SUMMARY

The prime goal in the present study was to deal with bioenergetic sources of some autumnal migrants species on the North East coast of Egypt,grounding after their journey over the Mediterranean Sea and to estimate the changes in the energy sources before and after a replenishing period to continue their journey to central Africa. The migratory birds used in the present investigation are :

(1)C.coturnix
(2)F.atra
(3)S.turtur

(A) Biometrical comparison :-

(1A) Live weight :-

There was a building up of weight after migration in C.coturnix and S.turtur.There was also an increase in both superficial and deep pectoral muscle weight in the three migratory species during the recovery period. A significant increase was noted among the weight of supracoracoideus muscle of F.atra and S.turtur throughout the experiment.

(2A) Wing length :-

The mean wing span was measured for all species and power-weight ratio was calculated (18.24 % for C.coturnix). The span loading recorded the highest value in G.domstica.

(B) Biochemical analysis:-

(1B) Glycogen :-

There was a significant increase in glycogen content in both superficial and deep pectoral muscle towards the 2nd week of capture in the three migratory species. The increasing glycogen may be attributed to two reasons :

1- The birds feed during this period and food intake might register a rise in glycogen in the tissues.

2- The stop of fatty acid oxidation during the postmigrant period as well as a glycogen resynthesis in muscle.

(2 B) Glucose:-

Serum glucose level was significantly increased after the 2nd week of recovery in C.coturnix , F.atra and S.turtur.The decrease in plasma glucose during prolonged flying can be attributed to the possible extraction of glucose by the contracting muscle to provide the carbohydrate source needed for fatty acid oxidation in the muscle.

(3 B) Inorganic phosphorus :-

The inorganic phosphorus decreased after the 2nd week of recovery in the serum of the three migratory species as well as in the C.livia. On the other hand, the muscular inorganic phosphorus content increased after the 1st week of recovery. The increase of serum phosphorus indicated a loss of phosphorus from the working muscles during migration.

(4 B) Creatine phosphate :-

The highest concentration of C.P was recorded after the 2nd week of recovery period in the pectoral muscles of the three migratory species.

(5B) Adenosine triphosphate :-

Muscular ATP levels in C.coturnix, F.atra and S.turtur increased after the 2nd week of recovery. The same depletion of ATP and CP in the three migratory species occurred just after arrival, seems to assume that the long-flying distance is one of the factors of significance to stimulate an increased glycolytic activity.

(6B) Total lipid :-

A significant increase in both of the circulating, superficial and deep pectroal muscle lipid was noticed from 0 -day of arrival till the end of the 2nd week after capture in the three migratory species, suggests the possibility that fat utilization was the main fuel for muscular energy.

(7B) Cholesterol:-

The cholesterol level in the serum of migratory species was elvated throughout the experiment. On the other hand, the cholesterol level in the pectoral muscle in C.coturnix and F.atra was significantly lowered at the end of the 2nd week of recovery.

(8 B) Triglyceride:-

There was a progressive increase in the serum and pectoral muscle triglyceride content in the three migratory species during capture,provide evidence suggesting that during migration,an increase in the amount of energy derived from fatty acid oxidation .This amount of fatty acid could be accounted for by increased lipolysis of muscle triglyceride.

(9B) Phospholipids:-

The serum and pectoral muscles phospholipids increased after the 2nd week of recovery for the migratory species .The decrease of serum and pectoral muscle phospholipid levels , just after arrival , could be related to the utilization of fat as fuel for muscular energy.

(10B) Total protein :-

There was no significant variation in the total protein level at 0 - day of landing and during the two weeks of recovery in the serum as well as in the pectoral muscles of the migratory birds . The data do not permit any generalization concerning the protein metabolism in migratory birds.

(11B) β- Lipoprotein :-

The circulating β - lipoprotein was significantly decreased in both C.coturnix and S.turtur during capture . On the other hand ,β - lipoprotein content in the deep pectoral muscle of the three migratory species, increased after the 1 st week of recovery.This may be due to after migration , the circulating β - Lipoprotein attach to receptors on the surface of many cells in the body and are ingested into the cell by endocytosis . Lysosmal enzymes then break down the protein , leaving the lipid free in the cell for incorporation into membranes or other uses . β - lipoprotein increased during flaying because it is the principal cariers of cholesterol in the circulation

(_C_) Body_composition_ratio_:-

(_1C_) Water_content_:-

There was a decrease in the water content percentage in the superficial and deep pectoral muscle in F.atra and S.turtur during capture period. On the other hand in C.coturnix water percentage (in superficial muscle) increased towards the 2nd week of recovery.Our observation recorded that, the water index decreases during capture and has a negative correlation with fat index.

(_2C_) Lean_-_dry_weight:-

The lean - dry weight of the superficial muscle during the 0-day of recovery was noted to be higher than after two weeks in both of C.coturnix and S.turtur, .

(_D_) Enzymes_:-

(_1_D_) Glucose_-_6_-_phosphate_dehydrogenase_:-

The estimated G6pDH in the serum as well as in the pectoral muscles of the three migratory species increased at the end of

the 2nd week of recovery. So that there was a probability of charing of G6PD in glycolysis by an indirect way.

(E) Hormones :-

(1 E) Insulin :-

The circulating and pancreatic tissue levels of insulin in the three migratory species were significantly increased at the end of the 2nd week of recovery. The lower of insulin level during migration may be attributed to prevent the lipid synthesis.

(2 E) Glucagon :-

The circulating and pancreatic tissue levels of glucagon were significantly decreased in the three migratory species during capture. The elevation of glucagon level during migration indicate that glucagon accelerates FFA release and inhibits fatty acid synthesis.

(G) Histochemistry :-

(1 G) Fat :-

The pectoral muscles showed an increase in intracellular lipid content in all migratory species during the recovery period (specially in the superficial muscles). The fat bodies are enlarged after recovery without increment in the number of cells, with relative increment of cell diameter as a result of increased fat deposition.

(2 G) Succinic dehydrogenase :-

A low SDH activity was observed in the muscles at 0 - day of arrival in the three migratory species. The activity of SDH increased with recovery period (specially in the superficial muscles).Also, the red fibers indicated a high SDH activity; in contrast, the white fibers were the lowest in activity. This may be related to the fact that, red muscle, which is capable of prolonged activity, relies on a high capacity for oxidative

metabolism.

(3 G) Glycogen :-

There was an increase in glycogen concentration in both superficial and deep pectoral muscles after the 2nd week of recovery in the three migratory species (specially in the deep muscles).

(H) Morphometric Technique :-

Analysis of cross section areas :-

Fibre types can be classified into white, intermediate and red muscle fibers.