Beekeeping in Ghana

On the road in Africa doing developmental beekeeping demonstrations

Part 2 of Two Parts

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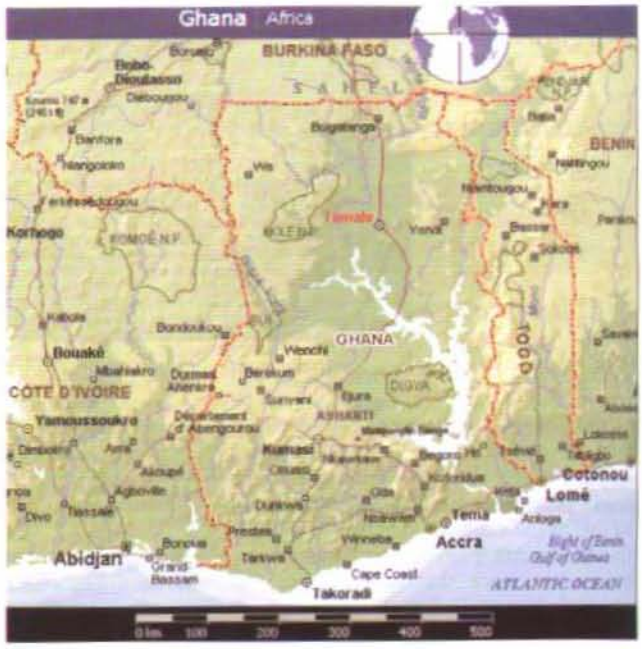


During my Farmer-to-Farmer exchange visit to Ghana I visited all of the client villages with which Opportunities Industrialization Center of Tamale (OICT) worked. Although the women's cooperative groups participating in the beekeeping project had received some training, the clients exhibited a minimal level of beekeeping skills and management practices. Most hives were opened usually only to harvest them. In light of this, I determined that the focus of training activities should be to convey simple techniques that would make the clients better "bee-havers" as a stepping-stone to becoming good beekeepers. Field visits were made to all 23 communities and, in all, 150 women and 27 men received on-site training in appropriate apiary siting, proper apiary arrangement, and hive conditioning. (Although the focus of the project limited credit to women, the men-folk were also quite interested in bees and often tagged along to observe and participate in apiary activities.)

During our field visits Ali and I made recommendations to reduce the hazards associated with beekeeping and to improve operations in general. We explained that bathing before entering the apiary and smoking one's skin and protective clothing can assist in masking odors that may incite bees to sting. In addition, Ali reminded me of a technique I had heard of decades earlier: scouring one's skin and protective clothing with crushed leaves of the cassava serves as a repellent to angry bees. We also went over with the women the proper way of wearing the veils and coveralls that had been provided to them and emphasized the importance of having protective equipment on hand when any work at all, such as reconditioning empty hives, weeding or refilling bee-waterers, was to be done in the apiary. This was a lesson that I was relieved I heeded myself: on one occasion I was so preoccupied in filming hive cleaning operations that I forgot the warning that the womenfolk had given me about some wild nests of bees in a large baobab tree behind me. While filming, I approached within about a dozen feet of the nest. In response to the women's gesturing and excited giggling and scurrying I turned to see the surface of the nest begin to stir and boil as the bees took flight and began bombarding me. I followed the advice that we had been disseminating and hunched over, covering my eyes with my narrowly parted fingers and walked at a moderate pace into the brushy area surrounding the apiary and then into a corn field where I donned my bee-jacket. Although I took a number of stings, my video camera seemed to suffer the brunt of attack—I could see at least a dozen stings protruding from the black rubber eyepiece. After I was adequately sheathed in my protective garb, I had to put the camera into a bag to reduce the plume of alarm pheromone that the bees were following. On the bright side, having been such a beacon of alarm pheromone myself, most of

At a number of apiaries, hives were too close together or not suitably arranged for the local defensive strain of bee and rearrangements were suggested and carried out during field visits.

In some locations co-op members had protected hives from attack by ants and termites by using the sticky, oily residue left over from "shea nut butter" processing—a good tactic and one that was promoted at other sites. Note the clay vessel nearby to provide water to the bees.

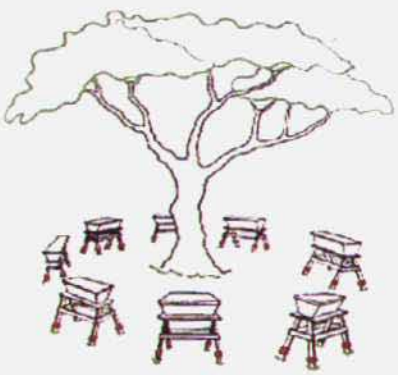
After hives were cleaned of any non-bee, tenants they were "baited" with lemon grass and/or beeswax which attract scout bees looking for a new home for swarms.

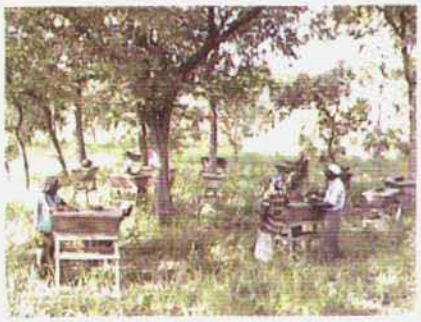
Apiaries were often sited near locations where wild hives occurred. Numerous wild hives indicated that there was ample forage in the area and provided a "seed source" for swarms that could occupy bait hives. However, one had to be wary to remember the whereabouts of wild nests when working in an apiary. Wild nests in buildings at the new OICT training center provided opportunity to train beekeepers on the removal of nuisance hives and wild nest transferring techniques.

the angry bees had been harrying me and the womenfolk had been able to make their own escapes unscathed. Although I find demonstration a more effective teaching tool than merely lecturing, that was a showpiece that I tried to use as little as possible in other sessions.

Heat-stressed and close-crowded colonies are irritable colonies; proper placement of hives can assist in reducing stinging risks. Most apiaries had been established in areas with sufficient shade (a lesson that could be learned by many beekeepers in the southern U.S. and the New World tropics). We emphasized that apiaries should be established in the same types of places that the women would want to be if they had to stand in the same spot all day: somewhere shady and close to a water source. My visit coincided with the "cool" portion of the year—although daytime temperatures rarely fell below 90 degrees Fahrenheit (32 degrees Celsius)—so this was a concept that the women easily grasped. When required, haphazardly arranged apiaries were reorganized to minimize risks of mass disturbances. Hives were repositioned to increase distance between hives to at least 1.5 meters and were arranged, if possible, into a circle with entrances facing outwards in order to create a relatively safe zone within the circle. This configuration reduces the potential for the drift of alarm pheromone and other cues from one hive to another that can set off a domino effect of infuriated colonies.

The insulated, protected space available to bees in the form of empty hives is attractive to various pests, predominantly ants. In one hive we found ants, 2 lizards, a dormouse and a scorpion. Dormice, lizards, spiders, and scorpions can capture and eat scout bees on reconnaissance for appropriate nest sites. An exploring scout bee can be eaten by one of these natural enemies of bees. In such a case there will be no way for the whereabouts to be transmitted to the swarm searching for what would otherwise be an attractive nest site.



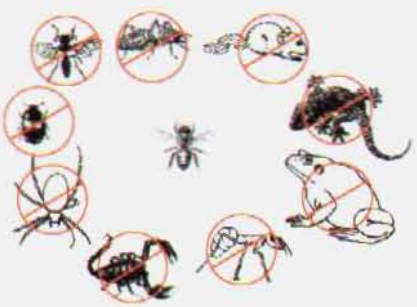


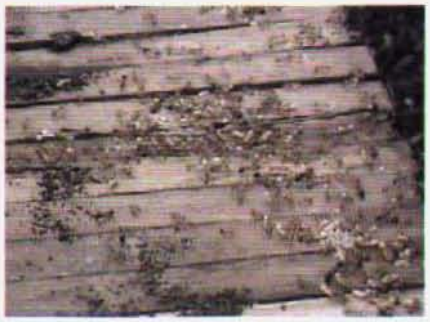
Apiaries should be established where hives will receive shade during the hottest portions of the day and where bees will have access to water and nectar and pollen bearing plants. Hives should be arranged so that entrances all face outwards (or all inwards) so to create a safe zone, out of bees' flight paths and the sensory periphery of bees, allowing easier apiary maintenance and hive manipulation. Apiaries should also be placed at least 200 meters from habitations, animal harborages and thoroughfares.

African hive beetles were common intruders in occupied bees' nests. I usually noted beetles down in the tight corners of hives where the floor met walls and, in an especially large bees' nest that was located in the roof of one of the buildings at the training center, I found an enormous number of beetles nestled in between a couple of wooden slats. I had not read about these beetles being so thigmotactic or "tending towards contact" and this observation gives me an idea on how to make more efficient the control of this beetle, which has recently been inadvertently introduced into the southern U.S. It seems to be that two slats of wood about an inch across could be used to construct a trap for the beetles. One face of each slat could be painted with label rates of a solution of an insecticide authorized for use to control the beetles (such as coumaphos in some states of the U.S.). Then, spacers, such as pennies, could be placed on one of the treated faces and the other treated face placed on top and the "penny sandwich" thus formed secured with rubber bands or thin wire. This "beetle motel" could then be placed in the bottom of a hive. Bees would be little exposed to the insecticide while beetles seeking shelter in the beetle motel would acquire a lethal dose of the poison. (If anyone tries this and finds it successful, please let me know. The level of beetle infestation in KTBH's, as opposed to wild nests, was not high enough to be especially noteworthy—except as being new to me—or warranting of control.)

Where ants were a problem (virtually all apiaries) and large trees abundant, it was suggested that hives be hung from branches and/or that vegetation beneath hives be trimmed to prevent ants from using the vegetation as bridges into hives. Whether on stands or hung, it was suggested that the legs of the hive-stand or ropes be treated with grease, shea-nut butter residue or sheep's wool, which will also discourage ants.

The women who attended our on-site demonstrations were encouraged to revise all of their empty hives to ensure organisms other than bees had not occupied them and to recondition such boxes with lemon grass and beeswax. (Lemon grass, *Cymbopogon citratus*, contains citral, which is the most attractive component of the Nasanov pheromone that bees use to mark their nest entrances and beeswax further enhances the attraction—i.e. makes a hive smell like home.) In addition to the cut stalks of lemon grass used for rubbing down the hives, rootstock was also provid-





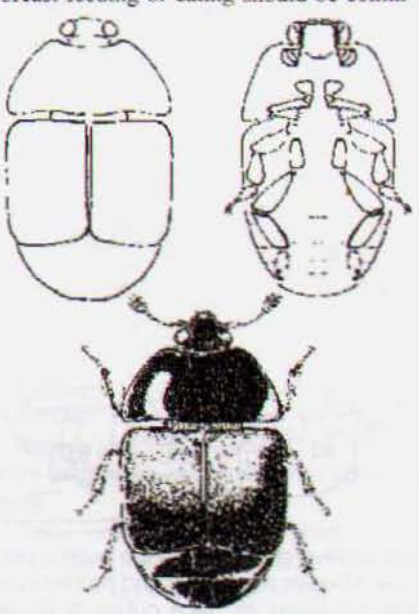
Ants, wasps, spiders, scorpions, lizards, and rodents may occupy hives and prevent bees from taking up residence. During the swarm season regular visits should be made to apiaries to ensure that hives unoccupied by bees are free of pests. Wood-destroying termites can cause damage to the structure of hives or hive stands. African hive beetles can consume honey and foul combs. Toads can consume great numbers of bees, but often go unnoticed since they are nocturnal in habit. Client women were instructed in measures to reduce impacts from all these pests,

Although ants were the most common problem, dormice were the most interesting to me since I had never seen them before. Dormice are rodents but are not, in fact, mice and are instead, members of a distinct genus. In appearance they resemble a cross between squirrels and mice and their behavior is likewise intermediate between the two. They feed on seeds, fruits and insects—making them a threat to scout bees.

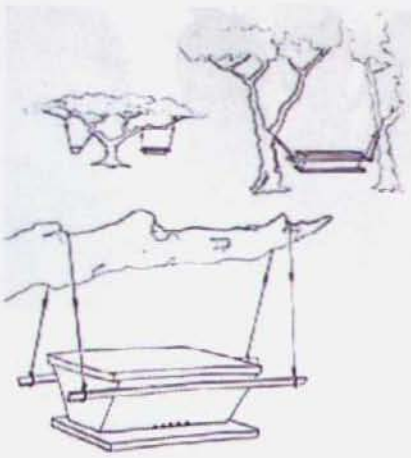
ed to participants for planting around their farms or compounds for future use.

Because of the scarcity of medical care and drugs, during our visits we also mentioned that lemon grass could be used in a tea to calm upset stomachs. In addition, I emphasized the legitimate use of honey as a wound dressing. Because it is a supersaturated sugar solution, honey is bacteriostatic and will impede the growth of microorganisms that can cause infection. A wound should be washed with soap and clean water, then covered with a light salve of honey and covered with a clean dressing; this procedure should be repeated daily until the wound is closed. Diarrhea caused by various maladies takes the lives of thousands of children in the tropics each year. A tablespoon of honey with a half teaspoon each of salt and baking soda in a liter of potable (and preferably boiled) water makes a drink that will help in rehydrating someone who is losing liquids from bouts of vomiting and/or diarrhea. (The drink should be given in sips every five minutes until at least a cup of the solution is consumed after ever bout of vomiting or diarrhea—and the normal routine of breast feeding or eating should be continued). Two level teaspoons of sugar can be substituted for the honey, but the inclusion of honey gave us the opportunity to discuss the important issue of rehydration therapy.

As the opportunity arose a number of other recommendations were made and areas where improvements could be made were noted. These points were used to develop the schedule for a 5-day intensive training short-course held at OICT's training center in Kumbungu, about 17 km northwest of Tamale. One woman from each village, who had been identified as a community leader, was invited to attend the short-course and encharged to thereafter convey the material she had learned back to her companions. The training center has dormitory and dining facilities, so that clients didn't have to make long commutes back to their villages each day. This also allowed for nighttime manipulations of bees. Ambient temperatures in Ghana are cooler at night—making hive manipulations less disruptive to the bees and thus more comfortable for beekeepers. The likelihood, duration and intensity of honey bee workers' response to their nest-mates' alarm pheromone increases with increasing temperatures. In addition, bees do not readily fly in the dark (although they will fly towards lights being used to illuminate the work area) thus limiting the stinging risk to bystanders. If hive manipulations are performed in early evening, nest defense reactions will generally have returned to normal by morning—reducing



African hive beetles were common intruders in occupied bees' nests. In the photo above a beetle can be seen scurrying near a queen—both were invariably quite camera-shy.



"Stretcher" handles can easily be added to the Kenya Top-Bar Hive. Such handles can be facilitate carrying fully loaded hives and provide a handy resting spot for combs removed from the hive during inspections. The handles also allow the KTBH to be hung from posts or tree-limbs to reduce damage caused by ants and bush fires and prevent knock-down by wind and domestic animals. Photos show cooperative members and PCF's hanging hives during a training exercise, line drawings are part of instructional newsprint materials developed for the training.

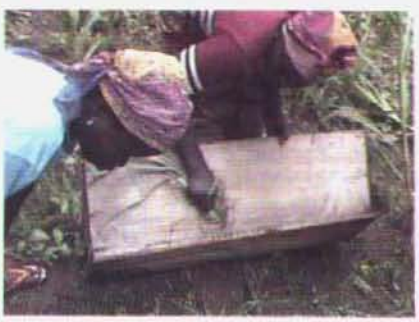
the need to avoid the hive area for prolonged periods. Because of Ghana's location just north of the equator (Tamale sits at about 9 degrees, 25 seconds N) nightfall occurs fairly close to 6:00 PM throughout the year. Hive manipulations are most required during the spring and summer. In areas at greater latitudes the hour of spring and summer nightfall is later in the day—when farmers are generally fatigued and ready to retire for the day; the equatorial circadian cycle in Ghana makes it far easier to work nighttime bee-work into a daily routine and is consistent with traditional honey-tapping techniques. During training sessions we emphasized the importance of working bees at night and over the course of two evening sessions held at the beginning of the short course, we harvested comb from 3 colonies that had taken up residence in the eaves of buildings at the training center. On the first evening the women had been rather reticent, but by the end of the second evening the women had gained enough confidence to conduct the operation pretty much on their own. In fact, the women were so pleased with their accomplishment that they broke out into an impromptu singing and dance session. The harvests provided raw material for training sessions on honey and wax processing, as well as value-added production of a skin moisturizer and batik-dyed cloth.

The current level of bee-skills exhibited by OICT clients characterizes them as bee-havers; they have acquired hives that allow them to harvest colonies with a fair amount of ease, but conduct no significant amount of management. During harvesting the brood nest remains relatively intact and the colony can be preserved from one season to the next. In contrast to traditional nest robbing that destroys the colony, the means of production, bee-havers can eat their honey and retain their hives, too. Nonetheless, bee-having can be conducted more efficiently than was observed during site visits. Clients should regularly inspect their empty hives to ensure that pests have not usurped the KTBH's. After cleaning, hives should be "baited" (rubbed with beeswax and lemon grass) to simulate nest odors and attract bees. In this way the number of occupied colonies can be maximized. Honey, pollen or other foods perceived as attractive to bees should not be used in empty hives as ants, in such a case, are much more likely to find and occupy hives before bees do and bees will not move into a hive already occupied by ants. These techniques were discussed with the clients during site visits and/or during training. In fact, participants from several communities reported that the reconditioning of hives during site visits had resulted in a significant increase in hive occupation. In several locations bees took up residence in reconditioned hives on the same

day or the day after our visit, which prompted several participants to ask me if I was a wizard! I'm not quite sure how Ali translated my response delivered in a self-mocking, Mr. Know-it-all voice: "No, Memanatu, it's not magic, it's just good science."

Harvesting must be conducted in a manner that allows for maintenance of colonies once they have been obtained. Novice bee-havers (and even beekeepers) often remove too much honey from hives and do not leave the colony sufficient stores to support them through periods of minimal nectar availability. To better provide for the bees' needs during dearth periods, it was suggested that comb only be harvested from one end of the hives (to establish a standard, it was suggested that this always be the right side, as one is facing the entrance of the hive).

With regards to transferring technical



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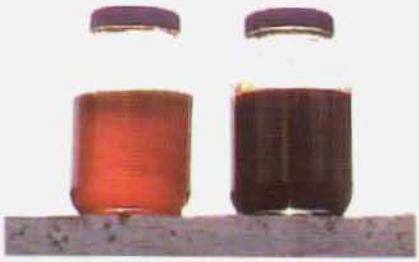
Beeswax can be even more valuable on a weight-to-weight basis than is honey—if it properly processed. The images above show how beeswax can be purified by placing combs into a tight-weave cotton sack that is then placed in near-boiling water. When the wax inside the sack has been sufficiently heated, the sack can be squeezed and twisted in the pot so that the wax is expressed. The molten wax floats to the surface of the water where it can be ladled off and allowed to solidify.



Honey produced by improved harvesting and processing techniques (shown to the left in the leftmost image above) can greatly improve the quality of honey as compared to honey produced by traditional honey tapping (shown to the right in the leftmost image above). Harvesting only ripe honey from combs that do not contain brood or pollen ensures that the final product is attractive and has good flavor and self-preserving properties.

Some solutions developed by villagers for local beekeeping problems:Grass matting was sometimes used to provide additional shade where ample shade from trees was unavailable.

A clay receptacle that is used to water poultry (larger domestic animals cannot reach the water through the apertures) was further modified to provide water to bees, small stones were placed in the vessel with the water to prevent poultry from drinking it all and to provide landing sites for bees.

skills, one of the major stumbling blocks in the progression along the road to beekeeping is overcoming one's fear of bees (while maintaining a healthy respect for them). I believe that the greatest gain made during the training program was that it provided opportunities that allowed the clients to gain confidence in their ability to deal with the risks inherent in working with defensive strains of bees, while being able to complete the tasks that will make them better bee-havers. As their confidence and experience increase, they will be able to proceed along the course to actual beekeeping—if they so choose. However, the goals for the program in which I was working revolve around creating income and not necessarily around creating beekeepers. Given the burden of labor that already falls on village women, it is a perfectly acceptable outcome to create good bee-havers as opposed to beekeepers.

On a more general note regarding improved efficiency for development work, it would be useful to encourage greater cooperation between developmental organizations working in beekeeping or with related projects in the client communities. As an example of this, Peace Corps volunteers working in the area were invited to attend the OICT training sessions; 3 Peace Corps representatives participated in one session—in which their assistance was appreciated—and one of them stayed to attend the remainder of the training. A Peace Corps volunteer working in the same community as that in which a women's cooperative had established an apiary could assist the project in a number of ways: A volunteer working in an Environment Education program could promote beekeeping as a component of agroforestry; an Integrated Sciences program volunteer could educate students about the role of pollination in agricultural production (and hence the need to exercise measures to protect bees from pesticides; a Practical Arts teacher could elaborate on techniques using beeswax for batik ("tie-and-dye") dyeing or for lost-wax metal casting. In any case, such activities would assist in promoting beekeeping projects and to educate the community about the value of beekeeping and bees—firming up public relations and possibly opening up local markets for bee products. Similar rationale could be made for other development agencies and for other programs.



Trainees participate in hiving a swarm at the training center—an exercise that built their confidence about working with bees.



The local strain of bee in Ghana, *Apis mellifera adansonii*, is more defensive than races of bees commonly used in Europe and North America, but is well-adapted to the tropical conditions in which it has evolved. From left to right, a young queen pulled from a swarm, worker bees tending a comb of bee-bread, and guard bees at the entrance to a KTBH (note how the entrance is composed of individual holes as opposed to a long slit to assist bees in protecting their hives from the intruders.

The essence of true beekeeping is management of the brood nest in concert with anticipated changes in resource availability. In this way the beekeeper can modify the colony's population to peak to coincide with periods of greatest nectar flow or to shrink down to a level that is more easily supported by diminishing floral resources. This level of management is well beyond the level of skill currently held by the women in the cooperatives. Like reading, the skills necessary for this kind of management cannot be conveyed in a mere matter of days, although, like the alphabet, the basic framework can be laid relatively quickly. Further development is a matter of individual practice. To simulate hive conditions during various times of the year, we used actual size photocopies of brood-, honey- and pollen-filled comb that were taped to top bars and practiced the appropriate hive manipulations for the various phases of the nectar cycle.

Overall, I'd have to say that I thought the field visits and training went surprisingly well, thanks to the assistance I received from OICT staff (especially Mohammed Ali [the beekeeper not the boxer]) and those PCF's (Sumani Osman, Abukari Ziblim, Yakubu Alhassan and Hudu Haruna) and PCV's (Rose Rosely, Suzy Corbin and Amanda Gordon), who assisted in conducting training sessions. During the short course a number of different educational tools were utilized. Instructive videos, including some taken during field visits were often used to illustrate conditions not available at the training center. Flip-charts, posters and photos were similarly employed to supplement lectures or to stimulate group discussions and problem-solving. Of course, the keystone of the training was lots of hands-on activities such as harvesting wild nests, hanging hives, reconditioning hives, installing a swarm, processing comb and bottling honey. But one training tool that we had some fun with, and I believe was effective, was role-playing to illustrate some of the more abstract concepts. In one of these sessions participants each took on the part of a colony member or natural enemy in a game/role play intended to get trainees to understand the challenges bees face in locating a suitable nest site. To paraphrase Mohammed Ali (the boxer not the beekeeper) trainees learned to "float like a butterfly and think like a bee". Two teams of trainees assumed the roles of swarm bees (with one queen, a number of hive bees and a smaller number of scout bees). While the hive bees danced about and serenaded their queen, scout bees attempted to find an appropriate "hive" amongst the rooms of the training center dormitories. Scout bees who entered hives occupied by trainees posing as ants, lizards or other natural enemies were detained. Eventually, a scout from one of the swarms discovered an appropriately empty hive and lead the team to its new home. This helped drive home the concepts intrinsic in swarm nest-site searches and underlined the importance of maintaining bait hives free of occupants other than bees. Another role play was designed to portray how a good honey flow is dependent upon an abundance of nectar-bearing plants, good weather that favors nectar production and bee-flights, and a large population of foragers that peaks concurrently with the peak nectar flow—brought about through good hive management. Assuming the roles of foraging bees highlighted for the trainees the interactions of environmental conditions with the hive population and how management techniques could be used to ensure that hive population peaked with the nectar flow instead of before or after the flow.

It occurred to me that to some degree my participation as facilitator during the training was somewhat of a role-play. Having acted to guide and motivate beekeeping activities amongst the members, an amusing and somewhat disturbing metaphor occurred to me. For the month that I served to guide and motivate the members of the cooperative, the collective, I was the queen.

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For more information on the Peace Corps visit the following website:
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