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## Morphological and Ecological Characteristics of Hawksbill Turtles (*Eretmochelys imbricata*) in the Cuban Sea Area

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The population of the hawksbill turtle (*Eretmochelys imbricata*) is considered to be on the decline. In order to save the hawksbill turtle, we will require the monitoring of wild turtles, understanding changes in the hawksbill populations. The reality is that there have been few such studies on the hawksbill turtle for lack of method on age determination necessary to analyze the population dynamics.

First, I tried to gather information regarding morphological characteristics based on the carapace of Cuban hawksbills. As a result, I suggest that the straight carapace length (SCL) measurements can be estimated based on the first coastal scutes width (C1W) measurements, and that this relationship between C1W and SCL can be applied to Cuban and Australian hawksbill turtles.

Next, by analyzing shifts in the brightness of the carapace, I found relationships between brightness, size or the presence of barnacles on the carapace and the cycle of the carapace's surface pattern. The results showed no correlation between brightness and C1W. of 2,756 C1 of hawksbill turtles, 669 C1s had barnacles and 2,097 did not C1s with barnacles tends to have greater C1W ( $27.1 \pm 2.8$  cm), while no barnacles were found on C1s with 20.3 cm (SCL=56 cm) or smaller width. C1s with barnacles, compared to C1s without, showed low brightness (somewhat dark) in terms of statistical significance. Those facts suggest that sexual maturity and the difference between the sexes may be asso-

ciated with the attachment of barnacles.

By converting the colors of C1 in the hawksbill turtle into numerical values in terms of shade (256 phases), it was initially observed that the black speckles on the carapace surface pattern are divided into two periods, one being the formation period and the other being the less formation period, which occur once a year, with the cycles having no relationship with the genetics or growth of the scute. These cycles are also very similar to the changes in the water surface temperature of the Cuban sea. According to our estimation, the black-speckle formation period falls before and after March, which is the dry season (a low-temperature period) while the amber color area tends to take shape during the wet season (high temperature) in Cuba.

I also gathered information regarding ecological characteristics of the turtle's environment in the Cuban sea area based on the turtle's age, developing a method of age estimation from the cycle expressed on the turtle's carapace. C1 collected from 2,749 hawksbill turtles were analyzed to determine their body size and age distributions. A growth function of van Bertalanffy,  $M(t) = A(1 - Be^{-kt})$ , was applied to determine the relationship between the age and body size (SCL). A formula,  $SCL = 80.4(1 - 0.663e^{-0.118(\text{Age})})$ , was applied and indicated a slowdown in growth after the age of about 14 years. Also, the maturation age was estimated to be 14 years based on the previous reports that showed the fe-

male and male both reached complete sexual maturity at  $\geq 81$  cm SCL. The rates of sexually mature females and males out of all turtles in captivity were estimated to be 15.4% (422) and  $\geq 10.6\%$  ( $\geq 290$ ), respectively.

The present study, it will also bear particular relevance to protection and management efforts which find it essential to monitor the numbers of turtles and predict the changes in their distributions and behavior.

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## The effects of diet, environmental and genetic conditions on lipoprotein levels in F1B hamsters

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Experimental and epidemiological studies have provided strong association between coronary heart disease (CHD), elevated low density lipoprotein (LDL) and reduced high density lipoprotein (HDL) levels. The hamster is a good animal model to study plasma lipid profiles because hamsters provide lipid response to atherogenic stimuli in a fashion similar to humans and develop comparable atherosclerotic lesions. In the present studies, I examined several dietary and environmental atherogenic stimuli in an effort to develop insights to help understand CHD.

From the first experiments regarding the effects of a high saturated, high fat diet on plasma lipid and lipoprotein concentrations, hepatic and intestinal apolipoprotein mRNA levels and stage I atherosclerosis in the F1B strain of hamster, I confirmed that this animal species remains a suitable model for the study of lipoprotein metabolism and atherogenesis.

From the second experiments on the potential for regression of fatty streak lesion by drug (lovastatin) or dietary treatment (low fat diet) in the hamster, I concluded that both

treatments are capable of both: 1) preventing elevation of cholesterol levels and inhibiting for formation of foam cells characteristic of animals on a high fat, high cholesterol diets, and 2) inducing regression of fatty streak.

Mediterranean populations display rates of chronic diseases amongst the lowest in the world on spite of consuming diets rich in fat. In the next experiments, I evaluated the effects of olive oil, characteristic of that region, containing  $\beta$ -sitosterol and squalene that could modify the effect of saturated fat and cholesterol of the diet on plasma lipoprotein levels and concluded that  $\beta$ -sitosterol produced a hypocholesterolemic and hypotriglyceridemic effect, while squalene supplement had no measurable effect.

I undertook the next set of studies to determine of photoperiod, caging conditions or age affect lipid metabolism and circulating lipid profiles. Photoperiod affected dietary modification of plasma lipid concentrations in F1B hamsters. Moreover, caging is a significant modulator of these effects.

In the final study I analyzed the differential response on plasma lipids, hepatic and in-