THE WATER CONTENT OF THE TISSUES IN THE CHELONIANS, LISSEMYS AND TESTUDO, THE SNAKES NAJA AND NATRIX, THE LIZARD CALOTES AND CROCODILE CROCODILUS

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It is known that different tissues have different water contents depending on the nature of the protoplasmic constituents and the metabolic activity within the cells (Winterstein 1925; Nello Pace and Rathbun 1945). It has also been shown that the water content of young animals tend to be higher than that of adult ones (Voit, 1929; Adolf, 1933). This fact was also observed in my study on the skeleton (chapter III). The water content of tissues of some desert reptiles and mammals was studied recently by Khalil and Abdel-Messeih (1954). These studies prompted me to make the present study on the water content of the tissues of representative reptiles living in different environments. It was also thought desirable to see the effect on the water content of tissues when an aquatic (amphibious) chelonian viz., Lissemys is kept out of water for two to three months and given water only to drink.

Material and Method:

The animals chosen were Lissemys an aquatic chelonian, Testudo a terrestrail chelonian, Naja a land snake, Natrix an aquatic snake, Calotes a land lizard, and Crocodilus an aquatic crocodile.

The water contents of the various tissues were estimated by the dehydration method. Dehydration was carried out in an electric oven at 103°C (Adolf, 1943 and Benjamin, 1946).

Results:

Vide. table

Discussion:

The tissues in which the water content is least are the fat bodies, skeleton and skin. The same observations were made in the case of a desert lizard and some desert mammals by Khalil and Abdel-Messeih (1954). Among the tissues common to all reptiles those with highest amount of water are blood, rectum, kidney and large intestine which are water conserving tissues. It was observed that of the lung tissue of different types of reptiles that of the chelonians, the aquatic as well as the terrestrial ones, contain the highest amount of water. This is so because the chelonian lung is of the spongy type and a greater amount of water also facilitates greater diffusion of respiratory gases. Of the muscle tissue the crocodile muscle has highest amount of water since the animal is aquatic while that of the land snake is the lowest. The highest water content of the skin is in Lissemys while lowest is in the lizard. This high water content of the Lissemys skin should help the exchange of respiratory gases. In support of this there is some evidence that the skin of aquatic Chelonia is respiratory (Root, 1949). Regarding the water content of the liver there is much seasonal fluctuation because there is an increase of

water when there is less fat and decrease with more fat in the liver. The heart of chelonians and crocodile contain a considerably higher amount of water than that of the other reptiles. This is perhaps due to the fact that the water content of the bloods of the chelonians and crocodile contain more water than that of the other reptiles. Perhaps blood volume which is higher in the former may also be a factor. The water content of the spleen is more or less the same in all these animals. That of the different parts of the alimentary canal shows a progressive increase from the stomach to the rectum in all the animals studied, the maximum being for the rectum. This shows that there is also a progressive increase in the absorption of water in these regions of the alimentary canal.

The water content of the tissues with respect to those individuals of Lissemys which were kept out of water for two to three months, showed an increase in many of the tissues except a few in which there was a decrease and in these cases it was more or less constant. Muscle, liver, pancreas, gut, urinary bladder, kidney and fat bodies showed an increase . Of these, the fat bodies, pancreas and liver showed a very great increase indeed. This seems to indicate

that the increase of water in the fat bodies and liver, is due to an increase in the metabolic water formed as a result of the break down of fat in order to effect the conservation of water in the body. The increase of water in the pancreas appears to be again conservation of water which is probably accomplished by the cells of the pancreas by not secreting much of the digestive juice. This inference is suggested by the fact that the animal was refusing food, after it was kept out of water for about fifteen days.

The water content of the spleen, heart and lung remained more or less constant while that of the lung was showing a slight decrease in the third month. Of the tissues that showed a decrease the skin was the greastest, then the skeleton and to a very slight extent the blood.