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## Africanized honey bee colonization in the human domain: Issues of environmental anthropology in southern Nevada

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**AFRICANIZED HONEY BEE COLONIZATION IN THE HUMAN DOMAIN:  
ISSUES OF ENVIRONMENTAL ANTHROPOLOGY  
IN SOUTHERN NEVADA**

by

**Daniel Edward LeBas**

**Bachelor of Science  
California State Polytechnic University  
1974**

**A thesis submitted in partial fulfillment  
of requirements for the**

**Master of Arts Degree  
Department of Anthropology and Ethnic Studies  
College of Liberal Arts**

**Graduate College  
University of Nevada, Las Vegas  
August 2000**

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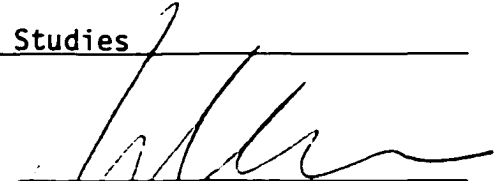
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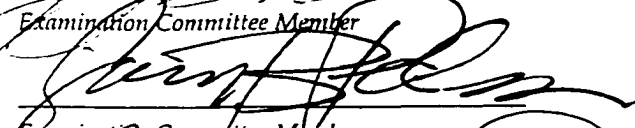
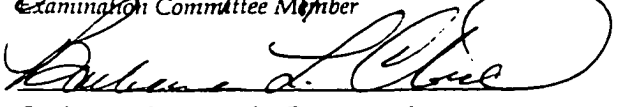
Africanized Honey Bee Colonization in the Human Domain:  
Issues of Environmental Anthropology in Southern Nevada

is approved in partial fulfillment of the requirements for the degree of

Master of Arts in Anthropology and Ethnic Studies

  
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## **ABSTRACT**

### **Africanized Honey Bees in the Human Domain: Issues of Environmental Anthropology in Southern Nevada**

by

**Daniel Edward LeBas**

**Dr. George L. Urioste, Examination Committee Chair  
Professor of Anthropology  
University of Nevada, Las Vegas**

Environmental anthropology seeks to identify issues and propose resolutions when humans are directly affected by environmental consequences or indirectly by policies that may marginalize the concerns of certain populations. Africanized Honey Bees created both environmental and policy consequences in southern Nevada. Identification of the issues was accomplished with literature review, participant observation, informal interview, and conferencing with academic and agency officials related to the human/bee problem. The controversy in risk assessment has implications for urban residents in southern Nevada. Both agricultural and urban environments may be economically and politically impacted by the colonization of feral Africanized Honey Bees. Urban populations affected by bee colonization should maintain a proactive, perceived risk posture to protect residents and tourism in southern Nevada.

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## CHAPTER I

### INTRODUCTION

Environmental anthropology<sup>1</sup> works with human populations in the study, discovery, and resolution of problems related to environmental issues.

Africanized Honey Bees<sup>2</sup> have created issues in southern Nevada that are described in this thesis. The history of their arrival to the Western Hemisphere has been portrayed with their troublesome nature. Insights from academic and agency interests have been reviewed to gather historical and contemporary information that reflects upon identifying issues created by the Africanized Honey Bee. Comparisons of human/bee relationship were made with this bee's original home in Africa. Current thought in risk analysis was presented to apply toward hazard concepts from bee colonization. Social, economic, and political risk and conflict issues were discussed to reveal findings that may promote better public-safety policy and understanding between two spheres: the urban populations of southern Nevada, and the interests of beekeeping. Conclusions and recommendations were set forth primarily based upon the fact that AHB colonies will increase exponentially in southern Nevada and the risk of accidental human/bee encounters will increase as well.

In chapter one, a brief history of the problem is described along with the issues and research inquiry. In chapter two, the methodologies used to acquire

understanding of the issues are described. In chapter three, a historical overview of the human/bee relationship is set forth with the history of how the Africanized Honey Bee arrived in the Western Hemisphere. In chapter four, academic perspectives regarding this new honey bee and its relative in South Africa are discussed and compared. In chapter five, perspectives of how academic and agency risk assessors arrive at their opinions and conclusions is presented which also create social issues. The situational or spontaneous risk factor of the Africanized Honey Bee is presented in relation to threatening the human "illusion of control". In chapter six, risk factors are discussed and applied to Africanized Honey Bee threats to residents, economic threats posed to agribusiness, costs to urban residents for removal services and medical treatment, and the potential threat to tourism. In chapter seven, discussion of urban and rural political issues created by economic threat and necessity of pollination services is set forth. Use of alternate terms for the Africanized Honey Bee are discussed in relation to fears that the term "killer bee" will create problems for beekeepers. The effect of human bee removal and predator inter-species conflict is described as a selection force for more defensive bees. In chapter eight, conclusions and recommendations from this study are discussed. The imperative recommendations are that southern Nevada maintain a "perceived risk" posture which is more proactive to protect residents and tourism; that timely broadcasting of public-safety oriented documentary should continue on commercial telemedia; and that a policy to random sample residential neighborhoods be implemented to determine efficacy of public-information campaigns. In the following subsection,

a statement of how the bees arrived in the Western Hemisphere with ensuing difficulties is presented with issues and research inquiry.

### I. The Problem: History and Hazard

The Africanized Honey Bee became troublesome in Brazil by 1958. Attack episodes have been publicized affecting in some way many human populations in the Western Hemisphere. Early in the colonization process in South America, this bee became popularly known as the "killer bee" and was publicized as such by North American news agencies signaling danger or life-threatening hazard to the unwary.

When this bee migrated into Mexico, this precise concern was expressed by David Glyn Nixon (1989) in his *Controlling Bees and Indians in Mexico: Maya and the USDA* while doing anthropological field work with the Mayan people of the Yucatan. He recommended that funding be allocated to employ Mayan-speaking agricultural extension agents to inform Mayan people about the dangers of Africanized Honey Bees<sup>3</sup>.

Robert B. Kent (1991), Professor at the Department of Geography, University of Akron became concerned for the lack of social focus on human/bee issues and stated:

Yet, detailed studies documenting the impact of the hybrid bee are rare. Consequentially, public policy decisions regarding measures to halt or retard the advance of this hybrid before it reaches the United States and decisions on how to ameliorate the effects of the bee should it reach the

southern United States are being taken without adequate data on the effects of the hybrid in other countries. This is surprising given the attention the Africanized has received from bee biologists and other scientists and the oft-repeated statements of ecologists who suggest that the best methods of preparing for a biological invader are detailed field study and the collection of empirical data about the invader before it invades. (p. 373-374)

From these concerns, field work was conducted in Peru in the early 1980's to investigate economic impacts on beekeepers and social impacts on urban dwellers as the process of "Africanization" was occurring within the honey bee population. Africanization is a biological process of hybridization between the genotypes of African and European honey bees which over time, eventually revert back to *neotropical scutellata* with a prominent resemblance to the East African Honey Bee of the Transvaal in South Africa.

As of 1960, the AHB was primarily in Brazil and spreading northward at the rate of 100 to 200 miles per year. For residents of North America, that would mean several years before the bees could approach the borders of the United States. Through the years, I followed developments in AHB colonization and the efforts of each invaded country to mitigate the spread of the bees. Funding from United States sources (primarily the USDA) was afforded to international cooperative efforts to study the AHB and attempt to discover a factor or set of factors in bee biology that would allow moderation of this bee's invasion and complete take-over of apiculture in countries south of the United States. In one

attempt to block the bees at the Isthmus of Tehuantepec, eight million dollars was committed to this effort (Gorst 1996). Retrospectively, nothing was discovered or implemented that could slow the progress of the AHB.

This bee first entered the United States by crossing the south Texas-Mexico border in 1990 and was subsequently discovered in Laughlin, Nevada in April of 1998. With this discovery and report, I set aside other research interests and began a literature review of bee ecology and proactive agency planning for emergency measures and response. My interest and involvement in these matters originates from career activity in integrated pest management, economic entomology, public health and safety, and environmental impact study and assessment.

On September 19th, 1998, the bees created a well-publicized and regrettable event in Boulder City, Nevada: one resident and two dogs were stung several times, many people were threatened, and one of the dogs eventually succumbed to the systemic effects of bee venom from numerous stings. Previously, I presented training and public-safety instruction to agency personnel of Boulder City, institutions, and individual residents in southern Nevada. In view of this community, our preparedness for such an event was situationally, good to excellent and yet, this was our first stinging episode that resulted in fatality. From the time of this incident to the present while preparing this thesis, I have been actively engaged in public-safety activity and research as an environmental anthropologist working with the issues generated by the arrival of the AHB.

In order to report the issues, many of these details must be presented to promote contextual understanding of the human/bee relationship much in the same way a medical anthropologist would study the biology of a disease pathogen in relation to human behavior and consequences. Although, presence of a disease organism in the human domain also constitutes an environmental hazard and hence, the focus of both medical and environmental anthropologists may also coincide.

## II. Issues and Inquiry

Regrettably, eight human deaths have occurred (along with uncounted and unknown pet, wildlife, and livestock deaths) since the AHB entered Texas in 1990. This record over one decade compared to the frequency and number of human deaths in other countries in the Western Hemisphere is impressive. The AHB colonies will rise in number rapidly during the second year of colonization increasing the risk of accidental encounters which may result in injury. This has lead to inquiry of how agencies and communities in the United States, with particular focus on southern Nevada, prepared for the colonization and presence of Africanized Honey Bees to achieve an impressive safety record thus far. Were we more successful (as in cultural adaptation) in dealing with this problem? If so, what cultural factors were present to facilitate adaptation? In exploring these questions, issues created by beliefs and agendas within subgroups will be discussed as to their effect on eventual problem resolution.



Important issues of this study have been opinion disagreements with the assessment of risk. Feral AHB defensive behavior traits have been described as being gentled by hybridization with European strains over time. The official contraindication of keeping pure strains of the AHB may be disregarded causing proliferation of *neotropical scutellata*. There have been conflicting statements of observation about this bee's feasibility for apiculture as either intractable by some researchers or claims of manageable by others. There exists conflicting advice in regard to health hazards created by the bees. There has been misunderstanding of how language is used in culture in regard to lay-public use of alternate names for the AHB. Bee removal to mitigate hazards will also become a selective force which will create more reclusive and defensive bees.

The social process of resolving many issues created by the AHB is ongoing. Regrettable preliminary accidental episodes brought on by individual misunderstandings may occur for at least two more years. Then, the population of southern Nevada will become more so enculturated to the presence of this new bee which will eventually be regarded as a commonplace biological resident that requires due respect.

In the next chapter, methodology used in this study will be presented. In regard to the validity of participant observation and interviewing, David Griffith (1999) presented his results using these techniques. In his article *Exaggerating Environmental Health Risk: The Case of the Toxic Dinoflagellate Pfiesteria* which appeared in *Human Organization*, Volume 58, Number 2, the argument of participant observation and interview as more accurate than survey methodology

was presented. This began a controversy with other researchers involved with the evaluation of this environmental risk which will be discussed later. The application of participant observation and interview in this study will be presented in the next chapter.

## CHAPTER II

### METHODOLOGY

Selected strategies for the environmental anthropology study of consequences created by Africanized Honey Bee colonization in southern Nevada<sup>4</sup> emphasized social issues generated by reaction to human/bee encounters. Kent's (1991:373-374) observation that human/bee social issues were disregarded in favor of biological study has become a consideration of this investigation. Because environmental anthropology is a relatively new area of research, providing exploratory studies for other researchers presents additional perspectives for applied methodology.

Library and internet research was conducted to ascertain historic perspective of the human/bee relationship. Participant observation has been ongoing since May of 1998, primarily in the community of Boulder City. Conferencing has been in progress with academic and agency officials in the State of Nevada, western regional States, the State of Virginia, and the countries of Mexico and South Africa. Library and internet (including e-mail communication) and participant observation have provided study of academic and agency perspectives in regard to the biological aspects of the bees that lead to human/bee conflict and policy formulation to deal with social issues.

Observation in Boulder City and southern Nevada has allowed me to gather hearsay commentary from numerous residents over time using the strategy of informal interview.

While conducting field research, I have worked for a pest control service which has provided additional positioning and community contact with many residents in Boulder City. This pest control company services about 1,000 residential and commercial locations in Boulder City. I also began a public-safety and bee removal service to assist with community hazards created by the bees. A primary concern was adequate and special insurance to cover my research activities, public-safety presentations, and removals when assistance was requested.

In two years, it was not taken into account how many people engaged in conversation (informal interview) with the author in regard to Africanized Honey Bee issues. The estimate could be more than three thousand residents ranging from child to elder in this community of more than 14,000. The objective in this study was to observe as many of the residents as possible, address their spontaneous questions, and listen to their commentary. In the beginning stages of colonization, resident questions and concerns were repetitive. The same questions were asked by many individuals and information about the bees and human safety began to follow somewhat, in a pattern. Foremost expressed were concerns for personal, family, pet, and livestock safety. From the informal interviews, apprehensiveness was observed which could be expressed in a range of very fearful to concerned. Some individuals would make comments that

appeared to apply the "illusion of control" (Bootzin et al. 1991:395). One resident stated that should he encounter bees while fishing by the shores of Lake Mead then, he would jump in the water to escape. This choice is officially contraindicated as unwise practice in that the bees will wait for you to surface. Opinions of this nature were not highly represented in the population rather, most residents felt as though their "illusion of control" was breached by the bees' pernicious behavior.

The residents of Boulder City are comparable to residents of other communities in southern Nevada in that they are primarily middle-class. The City provides a suburban community where people can choose to live in a retirement life-style or a family life-style while children are being raised. Many of the residents are employed in other areas of southern Nevada and commute to their place of employment. Observations made in Boulder City could then be generalized to other communities in southern Nevada.

Additional groups that were studied are academic researchers, emergency response agencies, administrative agencies, news reporters, and beekeepers (who often represent the interests of apiculture as related to agribusiness). Methods included the study of official published literature, printed literature for public distribution (including newspaper articles), television news reports, telephone and e-mail communication, and in-person conversation.

Academic researchers are biologists, entomologists, environmentalists, and zoologists who study bee ecology and may or may not report their research results to the general public. Emergency response agencies are fire and police

departments in urban areas and public lands. Administrative agencies are Federal, State, County and City officials who regulate and mitigate bee hazards in their respective areas and are primary policy institutions. They may also be involved with public information presentations about the AHB and risk evaluations. The study of individuals who have career interests in risk evaluation was focused on multi-discipline academic researchers and agency administrators. Those researchers who publish articles about risk are extensively represented in academic philosophy, although opinion has also been offered by safety institutions, schools of journalism, and anthropology. News reporters are those individuals who inform the public of bee encounters in short presentations like television newscasts and with more in-depth communications printed in newspapers<sup>5</sup>. Beekeepers are proponents of bee ecology and agribusiness concerns related to the practice of apiculture. One bee removal service was studied because the local representative was a former USDA honey bee researcher. This representative of the bee removal service offered analysis of honey bee colonization in southern Nevada with academic/private practice experiences and perspectives.

In Boulder City, as a member of the community , a "bee specialist", and a "pest-management specialist", volunteer information would come easily from residents who also in turn, may have asked questions of the author about the bees. With the author being perceived more so as a community member, this social connection yielded more candid replies and offerings of opinion and information which is the strength of informal interview (Fraenkel and Wallen

1993:387). From residing in Boulder City, I had the convenience of seeing several hundred residents in many occasions over the last two years of field work (which is still ongoing).

A participant-observer issue associated with this study was the author's "perceived" identity or position. In some cases, "guarded" reaction was noted while communicating with academic and agency officials, although the residents in southern Nevada were for the most part congenial and interested in this study. Some residents would discover that I was researching these issues in connection with graduate study. This created mixed reactions within the populace of Boulder City and southern Nevada. Some individuals reacted with enthusiasm for my interest and graduate field work in these matters while other individuals would cease their comments and opinions appearing uneasy as though they may become a subject of study.

It became clear that any uneasiness from the discovery of my academic pursuits usually elevated the author's status to "expert". This, in some cases, may have shifted an interviewee's focus from offering candid opinions and personal perspectives about the bees with possible ideas for "removing them" over to listening in regard to inquiries posed of the author. In consideration of personalities, some people are more gregarious than others when offering their opinions.

"Folk wisdom" (like jumping into the lake to escape the bees) and "folk remedy" (like using a garden hose to chase bees away) are important opinions and observed applications from this population. In consideration of gathering

commentary and observation, the author maintained a community identity of just another resident of Boulder City. Due to early television news interviews, the author acquired notoriety as a "bee specialist", and in one telecast, as an anthropologist studying impending human/bee social problems. The effect of this in Boulder City was more toward the residents regarding me as "one of their own from Boulder City".

Related to this participant-observer difficulty is: "naming stops the flow". During my service visits to homes and offices, the residents would immediately ask typical questions like, "Tell me about the bees, have you had any emergency calls?", or "Are they increasing now, have you seen any lately?" It is disastrous to stop the conversation and refocus their attention by reminding them they are now in an official interview. I tried this early on and it didn't work very well due to previously discussed participant observation problems. I decided to accept spontaneous conversation as hearsay or "informal interview" and describe this as a method of obtaining information. From hundreds of in-person conversations in two years, I have noted individual expressions that reflect divergence from the usual comments and questions about safety and bee colonization.

It should also be taken into consideration that the author was conducting both research and public-safety work within the context of informal interview and participant observation. My concern for the personal safety of Boulder City residents was pressing. With many years of experience in this field and early introduction to the consequences of Africanized Honey Bees, conversations were focused in part, upon resident concern for safety. The residents of Boulder



City regarded the author as a valued member of the community and provided this privilege for study, which became a reciprocal exchange of knowledge.

When distance precluded meeting with academic and agency officials, telephone and e-mail conveyances were used to gather insights from individuals of these groups who have research interests with, or would indirectly reflect upon human/bee issues. H. Randall Hepburn of South Africa became a consultant providing *scutellata* history, biology, and application in their beekeeping industry. He provided insights into this bee's behavior through time and in relation to the commercial interest of keeping this bee subspecies in South Africa. Charles Magolda of Sting Shield, Inc., Roanoke, Virginia, has provided insights into bee problems, safety, and use of his news-report data base. Both Hepburn and Magolda are academic bee specialists who study and inspect bees for problems and diseases.

Both Hepburn and Magolda have expressed interest in this research project and gave permission early on for their appearance in this work. Researchers who publish have been cited for their observations and opinions, which is acceptable academic protocol provided they are not quoted or cited out of context. Reporters were cited when their news items reflected issues in this study. Otherwise, references to specific (as in identity) participants in conversations and observed activities will not appear in this work. Instances involving specific people will be objectively described to show social issues. This observance is also extended to members of agencies in southern Nevada who may be politically disadvantaged if specifically mentioned. As an alternative, their

proper agency name will be referenced.

In Carmen A. Ferradas' (1997) *From Vegetable Gardens to Flower Gardens: The Symbolic Construction of Social Mobility in a Development Project*, a 14 year study of a development project in northeastern Argentina was focused on "development actors". The role played by social scientists in development projects was studied, and she further stated, "I want to look at the participation of anthropologists and other development practitioners as active components of the development process." (p. 450). In similar perspective, the participation of agency and academic professionals has been observed in the developing issues created by AHB colonization. Thomas Gregor (1977) utilized this observation technique while studying the Mehinaku where, "In practice the dramaturgical approach turns our gaze in new directions, focusing our attention on the expressive aspects of social relationships as well as on their economic or political significance." (p. 12).

This methodology promoted the determination of relationships between data obtained from literature review (an important item of literature data would be incongruent information), commentary from all social groups (in-person, telephone, and e-mail), news-media accounts, and observation. In turn, this study identified issues generated by the AHB colonization of southern Nevada.

In the following chapter, development of the human/bee relationship will be presented. This will include historical and contemporary perspectives in South Africa with subsequent arrival of African honey bees in the Western Hemisphere.

## CHAPTER III

### REVIEW: HUMANS AND HONEY BEES

#### I. Africa: Humans and Honey Bees

The human/bee relationship began many thousands of years ago with honey hunting. Through the centuries, humans developed sedentary life with agriculture and domesticated honey bees. Because honey bees were primarily hunted for their honey and wax in Africa south of the Sahara desert, the *scutellata* subspecies developed highly vigilant behavior toward intruders. That defensive behavior continues to be troublesome with beekeepers and urban residents.

Expressed as "the great thaw", the glaciers of the north and south poles began receding about 15,000 years ago (Gowlett 1993:148). The weather across northern Africa gradually changed and savannah-like conditions were replaced with the Sahara desert which isolated subspecies of *Apis mellifera* from contact with relatives in the north. The environmental conditions in sub-Saharan Africa became very challenging to all subspecies of honey bees in the south. The *scutellata* subspecies developed hypervigilance and defensive behavior as a means of adaptation to those environmental challenges.

Paleolithic art featuring bees in Altamira, Spain suggests honey hunting

by early humans at least 11,000 years ago, but with no conclusive evidence of beekeeping (Crane 1983:19-25). Early Egyptian artwork however, portrays beekeeping or apiculture 4,400 years ago in northern Africa. At that time, the Sahara desert was well into existence and a barrier to bee migration and colonization. Even though *Apis mellifera scutellata* regionally named the East African Honey Bee (Winston 1992:20) from sub-Saharan Africa, is known for extreme life-threatening defensive behavior, its relative *Apis mellifera lamarkii* has been kept by the Egyptians for the last 4,400 years (Crane 1983:35-39).

Agriculturally-based sedentary culture in the Nile delta began about 7,000 years ago along with the gradual domestication of plants, animals and presumably, the honey bee (Price and Feinman 1993:418). In view of this, the honey bee was required to become a cosmopolitan dweller with acceptable manners as well. The interaction between the Egyptian and the honey bees produced a "reciprocal behavioral contract". The early beekeepers provided shelter and protection from predators for their bees in exchange for hive products, but more importantly, manageability (the display of good manners). The "contract" would also include the reciprocal: human beekeepers must show appropriate behavior or injury might result from stinging defense of the hive.

The *lamarkii* subspecies has one distinct behavioral trait that its relative, *scutellata*, resists. *Apis mellifera lamarkii* allows handling by beekeepers and does not readily attempt to escape (known as absconding behavior). Conversely, this is an indication that *scutellata*, through the centuries, has not been mutually and beneficially interacted with by humans in the sub-Saharan. In developing

Egypt, most likely, through many patient centuries of keeping (or attempting to keep) *lamarkii*, absconding behavior diminished in favor of what humans could provide for colony security. In other words, the bees became accustomed to human presence and routine handling, but not so in the sub-Saharan with the relative *scutellata*. Environmental pressures including predation in southern Africa necessitated the display of extreme defensive behavior.

Through the centuries, this bee had to adapt to raids perpetrated by ants and honey badgers as well as the "honey hunting" raids of sub-Saharan, native peoples (Winston 1992:58, 101; Crane 1983:60-61). In regard to this adaptation of the bees to environmental threats, Mark L. Winston (1992) stated:

The large number of predators in tropical habitats has had considerable impact on tropical bees, particularly in the evolution of defensive behavior. The feistiness of Africanized bees, which has earned them their "killer" moniker, has its roots in millions of years of heightened predator pressure. Attackers such as ants, honey badgers, and humans have been a strong evolutionary influence on the predisposition of tropical bees to sting.

(p. 19)

An additional view to the "desert barrier" theory of isolation would be that this honey bee evolved highly aggressive and absconding behaviors over a much longer period of time, perhaps millions of years. The long-standing diversification of the East African Honey Bee combined with a recent geological event (the last ice-age ending) would have further created isolation in a highly competitive environment in the sub-Saharan (Hepburn and Radloff 1998:170). Considering

the length of time that these adaptive and successful behaviors were utilized by this bee, it appears that there would never exist the possibility to adapt this bee to the more modern and sedentary practices of beekeeping.

Through the centuries then, the foraging tribes in southern Africa could only hunt for colonies of this bee, a practice that still continues today (Hepburn and Radloff 1998:172, 205-206). One labor-saving improvement was invented and still used contemporarily: a hollowed-log "bee hive" which is suspended in trees and very attractive for nest building by bees in southern Africa (Crane 1982: 61). This hive is lowered periodically to access and "rob" the colony within and may be viewed as the next logical step in culturing bees in that region but, not necessarily viewed as "beekeeping". The suspended log hive, more so, suggests a "bee trap" that attracts bees thereby discontinuing the necessity to track them down in the wilds and hence saving a tremendous amount of time and labor. The suspended log also provides a localized source of honey for native cultures that practice a semi-sedentary life-style.

The view that East African Honey Bee behavioral characteristics would not be adaptable to sedentary life was modified with the arrival of European colonials in southern Africa. With their more sophisticated beekeeping methods and observations, they adapted this bee to modern apiary life, although absconding, excessive swarming, and highly aggressive "ancient" behaviors are retained. This adaptation by humans finally habituated the bees to live in one location while nervously tolerating human handling of their colonies. In so doing, the East African Honey Bee has become a sedentary dweller in southern Africa

producing record amounts of honey, but requiring labor-intensive care to placate each colony. A reciprocal behavioral contract was drawn with this very unsettled partner, although the interaction between humans and the East African Honey Bee, in view of more sophisticated beekeeping practices, is relatively new in Africa (about 150 years).

H. Randall Hepburn and S. E. Radloff (both professors at Rhodes University, Grahamstown, South Africa) have extensively studied bee ecology in Africa with the interests of beekeeping emphasized. In taking the history of both "honey hunting" and European methods of apiculture into account, Hepburn and Radloff (1998) stated:

There are two separate histories for apiculture in Africa: the little documented vernacular of the honey-hunter and the other representing the activities of northern hemisphere nations operating on the African continent. In the latter case, the bees of Africa were found to be so intractable to northern methods of beekeeping that temperate bees have been introduced into virtually every corner of the continent and this continues unabated today. Introduced honeybees from Europe have invariably failed against the local competition in the African climate just as they have failed against African bees in the neotropics. (p. viii)

## II. The Americas: Arrival of African Bees

Carefully considering Africa's tropical honey bees for neotropical application in South America, Warwick Kerr, a geneticist, participated in the

Brazilian bee-improvement program in the early 1950's. By request of the Brazilian Ministry of Agriculture, he transported several African queen-bees from Tanzania and the Transvaal Providence in southern Africa. Upon arrival back in Brazil, 54 of those queen-bees had survived the journey. Kerr warned the Brazilian government that these bees could be dangerous, and therefore proposed a genetic experiment to see if the African bees could be hybridized with more docile European varieties (Gorst<sup>6</sup> 1998).

The incident that people in the Americas view as the source of the "killer bee" problem occurred in 1957 with the accidental escape of East African Honey Bee queens with swarms of worker bees in the Sao Paulo area of Brazil. Winston (1992:11) stated that Kerr may have taken too much responsibility for this accident. African queen bees that were reared in Brazil prior to the Sao Paulo bee escape were given to other local beekeepers for apiary trials. Those bees also subsequently escaped. Considering the absconding behavior of the East African Honey Bee from 1957 on, many swarms escaped into the surrounding Sao Paulo area from additional apiary sources other than Warwick Kerr's research station.

Kerr's reasoning for the selection of African honey bee subspecies was based upon their adaptability to tropical climates as well as their superior honey producing ability. He had studied this bee and observed commercial beekeepers in South Africa who were keeping African colonies and setting honey-production records. Kerr was also aware of the precautions that beekeepers must observe with this bee to prevent any mishaps.



The original research plan was focused upon cross-breeding African honey bees with European honey bees (both *mellifera* subspecies) to produce a hybrid, hopefully, with the best qualities of both subspecies (in practicality, the European subspecies *ligustica* crossed with the African subspecies *scutellata*). With the unplanned escape of the experimental African honey bees in the Sao Paulo area, they spread faster than human reactive comprehension of the dangers that would visit upon residents in the Western Hemisphere.

Without experience, people have superficially reacted to the warnings from agencies regarding the potential dangers of the African honey bees that escaped in 1957. This is understandable if one considers the fact that the East African Honey Bee was not native to the Americas and human populations were then not enculturated with this bee's pernicious behavior and the impending consequences to human and animal welfare.

In the next chapter, individual perspectives within the honey bee researcher group will be reviewed. This will be based on viewpoint and findings from their research conducted in the Western Hemisphere and in Africa.

## CHAPTER IV

### REVIEW: HONEY BEE RESEARCH PERSPECTIVES

The following is an overview of how academic researchers and agency officials see the Africanized Honey Bee in contrast to the more docile subspecies conceptually known as the European Honey Bee. The latter has been a congenial friend to the Western Hemisphere in stark contrast to the behaviors of its African counterpart. I will present those adaptive behaviors of *scutellata* that have created problems for human beings in the Western Hemisphere. Where residents have lived with European Honey Bees for more than 400 years in a state of equilibrium between humans and honey bees, much is understood about them.

European Honey Bees have been identifiable with their characteristic dark yellow bands, whereas the *scutellata* subspecies in South Africa is not always discernible<sup>7</sup> from other European honey bee varieties. Literature findings of important differences between the AHB and the EHB, as discovered through academic and agency research, will be discussed foregoing my own field observations until we arrive at the chapters of discussion and conclusions/recommendations.

Beginning in South Africa with additional comments from Howard R. Hepburn and S. E. Radloff (1998), Rhodes University, Grahams Town, South Africa, *scutellata* observations from the original homeland will be reviewed with observations of *neotropical scutellata* in the Western Hemisphere. David W. Roubik (1989:359), Smithsonian Tropical Research Institute, Panama, explained that the *scutellata* which invaded Panama from Columbia in 1982, were almost genotypically the same as feral *scutellata* found in South America in 1970. Moreover, feral *scutellata* in Brazil are almost the exact genotype of the *scutellata* in South Africa. When comparing *scutellata* from Africa with *neotropical scutellata* in the Western Hemisphere, Mark L. Winston (1992) described the difference in this manner:

Since the bees from both regions were almost identical in their swarming, absconding, and defensive behavior, it was evident that the Africanized bees were only slightly modified from their ancestors and for all practical purposes could be considered the same bee. (p. 73)

*Neotropical scutellata* may be very resistant to hybridization, the feral colony will revert back to the genotype found in southern Africa which is commonly known as the East African Honey Bee (Burgett 1998:3).

Regarded as difficult to work with in South Africa, yet in the Western Hemisphere this honey bee has been reputed as highly troublesome and by some estimates, impossible to handle. When *scutellata* becomes uncomfortable with its hive location, the colony will ingest maximum honey stores, gather and accompany the queen to a new location that is deemed safer and

environmentally more congenial. This behavior is called "absconding" and is troublesome to beekeepers who maintain *scutellata* colonies, and equally troublesome for urban dwellers.

With a queen excluder attached to the hive box to prevent the queen from leaving, the entire colony may abscond and thereby abandon the queen. The "queenless" absconding swarm may amalgamate with another colony of honey bees nesting in some other location. In South Africa, *scutellata* migratory flights may last 30 to 90 minutes over a distance of 15 to 36 kilometers before honey stores are depleted. The swarm and/or migrating colony may then stop and replenish from floral sources (Hepburn and Radloff 1998:150,152,158-159). While in migratory route, the swarm may travel 160 kilometers before selecting a new colony location (Winston 1991:208).

In Tanzania, the rainy season begins from November through March with the dry season from April through October. There are two major swarming periods for *scutellata* in Tanzania, one beginning in August and one in May. In Zimbabwe, swarming events may begin in September and if above average rainfall occurs, another swarming event will occur from February to April. In either area, *scutellata* adjusts brood rearing and swarming to nectar flows with two major swarming events which are stimulated by woodland and savannah nectar flows (Hepburn and Radloff, 1998:283-284). As a dynamic sequence of events, Hepburn and Radloff (1998:134) pointed out that peak rainfall will stimulate peak flowering and *scutellata* will react to this by increasing brood rearing and then subsequently, swarming. During the swarming season, eight afterswarms may

be produced with between four and 22 queens produced per afterswarm in the months from August through December in South Africa. Additionally, Zimbabwe may experience another swarming period from February to April (Hepburn and Radloff 1998:135).

Analogous to warm-blooded adaptation in cold environments, *scutellata* has the ability to thermoregulate. Honey consumption provides the energy to allow an increase of metabolism necessary to create warmth, which provides adaptation for some cold tolerance. In Africa *scutellata* is less able to conserve heat and survive cold spells (Hepburn and Radloff 1998:200-201). The New World close relative *neotropical scutellata* has further adapted with clustering behavior to conserve heat, allowing them to sustain short periods of exposure to temperatures approaching five degrees Fahrenheit, an important factor as they migrate farther North in the Western Hemisphere (Gorst 1996).

David J. C. Fletcher (1991) lived in the Natal Province of South Africa and observed *scutellata* behavior for several years. He noted that when nectar flow occurs over wide areas seasonally (like temperate zone environmental conditions for plants), *scutellata* colonies may remain in large hives. However, when this honey bee lives in tropical conditions and nectar flows are successive, the colonies will remain small and migrate with the regional nectar flows. Respectively, these two strategies are for temperate and tropical adaptation, where the first strategy described would be applied in the northern temperate zone of the Western Hemisphere (Fletcher 1991:84).

In Africa, *scutellata* is viewed as one of the most aggressive subspecies of honey bee present. Hepburn and Radloff (1998) stated that they are, "noted for massive and apparently unprovoked and uncontrollable attacks on man and beast" (p. 229). The term "defensiveness" is entomology code-talk used to describe bee defending behavior against outside predators, whereas "aggressiveness" is used to describe conflict between different species of bees. In regard to *scutellata* behavior, Hepburn and Radloff (1998) advise no distinction between "defensiveness" and "aggressiveness" because, "the realities in Africa are more of the 'total onslaught' variety" (p. 227). *Scutellata* may defend based on a simple movement or odor and yet, in one instance, a researcher was attacked at 200 meters even before opening any hives, and the bees required two hours to calm down after they were inspected. Additional environmental aspects that heighten aggressiveness in South Africa are the dry season, increased nectar flow, and swarming (Hepburn and Radloff 1998:228-229). In ongoing research efforts to hybridize *scutellata* in South Africa with a more gentler subspecies, one experiment yielded gentle bees until the F2 generation; hence *scutellata* defensive traits revert back very quickly (Hepburn and Radloff 1998:92).

Hepburn and Radloff (1998:170) also noted that between *scutellata* queens and drones, a partial selective mating strategy may be present. This would indicate a partial reproductive isolation dynamic attributable to the isolation of the Sahara desert when it became a natural barrier to gene flow. This further indicated that *scutellata* survival strategy is focused upon maintaining genetic

purity of their own subspecies gene pool which is another troublesome factor for the Western Hemisphere. Roubik (1989:361) observed *neotropical scutellata* drones and queens flying together earlier in the day than European varieties again suggesting reproductive isolation behavior favoring perpetuation of the African genotype in the Western Hemisphere.

Acknowledging the efforts of many researchers who have studied problems created by *neotropical scutellata* in the last 43 years, the previous works and findings discussed so far provide enough background to explain how the bees arrived, how they have adapted thus far in the Western Hemisphere, and which characteristics will be troublesome in areas inhabited and visited by people. Essentially, their behavior and adaptation is almost precisely comparable to *scutellata* in South Africa. As Winston (1992) pointed out, *neotropical scutellata* appear slightly larger than their relatives in Africa while maintaining similar adaptive behaviors. Because *neotropical scutellata* has no other serious *Apis mellifera* subspecies competitor in the Western Hemisphere, they have been able to command environmental niches that other honey bee subspecies would otherwise occupy. David Glyn Nixon (1989) while studying Mayan culture in the Yucatan assessed colonization of the area by *neotropical scutellata*, "It is doubtful that hybrid bees can ever be eradicated from the Americas. As in so many battles between humans and insects, the bugs always seem to persist." (p. 48).

In the next chapter, a review of academic viewpoint and risk assessment will be presented. Controversy in risk evaluation is a social issue in regard to the

**assessment of environmental threats, one being the colonization of southern Nevada by feral Africanized Honey Bees.**



## CHAPTER V

### REVIEW: RISK PERSPECTIVES

#### I. At Risk: Humans and Honey Bees

The bees are here to stay. It is therefore a matter of humans adapting to the growing presence of the bees rather than the reverse of this position. The following review will present academic and agency views about risks posed by the AHB. Two contrastive analytic positions: positivist and relativist will be related to risk perspective applied to southern Nevada.

During this year (2000), the bees will begin further increase in numbers of colonies per square mile thereby also increasing the risk of an accidental encounter. Colonization phenomenon is exponential where after two years of presence, the number of colonies seem to "jump" from 100's to 1000's. The arrival of the AHB has been communicated to the public as an inevitable occurrence. Along with this, the perspective that --- we have, in the past, coped with other poisonous and dangerous animals and so, the bees are just one more thing to watch out for --- has been offered as a conciliatory remark and yet, suggests a statement of risk comparison (Global Entomological Agricultural Research Server 1998:1).

Informing the general public that living with the AHB is inevitable just like

other hazardous biological factors, does not alleviate anxieties where social values of risk are expressed in terms of dread, salience of blame, identifiability of those at risk, and other social contexts discussed by Adam Finkel (1996). Dread can be experienced as an individual state of woe but, most likely, when an entire area of culture is threatened, dread may be a woe shared in culture.

Situational stress which can induce affective loss of control and helplessness is a crucial issue (Pervin 1989:34-42). This type of stress distracts individuals from their daily pursuits, who in turn search for some means to retake control of events that are perceived as threatening. Collectively viewed, this creates issues of public safety which in turn may trigger political reaction to accomplish a social goal. Academic and agency bee experts have been apprehensive about possible social and political repercussions stemming from urban and suburban areas which may possibly impact beekeeping and agriculture. With this in mind, the *Africanized Honey Bees in Arizona Training Manual* explained,

While experts acknowledge that the influx of Africanized honey bees probably will increase the number of insect-related deaths in the United States each year, they see this as a minor concern when compared to yearly deaths from automobile accidents, cancer, AIDS, murder or even accidental household poisoning. (Mitchell and Gibson 1996:4)

This statement is a comparative risk assessment where dissimilar risks are weighed against the probability of death from exposure to the AHB.

Risk from automobile accidents, AIDS, and murder are most often from voluntary exposure to the activities of driving, unsafe sexual practice, and affiliating with dangerous social environments. Assuming that few deaths will occur in relation to other hazards listed, a strong political reaction to AHB colonization could be what Griffith (1999:119) implied in his article: an exaggeration of environmental health risk.

People remain concerned about this one particular risk: the ability of the bees to appear within seconds and begin colonization of a particular structure, and deliver a "total onslaught" defense if their colony is threatened. Returning to the *Africanized Honey Bees in Arizona Training Manual* which further explained,

Whether the Africanized honey bee turns out to be a minor problem or a major threat in the United States, there is no question that some individuals are going to experience the pain, and perhaps even the tragedy, of an encounter with the testy little critters. ....

In a few rare cases, the people who came under attack hadn't done anything to upset the bees, but are hapless victims of circumstances.

(Mitchell and Gibson 1996:21-22)

While working in southern Nevada, the situational stress concerns expressed by residents have centered around avoidance of becoming "hapless victims of circumstances". This view expressed by the public is a "relativist" position in the controversy occurring in risk assessment and it would be contributive to present some aspects of this to show how the bees may be viewed in at least two different perspectives.

Restated, the U. S. has experienced an impressive record of low fatality in comparison to other countries in the Western Hemisphere. If one is a positivist and relying on probability, then objectively the risk would be viewed as minimal and of little impact overall (Shrader-Frechette 1997; Thompson and Dean 1996). If one is a relativist, then emotional, moral, and political reactions are important where members of society as consensus contribute to the evaluation of risk. Eight deaths in ten years may have no relevance where a perceived risk does not have to be based on a model like probability or frequency of incidence, as in this case, stinging incidence (Valverde A. 1991). The values of the community set the perception of the risk as being serious or slight (Kadvany 1995; Finkel 1996). Therefore, one may choose to see the bee colonization problem as low risk due to low probability of stinging death in one decade, or as a potentially harmful situation that should be given community attention in order to avert further incidences of injury and fatality.

Communication of risk by analysts often falls somewhere between the two positions of positivist and relativist (Thompson and Dean 1996). Kristin Shrader-Frechette (1997) maintained that risk analysts should not ignore the concerns of potential risk victims. Her position has relevance to the urban and recreational lands in southern Nevada where the tolerance of one tourist and/or resident suffering injury is low due to community value placed on reducing the risk of stinging episodes with potential impacts on a tourism-based economy. Humans will and have responded to Africanized Honey Bees moving into agricultural, urban, and recreational lands. Proactive response would exhibit

cultural ecological aspects of adaptation in the forms of adopting public policy to reduce risk in both private and public domain. It would include bee research to enhance understanding of risks for apiculture and public safety, public dissemination of information to provide proper human response to bees, and bee-proofing structures to exclude colonization. These activities are preparatory to reduce anxiety or stress especially in urban and recreational areas.

Due to the AHB's ability to colonize urban areas surreptitiously and without forewarning, the possibility of surprise encounter with the bees creates a condition of situational stress. In anticipation of accidentally encountering bees, people have been preoccupied with these concerns, a preoccupation that could be described as dread. In discussion of social factors regarding risk, Adam M. Finkel (1996) listed dread where degree of fear is, "..... one of the most significant dimensions of risk, and it varies widely both across individuals within society and cross-culturally." (p. 10).

Society expressed as individuals responding collectively will attend to necessary physical adaptations in the environment to provide public safety while reducing stress within that society. Each individual on a scale of low-stress response to high-stress reaction will spend various amounts of time in contemplation about unforeseen encounters with Africanized Honey Bees with extra deliberation in regard to family members, pets and livestock. Since September of 1998, I have answered in-depth questions from Boulder City residents about the AHB an average of five occasions per day, often with eight to ten encounters during some of those days. From these informal question and

answer sessions (which have also become informal interviews), the author has gathered that accidental stinging encounters are very much on the minds of these residents.

To address social effect in the community in regard to hazards presented by the colonization of the AHB, Finkel (1996) stated:

Provide a forum for identifying, and making judgments about, the "important" dimensions of the risks being compared. As a practical matter, the process should therefore move the debate over which risks are "worst" beyond the current "tunnel vision" that only considers point estimates of consequences, and yet not lurch so far towards an ornate characterization of each risk that the debate becomes unmanageably complex and divorced from any consideration of quantitative risk information. (p. 11)

Provide a framework for asking, and moving towards consensus about, the real underlying question: "What should we do to make our lives safer and do less damage to the environment, given that any intervention we undertake will use up resources from a finite supply?" (p. 12)

Therefore, a social process was proposed to resolve issues about risks that may have in turn, caused anxiety and dread. Finkel's (1996) suggestion appears socially-based allowing input from community members which would address Kristin Shrader-Frechette's (1997) concern of disempowering residents of a community affected by environmental risk when given no opportunity for redress of concerns.

This was evident when the author presented AHB historical, biological, and risk presentations to the Public Works Department of Boulder City and the local Horseman's Club, with special regard for the safety of their livestock. In both presentations, there were more than 300 attendees who asked questions focused upon each individual's need for understanding and accuracy of preconceptions. I believe that the experience gave each resident a better sense of control over fears that stem from doubt or "the unknown".

Another issue of disempowerment observed in this work is academic and agency disdain for the public's use of "killer bee" as a pragmatic term of alarm and warning of danger. In some instances, the public is informed that Africanized Honey Bees are not really dangerous and yet, very detailed emergency response instruction and treatment methodology are provided in the same discourse about the bees not being so hazardous. This sets up a message of confusion within the general public which reinforces Finkel's (1996) "dread" issue.

## II. The Contestants: Humans and Honey Bees

This review of literature is sufficient to express parameters of the issues that will be discussed in chapters five and six. Additional commentary from residents, academic and agency officials, news-reporter accounts, and more specific literature citations relative to the exploration of those issues will be included. Germane to the issue of witnessing a person or animal injured and/or stung to death by the AHB during an "onslaught", in a like manner, if a murder or an automobile accident were witnessed in progress, this would have equal

affective impact as well. The training manual referenced earlier argued that AHB deaths will be relatively few in comparison to auto accidents and murders. What remains as an important difference is that humans voluntarily accept risks which may result in regrettable accidents or intentional misdeeds. This suggests that residents in this country are enculturated with the presence of those risks created by human civilization where the "illusion of control" permits people to make decisions based on their individual perceptions and assessments of risk.

In an unpredictable manner, the Africanized Honey Bee purposefully selects a home site and colonizes on its own volition. Because it prefers urban areas just as well as remote areas, it may appear as though spontaneously at a residence or office building, with the intent to move in shattering the "illusion of control". In view of this, it is comparable to any other perceived violation of space. One might think of a dangerous snake which is always "out there" in the desert but, "not here" at home and yet, because the bees make their own decisions, they want to be "here" in the residential zone and not necessarily "out there" in the desert. Hence, we are in a struggle for control of space and place, and based upon this simplistic overview of contest, the issues of humans and honey bees come forth.

In the next chapter, the controversy in risk evaluation is demonstrated with varying assessments. Discussion will show that this is troublesome to human populations who are attempting to ascertain the "bottom line" as to personal and economic consequences in both agricultural and urban locations.



## CHAPTER VI

### DISCUSSION: RISK FACTORS

#### I. The Social Impact of Risk

One decade has passed and the AHB has not posed the kind of threat upon residents of the United States that has been observed in other countries in the Western Hemisphere. Between September of 1986 and September of 1991, Mexico encountered over 1,000 stinging incidents with 58 human deaths during that period of time (Los Angeles County West Vector Control District 2000). Furthermore in the United States, an impressive record with few fatalities could be interpreted as grounds for dismissing public safety issues generated by AHB colonization and accidental encounters. The responses from residents contraindicate dismissal of those concerns, where perceived risk of injury will remain the leading social factor that has established other political and economic factors as the AHB continues colonization in the United States.

As with automobile operating risks, most accidents from "fender benders" to fatalities are recorded in official accident reports filed by investigating authorities (usually police departments). Insurance companies in the United States require a copy of the accident report before claims of injury or damage will be considered. As a result of keeping public accident records, insurance

companies can derive more accurate estimates of driving risks in many different environments such as urban and rural areas.

Defensive-attack episodes can be expressed with a range of one sting and no consequence, to a multiple-sting fatality. Because the "no consequence" encounters are not reported, accidental encounters with the AHB are not accurately recorded. Aspects of risk assessment rely upon an accurate descriptive range of one-sting to multiple-sting encounters.

Since September of 1998, in ten episodes involving stinging injury to humans of which the author investigated, four stinging victims in two of those episodes were recorded by the Nevada Department of Agriculture, and twelve victims in eight episodes were not recorded. Because minor stinging incidents are often regarded as just an unpleasant inconvenience by the victim, incidences will go unrecorded.

Private agencies that remove feral colonies of honey bees have for the most part, lost interest in sending official samples to the Nevada Department of Agriculture. For bee removal services, the occurrence of service requests have become ordinary with the appearance of the AHB no longer a novelty. Collecting and preparing samples takes them away from their pursuits of bee related duties within the community.

Consequently, records that would reflect accurate risk factors are not being kept therefore, risk assessment may only be based upon the vital statistic fatality which will be recorded in autopsy and most likely, appear in local newspapers and television news coverage<sup>6</sup>. David Griffith (1999:124) pointed out

that anecdotal information is interesting to the news media, but if utilized strictly in scientific study to forecast risk could lead to faulty assessments.

Viewing the entire consequences of risk based upon eight human deaths in ten years is disproportionate data appearing as "wow statistics" in favor of viewing human/bee encounters as low risk. If used as an official proclamation, this could be very misleading to the general public creating further illusion of public safety.

David Griffith (1999) in his *Exaggerating Environmental Health Risk: The Case of the Toxic Dinoflagellate Pfiesteria*, from field work and historiographic records analysis concluded that there was little health risk to humans from the presence of *Pfiesteria* in the marine coastal areas of North Carolina contrary to other research agency findings based on survey instruments only. This created a swift rebuttal response by other academic and agency authorities printed in *Human Organization*, Vol. 58, No. 4, Winter 1999 (who have previously gone on record in favor of alarming the general public of potential health risks to wit: Griffith characterized their issue as, "a safe, affluent white people's issue" [p. 125]). Griffith's (1999) article drew defensive commentary in *Human Organization* from JoAnn M. Burkholder and Howard B. Glasgow (1999) where Griffith's claims were buffeted further, alleging "false allegations" (p. 443) and "misinformation" (p. 450). Griffith (1999) was permitted to include in this same issue of *Human Organization*, a rebuttal of his opponents' criticism and reminded readers, "people tend to be poor judges of the risks they face" (p. 461) where affectively, nuclear power plant meltdowns are more ardently viewed as

serious in comparison to the risks of driving, smoking and drinking alcohol.

In the review of literature, it was stated that risk assessment has controversial issues, one of which centers around social affective responses. Fearfulness of potential danger from perceived risk may be an unwarranted community response when compared with probable descriptive statistics about the observed risk. Griffith (1999) has basically taken a positivist stance with *Pfiesteria* and criticized the relativist stance of those currently researching this toxic dinoflagellate as a potential human hazard. Relating risk perspective to the bees in urban zones, the relativist view is more appropriate to the needs of over one and one-half million urban residents in southern Nevada where hazards from bee colonization should continuously be viewed as a perceived risk.

Fifteen years prior to the bees crossing from Mexico into south Texas, Roger A. Morse (1975) in his *Bees and Beekeeping* provided this assessment, "There is little justification for the concern that the Africanized bees will spread northward and into the United States." (p. 151). There are other "expert" opinions carried by news sources that could mislead the public in regard to risk. Keith Rogers (1998) in the November 10th issue of the *Las Vegas-Review Journal* reported an interview with an entomologist who was attending a meeting of the Entomological Society of America. Rogers (1998) quoted the entomologist, "Essentially, this means you've got a new rattlesnake, so to speak, an insect that is potentially threatening. As in rattlesnakes, you've got to keep an eye out for them and avoid them." (p. 1B, 3B). Rogers (1998) further reported the

entomologist as explaining how Africanized bees become more docile over time as they adapt to their new surroundings quoting again, "the pattern of incidence frequency becomes less frequent" (p. 3B). Logan Jenkins (1999) in the April 2nd issue of *San Diego Union-Tribune* reported an interview with an entomologist (San Diego County Department of Agriculture, Weights and Measures) who offered this opinion: "In the long run, if we leave the European bees alone, they can mate with the Africanized bees, dilute the genes down to the point where they're not such an aggressive bee."

Comparing this to South Africa, Randall Hepburn informed me of one researcher there who rates his *scutellata* bees from *slightly terrible* to *terrible terrible*, and he reminded that *scutellata* is highly aggressive with no possibility of becoming docile over time (e-mail communication). Representing this in colony comparison, there are an exceptional few that would be easy to work with considering David J. C. Fletcher's (1991:88) observation of only two percent docile *scutellata* commercial colonies in South Africa.

Related to misperception of risk potential, on February 9th, 2000, a Las Vegas resident attempted to remove a large colony of bees from his back yard with an aerosol can of over-the-counter spray insecticide while in morning daylight. This resident was then attacked and had to be admitted for medical treatment. His neighbor was also attacked when attempting to offer assistance. The neighbor merely opened his door and the pursuing bees flew in his house and attacked his pets. The neighbor had to close the door quickly and could not render assistance to the man who set off the original attack by the bees. That

man then ran down the street pursued by at least 200 bees close to his head. The neighbor was later interviewed by a reporter with the Review Journal and he stated of the man who set off the attack and in reference to his not getting help soon, "forget it, he dies" (Joe Schoenmann 2000:1,4). I reviewed this particular episode and the colony size appeared to be at least 40,000 bees.

Aerosol insecticide preparations intended for homeowner use do not affect the bees quickly, instead they become extremely agitated from the smell and irritation created by the aerosol chemical compounds. Then they will launch an all out onslaught against the perceived threat and any other moving targets within usually, 150 feet. A similar episode occurred in Boulder City in April of 1999 when a trailer park resident attempted to remove a colony with an aerosol can of wasp and hornet spray after sundown in darkness which is the recommended time of day to affect removal. The chemical compounds had little effect other than as an irritant, the bees merely moved out for three days and then returned to their nest in the hollow of a tree trunk (LeBas 2000:4). Relative to these removal episodes, the Los Angeles County West Vector Control District (2000) warned against the homeowner use of aerosol insecticides for eradicating the AHB because those compounds do not kill quickly enough and instead, irritate the bees into a stinging frenzy.

People have been informed of the hazardous characteristics of the bees and yet continue to apply folk wisdom and methods to remove the colonies. From episodes of this kind, a question arises: how is it that one does not assess the complete potential consequences of attempted bee removal? In answer,

Finkel (1996) stated, "Some risks are more worth taking -- or bearing -- than others, and this difference is largely governed by the perceived benefits that accompany the risk." (p. 11). In this case, the "do-it-your-selfer" would attempt to save money.

Another relevant question is: will accidents brought on by negligence be of common or frequent occurrence? In reply to this inquiry, the author's first 100 requests for consultation and removal of feral AHB colonies and swarms in the greater southern Nevada area showed that only three residents refused action upon the swarms that landed on their respective properties. Two of those property owners expressed their wish to wait and see if the bees would leave. One property owner attempted to persuade the bees to leave by hosing them with water, although that person had to hose the swarm on two occasions to finally persuade the bees to leave. The first two residents who wanted to wait and see if the bees would leave chose this alternative because they did not want to pay a service fee for removal. The resident who chose to chase the bees away with a garden hose did so to avoid the guilt of exterminating about 5,000 honey bees in the swarm that took temporary refuge in his camper shell stored in his back yard. Nevertheless, by choosing not to exterminate the bee swarms, those residents allowed the bees to fly off and find another home, most likely within another nearby urban residence. Should these descriptive statistics have generalizability, then suggestively southern Nevada might expect 97 percent of residential and commercial locations where bee swarms land and/or colonize will request removal procedures which would demonstrate significant concern and

response for safety from the general public.

The following commentary portrays aspects of culture where transmitted images through media and social discourse urge formulation of concepts about the bees. In consideration of this, I believe that more than 40 years of spectacular "killer bee" reporting and even fantasy horror movies served to keep the pernicious nature of this bee in the awareness of residents. While doing field work, the author has noted a general "heightened sense of awareness" with interest of bees while speaking with consultants. That sense of awareness could be termed anxiety or nervous reflection upon impending consequences with the bees colonizing. "Fear of the unknown" with this honey bee subspecies could be viewed as a healthy factor in community preparedness for accidental encounters.

The general public in southern Nevada can be described as having a significant amount of respect for the AHB and concern for possible consequences. This assessment was based upon observation of agency preparedness for the arrival of the AHB along with responsible reporting of episodes by local news agencies that have occurred thus far. Although news media may prefer to report spectacular episodes of danger rather than safety, local news sources in Las Vegas have applied equal perspective to both issues: danger and safety. The Nevada Department of Agriculture as the lead agency for public preparedness with their bee specialists have requested of news media that both issues be given equal consideration when reporting. In heterogeneous communities, the media will seek out problems and issues to present to their viewers and readers for among other reasons, response to the cultural needs of



the community (Dunwoody 1994).

The Nevada Department of Agriculture has printed brochures for public awareness, has hosted seminars for the general public, the school district, private firms and utilities, other agencies like police and fire departments, and also has surveyed and kept records of AHB colonization, among other duties. Generally, residents have been able to address their inquiries to both the Department of Agriculture and the Cooperative Extension Service in person or by telephone. Also, the Department of Agriculture, the Cooperative Extension Service, and Clark County Vector Control have web sites that may be accessed for public safety information about the AHB.

Instructional videos are available to teachers of the Clark County School District for presentation in elementary and high school classrooms. Several documentaries featuring the AHB have been presented on cable and public television; for example, *The Killer Bees* was presented on The Learning Channel, and viewed by the author on November 8th, 1998 (Gorst 1996). Although, in regard to Schrader-Frechette's (1997) question "How safe is safe enough?", I would respond with another question, "How much informed of the AHB hazards is informed enough?"

## II. Economic Impact

The following discussion will describe impacts on agriculture and beekeeping with emphasis on technical adaptation to continue pollination services. The impacts to urban dwellers will be expressed in terms of costs to

adapt structures and mitigate bee swarms. Injuries and law suits are also discussed to show additional problems and costs created by AHB colonization. Together, these impacts affect urban and rural areas, and yet can be ameliorated with education, science, and applied technology.

Mark L. Winston (1992) set forth commentary that brings many issues into focus for the interests of agriculture and beekeeping:

My 1977 visit to an apiary in Surinam that had recently become Africanized was typical. A local schoolteacher maintained about twenty colonies in an isolated grove out in the country, a few hundred meters away from a number of small farms. He abandoned his colonies shortly after my visit, but at that time he was still keen on beekeeping and eager to convince me of the advantages of these bees. ....

Merely walking toward the colonies elicited a massive response on the part of the bees, so the situation was out of control before we smoked and opened our first colony. Bees were everywhere, banging into our veils and helmets with such ferocity that we could barely hear each other and stinging through our layered clothing. It was a hot, humid day, and the combination of sweat, noise, and stings forced us to retreat after examining only a few colonies. The bees followed us all the way back to the car, and we had to keep our equipment on until we were far out of their stinging range. As we drove off, we could see the farmers swatting at bees and two of their cows were being stung; we had to stop and move the animals farther away to safety. (p. 13-14)

The Technical Working Group of the USDA<sup>9</sup> does not recommend the commercial keeping of this subspecies, but rather advises beekeepers to requeen their colonies and keep them in safe locations; whereas unmanageable bees should be destroyed (Los Angeles County West Vector Control District 2000). There are optimistic beekeepers who believe that the AHB is workable and there are pessimists who forecast the demise of beekeeping in the U. S. (Winston 1992:103). This bee will inhabit most of the United States from the mid-latitudes to the southern borders (Gorst 1998). A reality that prompted Fletcher's (1991) comment,

There appears to me to be only one viable solution: to accept that the neotropical African bee will be here to stay and to institute a selective breeding program to improve its apicultural qualities in the same way as was done with European bees before it. (p. 80)

The First Brazilian Congress of Apiculture met in 1970 to discuss solutions to these problems. The press had exaggerated the defensive nature of this bee which caused difficulties for Brazilian apiculture in the years 1964 to 1970 (Gonçalves, Stort, and De Jong 1991:362). However, the greatest advantage of Africanized honey bees is their productivity, with some colonies producing 100 kilograms of honey in three months, (ranging from two and one-half to five times more honey production than European hybrids). Before the Congress of Apiculture met, sixty percent of the beekeepers left the practice due to public reaction to beekeeping. Although, with 43 years of enculturation in

Brazil, the fatality rate has been reduced to between three and four deaths per year (Gorst 1996). The organization of beekeepers in Brazil may be viewed as initiating and promoting a new social image to address cultural distortion from the public's negative response to bees and beekeeping.

Robert B. Kent's (1991:396) study in Peru revealed that the Africanized bee in commercial beekeeping was problematical, but with adaptive equipment and management knowledge the practice was successful leading to the conclusion that beekeepers in the United States would be able to apply adaptive measures as well. In Venezuela; where 400 deaths occurred by 1990, beekeeping all but disappeared due to the undesirable traits of the AHB (Hellmich and Rinderer 1991:399-400). Where commercial keepers used to manage 1,000 colonies or more by 1981, those beekeepers reduced their colonies to 500, and two commercial beekeepers ceased operation in the early 1980's. Marla Spivak (1991:144) reported similar reaction in Costa Rica where beekeepers who were not equipped properly, abandoned their apiaries after honey bee "onslaughts" drove them away. Although, she reported, one beekeeper who acquired proper equipment and knowledge of management skills and set a production record with his *neotropical scutellata* hives.

Mexico's approach to the AHB selective pressures upon docile varieties of honey bees is to maintain less than 25 percent African genes in the commercial hives by requeening (Tere B. Garcia e-mail communication). Francis Ratnieks and P. Kirk Visscher (1998:5) reported their study of pollination services in Sinaloa, Mexico where Africanized Honey Bees are used for pollinating crops.

The beekeepers requeen their colonies to maintain more docility with about sixty-five percent manageable hives which are "gentle though not as gentle as most pure European colonies" (p. 5). The beekeepers have adapted by using protective wear, moving hives at night, keeping hives 200 meters away from buildings, feeding colonies syrup when floral nectar sources are low to discourage absconding, and queen rearing to provide docile, European queens. The owners of pollinating services in Sinaloa have had to raise wages to employ workers willing to tolerate bee suits in hot weather, more stinging injuries, and night work. Ratnieks and Visscher (1998:8) concluded that when the AHB impacts California agriculture that this bee has feasibility as a pollinator of crops.

The preceding sampling of accounts and perspectives in different countries demonstrates the conflict in the way that Winston (1992) explained in the manner of optimists and pessimists. When the AHB is fully colonized in the United States, the following are expected impacts on commercial beekeeping: package-bee and queen production destroyed in the southern States, restriction of migratory beekeeping, reduced honey and beeswax production, loss of pollination fees, legislated restrictions on beekeeping, and severe decline of hobbyist beekeeping. Winston (1992) provided the 1984 USDA preinvasion forecast of economic damage from the preceding changes forced by the AHB which would mean in terms of value in 1984, 26 to 58 million dollars of losses to the beekeeping industry and 93 million dollars in crop losses due to reduced pollination services; about 50 percent of crops require pollination (Gorst [1996] stated 30 percent, and Texas A & M University [2000] stated 80 percent).

The present value of crops in the United States requiring pollination on an annual basis is nine billion dollars, Texas A & M University (2000) advised, "Beyond public safety, the Africanized honey bee will have the greatest impact on beekeepers. Commercial beekeepers could go out of business if Africanized bees drive out or breed into their domestic colonies." From my perusal of agency web sites from California to North Carolina thus far, I get the impression that beekeepers in the United States are going to attempt requeening frequently to maintain a low African-gene profile in their commercial hives. This procedure was also demonstrated by a mobile pollinating beekeeper in Gorst's (1996) video documentary *The Killer Bees*, where one of the beekeeper's colonies had become unmanageable. This gathered information suggests good social networking within the interests of apiculture, further supported by government and university assistance, which was established prior to 1900 to support agricultural endeavors. This social system was in place and ready to assist apiculture with difficulties encountered by the invading AHB.

Additional losses associated with urban zones will include law suits, medical treatment, bee removal fees, bee-proofing structures, and reconstruction fees to repair damages to structures caused by seeping honey from bee colonies in attics and wall spaces. In the matter of law suits, Jim Erickson (1998) of *The Arizona Daily Star* reported suits filed by injured neighbors close to properties where owners were aware of the presence of AHB. Attorneys for plaintiff's argued that homeowners have a duty to keep their property as not to create a hazard for neighboring residents. I sent out 13 letters to law offices in southern

Nevada inquiring of their position in these matters, where those offices selected advertised recovery of injuries due to animal attacks. One respondent e-mailed the author and stated, "That's what we are in business for." and this was taken as an affirmative answer. All in all I found law offices as consultants rather circumspect when posed inquiries about these matters. Liability is also a concern for administrative agencies of public lands. Test cases will have to be filed in order to ascertain what jurists and higher court justices will hold as to opinion of responsibility.

In another cultural perspective, Randall Hepburn in South Africa informed the author that a test case was filed in Pretoria in 1933 (e-mail communication). A widow of a police officer was seeking compensation for her loss of husband when he was stung to death by a colony of East African Honey Bees which had nested in a police substation. The judge had ruled that because the bees are native to the area, the public cannot be held responsible for such occurrences. This case set a precedent that has been withstanding since 1933. Dr. Hepburn further informed that no other cases involving bee injury have come to trial in South Africa. In the *scutellata* inhabited areas of South Africa, four to five Europeans are killed each year from bee attacks and further, Hepburn could not estimate the number of fatalities among native tribal cultures. He based the annual death rate from *scutellata* attacks on newspaper accounts; however, to acquire accurate death rates among tribal cultures, one would have to interview populations there to ascertain an estimate of death rate due to bee stinging. Returning focus to the United States, cultural perspectives of property rights

have traditionally included the responsibilities that come with ownership. The contrast in liability perspective of the United States and South Africa is evident in the previous two paragraphs. It is too early to forecast how liabilities will be handled when the bees cause injury or death.

The costs of bee removal and bee-proofing structures will add to maintenance costs, from the single-family dwelling to the expansive resort. Costs will vary, but I have obtained some examples of service charges that are generalizable to southern Nevada. At a Boulder City two-story residence where bees gained access to the interior of the house, bee-proofing cost the owner six hundred and fifty dollars. Recently, a swarm of bees landed on a large shrub and a local pest control service charged sixty dollars to remove the swarm. The resident of this address was interviewed as to personal impressions and impact. She was concerned that other swarms would land on her property which could amount to additional costs. A few days later, two more swarms landed in her trees and she called upon a bee removal service from the Las Vegas area. That service charged her one hundred and seventy five dollars to remove both swarms. In less than six weeks, this resident has had to spend two hundred and thirty-five dollars. The representative from the bee removal service also informed her that more swarms may land in the trees because the original visiting swarms left behind a pheromone that could easily attract several more swarms.

At the present time in southern Nevada, I have witnessed coverage of honey damage to one structure that was presented by a local television news broadcast. The apartment is in the northwest Las Vegas valley area. The



resident had stated that a large colony was exterminated in the attic, but the comb with honey was not removed. Three months later, the ceiling began to cave in from honey saturation of the dry-wall panels. The news crew panned over the damage, which included seeping honey down the interior walls with about 120 square feet of ceiling destroyed. I would estimate damage repair costs at around 2,000 dollars to repair the ceiling, repaint the walls, and clean the carpeting, provided that it is salvageable. With thousands of AHB swarms and colonies seeking suitable homes, this scenario will become more common if residential and commercial structures in the urban environment are not bee-proofed.

Tourism may also be threatened as well if one highly publicized stinging incident occurred. Winston (1992:120) suggested the probable economic impact on Disneyland should such an unfortunate event happen. At Disneyland in California or Disney World in Florida, the bees will find hundreds of suitable homes in man-made mountains and scenery effects. Las Vegas may also encounter this difficulty where the bees may wish to inhabit any of the numerous mountainscapes present on resort properties. One could imagine a maintenance worker startling a colony of about 50,000 bees, which in turn would then attack perhaps, 100 scantily clad sun bathers around a meandering lagoon-styled pool. The attorneys would then have a prudent opportunity with multiple claims of injury as they argue responsibility to adjudicate this liability.

As to medical<sup>10</sup> costs, readers are already knowledgeable of the spiraling costs to sustain human life in a hospital. The family in Boulder City that

sustained the loss of one dog and the medical costs of continuing treatment of a surviving dog encountered costs that exceeded one thousand dollars. Being reluctant to interview this family due to reminding them of past anguish, I did not pursue their story directly. Further, I was the emergency respondent who lead their dog (that later perished) out of the back yard. This is also hard for me to recall and revisit as a memory, being so certain that this dog would be okay and yet it died from bee venom complications. A neighbor of this family informed me of details about the family's loss, and about how horribly the parents felt because they were not home at the time to render assistance to their son. He was also viciously attacked by the bees, terribly frightened, and had to stand by helplessly and watch the family pets as they were relentlessly attacked by the bees. This family's neighbor also said that the guilt shared by all of the family members was very difficult for them to adjust to over time. The episodic impact on this Boulder City family was and still is considered a community matter.

In the next chapter, discussion will continue with related human and cross-species interactive factors which involve political discord, disequilibrium in the social sphere regarding how language is used, and honey hunting (which has implications for bee removal). Honey hunting, bee removal, and additional cross-species predation will selectively maintain honey bee pernicious defensiveness and proficiency in choosing secretive hive locations.

## CHAPTER VII

### DISCUSSION: SPECIES INTERACTIVE FACTORS

#### I. Political Impact: Urban Anxiety Versus Rural Angst

The social and economic impact of this bee on both urban and agricultural environments has many perplexities. Following discussion will express the political view of agribusiness which is primarily based upon economic issues. Applied management of honey bees is described as means to achieve political goals. The urban political view is more so, based on safety issues that have prompted more regulation of beekeeping, and through time has influenced beekeeping methods. Values in urban and agricultural communities conflict at times. Agricultural attitudes toward urban negative response may be ungrounded and yet, both have in the past fostered misconceptions of each subcultural sphere.

Honey bees are crucial to agricultural production which indirectly effects urban residents, who in turn are consumers of agricultural products. The effect of the AHB may translate into higher food prices if pollination services diminish (Winston 1992:119).

The Entomology Department of Clemson University in South Carolina (1998) stated:

Apiculture is important to SC agriculture; many of our crops (about \$25 million industry) are dependent upon honey bees for pollination before fruit can be produced. Additionally, bee rental and honey products account for another \$20 million. (p. 1)

and, with regard to the above, further stated:

The greatest challenge is to avoid public alarm and reaction to ban or limit beekeeping because of incidents associated with the AHB. (p. 1)

In discussing the role of beekeepers in the AHB issue, Keith S. Delaplane (1991) an Extension Entomologist for the University of Georgia, stated:

Beekeepers are the best defense Americans have against Africanized honey bees. It is vitally important that citizens and lawmakers understand this. In the fear that accompanies the arrival of Africanized bees, some groups may want to ban beekeeping in certain areas. Without beekeepers, the density of docile European bees in an area will decrease, leaving the area open to infestation by Africanized bees. It is equivalent to "abandoning territory to the enemy". Only beekeepers have the knowledge and resources to maintain the high densities of European bees that can limit Africanization. (p. 4)

In the southern-State quarantine zones, requeening commercial colonies each year is required should beekeepers desire to keep certified European colonies. Requeening involves the removal of the original queen out of a hive and introducing a certified European queen from a commercial apiary producer. By

doing so, a beekeeper can prevent the takeover of gentle European hives by the AHB.

Because the AHB is so prolific and will be present in great numbers in a colonized area, commercial European colonies can be viewed as a small gene pool surrounded by an immense gene pool of feral Africanized colonies. For the commercial beekeeper who wishes to keep European bees, this situation may look like a losing battle but actually, preventing a takeover simply requires more effort on the part of the apiarists in order to maintain pure European stock.

The beekeepers adaptation to the AHB threat is vigilance and frequent maintenance or "working" of their European commercial hives. In her research, Gloria DeGrandi-Hoffman (1998:1-3) discovered that when many competing African drones are present in one area then, a new European virgin queen introduced into a commercial hive may end up mating with an AHB drone rather than a European drone. She also discovered that European queens mated to AHB drones produced highly defensive progeny thereby suggesting that aggressive tendencies are carried by the AHB male. This was confirmed with the work of Greg Hunt, Robert Page, and Ernesto Guzman-Novoa (1998:2-4) who discovered that the trait for aggressive stinging behavior in Africanized bees is carried and passed on by the male or drone. Requeening will not always be effective in maintaining a more docile European gene pool in the commercial hive where instead, colonies may revert to highly Africanized in just a few months.

Mobile pollinating services will have to inspect bee behavior and requeen often to maintain European traits which provide bee colonies that can travel. The AHB is not adaptable to mobile pollinating and should this bee seriously effect pollinating services, another method of pollinating service will have to be implemented. One such proposal suggests setting up bee homes in orchards and fields for migrating AHB swarms to utilize (Rodney Mehring, personal communication). However, due caution would have to be displayed by people maintaining and working in orchards and fields.

The apicultural argument that bees are ecologically and economically necessary for agriculture implies that those needs supersede urban concerns. Following this position then, the public must cope with the hazards of feral bee colonization in urban zones. Herein lies the problem which is no longer economical but rather, political: urban dwellers are not going to accept the risks of AHB stinging incidents in residential neighborhoods. After 40 years of "killer bee" publicizing, the urban population has already formed conceptions about the potential impact of the AHB in residential zones (a relevant example of enculturation). The ecological need to keep bees with potential risks conflicts with the public need to reduce a serious health and safety threat. The bees are here now and urban residents must deal with them however, this does not mean that the urban public will readily accept a moderated appeasement. With the arrival of the AHB, the perspective that --- we have, in the past, coped with other poisonous and dangerous animals, and so the bees are just one more thing to watch out for --- has been offered as a conciliatory remark (Global Entomological

Agricultural Research Server 1998:1). Commentary from interview with entomologists by Jenkins (1999) and Rogers (1998) also suggests appeasement and appraisal of hazard as being moderate, where in one interview the bees were related metaphorically to rattlesnakes with precautions that must be observed. This is again, a dissimilar risk comparison as rattlesnakes do not fly by the thousands in pursuit of threats. In the end, it will not be professionally-kept bee colonies nor the needs of agribusiness that will be viewed as a threat, but rather the tremendous ability of the AHB to rapidly colonize an urban zone. This is the potential issue that the urban and recreation-land environments must face: places frequented by humans on a regular basis and yet, saturated<sup>11</sup> with AHB colonies. The agribusiness view has ranked concern for the impact upon urban areas, recreation-lands and wildlife range as secondary whereas, the keeping of bees and the pollination of crops as primary.

In regard to Delaplane's (1998:4) argument of maintaining docile European Honey Bees by commercial beekeepers and thereby slowing the takeover of the AHB and not "abandoning territory to the enemy" (p. 4), the Africanization process can occur very rapidly. In southern Africa, one of the principal commercial honey bees is the East African Honey Bee. Fletcher's (1991:88) work with bees in southern Africa produced an estimate of only two percent of those commercial colonies as considered docile and easy to work with. Presumably then, the other 98 percent of commercial colonies possess varying degrees of defensive behavior so typical of the subspecies prompting Hepburn's remark about rating them from slightly terrible to terrible terrible. In

referencing the Africanized Honey Bee in the Americas, Fletcher (1991) stated: "One trait certainly seems to have been left behind in Africa, and that is a high defensive threshold, i.e., docility." (p. 87-88).

The greatest social impact would correspond with the beginning of this discussion, where concern for risk becomes concern for stinging injury. The inconveniences to the urban environment have caused much concern for public safety. This has fostered political regulation of beekeeping practices and management of properties to assure that there are no feral colonies living in urban areas. Hobbyist beekeepers have received the most stringent political impact in that some localities will not allow keeping of bees in urban zones. Hobbyists in some areas have had to relocate their colonies due to zoning regulations, insurance prohibitions, and public concern over the difficulties with colonies that may revert to fully Africanized (Winston 1992:119). One relevant instance happened in Boulder City where a hobbyist beekeeper had two colonies in an urban neighborhood, where nearby residents became very concerned about those bees. I had given opinion to officials of Boulder City that the colonies appeared not to have been managed properly and were most likely approaching fully Africanized. Subsequently, the City Attorney issued an abatement notice to have the colonies removed. The Board of Supervisors in Pima County, Arizona recognized the importance of having bee colonies for agriculture and native flora; therefore, their approach was to attach special apiary ordinance to their nuisance law to empower the County with removal rights in the case of a beekeeper who would not properly manage honey bees (Davis 1998). This type of administration



is a good compromise which allows for essential honey bee services with the provisions to remove hazardous colonies.

## II. Symbolic Domains: Humans and Honey Bees

While agencies attempt to inform the public that the bees are not a frequently-occurring dangerous risk and should not be called "killer bees" because this perpetuates bias toward beekeeping, the general public sees this symbolically in another way. In a more popular view, the honey bee has been thought of as a prized, industrious little worker, as a symbol of royalty, and also consider the oft used cliché "busy as a bee".

Crane (1983) discussed many cultural depictions of honey bees associated with people, often in benevolent appearances. In one example:

St. Ambrose was Bishop of Milan in Italy from 374 to 397; the altar of his church (San Ambrogio), rebuilt in the tenth century, shows the infant Ambrose in his cradle with a swarm of bees flying round his head; they were supposedly the source of his eloquence, and of his appellation 'honey-tongued'. (p. 216)

This was further illustrated by Laurence Gardner (1996) where he stated:

To the Merovingians, the bee was a most hallowed creature. A sacred emblem of Egyptian royalty, it became a symbol of Wisdom. Some 300 small golden bees were found stitched to the cloak of Childeric I (the son of Meroveus) when his grave was unearthed in 1653. Napoleon had these attached to his own coronation robe in 1804. (p. 171)

Additionally, J. E. Cirlot (1995) described the historic and symbolic uses of Bee:

In Egyptian hieroglyphic language, the sign of the bee was a determinative in royal nomenclature, partly by analogy with the monarchic organization of these insects, but more especially because of the ideas of industry, creative activity and wealth which are associated with the production of honey. In a parable of Samson (Judges xiv, 8) the bee appears in this same sense. In Greece it was emblematic of work and obedience. According to a Delphic tradition, the second of the temples built in Delphi had been erected by bees. In Orphic teaching, souls were symbolized by bees, not only because of the association with honey but also because they migrate from the hive in swarms, since it was held that souls 'swarm' from the divine unity in a similar manner. In Christian symbolism, and particularly during the Romanesque period, bees were symbols of diligence and eloquence. In the Indo-Aryan and Moslem traditions they have the same purely spiritual significance as in Orphic teaching. (p. 23-24)

From illustration by Crane (1993:221), Gardner (1996:171), and Cirlot (1995:23-24), symbols have been fashioned in culture where "bees are royalty", "bees are eloquent", "bees are diligent", "bees are divine", and yet as everyone is aware, "bees can sting", the latter being a negative expression still, not so bad because it symbolizes pain, trouble, or inconvenience, but not death.

The difficulty with our new honey bee resident in the United States is that we have gone beyond "bees can sting" to the ultimate tragedy "bees can kill". In

symbolic relationships, words like "bee", "comb", "hive", and "honey" can still be kept in related domains and recombined into "honey bee", "honey comb", and "beehive" without alarm or the need to separate any of these words into contrastive or dissimilar domains. However, "kill" cannot be added to the domain of "honey bee" because of the historic and ideal customary significance of honey bees.

From many interviews, I have not encountered any comments that suggest hatred of honey bees but rather, have heard expressions of fear about Africanized defensive onslaughts. Parents worry about their children being attacked and pet owners express similar concerns. People do not refer to the AHB as the "Africanized Honey Bee" but instead, "killer bee", and a distinction is made between "honey bee" and "killer bee" where the latter signals danger and reaction to avoid injury.

In interview with the Cooperative Extension Service, the Nevada Department of Agriculture, Clark County Vector Control, and Bee Masters, Inc., I inquired of the public's most frequently expressed question and concern when these agencies respond to general inquiries. Those agencies reported that people call to ask if foraging bees on their flowers are dangerous and if not, are they okay to be around. So, the public is requesting expert information about circumstantial danger or hazard which may be expressed by a respondent with apprehension, but not with a bias characterized by hatred. This suggested that the urban prejudice against honey bees assumed by the interests of agriculture is instead an issue of rural, subcultural fear of negative public reaction. The

bees have become a symbolic icon of rural agricultural values versus urban city-dweller values, hence one subculture in conflict with another.

In one brochure distributed by the Nevada Department of Agriculture and the Clark County Public Works Environmental Control and Neighborhood Services Vector Control Section (no date)(adapted from MVC Association of California), the title page reads, "Preparing for Africanized Honey Bees: Alias 'Killer Bees'" wherein, on the last page it reads, "'Killer bee' is a misnomer popularized by Hollywood and the media." In what appears to be a subsequent brochure issue titled, "Africanized Honey Bees", there is no commentary or mention of "killer bee". On the right inside overleaf it is stated, "Africanized honey bees defend their colonies in an aggressive manner and can pose a threat to pets, livestock and people who come too close to their hives." Additionally, it states, "Honey bees have been bred to benefit agriculture by aggressive pollination and honey production." (Nevada Department of Agriculture, no date, supported by the Las Vegas Convention and Visitors Authority). It appears that the Nevada Department of Agriculture is presenting the hazards of the AHB to an urban area reliant on tourism while also expressing support for the needs of agriculture and beekeeping.

A resident from the Las Vegas valley area expressed her concern for the surprise nature of attacks that can occur. Her affective inflection seemed to be apprehensive about the bees, indicating an attitude of perceived risk, but not hatred or loathing. Her last comment to me was, "I know they are all bees but to me, killer bees are pit bulls, not cocker spaniels."

### III. Reciprocal Impact: Honey Hunting and Animal Allies

Human concern for public safety will be the specific reason for effecting intervention with endeavors necessary for the detection and eradication of feral colonies in urban zones to reduce accident potential. Bee removal by humans will have the same selection-pressure effect on the AHB as does the practice of honey hunting, where the bees will become more reclusive and defensive. In Africa, the most significant predators of honey bee colonies are humans whether as honey-hunters or as traditional beekeepers. In 1982, 8,000 metric tons of bees wax was taken from nest destruction which would equal 15,000,000 colonies each year. Because of the intensity of honey hunting in Africa, humans are the predominant factor of the escalation and persistence of intense, ferocious defensive behavior of bees (Hepburn and Radloff 1998:205-206). Further, Hepburn and Radloff (1998) stated, "Honey bee reaction to interference is simple: total onslaught against the human predator but usually followed by retreat and/or absconding after destruction of the nest." (p. 206). Randall Hepburn also informed me that the native honey hunters there are stung mercilessly while raiding the colonies and further, does not understand why those natives are not seriously injured or killed in the process (e-mail communication).

With efforts to remove possibly astounding numbers of feral colonies from urban, rural, and public lands, humans are not alone in these endeavors. Southern Nevada has a few resident animal species that may prove to be invaluable in their impact on AHB colonization. While doing his research work in

the northern countries of South America for five years, Winston (1992:39-40) observed that ants and anteaters were the most successful predators of the AHB colonies. The southwestern United States is home to an interesting animal known as the Ringtail, *Bassariscus astutus*, a relative of the raccoon. The Ringtail is nocturnal and also has a fondness for honey (Ingles 1967:359-360). As feral AHB swarms attempt to colonize rocky grottos and thick brush, the nocturnal Ringtail may pay the new residents a visit and raid their honey stores. In Central America, David Roubik (1989:362) noted that animal predators of this kind learn to locate AHB colonies and drive down their numbers in the wild. What remains to be seen is whether the Ringtail can sustain AHB stings at night while robbing a nest. Winston (1992:40) noted that the anteater in South America had sufficient fur to protect from AHB stings.

One ant ally native to the projected range of the AHB entering the United States, is the Southern Fire Ant, *Solenopsis xyloni*, which readily preys upon other insects, but is more so described as omnivorous (Ebeling 1975:347). Roubik (1989:223) observed both ant genera *Solenopsis* and *Iridomyrmex* as having a serious eradication impact on the AHB in Central America. The Argentine Ant, *Iridomyrmex humilis*, is not native to the United States, but rather entered New Orleans in 1891 via commercial shipping and spread to all southern latitudes in North America by 1905 (Ebeling 1975:263). Many species of ants are entirely successful at overpowering bee colonies and are one of the foremost reasons for AHB absconding (Hepburn and Radloff 1998:203-210).

Because AHB adaptation in southern Nevada is in an early stage, it is not known at this time which local wildlife predators will emerge as a serious biological impact upon feral AHB colonies. It is possible that two ant genera and one raccoon relative may end up becoming the greatest obstacle to AHB colonization in southern Nevada. Nevertheless, humans, Ringtails, and ants working in a concerted effort will amount to tremendous selection pressure. This will encourage AHB adaptation along the lines of becoming even more defensive, more secretive about their colony locations, and more encouraged to readily abscond to another location, thereby escaping efforts from human bee removal endeavors and animal predators. This is a human/bee interactive issue which is paradoxical. Humans are at risk if the bees are not managed and yet, human effort to detect and remove feral bees in turn, creates even more environmentally adept Africanized Honey Bees. This interaction between humans and honey bees will develop bees that are more vigilant and surreptitious in their selection of nesting sites.

## CHAPTER VIII

### CONCLUSIONS AND RECOMMENDATIONS

In the beginning of this thesis, I asked, "Were we more successful (as in social adaptation) in dealing with this problem?" and, "If so, what cultural characteristics or factors were present to facilitate adaptation?" Reply to this question was answered for the most part, in the discussion pertaining to my study area of southern Nevada with specific instances in Boulder City, but there is another perspective of answer.

It may be too early to assess, but the trend of community adaptation from Texas to California with subsequent discovery of the AHB in Florida and the Caribbean suggests that we were in a state of readiness. I believe that the news presentations of the early 1970's, fantasy movies about the bees, reality-based documentaries, and social discourse (hearsay) among community residents established a symbolic domain within people's beliefs from their impressions gathered about the hazardous aspects of the bees from hearing or viewing accounts of stinging episodes. Even if criticized as "distorted", "overblown", or "exaggeration", the accounts, mythical, folkloric, factual, or otherwise, served to keep an impending public-safety threat in the awareness of the residents bordering Brazil, Central America, Mexico and eventually, the United States and



the Caribbean.

Kent (1991) while studying social and economic impacts of the AHB in Peru beginning in 1981 noted,

The fact that the stinging incidents involving humans are minor and not statistically significant, probably indicates that the public in the Africanized region is aware of the bee's aggressiveness and consequently avoids the area around apiaries. (p. 385-386)

In 1998, the bees first became apparent in southern Nevada as well as southern California, where various agencies public and private posted warnings about the AHB on internet web sites suggestive of symbolic communication. The Earthquake Survival Program (1998) web site stated:

Africanized Honey Bees --- Why? --- Besides earthquakes, fire and floods over the last several years, Mother Nature has provided us with a new threat -- Africanized honey bees.

Bob Katz (1998) of the Desert USA web site in his *Attack of the "Killer Bees"* stated:

Africanized bees acquired the name "killer bees" because they will viciously attack people and animals who unwittingly stray into their territory, often resulting in serious injury or death.

Social action does not have to be based in the accuracy of science hence, in preparing ourselves, what we symbolize through experience as real --- is real (McGee and Warms 1996:430). With an underlying symbolism of what this bee could potentially visit upon each colonized area, supplementary local news

announcements with agency-issued technical, precautionary information served to clarify fact from fiction within precursory symbolic impressions that each society formulated prior to colonization early on. In response to public safety in Costa Rica, officials warned beekeepers to move hives away from populated areas, and of the dangers of collecting and hiving swarms of *neotropical scutellata*. The warnings were delivered with television announcements and in many newspaper articles (Spivak 1991:146). The public in most instances, grasped advisory measures quickly and updated any previously gathered awareness. Other than Kent's (1991) study in Peru, no studies were conducted to assess public knowledge about the bees prior to invasion. In the United States, newspapers have carried stories characterized as "They're On Their Way Here" to alert the public in advance. Documentary videos aired on public television have provided similar preinvasion advisory.

I find it puzzling that in ten years, the United States has had eight fatalities. In comparison, Venezuela had 100 fatalities during their first year of troublesome colonization, and Mexico had 58 losses in five years. Currently, Brazil sustains between three and four fatalities each year which is cross-culturally comparable and favorable to Hepburn's estimate in South Africa. This would lead to the assumption of cross-cultural differences in how residents view hazards and public safety, and view the human/bee relationship in each country, and this would be worthy of future study. During the process of this work, while e-mail communicating with officials in other countries, various expressed conceptualizations toward the human/bee relationship suggests this

for proposed research.

The issue of environmental dangers reported by the press as anecdotal and sensational, while not statistically representative of true risk assessment, has been generally discussed by Griffith (1999). The effects of *Pfiesteria* on human health and attacks by killer bees are symbols to residents that remind of the consequences of unforeseen hazards. In a way, Griffith (1999) was pointing to folkloric urban legends, where for example Jan Harold Brunvand (1989) stated:

The cautiously worded conclusion that Hopkins's office drew from the results of the survey was that these results "tend to support our initial impression that the anonymous letters warning about Blue Star LSD was a hoax and should be treated as such." In the cover letter transmitting the survey results, the advice furnished to the state's drug agencies was to "discourage the reprinting and circulation" of the fliers because "the rumored spread of LSD is generally unfounded." (p. 62).

Each year the spread of this rumor motivates parents to copy and distribute this perceived risk to families with children. From Brunvand's (1989) research in urban legends, it appears to be an unsubstantiated threat or risk. Should the perceived risks of the AHB be considered more so, anecdotal and folkloric where defensive attack episodes produce little more than provocative news reporting? With eight human deaths in one decade, it would appear that *neotropical scutellata* does not pose a serious risk to public safety in terms of numerous fatalities.

Griffith (1999) offered a similar conclusion about the (in his view, alleged) public safety risks of *Pfiesteria* in the coastal waters of North Carolina.

Burkholder and Glasgow (1999) rebutted Griffith's conclusions and reaffirmed the potential risks of *Pfiesteria*. In understanding Burkholder and Glasgow's concerns for public safety, I would view their interests as enlisting support for further study to determine under what circumstances the toxic dinoflagellate would be a health threat to a human population. Research of this nature may reveal other discoveries as well. This type of vanguard is one way that has attributed to our cultural survival in the United States and for the benefit of other global cultures when cooperating with the United Nations health programs and other international requests for assistance. Not long ago, our country could have suffered an Ebola virus outbreak. At that time, authorities did not know enough about the virus to make accurate predictions. A spokesperson for the Center for Disease Control was interviewed on a television news program and indicated that one form of the virus, if introduced into this country, could go airborne and possibly start an epidemic in the United States. Currently, the West Nile encephalitis virus discovered in and around New York City may pose the same kind of epidemic threat.

Public safety as an agency task, is a proactive application where the accumulation of all possible data is collected to predict under what circumstances a human population will be at risk. Over-simplifying the risks of the AHB by comparing impact with eight deaths in one decade could be misleading to the populations that reside in colonization zones. As pointed out

earlier, statistical reporting of all non-fatal stinging incidents in the United States cannot be ascertained. For the most part, statistics of stinging incidents would then come from medical facilities where causality for treatment is kept in record, but would otherwise not reflect unreported incidents considered nonserious by victims who did not seek treatment. From this, I recommend that the hazards of the AHB be kept in the awareness of populations through reporting and documentary presentations. In other words, publicly announced and displayed by the media as a public service in the same manner that this society reminds of not drinking and driving.

Because bees are crucial for the pollination of agricultural crops and native plant life in all regional life zones, they must be present to assure the continuation of many plant species. Should a society become biased and fearful of bees, then misunderstanding and hostility may culminate between the beekeeping industry (and other proponents of agribusiness) and the urban public. Historically, this scenario has happened in every country from Brazil to Mexico, where it has been difficult to maintain beekeeping services in view of the public's knowledge and repugnance of gruesome attacks and deaths.

In the United States, should the beekeeping industry be able to maintain docile colonies, then only feral honey bees will be troublesome. While generally not banned by law, some beekeepers are maintaining pure-strain Africanized Honey Bee colonies contrary to recommendations from the USDA. In one instance, AHB commercial colonies kept in the Tucson area of Arizona produce two and one-half times more honey than European hybrids (Rodney Mehring,

personal communication). The temptation to keep pure AHB colonies will increase for both honey production and the knowledge of working with these bees. It can be expected that those colonies will become hostile like those kept in Africa and rated between slightly terrible and terrible terrible. This statement could be considered biased by some apiculturists, but it is nevertheless founded in reality. Should keeping of AHB become more popular with beekeepers, then I would forecast more difficulties between urban populations and apiculture.

The Africanized Honey Bee threat in our country is "novel" or new to us and yet, in following years, the AHB will claim a limited number of victims in comparison with auto accidents and included with that human death toll: pets, livestock, and wildlife killed on streets and highways by careless drivers. As a necessary risk, both private and public transportation and the pollination services of honey bees are crucial for society to exist. As time passes, the AHB will become ordinary in our country, although each time an attack occurs, it is foreseeable that the affected public may become alarmed and vent hostility toward beekeepers or cast blame on a government agency that was presumably supposed to protect them from encroaching feral colonies. Should a publicizing campaign be instituted and continued, like being reminded that alcohol and driving is dangerous and disdained by society, the public would become more adjusted to living with this honey bee in surrounding areas and would also seek reasonable solutions to problems associated with colonization rather than rash political reactions.

Public bias toward honey bees has not been substantiated. Instead, they are viewed in two different symbolic domains: dangerous things, and fun honey bee icons (the ideal honey bee). The public continues to purchase honey bee icon items like coloring books, story books, place mats, honey jars, and so on and yet, this is not connected with *neotropical scutellata* or the onslaughts they are capable of after being accidentally startled. The public sees *neotropical scutellata* in the domain of dangerous things, and so a name was adopted to communicate alarm: killer bee. Many individuals in academic, agency, and apicultural organizations absolutely loath this anthropomorphic metaphor used by the general public. They assume that if the public uses such a term, then prejudice will prevail toward honey bees. Mike Burgett (1998) in his lecture Pests, Plagues and Politics posted by Oregon State University, Department of Entomology, described "killer" as "an anthropomorphic term totally unsuited for this situation" (p. 2). Further, Clemson University Department of Entomology in South Carolina (1998) posted a comment on the preceding as well, "Sensationalized movies, 'The Savage Bees', 'The Killer Bees', and 'The Swarm' have created inaccurate perceptions of the AHB." (p. 1). My investigation does not substantiate their claims. Those associated with apiculture and related research may wish to focus on the development and use of language in culture to convey meaning rather than assume that misnomers lead to misanthropy from the general public.

I also recommend the continued use of killer bee by the news media. In the past, reporters have been advised by agencies not to use killer bee and

being accommodating, have noticed headlines reading, "Africanized killer bees" or "Africanized 'killer' honey bees". In these cases, the reporters were merely reflecting the cultural norm for usage of terms, understanding that their readers would immediately identify with "killer bee" and its meaning while at the same time appeasing authorities with the addition of "Africanized".

In order to update risk to southern Nevada as AHB colonization escalates to maximum density of nests, I recommend periodic study conducted to assess the effectiveness of public information and safety campaigns in the area. It is assumed that the public is, for the most part, aware of all aspects of Africanized colonization and that caregivers are passing this information along to younger individuals thereby effecting enculturation. The southern Nevada area has several subcultures which may not be receiving accurate information about the AHB.

I have found that immigrants from Mexico, Central America, and South America bring with them cultural knowledge of *neotropical scutellata* and it is hoped that those individuals will share their understanding with others in their surrounding neighborhoods. One immigrant from Venezuela, who was encountered by coincidence and interviewed, was very knowledgeable about the bees and able to describe and distinguish characteristics of the AHB.

Without observation and survey study, risk assessment will be more reinforced by vital statistics. Using a dissimilar comparison, I could then inform that one is 60,000 times more likely to die in an auto accident than in a AHB defensive attack, but does that speak of entire risk potential? Colonization is an



ongoing process and public reaction to bee encroachment in urban zones should also be an ongoing process.

In 24 years of inspecting structures in southern Nevada for environmental hazards, I can accurately state that every property has at least one preferred nesting site for the AHB scout bee to locate and report discovery back to the swarm or migrating colony. The scout bee will seek out the best location for nesting and as the numbers of colonies proliferate, competition for nesting sites will occur. All of the best sites will be occupied before less preferred sites are taken by competing colonies. Once colony numbers have reached a certain level in southern Nevada, an exponential proliferation of new swarms will occur. While reading this description of honey bee colonization process in southern Nevada, it should be clear that the risk of having a swarm or migrating colony select your property for nesting increases exponentially with colony numbers.

The adverse risk in an urban area is a property being surreptitiously occupied by a colony that may go unnoticed until accidentally surprised. Because of inaccurate or discontinuous records of stinging incidents, I cannot make an accurate prediction of how likely one might be to encounter a defensive attack if a colony exists on one's property and was accidentally surprised. From participant observation and news accounts, that possibility appears very likely. Of all surprise encounters studied, I have only recorded three separate cases where the humans got away without being stung at least one time.

In one recent case, an 83-year-old man and resident of Long Beach, California, surprised a colony on his property while mowing his lawn. Regrettably,

he died from medical complications from the venom of only 50 bee stings (ABC News Wire 9/13/99). Because the risk nature is situational, I recommend that individuals in the communities of southern Nevada maintain a relativist position of risk perception. Perceived risk does not have to satisfy conditions of reality based upon a theoretical model of quantifiable probability (Valverde A. 1991). The known descriptive statistic of eight deaths in ten years as a basis for probability of death injury has meaning, but does not address prediction of encounter from colonization risks of human/bee dynamics in urban areas nor in recreational lands. Entomologists have described *neotropical scutellata* as being hypervigilant toward threats and likewise, would recommend that humans continue to reciprocate with their own vigilance of risk awareness and precautionary behavior.

As their main focus, the USDA and State Departments of Agriculture are dedicated to promoting agribusiness. Their policy toward the general public and AHB colonization has been existential by mandating responsibility for bee removal to residents. The underlying recommendations for public respondents are: if you are being attacked by bees --- call 911 --- and if the bees land on your property --- call a bee remover. This reality has left many residents in my regional area of study feeling as though abandoned to the forces of nature. The economic impact created by the AHB for services to remove colonies from properties prompted the State of Nevada to enact a program to assist residents who are economically disadvantaged.

The agency responsible for bee removal on county-administered lands in Clark County must, by policy refuse private property requests for removal of bees. Private property owners believe that the County should provide this service and call the County Vector Control office to request the same. One outstanding reason why the County will not assume responsibility for this service on private lands is because of the perception that free enterprise will be preempted. There is an analogous way of looking at this historically. In the 1800's and early 1900's, fire departments which were known as "fire companies", were essentially free enterprise. Due to public need of integrated, reliable and responsive service, "fire companies" became public fire departments operated by public municipalities. Should the AHB become a unilateral threat to the public of southern Nevada, there may be justification for a municipal service of bee removal to insure that the service is reliable, cost effective, and assured by County services. If the free enterprise concerns of southern Nevada show unreliability to respond, then a good case for municipal service can be made.

A related social phenomenon is that at first, all pest control companies wanted to benefit from fees obtained from such work. Complications associated with bee removal caused many pest control companies to evacuate this type of covered service and return to their routine service work with other pests of annoyance and public health concerns. Bee removal is risky, and may generate liability claims upon the service that fails to perform safely and effectively.

*The Africanized Honey Bees in Arizona Training Manual* which was featured earlier, and again restated in part:

While experts acknowledge that the influx of Africanized honey bees probably will increase the number of insect-related deaths in the United States each year, they see this as a minor concern when compared to yearly deaths from automobile accidents, cancer, AIDS, murder or even accidental household poisoning. (p. 4)

This training manual was produced by the University of Arizona College of Agriculture in cooperation with the United States Department of Agriculture, and received partial funding from the Arizona Department of Agriculture and the American Association of Professional Apiculturists. When it comes to the affective perceived risks to the general public in comparison to the reality of vital statistics, it may be reasonable for the "experts", while considering true numbers of stinging injuries and deaths, to "see this as a minor concern". This would be a positivist viewpoint which has very much to do with objective statistics and maintaining emotional distance from human/bee episodes. One can be a positivist if the bees land on a property five blocks over; however, if the bees land on the positivist's property, in that instance, the philosophical viewpoint may change to relativist.

Agency policy that attempts to moderate the economic interests of agriculture and the public safety interests of urban residents is in a precarious position. One bee remover in Clark County, who has performed bee research for the USDA while pursuing graduate studies, informed me that, "Interests in southern Nevada are ignoring the bee problem, they are not being proactive about it." (12/15/99). This individual has also donated his time to provide safety

and information public-service seminars, while also readily providing answers for telephone respondents about their bee concerns.

A philosophical paradox about AHB impact on the urban environment became noticeable during this field work. Back in the Fall of 1998, the first few requests in Boulder City for swarm removal were accommodated by property owner remarks about the unfairness of having to assume the costs. One resident requested a removal but refused to pay stating that the City should pay for removal because the whole community is collectively affected. In this instance, the Police Department persuaded the resident to have the bees removed. To demonstrate disdain for this, the resident ordered services from a Las Vegas business, which charged the resident forty dollars more for the travel charge to Boulder City.

The existential view of each individual responsible for their own bee problem has created additional problems. In some views, I agree that the AHB impacts the urban environment with equal potentiality and risk. From this, I foresee that if a community were to develop a shared-cost program, the economic impact on one person could be minimized with a small property tax payment to be added collectively to remove bees. Removal fees range from sixty dollars to five hundred dollars, depending upon the circumstances. As exemplified in chapter four, when a swarm touches down, they leave behind a clustering pheromone, so if one swarm is removed, another swarm may detect the clustering pheromone and land in the same spot again. Some properties may suffer multiple episodes each year and if bee removal services are hired for each

instance, the amount of monetary outlay could be a serious personal economic impact. While living in southern Nevada for 24 years, I have come to understand the anti-government and anti-taxation sentiments that often are expressed. Paradoxically, the bees have caused a philosophical shift in some cases, to a social, collective problem rather than an individual problem.

As southern Nevada becomes more saturated with bee colonies, more injuries and regrettably, fatalities will occur from a growing accident potential. The subject of the bees may become an emotionally-charged political issue like the need for animal control and rabies vaccination in the early twentieth century.

It is better to tell the public the truth, perhaps one like Michael Breed's (1991), "Defensive behavior, and associated stinging incidents, are the most attention getting aspect of Africanized bee behavior. Defense has certainly been the most important component of human-Africanized bee interactions and has the greatest impact on apiculture" (p. 299), or perhaps one like Randall Hepburn of South Africa, "They are rated slightly terrible to terrible terrible." Either or both of the above truths should be given careful consideration because the Africanized Honey Bees are just beginning to approach levels of colonization that could demonstrate real hazard in either rural or urban environments.

As a vital statistic, a certain number of injuries and deaths will occur each year in the United States, and a certain amount of economic damage will result from AHB effects on agriculture and beekeeping. It appears that the human population will be able to sustain and adjust to these changes through adaptive measures stemming from these aspects of culture: applied technology, science,

education, and social networking. The relativist view of making efforts to reduce losses of any kind is reasonable and focused within the values and beliefs of the culture. Another theme connected with this value perception is how the public views both "honey bee" and "killer bee", where a symbolic distinction is made between either conceptualization. Should a beekeeper choose to work with Africanized Honey Bees or "killer bees", then that apiculturist will most likely be viewed in association with people who put out oil well fires, explosives handlers, herpetologists who milk venom from poisonous snakes, and so on within the domain of dangerous things. Condemning the language usage of "killer bee" is another form of enforcing a policy of denial. The exponential growth in AHB colony population in urban, rural, and recreation-land environments will catch the unwary who have practiced denial, and this is not wise policy.

Because the public values honey bee imagery and sees this as different from the behaviors of the AHB, it would be prudent if interests in agriculture and beekeeping understand the public's viewpoint. This would assist beekeepers in maintaining a valued position within the entire milieu. It appears that mobile pollinating services and sedentary beekeepers will maintain docile European traits in their apiaries. That being so, those associated with beekeeping can continue to present an image as "keepers of honey bees" which will associate with the favorable symbolic domains of most residents in the United States, and for the purpose of this study, Nevada, where extensive use of mobile pollinating services are used every year.

The human/bee relationship is at least 10,000 years old and demonstrates inter-species conflict and cooperation in cultures worldwide. The interaction may involve simple honey hunting or sophisticated computer management of thousands of honey bee colonies that are moved regularly from one agricultural district to another. The arrival of the Africanized Honey Bee is not going to signal the demise of apiculture and pollinating services in the United States. Residents in rural and urban areas will have to adjust their awareness and behaviors to accommodate this new honey bee. While problematical in South Africa, the native *scutellata* did not disrupt the development of civilization there nor the development of apiculture and pollination services. The responsibility for adaptation in culture is strictly upon the residents of the Western Hemisphere because the bees will not change their behavior. There exists no simple remedy like vaccination to acquire immunity from the deleterious effect of a disease organism. The bees are part of the environment with both beneficial and detrimental impacts. With the presence of the Africanized Honey Bee functioning in unintentional and intentional ways, subsistence will continue with some modifications. The bees will support environmental needs and in reciprocation, human enthusiasm for honey bees has and will continue flourishing over time.



## NOTES

1. Environmental Anthropology is a relatively new field of study. As applied anthropology, it was operationally described by the Society for Applied Anthropology and posted at their web site in the Fall of 1998 (SfAA, 2000):

Anthropology is particularly effective in relating to and gaining understanding of cultural diversity in community settings, and intercultural/intersect oral conflict, thus lending itself to applied endeavors that involve collaboration among diverse interest groups for the common good. Applied anthropology utilizes these understandings to work with communities and stake holders in the investigation, identification and joint resolution of problems related to health, education, social welfare, development and environmental protection..... The methods and tools of environmental and other domains of applied anthropology are far-ranging. Prominent among them are observation techniques, qualitative and survey interviews, systematic data collection techniques for accessing core values or areas of cultural consensus, ways of identifying and interpreting social networks and a variety of participatory cultural, social and environmental assessment techniques designed to improve intersect oral understanding .... (p. 1, 2)

Recent descriptive information about Environmental Anthropology appears at the web site of the University of Washington. The primary concerns of an environmental anthropologist are: indigenous environmental knowledge (e.g. ethnobiology); social and cultural causes and consequences of environmental modification; environmental conservation and sustainability; culturally-appropriate environmental economics; and political ecology of economic and environmental change. The listed concerns are research areas to address this problem: "far more attention has been focused on physical and biological dimensions of these problems than on social, cultural, and historical dimensions."

2. Throughout this thesis, alternate terms for the Africanized Honey Bee will appear: AHB, an acronym, and *neotropical scutellata*, an academically accepted term for the ancestor known as the East African Honey Bee, *Apis mellifera scutellata*, which resides in South Africa. Similarly, the European Honey Bee may be alternately referenced in acronym as EHB.

3. In an e-mail conference with the author, Tere B. Garcia (presently in Doctoral Candidacy at Virginia Tech) of the National Institute of Research in Forestry, Agriculture, and Animal Science, Veracruz, Mexico established that the Maya have customarily kept stingless bees *Melapona sp.* for centuries and that the Africanized Honey Bees have not posed a serious threat to these people. Instead, the greatest threat has been the deforestation of the Yucatan which among other environmental problems, has ruined bee pasture (floral nectar and pollen sources) for their stingless bees. In relation to Garcia's observation, David Roubik (1989:366) noted that forest clearing in Central America favors AHB colonization, which takes advantage of hollowed log cuts that are left at the edges of clearings. Hence, with deforestation in the Yucatan, the Maya may be subjected to two misgivings, reduced pasture for their stingless bees and increased environmental desirability for *neotropical scutellata*.

4. Southern Nevada as a geographical area includes all of the communities therein. Boulder City has been a focal point of study possessing urban characteristics similar to other communities in southern Nevada that will provide sites for bee colonization. Boulder City's relationship to recreation lands has also been important to this study, where the bees are expected to colonize and be troublesome in lands administered by the National Park Service. Some agencies and other factions of this study reside in the greater Las Vegas area therefore, study has been conducted in other areas of southern Nevada.

5. Stingshield's *Recent Africanized Honey Bee "killer bee" News Stories* web page is verbatim posting of news media accounts with authors and source credit provided, and may be accessed at: URL <http://www.stingshield.com/news.htm>. This data base is being utilized in this research project for news accounts of AHB issues, events, and accidental encounters. This web site maintains continuous updates of articles from the United States which are readily available, and from Mexico, Central and South American countries when accessible or made available to Dr. Charles Magolda of Sting Shield, Inc., P.O. Box 7609, Roanoke, VA, 24019.

6. I am referencing a video documentary produced and directed by Martin Gorst in 1996. In this documentary, he traced the history of AHB colonization through testimony of many researchers who are also referenced in this thesis, where Warwick Kerr (Professor, Honey Bee Geneticist), Chip Taylor (USDA), David Roubik (Smithsonian Tropical Research Institute), Gloria Hoffman (Carl Hayden Bee Research Center), and Gerald Loper (USDA) were featured in video-documentary interview.

7. In comparison to the European Honey Bee, a *neotropical scutellata* colony will exhibit fewer stripes with "tobacco brown" or bronze coloration. Robert Page, a honey bee geneticist at UC Davis, informed the author that *neotropical scutellata* will acquire a color shift toward "muddy yellow" (as he described it) and yet, further cautioned that color cannot be officially used to determine africanization or subspecies (e-mail communication). Also, Hepburn and Radloff (1998:96) noted that *scutellata* drones will have bronze coloration on the ventral sides of their abdomens which is a reliable and identifiable trait passed on to the males.

8. Stingshield's Africanized Bee Index Page explained that episodes with the AHB may go unreported by some media sources. The newspaper, *The Tucson Citizen*, stopped reporting human/bee incidents in 1994.

9. Stingshield's Africanized Bee Index Page recorded articles verbatim in *The Arizona Daily Star* written by Jim Erickson and issued on July 14th and September 21st, 1998. Erickson interviewed Gerald Loper (retired) who worked for the USDA Agricultural Research Service with emphasis in bee research. Loper observed feral colonies of AHB in cliff-sides near Oracle, Arizona, about 50 miles due north of Tucson. Loper checked the cliff-side cavities in early March of 1998 and found only 12 colonies but, a few months later, found more than 100 colonies. Erickson quoted Loper in regard to the ferocity of the bees, "They were terrible. I've never been attacked any worse. They had me running." In regard to Loper's commentary, Erickson further stated, " Loper says the wild honey bee colonies inhabiting the cliffs about 10 miles north of Oracle are the meanest, nastiest bees he's ever seen." (Stingshield's Africanized Bee Index Page, 1998).

10. The subject of medical complications was not generally discussed in this thesis, whereas the costs of treatment are mentioned as an added economic impact. Beside the inconvenience to those who are not allergic to bee venom in the manner of pain and swelling, there are far more serious ramifications which should also be viewed as potential risks to the general population. Basically, children, the elderly and those who are allergic (about 2% of the population) to bee venom hazard the most serious of risks from a defensive attack by the bees. One sting could place a victim immediately into anaphylaxis. Also, there are chronic and systemic complications as well from episodes of multitudinous stings. Multi-organ complications sometimes develop in response to large doses of venom. The initial toxic symptoms can resemble anaphylaxis and then, progress to myoglobinuria, hemoglobinuria, rhabdomyolysis, acute renal failure, hepatic dysfunction, myocardial damage, cerebral and pulmonary edema, or acute hemorrhagic pancreatitis up to ten days after the stinging incident (Apiculture News - January/February 1999, UC Davis Entomology, p. 3).

11. Considering bee expansion in Central and South America, Winston (1992) stated:

David Roubik, one of the original killer bee team members who is currently at the Smithsonian Tropical Research Institute in Panama, estimates that there are currently one trillion individual Africanized bees in Latin America, which would make up 50 million to 100 million nests --- and these estimates probably are conservative. (p. 11)

Colonization densities in Latin America range from 6 colonies per square kilometer to 108 colonies per square kilometer (Winston 1992:11). In translated terms of measurement, that would mean a possible range of 14 to 243 colonies per square mile in the colonization zones of the United States. While studying the arrival of the AHB in French Guiana, Winston (1992:11-12) noted that it took two years for the original AHB colonizers to explode in population. In comparison with the proliferation of nests in Africa, Hepburn and Radloff (1998:205) reported that in 1982, 8,000 metric tons of bees wax was collected from 15,000,000 colonies of various subspecies throughout the continent. Many of the colonies were encouraged to develop with bee traps which, often are hollowed logs constructed by honey and wax harvesters. Although much of honey bee colonization is artificially encouraged by humans, the 8,000-metric-ton figure would represent 1280 bee nests per square mile over the entire continent of Africa. Therefore, this data is an overall display of how prolific the various subspecies of honey bees in Africa can be, and more so when humans provide ideal nesting places to encourage maximum colonization expressed in numbers of nests harvested.

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