**Benha University**

**Faculty of Science**

**Entomology Department**

**4th year Student Final Examination**

**Time allowed: 2Hour**

**Date: 17 / 1 /2013**

**Specialized Field Training (code: E 491)**

**Model Answer**

1. **Safety precautions which you must take as an ntomologist during your work in the field**

Your major responsibility is to come back safely.

Make sure you know what insect problems there are likely to be before you go. For instance, working outside during certain times of the day is made virtually impossible due to the attentions of midges (Diptera: Culicoides spp.), horse flies (Diptera: Tabanidae) and other biting insects. Nets, veils and various repellent preparations should be used. Even if you are one of those odd people who never seem to get bitten make sure that you do not have an allergy to any insect repellent products before you go into the field. For extreme conditions, 100% Deet (diethyl toluamide) on exposed skin and a spray of 30-50% Deet on clothing is recommended. Wear long sleeved shirts and long trousers. Although hungry mosquitoes can bite through shirts they find it difficult to get through two layers. Wearing a Tshirt under a shirt, even if it is very warm, is a good idea in certain habitats, such as tropical seasonal forests, during the wet season. If undertaking aquatic insect sampling in low latitudes it is essential that you take precautions against schistosomiasis (bilharzia). In areas where schistosomiasis is known to be prevalent, the use of wellington boots and rubber gloves is obligatory.

In tropical regions many species of social wasp and the Africanised or “killer” bees (confined to parts of Central and South America) can pose very serious problems. Keep away from any nests you come across. Along with social wasps and bees, other members of the Hymenoptera should be treated with respect.

The bodies of Paederus cribripunctatus and related species of rove beetle (Coleoptera: Staphylinidae) often known as Nairobi Eye Beetles, contain a substance called pederin which is toxic and is an irritant to most vertebrates (including man). Paederus species occur all over the world, so if you see beetles like these anywhere don’t brush them roughly off your skin and, if you do handle them by accident, wash your hands very thoroughly. Triatomine bugs are obligate vertebrate blood-suckers and are vectors of Trypanosoma cruzi, the protozoan organism that causes Chagas’ disease. Some species hide in the crowns of palm trees and, as a general rule, never put your hand anywhere you cannot see (this includes inside collecting nets). Kissing bugs are not the only things that might be lurking.

Quite apart from the dangers of sharps and thorns, the sand flea, jigger or chigoe is a significant parasite of humans in dry, sandy areas of tropical Africa and the New World.

Avoid glass tubes and containers if at all possible. They are heavier than plastic and a common cause of accidents. Make sure you know the properties of any chemicals you might be using and follow instructions on their use and disposal.

As far as tree climbing is concerned, do not do it unless you are fully qualified and trained specifically in tree climbing. If not specified in advance any insurance cover will almost certainly be void. Even if your expedition is visiting a site where canopy walkways and other static structures exist there are dangers and you must consider safety first. If you need to sample from small tree-tops use long-handled pruners or local expertise (they are better at it and probably a lot fitter).

The final word about safety on any expedition must be on driving, whether off- or on-road. Hiring a vehicle with a driver might be an option. If you have to drive make sure the vehicle is fit for the job and road worthy. Cheap vehicle hire might end up being rather expensive. If you are going to drive off-road make sure you get proper training. The bottom line is the simple fact that the vast majority of injuries on expeditions happen as a result of road accidents and not from malevolent beasties.

1. Types of traps that can be used in collecting aquatic insects and how to use these traps for sampling mosquitoes

Collecting aquatic insects/bugs requires only a limited amount of equipment:

--Dippers as (ladles, white pans, plastic containers)

- Nets (long handled net or kitchen sieve)

-Pipettes (Eye dropper)

Sampling aquatic insects:

 http://t1.gstatic.com/images?q=tbn:ANd9GcRQfYNMHX4LRl4AIJ1CcAueL9iFdTVwSTjU5QA8_W1xwrJHqFbv 

* Sampling sites are chosen by utilizing local, large-scale maps and local knowledge.
* Larvae are collected by using a standard white enamel dipper attached to a handle of an appropriate length, or a white enamel pan which can be swept through the water until half full then left floating in the water while the larvae within it are removed.
* Using a dipper of a known capacity allows the number of larvae collected to be related to the surface area of the water examined, allowing calculation of the number of mosquito larvae per unit area of the water habitat.
* In small inaccessible locations (e.g. tree holes) it may be necessary to use a suction bottle or tube to remove water and larvae together and transfer them to a pan.
* Once in a dipper or pan, larvae may be collected using a wide-mouthed pipette (eye dropper) and placed in a small vial with an appropriate preservative such as 70% alcohol, 95% alcohol or 100% cellosolve.
* If transport containers are wide-mouthed, a screen-bottomed spoon or a sieve may be used to remove the larvae from the water.
* The number of dips for larvae undertaken in any one location will vary depending on the size of the area.
* Sampling is repeated every one to two weeks throughout the mosquito breeding season; ]
* Areas free of larvae at one collection time may contain large numbers of larvae at a different point in the breeding season.

Counting:

Insect numbers may be calculated on a numerical basis (x larvae per square metre of water surface, y larvae in a given water body) or ranked (e.g. zero, low, moderate or high numbers at a given site).

An example of a simple sampling system is given) allowing an inspector to rank a pool as having "nil", "low", "moderate" or "high" numbers of larvae:

* If the number of larvae collected in at least five dips is 31 or more, the site is rated as "high".
* If only one or two larvae are collected in 10 dips, the site is rated as "low".
* If no larvae are collected, the site is rated as "nil".
* 10 dips must be taken to distinguish between "moderate" and "high".
* After ten dips, a rating of "moderate" would be given for a count of 7-30 larvae, and "high" for more than 76 larvae.
* For areas greater than 50 metres by 50 metres (2500m2), the number of dips taken must be doubled.

1. **Designing an experiment to survey mealy bugs infesting ornamental plants (16 Marks).**

To survey mealy bugs begins with the development of sampling techniques to determine the abundance of the insect in the habitat under study. When the habitat has definable boundaries, we can estimate the number of individuals in the population. More frequently, we estimate density or number of individuals per unit of habitat. Sampling methods vary tremendously with habitat type.

Most sampling schemes may be classified as random, systematic, or stratified random designs. In random sampling, the sample units are chosen or placed at randomly selected locations in the sample area. Random selection is typically done by choosing coordinate points from a table or list of random numbers. In a systematic design, sample units are placed at regular intervals across the sample universe (e.g., every 20 m or every 10th plant). Systematic samples are frequently much easier to conduct, and they ensure that the samples are distributed evenly across the sample universe. However, systematic samples violate the requirement that samples be selected independently and at random from the sample universe, imposed by most statistical analyses. Whether violation of this requirement leads to erroneous conclusions in any particular system is usually debatable. A reasonable compromise between the two approaches is a stratified random or randomized block design in which the sample universe is divided into regularly spaced subunits or blocks and samples are selected at random from each block. Differences in density between subunits caused by edge effects or density gradients across the field can be detected with appropriate statistical analysis.

A garden containing ornamental plants will be selected. Four trees of the host plant of similar size, shape, heights and vegetation, and homogenous in their infestation with mealy bugs will be selected. Weather factors; mainly maximum, minimum and mean temperatures and average percent relative humidity (% R.H.), will be obtained from the nearest meteorological station and will be considered as the field experimental conditions.

Thirty leaves with will be picked randomly from all directions of each tree. Collected leaves will be packed immediately after their collection in polyethylene bags (20x30 cm) with minute holes and transferred to the laboratory on the same day and examined by using a stereoscopic binocular microscope. Different stages of mealy bugs will be examined, and recorded. The percentage of preadults (nymphs) in the total insect recorded will be estimated.

Data will be statistically analyzed according to SPSS program.

**4. Explain how to Design an experiment to evaluate the efficiency of 3 insecticides against mosquitoes under field conditions. (10 Marks)**

Answer by yourself