bees to find- a neighborhood swimming pool.

Water foragers and swimming pools

"How do I keep my honey bees away from my neighbor's swimming pool?" is ranked high on my list of difficult questions. Variations of the question are: "How do I keep my bees away from animal watering

troughs?" or "How do I keep my bees away from bird baths?" It used to be that we, as beekeepers, could argue that there was a good chance it was not only our bees doing the collecting, but nowadays, I am afraid that too often it is mostly our bees at our neighbors' water sources. Swimming pools combined with dry weather and scantily-clad swimmers equal problems. Water sources as large as a swimming pool:

1. Have both an odor and taste.
2. Are easily visible.
3. Don't dry up.
4. Are large enough to establish a "humidity field."

If you were a thirsty bee and found the neighbor's swimming pool, why look any further? And just when you think things can't get any worse - they do. When your bees visit your neighbor's pool, they will train themselves to specific watering sites at the pool that are frequently on or around the pool ladders or on wet areas on the pool deck. There really is not much a beekeeper can do. Provide a dependable water source, provide it near the hive, and never let it dry up.

Another issue - bees and dirty water

Another water-related and troubling situation is: "I've seen honey bees drinking water (or whatever) from the cement pad

of my beef cattle holding pen. Won't this nasty water get into the honey?" This framework of questioning immediately results in shudders and wrinkled noses around the room and is definitely not honey's best hour. The fact is that bees do not always look for the cleanest sources of water. They will readily collect from manure pits, stagnant pools or other questionable water sources having nitrogenous byproducts or trace minerals that bees need. Obviously, the physical size of many undesirable water sources, combined with the smell and taste, would make such a site much easier for a water forager to find when compared to a drum or some other manageable container of clean water. Consequently, bees probably have more difficulty locating and collecting from a small, clean water supply. If you watch water foragers while they collect from a clean source, foraging bees will expose their Nasanov gland (the scent gland) in order to help other bees find the same source.

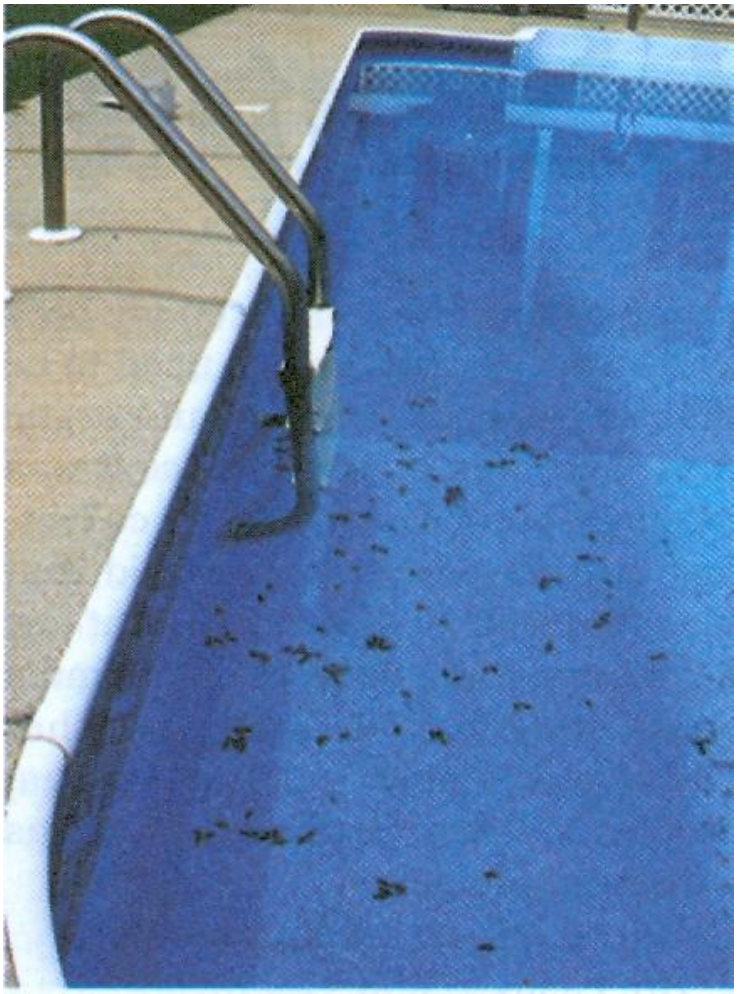
As honey consumers, our saving grace is that honey has a novel system for safeguarding against such nastiness by having a system producing hydrogen peroxide within honey. Also, honey has a very low moisture content which will desiccate microscopic invaders. Consequently, honey is, by its nature, a very clean product. But.. .. be assured that the audience will not soon forget that the question was asked. You may want to consider moving colonies that are collecting from suspicious sources. But you never really know where all the other water collecting sites are. I would not make this a high priority.

Why bees drink

Thirsty bees forage for water for many of the same reasons that we need water. They need it for themselves, for their developing young, and to cool the hive during hot weather. The hive reception procedure is interesting. Water foragers probably make the decision to collect water individually. Maybe an individual bee is hot and simply went out for a drink. Regardless, if water foragers are eagerly met by house bees at the hive entrance and the water is quickly unloaded, water foragers are stimulated to make more water foraging trips. If such tanker bees are unloaded within 60 seconds, they take off on another flight for more water. Anything longer than 60 seconds discourages water collection and unloading times longer than 180 seconds will outright stop water collection. (Winston, 1987).

Controlling the internal hive temperature is critical for the colony's development ofimmature bees. In hot weather, bees collect water and put it in indentations in burr comb along the top bars and within cells near brood. Fanning bees evaporate the water thereby cooling and humidifying the hive. So much water will spill out when a frame is moved during times of active water collection, that it may appear that a nectar flow is progress. Bees given the task of holding water until needed have been dubbed reservoir bees (Park, 1923) in the beekeeping literature. They stand quietly near the brood areas and dispense water as needed. They serve a particularly important function for providing water during hot nights when foraging is not possible.

Hive nurseries are kept in the range of94-96°F. As the temperature increases to 96°F in the brood area, the demand for water increases. Initially, nurse bees deposit the contents of their crops in a thin film into or near brood cells. This has been called "tongue-lashing" (Winston, 1987). If these procedures still do not bring rising temperatures under control, nurse bees and house bees begin to eagerly search throughout the hive for bees having crop contents of dilute nectar or even better - plain water. That would leave foragers having good, sugar-laden nectar load standing idle while bees with lesser sugar contents or water are suddenly in demand. Communications within the hive swing toward using the foraging force to collect water. Finally, temperatures drop, and attention again shifts to either pollen or nectar collecting bees.



Drowned bees floating in a swimming pool.

Frequently, during these periods, the majority of the adult bee population will completely move out of the hive - a sight frequently seen in parts of the southeastern and southwestern U. S. During these times, bees will mass around the entrance of the hive giving the few remaining bees inside the colony more space to evaporate water and cool the bee nursery. Additionally, by removing so much body mass, internal hive temperatures will drop. For many parts of the U.S., 96°F and higher is not an uncommon ambient temperature. The colony need for water collection is daily or even hourly. In the Summer, a full sized colony will use *at least* a quart a day. In arid areas even more.

In hot climates, staggering supers in order to allow for upper level ventilation will make evaporation more efficient

and help in keeping the colony cooler. Beekeepers have occasionally pointed out that so many extra openings may incite robbing of weaker colonies - a point that I can't deny, but weak colonies are at risk anyway. It has been my observation that hot bees are not friendly bees. Many beekeepers have special stories of moving colonies at night with hot bees hanging from the front. Hot bees are defensive bees and would be alert for robbing.

Having little to do with hive temperature, bees also collect water to dilute honey in order to feed it to developing bees. Bees can also use metabolic water (water produced as a physiological byproduct). During cold months, water for brood can be gotten from either frost or ice within the colony.

Clearly, bees need abundant supplies of water all year. If you don't provide it for them, they will find it somewhere else. In fact, they will frequently find it somewhere else *even* if you do provide water for them. Let a faucet drip, provide an internal water supply, keep a bird bath filled nearby, install a fish pond, or buy a plastic child's swimming pool, but by all means, keep your water sources wet. Once they dry out, like children developing bad habits, bees will *move* to other sources. Bees are going to drink - one way or the other.

Water foragers on a stream bank.

Bee Hive Water Facts

1. Time for a bee to load up - one minute
2. Normal time for the water run - three minutes or less (67%), 10 minutes or less (92%).
3. Rest period between trips - two to three minutes
4. Water trips per day - 50 (100 max)
5. One quart of water will take 800 bees working all day
6. Daily water use per colony around 1/$_2$ pint - *2-10* pints

I don't have new answers

While I don't have new answers, I do have the same old questions. This Winter, I plan to speak with individuals in the animal care business to see how water is provided to livestock and poultry. Noticing that water foragers quickly find my grandkid's wading pool water, next Spring I plan to use such a container as an initial container for experimenting. I hypothesize that a mesh covering of chicken wire will keep out birds and other animals. The watering device will need floats of some kind to prevent bees from drowning. I am trying to have an idea how to position the watering device so that the downspout on my storage barn can provide rainwater runoff into the container. If available, water from a faucet could be allowed to trickle into the container, but that is water-wasteful. Would a float valve be practical? Should I check with swimming pool companies to determine how to treat the water with a chlorine concoction in order to control microbial and fungal growth or is there a risk that chlorine products will give honey an off-flavor?

Someone must have an idea

You folks are a creative bunch. What are your ideas? Maybe a hive top feeder can be converted to a hive top waterer. Maybe a five-gallon bucket can *serve* as a storage reservoir on top of the hive (This would keep the outer *cover* on and provide water reserves to the internal hive top waterer, but then you must *remove* it when you open the colony.) Maybe some kind of trickle irrigation component could be modified so you water your plants while you water your bees. Maybe a plastic spray tank could be modified to provide slow-drip water. I don't know, but I do know this - in general, we don't have a good watering system for our bees. Many of you don't need it, but for those of us who do, we are stuck with the traditional techniques. If we don't come up with something, our bees are going to be hanging out at the neighbor's pool next Summer - just like last Summer.

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References

Lindauer, M. 1954. *The Water Economy and Temperature Regulation of the Honey Bee Colony.* Bee World 36:6272,81-92.

Park, O.W. 1923. *Behavior of Water Carriers.* Amer. Bee J. Vol 63:553

Park,O.W. 1928. *Time Factors in Relation to the Acquisition of Food by the Honey Bee.* IA Agric. Exp. Sta. Res Bul 108

Seeley, T.D. 1985. *Honey Bee Ecology.* Princeton University Press. Princeton, NJ. 201pp.

Winston, M. 1987. *The Biology of the Honey Bee.* Harvard University Press. Cambridge, MA 281 pp.

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DATES TO REMEMBER

General Meeting – December 6, 2008 – at Oregon Ridge Nature Center. 6:00PM.

Annual Pot Luck Dinner – Bring a dish to share and your family to partake in this year ending event. There will be plenty of food and lots of good conversation.

General Meeting – January 8, 2009 – at Oregon Ridge Nature Center. 7:30PM.

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