THE FIELD NATURALIST

BULLETIN OF THE TRINIDAD AND TOBAGO FIELD NATURALIST CLUB

FOURTH QUARTER OF 1993

CLUB EVENTS FOR THIS QUARTER

Meetings

Tobago 4 October 1993.
Major agendum: Review and discussion of Tobago's endemic and characteristic plants and animals.

Trinidad 14 October 1993.
Lecture: "Marine Parks in the Management of Biodiversity" by Richard Laydoo (Institute of Marine Affairs).

Tobago 1 November 1993.
Lecture: "Roles and Experiences of Game Wardens in Tobago" by Selwyn Davis (Forestry Division of Tobago House of Assembly).

Trinidad 11 November 1993.
Lecture: "What Difference Could a Breadfruit Make?" by Laura Roberts-Nkrumah (University of the West Indies).
[Dr Roberts-Nkrumah has graciously consented to fill in for Sandra Barnes, who expects to be called out of the country at that time.]

(No regular meetings in December, superceded by year-end party.)

Field Trips

Tobago 17 October 1993
Merchiston Trail (*Trail Guide* no. 39).

Trinidad 31 October 1993
Covigne - Chaguaramas (*Trail Guide* no. 3).

Tobago 21 November 1993
Louis D'Or - Roxborough Valleys (*Trail Guide* no. 38).

Trinidad 28 November 1993
Mt. St. Benedict - Tunapuna (*Trail Guide* no. 12).

(No regular field trips in December.)

LECTURES DURING THE THIRD QUARTER

8 July
Indar Ramnarine (Dep't of Zoology, UWI), BASIC AND COMMERCIAL BIOLOGY OF THE CASCADU

[No summary available.]

22 July
Jonathan Barnes & Roger Downie (Dep't of Zoology, University of Glasgow), HOW TO BE A FROG

The Glasgow zoological connection with Trinidad began with a research visit in 1982 and has since developed into a series of staff/student expeditions. These allow staff to conduct research and give students an opportunity to gain first-hand experience in tropical biology. Much of the work has been in collaboration with such T&T agencies as the Wildlife Division and the Crusoe Reef Society and is relevant to conservation.

Part 1. HOW TREE-FROGS HOLD ON (by Dr Barnes)

The ability to climb has evolved in a number of vertebrates, including arboreal salamanders, geckos, chameleons, woodpeckers, tree-creepers, opossums, sloths, some carnivores, most primates and tree-frogs. It opens up a whole new habitat with opportunities for food and shelter and a safe haven from ground-living predators. Climbing requires strength, balance, and a means of hanging on. Some climbers, like monkeys, use their digits (and sometimes tails) for grasping. Others, such as carnivores, use claws to grip rough surfaces. Yet others stick best to smooth surfaces by some form of adhesion. Geckos use dry adhesion, probably involving intermolecular forces, while tree-frogs appear to use wet adhesion.

The term "tree-frog" is applied to diverse frogs characterised by large, disc-like pads at the toe-tips, which provide adhesion as they climb and jump. Trinidad has fourteen species of tree-frog in three families. These include your rarest amphibian, the golden tree-frog *Amphodus auratus*, found only atop Mt Tucuche. My research asks "How do tree-frogs adhere to surfaces?" and "How do they deal with the need to remove their toe-pads during walking, climbing and jumping?" Must they overcome the substantial sticking forces exerted by their pads each time they take a step, or is there a detachment mechanism to allow free movement when required?

Scanning electron micrographs of toe-pads show them covered by a specialised epithelium. The cells contain many pores of epidermal mucous glands, which secrete the fluid that is the basis of sticking. The physical mechanisms by which toe-pads enable tree-frogs to adhere to surfaces have been the subject of much debate, with friction, suction and surface tension being put forward by different authorities. My data are compatible with a mechanism of wet adhesion, the mechanism by which a wet piece of paper sticks to glass. Physically, the process is quite complex, involving both viscosity and surface-tension forces. Experiments show that the actual sticking forces are within the range expected of an animal employing wet adhesion, and that they exhibit the velocity-dependant resistance to shear forces expected of any system employing a visco-elastic fluid for adhesion.

During locomotion, the toe-pads detach by peeling, an efficient mechanism of removal that avoids the need to overcome the substantial sticking forces exerted. This conclusion is based on video analysis of frogs detaching from surfaces and measurement of locomotor forces using a force platform.

In Trinidad I am making a comparative study of adhesion. I want to know whether different tree-frogs have very different sticking abilities, whether there are habitat-specific adaptations, and whether similar mechanisms of adhesion and detachment have evolved in different families.

Part 2. FOAM-NESTING FROGS IN TRINIDAD & TOBAGO (by Dr Downie)

My research has concerned the functions of foam nests in frogs, with emphasis on three species.

The tûngara frog, *Physalaemus pustulosus* (formerly placed in *Eupemphix*), makes floating nests of white foam on the surface of choked drainage ditches and temporary pools. Eggs hatch into the foam in less than two days, but many remain in the nest for up to a day longer, using it as a refuge at some cost to their rate of growth. Detailed study shows that the nests convey little temperature regulation or ability to withstand dessication. Their main funtion seems to be in protection against egg predation, with *Leptodactylus fuscus* tadpoles as the main predators.

Leptodactylus fuscus (formerly known as *L. sibilatrix*) forms foam nests in burrows at the sides of ditches. Nests are often made when the ditch is still dry, rather than on wet days. Eggs hatch after three days into the foam. After a further day, tadpoles start to make a new kind of foam, which replaces the original foam nest. At this time, development virtually stops, and tadpoles can remain in the nest for several weeks until heavy rain washes them into the ditch. The advantage in this reproductive mode is that the young are ready to feed as soon as rain has fallen, with one food source being the eggs of *Physalaemus* and other frogs.

Another *Leptodactylus* species is something of a taxonomic problem. Listed by Kenny as *L. podicipinus petersi*, its foam nests are deposited on the water surface at the edge of forest pools, usually under leaves. In southern Trinidad this frog's call is distinctly different from that in the north. In the view of W.R. Heyer, the leading authority on leptodactylids, two distinct species are involved. Dr Heyer has not determined what they should be called, except that neither one is *L. podicipinus*!

29 July

Justin O. Schmidt (U.S. Dep't of Agriculture), WHY THERE ARE THINGS THAT STING

We all wonder on occasion why some insects sting. To most this is probably a short-term concern, arising just after one has been stung, rather like wondering why mosquitoes bite. We all know that for mosquitoes biting provides blood for the maturation of eggs, but what do stinging insects gain from stinging us? It is certainly not blood.

I will address four questions:

1. Which insects sting?
2. Why and how do they sting?
3. How effective are their stings?
4. How should one react to stinging insects?

The stinging insects are a subgroup of the order Hymenoptera, known as the aculeate Hymenoptera. In these, the female's ovipositor has evolved into a device for injecting venom. They live in a wide variety of places, usually in nests constructed by the insects themselves or adapted from pre-existing cavities. The stinger is a complex device, found at the posterior end of the body and usually retracted into the abdomen when not in use. It is a sort of insect-evolved syringe. Venom is produced and stored in a glandular structure deep in the abdomen.

What is venom for? Its primary function is defense against predators, in which it can be extraordinarily effective. First, it produces pain, which is the body's warning system about perceived tissue damage. Pain can in turn can give rise to strong fear in the other animal. These together cause the other animal to stop bothering the stinging insect or its nest. It may also partly or entirely incapacitate the intruder.

One goal of my research is to measure the properties of insect venoms, specifically their painfulness and ability to cause damage. Painfulness is directly measurable only in humans, in which individual stings are ranked from 0 (no penetration of the skin, hence no pain) to 4 (excruciating). Most of my data in this respect come from personal experience, as it is hard to find volunteers to experience stings in the interests of science.

Tissue damage is expressed as the median lethal dose (LD_{50}) for a standard test animal, usually white laboratory mice. An LD_{50} means that the probability of death is 50%, so that a lower value indicates more toxic venom. For stinging insects we find a wide range of LD_{50} values, from several times as toxic as that of the familiar mapepire balsain (*Bothrops atrox*) to only a small fraction as toxic.

How do these figures relate to real life, specifically human life? We can answer this by combining the amount of venom that an insect possesses with its toxicity, to arrive at a measure of killing power. The number of stings needed to kill an average person varies between species and sometimes between populations of a single species. In the common honey bee (*Apis mellifera*), for example, it takes about 950 stings from the European race of bees to kill a person but about 1450 stings from African bees. Their venom toxicities are virtually identical, but the smaller African bees (which are now wild in Trinidad) produce less venom per bee.

Are honey bees a major threat to human life? I have no data for Trinidad & Tobago, but statistics on causes of death in the USA show that honey bee stings are a negligible factor, accounting for about 40 deaths per year. On the same scale, one would expect about one death every five years in this country.

Still, being stung is not fun, and you might like some advice on how to avoid too close contacts with social wasps or honey bees. Over the years I have devised the following general rules:

1. In a situation where you may expect to encounter colonies of stinging insects, wear light-coloured clothes and cover long hair with a hat.
2. If an insect is buzzing about your head, do not swat frantically at it. Stay calm and observe whether it is in fact a bee or wasp.
3. If an insect attacks, momentarily hold your breath (which stinging insects can use to orient) and try to determine where it is coming from. Then walk in the opposite direction.
4. If attacked by many insects at once, hold your breath initially, cover your face, and run away from the nest to the shelter of a vehicle, building, etc. If no such shelter is near, keep running, preferably in the direction of people, whose help you may need.

9 September
Hans Boos (Emperor Valley Zoo), WHAT CAN YOU DO WITH A ZOO?

Zoos originated as the Roman menageries where captive exotic animals were kept for mass entertainment. Only the rich and powerful could afford the capture and maintenance of these animals, and only a few collections were for the personal pleasure of these individuals, for whom the rarities in their cages served as a symbol of grandeur and distinction.

Increasing costs and the recognition that the mass appeal of menageries could be utilized to help pay for their upkeep has in recent centuries led to a proliferation of zoological gardens and parks, so that almost every major city now has at least one. By the start of this century zoos were in intense competition to display more and rarer animals. This led to a new concept, the husbandry of non-domestic animals, together with the care and breeding of a broader and broader range of species. Zookeepers were increasingly mindful of the financial and environmental costs of continuing to simply compensate for zoo deaths with new wild captures.

In order to address this problem -- which at times threatened the very existence of zoos, a new breed of managers began to go beyond the traditional entertainment role of zoos to think also in terms of education. They saw their paying visitors as a public to be sensitized to the pressing needs for conservation of habitat and species. At the same time, they began to utilize part of their public funding in research into better ways to keep their animals healthy and, in some cases, breeding. As a result, there was less and less pressure to capture new animals from the wild.

Furthermore, zoos were recognized as the only hope for the preservation of some species that were already extinct in the wild -- as in th case of Père David's deer -- or were rapidly moving in that direction -- as the Arabian oryx, golden lion tamarin, California condor, and many more. Cooperative breeding programmes between zoos have stabilized the status of some species. And public education of the needs for environmental and faunal conservation has permitted some successful re-introductions.

How does the Emperor Valley Zoo fit into this overall scheme? Over the past 20 years the Emperor Valley Zoo has had a commendable breeding programme, allowing the maintenance of some local mammals with little new input from the wild. Deer, peccary, agouti, lappe, porcupine and ocelot have been reproducing regularly. Some local and foreign snakes, lizards and turtles produce young each year in the zoo. Surplus individuals are released into the wild or go to supply other zoos. The Emperor Valley Zoo was the first in the world to breed the Amazonian arrau turtle, *Podocnemis expansa*, and some North American zoos have been seeded with the progeny of this programme. The breeding of second-generation Australian pythons is another success of note. We likewise breed and export some exotic mammals mandrills to Suriname and Europe, lions to Suriname and Guyana, and monkeys and deer to Suriname, Guyana and Barbados. Birds are also regularly bred, including various species of parrots, ducks, herons, finches and doves.

Though woefully short on funds, the Emperor Valley Zoo's education programme includes a research library. This and other zoo facilities have been utilized in several UWI projects.

At present we are unable to participate in or benefit from the high-technology studies at some zoos for genetic preservation and engineering. Nonetheless, this too is an important link in the struggle for preservation and another indication of what you can do with a zoo.

Notes from the Management Committee

1. The *Rules of the Trinidad and Tobago Field Naturalists' Club* underwent their last major review in 1984. We are preparing a revised version for approval by the membership, and will be pleased to send the present draft for comment to any member who requests it. Contact the Secretary by phone (662-9477 at home, 662-1334 ext 3096 at work), fax (662-9684, specify my name), or mail (Dep't of Zoology, UWI, St Augustine). We would like maximum input from the broader membership before the meeting to decide on proposed changes.

2. Clayton Hull has now computerized the records for the present membership, using DBase3+. This is a big step forward. We can now dispense with the old system of maintaining membership records on index cards and switch over to a much more accessible system for multiple uses. However, the records as they stand are replete with omissions and most likely contain errors. Attached is a printout of data relating to your own person and membership. Please look it over, correct any errors or omissions, and send or give it to any member the Management Committee. If the record is accurate, write "correct" on it and return it to us.
   We have labeled all women who are not "Dr" as "Ms". If you would rather be a "Miss" or a "Mrs", let us know. Please disregard "Number" for now. "Highest degree" refers to education.

3. Please note that dues for 1994 are payable at the start of the year. Prompt payment helps in keeping the Club's finances orderly. We suggest that you come to the Annual General Meeting (6 January 1994) prepared to renew your membership. Those who do not expect to attend the meeting are urged to renew ahead of time by mail.

4. In order to facilitate the process of electing officers for 1994 at the Annual General Meeting on 6 January 1994, the Management Committee has appointed a special Nominating Subcommittee of three long-standing, active members of the Club. These are:
   Luisa Zuniaga (624-3321; 1 Errol Park Road, St Ann's, Port of Spain),
   Paul Christopher (637-3842), and
   John Hilton (624-1289).
   The subcommittee is mandated to consult with the membership and to present a slate of nominees at the AGM. This will ensure that at least one strong candidate is available for each position. If you have a recommendation with respect to any position, it is suggested that you send it to Luisa by mail. Alternatively, contact any member of the subcommittee by phone. Please note two important points:
   (a) THE SUBCOMMITTEE'S DELIBERATIONS IN NO WAY DIMINISH THE RIGHT OF ANY MEMBER TO MAKE ALTERNATIVE NOMINATIONS AT THE ANNUAL GENERAL MEETING, and
   (b) THERE IS ABSOLUTELY NOTHING WRONG WITH RECOMMENDING THAT YOUR OWN NAME BE PLACED IN NOMINATION. If you believe you can do the job well and are willing to do it, by all means tell the subcommittee.
   Aside from its list of nominees, all deliberations of the subcommittee with respect to any person will remain confidential.

5. The Club has a new mailing address: P.O. Box 642, Port of Spain.

DIRECTION FINDING FOR THE EXPEDITIONARY OR HIKER

by Peter Reis

[Mr Reis is a retired aircraft maintenance engineer. The responsibilities of his profession include aircraft instrumentation, which includes compasses. In preparation of this article, reference was made to *The Manual of Survival. Book of Life, Part 3*, published by Marshall Cavendish. Mr Reis can be reached at 628-0460.]

The magnetic compass is defined as "a device for determining direction by means of a magnetic needle turning freely on a pivot and pointing to Magnetic North." Our attention here will be on use of magnetic compasses in difficult or forested areas.

Compasses may be broadly classified according to three qualities:

(a) needle or dial type,
(b) liquid filled or air filled,
(c) protractor base or non-protractor base.

For the purposes discussed here, a needle-type, liquid-filled, protractor-base compass is preferred. Four different makes of readily available compasses are evaluated and the findings shown in Appendix 2.

The Importance of Direction Finding

Direction finding in forested or remote areas may be necessary for a variety of reasons, including:

(a) to prove or follow previously established trails or routes,
(b) to prepare a route or trail with the aid of a map,
(b) to accurately determine directions taken in difficult terrain, for the above stated purposes or to allow one to retrace one's steps,
(c) to identify a specific location on a map.

Background

The Earth rotates about its axis every 24 hours. At the opposite ends of this axis are the True North and True South poles. The planet acts as an enormous magnet, with one end at the Magnetic North pole and the other at the Magnetic South pole. Inconveniently, the magnetic poles are not in exactly the same positions as the true poles, nor are the meridians, or lines of force, between the magnetic poles straight. In addition, the meridians are constantly on the move.

Variation

The angle between True North and a point on the magnetic meridians is called Variation and is expressed in degrees east or west of True North. Because True North and Magnetic North do not exactly coïncide, any reliable map must indicate magnetic variation at the time of the survey. Most maps also use a grid system and may make reference to Grid North.

To use a compass effectively, you must therefore know which of the three norths -- True, Magnetic or Grid -- you intend to utilize when positioning your map. Accordingly, we refer to a "true bearing", "magnetic (or field or compass) bearing", or a "grid bearing".

Caution Before taking any compass reading, certain precautions must be observed:

(a) Carry out serviceability checks on the compass as indicated in

Appendix 1.

(b) Determine the present magnetic variation for your location.

(c) Ensure that any magnetic or potentially magnetic materials are removed to a safe distance from the compass. These include watches, rings, flashlights, belt buckles, cutlasses, knives, pens, opoeners, cans, other containers, binoculars, all electronic equipment, and other compasses.

(d) The work areas should be free from all external magnetic influence, which may be caused by such things as power lines, transformers, automobiles, buried metallic objects, home burglar-proofing, metal desks and table tops secured with steel nails.

Map Orientation

In Trinidad & Tobago the 1993 magnetic variation is 12 degrees west. This means that your compass needle or dial will always be deflected by 12 degrees to the left of the true bearing. For example, if we wish to travel on a true bearing of 90 degrees, we set the compass to read (90+12=) 102 degrees and move in that direction, in order to compensate for the variation. Conversely, if we take a magnetic bearing of 102 degrees, our true bearing will be 90 degrees.

If this principle is not clearly understood, one could end up wandering aimlessly or in the wrong direction.

Rule 1. When working from map to terrain with the aid of a protractor type compass, add westerly variation to your grid bearing in order to obtain your magnetic bearing.

Rule 2. When working from terrain to map, subtract westerly variation in order to obtain your grid bearing.

Map orientation may be carried out using Magnetic North or True North to align the grid or the north-indicating arrow on the map. For the purpose of this exercise, we will use the more convenient True North bearing to position the map.

1. Set map on a flat surface and place compass on map.
2. Align straight edge of compass with map grid lines or north-indicating arrow.
3. Carefully turn map and compass together until compass gives a magnetic bearing of 12 degrees (i.e. north + variation) or True North.
4. Use a small piece of tape or a brass (not steel) pins to firmly fix the map in place. The map is now positioned to represent the true geographic settings of your location.
5. All readings now plotted will be the same as magnetic readings obtained in the field. When using these plotted readings, there is no longer any need to compensate for variation.
6. In step 3 above, if Magnetic North was used, then in practice all map headings logged for the map must first be compensated to allow for magnetic variation. Either method may be satisfactorily used.

Using a Compass to Explore or Follow a Trail

1. Prepare a small notebook to facilitate keeping headings and comments.
2. At the start position, log direction of initial heading and any pertinent remarks.
3. At each node* take "in" and "out" headings and make any further identifying comments in order to assist in relocation. Trails may also be marked by any approved method, which may include dye, tags, or careful

cutting, weaving or breaking of underbrush.
4. Proceed as above until destination is reached.
5. In returning, use 180-degree reverse readings or use original headings with white end of compass needle instead of red end. On the return trip, "out" readings should be used as "in" readings.

* For present purposes, a node is defined as a point, prominence or change of direction which offers several, often conflicting options.

Finding Your Location on a Map

Findign your exact position on a map with the aid of a compass can only be accomplished if you are in a position to take a magnetic bearing on two objects (e.g. lighthouse, tracking station) clearly shown on the map. The procedure is the following:

1. Orient your map with True North as explained above and secure the map in this position.
2. Take an accurate magnetic bearing to the first object.
3. Take an accurate magnetic bearing to the second object.
4. Find the first object on the map and align compass straight-edge with it.
5. Using a non-magnetic pin, create a pivot point and swing the compass about the point until reading is the same as that taken to the first object.
6. Draw a fine pencil line along straight-edge.
7. Repeat steps 3, 4 and 5, using second readings.
8. Your present position is at the intersection of the two lines.

Final Comment

It is wise to become familiar with the use of the compass on a regular basis and not wait for a crisis to attempt to become suddenly adept.

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Appendix 1. Compass serviceability checks.

1. Choose a magnetic-free location , as indicated above.
2. Check compass visually for damage, leakage, air bubbles. Check legibility of readings and security of needle/dial.
3. Set compass on a piece of graph paper on a firm, level surface.
4. Align compass with y-axis lines of graph paper.
5. Carefully turn paper and compass until needle/dial points north. Fix graph paper firmly in this position.
6. Using a small magnet, deflect needle/dial by 90° to east, then release. It should return freely to its original position.
7. Repeat the above test with a deflection to west.
8. Turn compass 180° on graph paper. Note reading, which should be within 2.5 degrees of 180°.
9. Turn compass along x-axis and face it to left side of paper. Reading should be within 2.5 degrees of 270°.
10. Repeat check to the right, observe reading of 90 + 2.5 degrees.
11. Add all errors. Average of the algebraic sum should not exceed 2 degrees.

Appendix 2. Evaluation of various compasses.

	RANGER	ENGINEER 3HL	SILVA 26	BRUNTON
TYPE	LFD	LFD	LFDPN	LFDPN
PRICE (US$)	20	9	15	11
SIGNAL PROVISION	N	N	(Y)	N
ERROR ADJUSTMENT	(Y)	N	N	N
BUOYANCY	N	N	(Y)	N
Rating (max 5)	1	1	3	2
INSTRUCTIONS PROVIDED	**	*	*****	****
APPEARANCE	***	***	**	*
PROVISION FOR VARIATION	*	*	**	*****
SIGHT READING PROVISION	***	***	**	nil
MAP BEARING PROVISION	****	*	***	***
LEGIBILITY	**	**	***	****
RUGGED/LIGHTWEIGHT	**	***	****	***
EASE OF USE	*	*	***	***
COMPACT/FOLDING	**	****	*****	**
Rating (max 45)	20+1	19+1	29+3	25+2
% of max requirements	42	40	64	54

Legend

LF	liquid filled	*	unsatisfactory
D	dial	**	poor
PBN	protractor-base needle	***	fair
		****	good
		*****	very good

AFRICAN HONEY BEES AND THE MIRACLES OF EVOLUTION
by Justin O. Schmidt

[Dr Schmidt, a specialist on stinging insects, is at the U.S. Department of Agriculture's Bee Research Lab in Arizona. After several participants on the May 1993 field trip to Morne Bleu had a run-in with African honey bees, *Apis mellifera scutellata* we asked him for some expert comment on them. See also the summary of his lecture on a closely related topic on pp 3-4.]

In treating African honey bees, the news media often take a "whodunnit" approach. How did these nasty creatures come into being, and who is responsible? The answer may surprise you -- we did it. Collectively. Humanity gave us African "killer bees", although in all fairness I should say it was a team effort between us (and a few other predators) and evolution by natural selection.

Like any other animal, honey bees seek to eat and reproduce, and not to be eaten by others. But when you make and store sweet honey along with plenty of protein-rich larvae and pupae, you unavoidably attract a host of predators seeking to destroy you and eat your nest contents. Honey bees have only one meaningful defence against large, strong predators: their sting and associated attack behaviours. In Africa, humans have probably hunted honey bees for at least a million years, with only the very meanest bees surviving to reproduce. A million years of intense natural selection has produced populations that are very good at defending themselves.

African honey bees were brought to Brazil 37 years ago, because European races did poorly in the tropics. The imported tropical bees immediately throve and displaced the poorly adapted European bees. During importation, little attention was paid to the fact that the new bees brought with them their savage defensive capabilities.

We have here a wonderful opportunity to see both natural selection and artificial selection acting together and separately. In the case of European honey bees, breeders have sought and achieved very gentle races. This artificial selection took only about 140 years. With African bees, on the other hand, humans consistently tried to rob their nests and thereby selected only the most aggressive bees to survice.

African bees in the New World entered an ecological vacuum, an open niche. With little competition and few effective predators, they have expanded their populations dramatically. This explains why they are now encountered so frequently in nature and even around homes in Trinidad, where they were not at all present just a few years ago.

What can we do to live with these bees? First, learn to appreciate them biologically. Second, learn to recognize them and predict where they are likely to be found. Third, learn how to act around them. Typically, African honey bees are dangerous only near the nest. Nests are usually (not always) in tree hollows, usually at forest edges or in isolated trees, and especially near water. They are infrequently found in deep forest. One can spot signs of a bee nest with eyes, ears and nose. Bees flying into and out of the nest move in a straight line, which makes a flash of light reflecting off their wings. One can also hear the characteristic buzz of bees. When very close to a colony, it can be detected by its characteristic odour.

If you find yourself near a colony, first stop all motion and hold your breath. If only few bees are about, back away from the nest. NEVER FLAP OR SWAT AT BEES. If you come under attack by many bees, there is only one

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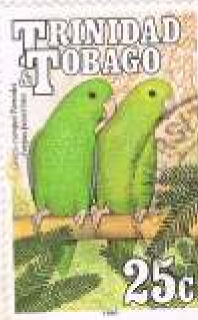

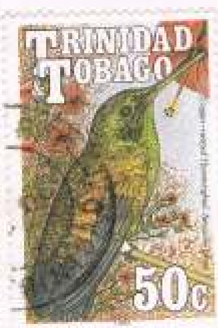

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thing to do -- RUN away from the nest and preferably toward people. If you need medical attention, you will want people to find you quickly. Try to cover your mouth and eyes while running, but do not flap your arms. If there is a house or car nearby, run into it. You may cause someone else a few stings, but you will likely save yourself many more. Virtually anyone can survive a few stings, but virtually no one can survive thousands.

African honey bees are fascinating little beasts. They are worth watching and learning about. They deserve our respect, but not our unreasoning fear.