produced from L-aspartate in any single subcellular fraction. However, when cytoplasmic and mitochondrial fractions were combined, ammonia was liberated. Prior dialysis against 0.02 M Tris at pH 7.4 inhibited ammonia production from L-aspartate when these fractions were combined. Apparently, a critical intermediate, perhaps α-ketoglutarate, was sequestered during dialysis.

The results suggest a transamination reaction is involved in the liberation of ammonia from L-aspartate in teleost liver. In rat liver, aspartate aminotransferase (EC 2.6.1.1) is in the cytoplasmic fraction; and glutamic acid dehydrogenase (EC 1.4.1.3) is in the mitochondrial fraction. These enzymes may also be involved in the liberation of ammonia from L-aspartate in teleost liver; particularly since all the homogenates produced more ammonia from L-glutamate than L-aspartate.

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1969 #16

PERMEABILITY AND METABOLISM OF UREA IN THE INTESTINE OF THE ELASMOBRANCH, Squalus acanthias

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This study attempted to assess the rate of penetration, content and rate of bacterial degradation of urea in the intestine of elasmobranchs. To determine the rate at which urea crosses the intestinal wall we injected two male dogfish, Squalus acanthias, with ^{14}C-urea (10 μC/Kg). After one hour, blood samples were drawn, and the intestines were ligated at the pylorus and anus, removed and flushed with 10 ml H_2O. The expressed fluid was analyzed for total and ^{14}C-urea. Comparison of the specific activities of ^{14}C-urea in plasma and intestinal fluid showed that the intestinal fluid was approximately half-equilibrated with the plasma (^{14}C-urea intestine/^{14}C-urea plasma = 0.56, 0.51) after one hour.

Intestinal fluids of dogfish were assayed for urea concentration. Dogfish which had been kept in the live car for indefinite periods of time generally had empty intestines, whereas fish fresh from the collecting boat usually contained some fluid. The fish were killed and opened and the intestines tied off at the pylorus, the rectum, and two intermediate points to produce three approximately equal segments. Each segment was then opened and as much fluid as possible withdrawn. Accurate measurement of the fluid present in the intestine was difficult. The values do give a minimum estimate, however, which might be of interest in the controversy about the drinking habits of dogfish. The total amount of intestinal fluid per fish averaged 1.3 ml with a standard error of 0.4 ml. Of eleven fish (nine of them fresh) included in this calculation, two from the live car and two fresh fish had empty intestines. We suggest that investigators who found no fluid in the intestines of dogfish from the live car were dealing with fasting fish under abnormal conditions. Conclusions drawn from such fish may have little relationship to the behavior of Squalus in the wild.

In the segment nearest the pyloric end, the mean urea concentration was 243 μmoles/ml, with S.E. = 25 and n = 7. In the middle segment, the mean was 323 μmoles/ml, S.E. = 29, n = 6.

In the segment at the rectal end of the spiral valve, mean was 338 μmoles/ml, S.E. = 7, n = 3.

Bacterial breakdown of urea was studied in the fluid expressed from the intestines of the skate, Raja erinacea and dogfish. In some preliminary studies in the skate, intestines were tied off, removed, and rinsed with an "elasmobranch Ringer's" solution. The fluid expressed was then incubated at 15-18° C for one hour. There was a definite increase in the concentration of ammonia during the hour, and this increase was less marked when antibiotics were added to the expressed fluid. Although these studies were non-quantitative, we may conclude that there is at least some bacterial breakdown of urea in the skate intestine. In preliminary studies in dogfish, fluid was expressed from the intestine and incubated at 13° C for one hour. Samples were taken at 20-minute intervals, precipited in cadmium sulfate, and analyzed for ammonia content. The increase in ammonia during the one-hour period averages 2.17 μmoles/ml, S.E. = 1.96, n = 3. From this figure it can be calculated that approximately 4 μmoles urea/kg fish per hour are degraded in the dogfish intestine. Although small compared to the total amount of urea lost from the fish, these preliminary studies suggest that bacterial degradation of urea must be considered in urea balance studies.

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1969 #17

SALT AND WATER TRANSPORT IN ISOLATED EEL INTESTINE

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Marine teleosts maintain water balance by drinking sea water and absorbing sodium chloride and water across the intestine. One of the physiological changes which euryhaline fish undergo on adaptation to sea water is an increase in the rate of intestinal absorption of salt and water (Skadhauge and Maetz, C. R. Acad. Sc. Paris 265:347-50, 1967) which is mediated by the pituitary-adrenal axis (Hirano and Utida, Gen. and Comp. Endocrin. 11:373-80, 1968). However, the mechanism by which the increase in salt transport is accomplished in the intestine is not clearly understood.

When freshwater eels, Anguilla rostrata, were transferred directly to full strength sea water they died on the third day after transfer, apparently due to their inability to adjust their osmotic and ionic regulatory mechanisms fast enough. This is illustrated in data for blood chloride levels obtained by serial sampling 3 fish (Figure 1). Blood chloride levels rose rapidly for the first 24 hours, then started to level off but all of the fish died on the third day after transfer. However, eels could be preadapted to survive direct transfer to sea water by injection of hydrocortisone (400 μg/100 gm body weight/day) for 2 weeks before transfer and by continuing injections after transfer. When these fish were transferred to full sea water, plasma chloride levels rose rapidly during the first day and then leveled off in the second day and remained constant in 2 of the 3 fish for the remaining 4 days of the experiment (Figure 1). The plasma chloride of the third fish rose slowly over the 6 days of the experiment reaching 185 mM/1 on the sixth day.

All eels used to study sea water adaptation of gut transport were placed in 50% sea water for 2 days before being transferred to 100% sea water. Transfer to sea water was considered to