HONEY PRODUCTION IN GUINEA

The author's trip to the area is indicated by the red circle.

Part I - Learning about Guinea, Its People and Teaching Beekeeping

by CONRAD BÉRUBÉ

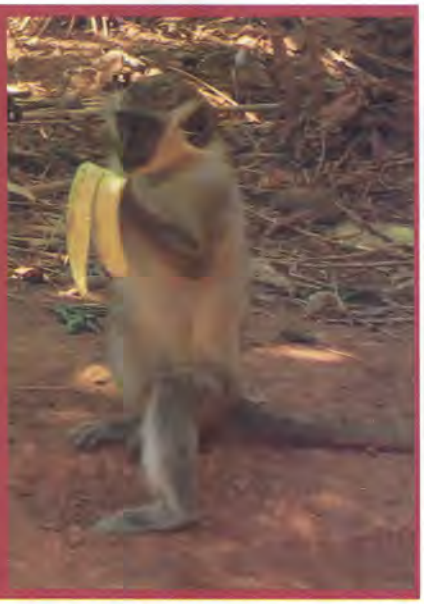
I work as an environmental protection officer with the Ministry of Environment in Nanaimo, British Columbia— having gained the position through a circuitous route. I received a Master's degree in entomology from the University of California, Davis, and specialized in apiculture and integrated pest management (IPM) and spent the early part of my career working in apicultural development, mostly in Latin America and in operating an IPM consulting company. After settling in British Columbia I was hired into the IPM program of the Ministry of Environment. However, over the years, my original job duties have changed and become increasingly administrative, managerial and bureaucratic—and largely unrelated to my principal interests of study. I have found that volunteering in beekeeping development projects stimulates my core interests and keeps my field skills honed. I can make the transition from being a desk jockey playing paper hockey to being a field hand in a strange land— which allows me the opportunity to share innovations I have observed in one locale in another where such practices may be unknown.

Since 2002 I have been privileged to serve on three Farmer-to-Farmer projects in West Africa, specifically two in Ghana and one in Guinea. I have written of my first two excursions in "Beekeeping in Ghana: on the road in Africa doing developmental beekeeping demonstrations" published in the May and June 2003 issues of *American Bee Journal*[1]. My experiences in Guinea were distinct enough to warrant their own account.

Farmer-to-Farmer (FtF) is a program funded by the United States Agency for International Development (USAID). The program offers, as a form of mutual aid, technical assistance to countries in Latin America and Africa. The technical assistance arrives in the form of volunteers with specialized technical skills that would otherwise not be readily available in the rural hinterlands. In exchange, the volunteer has the opportunity to gain a richer worldview, share knowledge and interests, acquire or practice foreign language skills and, not least of all, make new friends. In addition, as a "goodwill ambassador", FtF volunteers can help to engender friendly sentiments towards the U.S.— a commodity that should not to be lightly discounted these days. It was with these guiding principles then that I began preparing for a five-week assignment to Guinea that was to start in November of 2007.

Guinea lies on the tropical west coast of Africa. It is roughly the shape of a croissant— which is perhaps appropriate as it was ruled by the French for many decades. French remains the country's official language and it occurred to me that the recipe for gourmet baked goods may have been one of the few technical benefits that the French left behind them. This, because in 1958, Guinea was the first of the African Francophone countries to seek independence from European colonial interests and,

Above, from left to right: OIC technician, Amadou Petty Diallo, Farmer to Farmer Volunteer Conrad Bérubé and beekeeper Mamadou Bailou Kaby observe (very cautiously) bees at the entrance of a Kenya Top Bar Hive in the village of Bousoura, one of the many communities visited during the author's trip to the area.



Honey badgers and monkeys are mammalian pests which regularly raid hives in certain areas of the Fouta Djallon region. I suggested that beekeepers soak the vines or ropes that they used to secure the lids to their hives with a one to one mix of ground chilli pepper and used axel grease or used motor oil to increase the deterrence against wildlife.

○ Apiaries should be established where hives will receive shade during the hottest portions of the day and where bees will have access to water and nectar and pollen bearing plants. Hives should be arranged so that entrances all face outwards (or all inwards) so to create a safe zone, out of bees flight paths and the sensory periphery of bees, allowing easier apiary maintenance and hive manipulation.

• lighting a smoker

○ Bellows smokers are virtually unknown amongst the Guinean honey producers whom we encountered. Typically the heavy smoke produced by torches or dried cow manure in ceramic vessels or buckets is used to dispatch or drive out bees from their hives before harvesting. We demonstrated how a bellows smoker can be lit and used to disperse enough smoke to control bees but not asphyxiate them, or drive them completely out of the nest, nor taint honey.

• smoking oneself and using cassava leaf juice as a bee repellent

○ Again, because bees are traditionally, more often than not, killed prior to harvest we demonstrated how applying a liberal dose of smoke to skin and hair prior to putting on protective equipment, and afterwards doing the same to one's veil, hat and clothing will mask one's scent and discourage bees from stinging. The leaves of cassava (manioc), commonly grown in the area for its starchy root, can be crushed and rubbed against skin and clothing as a bee repellent. (I have tried this on several occasions and found cassava leaves as effective as smoke, i.e. after treating one hand with smoke and the other with cassava leaves and working a hive, gloveless, for light manipulations, I received no stings—which quite astounded my Guinean colleagues.)

• maintaining beekeeping clothing clean and smelling only of smoke to reduce stings

○ Many beekeepers knew that when honey bees began stinging someone they would continue to do so, but the details of alarm pheromone were new to most. We explained that keeping clothes free of the smell of alarm pheromone and other odors, such as that of sweat, which will incite bees to sting, would make working with bees more comfortable and less dangerous. We again emphasized that smoking one's clothing prior to hive manipulations is as important as smoking the colony.

• removing and smoking a sting

○ We emphasized that removing a sting quickly would reduce the resulting pain and swelling and that the site should be washed off or smoked to mask the scent of alarm pheromone.

• smoking hives prior to inspection

○ We described and demonstrated the appropriate technique for tranquilizing a hive with smoke rather than completely stultifying them.

• basic comb manipulation

○ Using model combs or those removed from hives, as the situation allowed, we demonstrated how Kenya Top-bar Hive combs should be handled so as not to break them.

• identifying brood comb, propolis, and pollen

○ Many of the farmers did not have a clear understanding of the interior structure of the brood nest and its contents so we confirmed or corrected the groups knowledge on the topic.

• recommending harvesting only honeycomb and leaving brood comb in the hive

○ Again, as a way of preserving the means of production, we encouraged honey producers to harvest only honeycomb and preferably to leave some honey for the bees to reduce the incidence of post-harvest absconding.

• cleaning natural enemies from the hive during the swarming season

○ The empty hive bodies, of whatever style, that are used to entice passing swarms to set up shop can also make ideal nesting sites for ants and other pests that will exclude bees from using the box as a nest. We encouraged farmers to ensure that their hives were kept free of inhabitants, other than bees, during the prime swarming season.

• protecting hives from ants and termites by banding access points (tree trunk, legs of the hive-stands) with sheep's wool or used motor oil.

○ Ants, termites and other pests can be discouraged from entering hives by smearing used engine oil or axle grease around the ropes from which hives depend or around the trunks or branches of trees where hives are propped. Ants dislike crossing a band of sheep wool which can be tied around a tree limb or trunk in the same way.

• rubbing a hive down with lemon grass as a hive attractant during the swarm season

○ Lemon grass (*Cymbopogon citrates*), in addition to being an herbal remedy (see medicinal uses above) contains citral which bees themselves produce as a component of the pheromone they use to mark nest entrances to assist returning foragers find their way home. Swarming bees are particularly attracted to the scent of citral such that rubbing the herb inside and around the entrance of empty hives is a good way of luring them into taking up residency. In the past, in Ghana, after treating, in this manner, hives that had remained empty for months were occupied within a day or two—prompting local tribeswomen to inquire if I was a wizard.

• rotating an empty hive in the place of a strong hive (placed in the shade) during manipulations

○ Although Guineans preferred to harvest hives at night, several techniques can be used to reduce stinging incidents if hives must be worked during the day. After smoking an occupied hive, a wet towel or cloth can be placed on top of the hive to keep the box cool and prevent the bees from "leaking" up from any ill-fitting top-bars. The hive is then carried away from the original location and placed in a well-shaded spot. An empty hive is set in the location originally occupied by the colonized box. Bees leaving the hive and returning foragers will return to the original location and enter the empty box. As combs are removed from the occupied box, the wet towel should be draped back over the empty slot left by the removal— thus reducing the number of bees leaving the hive. When revisions are complete the hive is returned to its original position and the empty box is opened and the bees inside smoked or brushed out at a convenient distance from the occupied hive.

• saving and utilizing beeswax

○ Oddly, most beekeepers we encountered were not aware of the variety of uses to which beeswax could be put—and it was often discarded once honey had been removed from the combs. We discussed and demonstrated a variety of methods for utilizing beeswax, from candle-making to the manufacture of moisturizing skin cream.

• basic design of the Kenya Top-bar Hive and the importance of the "bee space" and central guides in the top-bars

○ We encouraged farmers who wanted to significantly increase the production of honey and beeswax to consider supplementing their traditional hives with Kenya Top-bar Hives (KTBH's). These "appropriate technology" hives are much easier and cheaper to produce than the Langstroth Hive familiar to bee-

Whether working at night or during the day, good protective equipment can make bee-work much more pleasant; new beekeepers who do not suffer extensively, either from excessive stings or overheating, during their initial forays into beekeeping are far more likely to continue in the undertaking than those who are ill-equipped. FAPI and OIC promoted the use of very sturdy equipment fashioned locally. Dian Bobo Diallo, at bottom centre, models a lighter bee-jacket of a style which I had tailored in Labe and which I demonstrated could be used quite comfortably in the hot Guinean weather—once it had been given a nice dousing with fumes from a smoker.

are thus less abundant than they might otherwise be for a fully developed colony, the dangers inherent in working with such unruly bees are also proportionately reduced. Because the colonies in the traditional hives are usually killed during harvest, the majority of Guinean honey producers would be classified as bee-havers rather than beekeepers.

Our time in each community was very short—no more than a few hours. Nonetheless, the technicians with whom I worked and I agreed that, following our assessment of current resources and capacity in each location, it was worthwhile to cover key points towards which future extension efforts would be directed. Here are the key topics and principal messages we conveyed in each community:

• medicinal uses of honey in rehydration drink and as a wound dressing

○ Because of ripe honey's low moisture content it prevents the growth of microbes and can be used as a wound dressing—very useful in rural areas where the nearest pharmacy or clinic may be many hours away. In addition, the honey will generate hydrogen peroxide as exudates from the wound dilute it, which will exert an antiseptic effect. The honey will also provide nutrients to the wounded tissue while it repairs itself. We recommended that wounds, after being washed with soap and clean water, should be salved with honey and covered with a clean, dry bandage to keep out dirt— and foraging bees. Honey and clean bandages should be reapplied daily until the wound is healed.

○ Honey is easier to digest than table sugar and can be of benefit in feeding people with intestinal distress or stomach disorders—and disentery still claims many young lives in the developing world. If someone is sick and losing a lot of fluids from vomiting or diarrhoea, honey can be used to make a rehydration drink. In one and one half liters of clean water (we recommended a bottle of a commonly available mineral water or water that has been boiled and cooled) should be mixed

• three tablespoons of honey and
• 3/8 teaspoon of salt and
• 3/8 teaspoon of baking soda (bicarbonated soda)
• [if baking soda is unavailable another 3/8 teaspoon of salt, i.e. 3/4 of a teaspoon in total can be used].

— instead of plain water we also noted that tea made from lemon grass (*Cymbopogon citrates*) could be substituted. Such tea is widely used as a natural remedy for digestive problems.

• possible improvements on traditional hives (hanging and installing access door)

○ In some locations we noted that hives, especially heavier wooden hives, were propped up on wooden stands or stumps. We encouraged the more traditional practice of hanging the hives from tree-limbs to reduce damage caused by ants and bush fires and to prevent knock-down by wind and domestic animals. We suggested that, for larger hives, "stretcher" handles could easily be added. Such handles can facilitate carrying fully loaded hives and provide a handy resting spot for combs removed from the hive during inspections, as well as providing a purchase for ropes.

○ We noticed that in several locales the traditional style of building hives did not include a removable door such that the woven hives had to be destroyed to get at the honeycombs—a messy operation that virtually guaranteed that the colony would be killed or driven away with heavy smoke prior to harvest. We encouraged farmers who were not willing to invest in relatively expensive wooden hives to consider incorporating access doors into their hive designs. The use of access doors would permit farmers to harvest honey from only one side of the hive, leaving some stores and the brood combs intact allowing the colony to persist for further production.

• proper placement of apiaries and hives



Traditional hives in the Ley Miro area are usually made of wicker that is then covered over with daub and straw for insulation. These hives are usually fairly small both because of the nature of the building materials, which would collapse if the hives were scaled up, and because the colonies are not allowed to grow very large before being robbed out. It is a chore to have to reconstruct such hives each season and the crude harvesting practices negate the possibility of maintaining perennial colonies, depending instead on the trapping of new swarms each season. Hollowed palm trunks such as those at upper right are sturdier and can be provided with doors.

in severing this relationship, the country spiralled into an economic chaos from which, in the intervening half century, it has yet to completely recover. Approximately 80 percent of the 10 million inhabitants of the Oregon-sized country live in small agrarian communities— often in materially impoverished conditions. I was to work with two non-governmental development agencies working in the central Fouta Djallon region to increase incomes and improve living conditions in the area. One of them, Opportunities Industrialization Centers' Food and Livelihood Security program in the Pita and Telemele districts has mercifully shortened its designation to OIC FLSPT. Their community outreach representatives live and work in rural postings in a capacity similar to extension agents of government and land-grant university programs in the U.S. Their extensionists work in fields as diverse as family planning and public health to farm improvement and agricultural cooperative management and marketing. The production of honey has a long tradition in the area, but it was believed that FtF volunteer input could improve the production and quality of bee products yielded from the area. The other organization with which I collaborated, the *Fédération des Apiculteurs de Guinée,* was much more specific in scope, as its work is restricted to things apicultural, but hoped for similar outcomes from the efforts of a volunteer. Namely, they were hoping for techniques to improve beekeepers' incomes and promote sustainable practices.

The gracious hospitality (which included some of the aforementioned baked French delicacies) of Leon Sakho, Country Representative, and Sidy Conde, Farmer-to-Farmer Project Coordinator for OIC Guinea, did much to restore my spirits after a long and difficult trip when I met them. Sidy accompanied me on the eight-hour journey to Labé to give me a general orientation on everything from changing money to the national cuisine. The vistas of the Fouta Djallon through which we passed were often quite spectacular. This high, rocky plateau is used for grazing goats and cattle and the resourceful farmers are also able to wrest grains such as dryland rice, maize (corn) and fonio (a cereal crop prepared much like rice, but strongly resembling couscous in texture and flavor), citrus and a few other tropical tree crops such as mangoes and avocados are cultivated in the valleys between the bluffs and mesas of the region.

By early evening we had arrived in the district prefecture at Labé where I was introduced to the staff of the *Fédération des Apiculteurs de Guinée*: Mamadou Yaya Diallo, president, and Tanou Diallo, technician, and Oury Sow, a Gambian who had been hired on contract as translator.

During our field visits it became apparent that the level of apicultural development was fairly uniform, and basic, amongst the various communities we visited. Most of the honey produced in the Fouta Djallon region is produced by simple, traditional methods. These methods conform to the characteristics of the native strains of honey bee in Guinea, *Apis mellifera scutellata*. Like the race of honey bee that was imported to Brazil in the 1950's, which has since colonized most of the New World tropics, Guinea's bees are very defensive and prone to swarming. Colonies grow and divide quickly when the rainy season has resuscitated vegetation and floral resources abound. When the landscape begins to dry and brown, colonies may abandon old nest sites in search of richer forage. In harmony with this cycle, Guinean honey producers set out easily made, low-cost hives in the hopes of catching passing colonies looking for a new nest site. Traditional fixed-comb hives share the same general shape: hollow cylinders oriented in the horizontal. The uniformity of shape contrasts with the wide variety of techniques that are used in their manufacture: fire-hollowed palm trunks, wicker frameworks covered with daub, chiseled out hardwood gums all serve as basic hive-building materials. Hives are harvested when floral resources begin to dwindle and honey stores are at their peak. Colonies are usually driven out of the hives or killed outright with smoke, allowing the honey to be more easily harvested with a minimum of protective equipment. Because of this practice colonies are often relatively small when robbed out—and the hives themselves are on the smallish side, saving on the cost of materials per nest box. Although the stores

In Guinea the harvesting of hives is usually done at night when bees are cooler and thus less defensive. Harvesting is then also made more convenient since honey bees do not fly in the dark.

I demonstrated to my colleagues that if one smokes one's skin and bee-suit it is possible to work even nasty African bees without gloves—even though it is a good idea to keep your gauntlets nearby-- just in case. Crushing cassava leaves and rubbing them on the skin also works as an effective bee repellent.

keepers in industrialized countries where power tools, and the electricity needed to run them, are commonplace. The KTBH can be made from a variety of materials, but is usually fabricated from wood. The trapezoidal cross section of the box allows bees to support the weight of the combs entirely from the top-bar without the need for wax bridge comb along the edges. Guides along the bottom of the top-bars encourage the bees to build their combs along the length of the bars instead of across them. The width of 3.2 cm (slightly smaller than what would be used with the larger European strains of honey bees) gives the bees enough space to build a comb yet still maintain a "bee-space" between successive panels.

Next month: Part II — Bee Product Production, Processing and Marketing in Guinea