1962 #1

BILE PIGMENT METABOLISM IN THE DOGFISH, Squalus acanthias

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Virtually all of the bilirubin present in freshly obtained mammalian bile is bilirubin glucuronide or sulfate. Because approximately 5-15% of the bilirubin in freshly obtained dogfish bile is unconjugated, the mechanism whereby dogfish liver excretes unconjugated bilirubin was studied.

The common bile duct of adult male dogfish was cannulated. Bile was collected on ice and in the dark at hourly intervals for four to eight hours while a continuous intravenous infusion of unconjugated bilirubin bound to dogfish plasma was administered. The proportion of conjugated and unconjugated bilirubin present in the bile samples was estimated by diazo reaction and paper chromatographic separation of azopigments.

In each of six experiments the plasma concentration of unconjugated bilirubin increased during the infusion period; however, the excretion of bilirubin conjugates in the bile remained at a plateau of 50-60 gamma of bilirubin excreted/100Gm. of fish/minute and the excretion of unconjugated bilirubin remained at a plateau of 5-10 gamma of bilirubin excreted/100Gm of fish/minute.

These observations suggest that dogfish can transport both unconjugated and conjugated bilirubin from liver cell to bile by mechanisms which have transport maxima. Mammals apparently lack the ability to transport unconjugated bilirubin from the liver cell into the bile.

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1962 #2

SOME EFFECTS OF THE FOOD OF Strongylocentrotus droebachiensis ON THE DIVISION OF ITS ENDOCOMMENSAL CILIATES

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The study deals with the ciliates Entodiscus borealis, Madsenia indomita, and Biggaria gracilis. In adult urchins collected in nature B. gracilis is almost always dividing. However, dividing specimens of E. borealis and M. indomita can be found in only about 3% of such urchins, and it was concluded earlier (Beers, 1948, Biol. Bull., 94: 99-112) that cycles of division are inherent in them.

Urchins were deprived of food for 2 weeks; dividing ciliates were absent in them. Groups of them were then supplied with generous amounts of food (the kelp Laminaria). The urchins were opened hourly and the condition of the ciliates with respect to division was recorded. By using numerous groups, which amounted to 294 urchins, and by starting the examinations at various times after the addition of food, records were compiled for most of the hours of 5 days of feeding. The records were then arranged by successive 8-hour periods and the percentage

of the urchins that contained dividing specimens of each species was calculated for each period.

Division began in E. borealis after 10-15 hours of feeding, and dividing specimens were present for about 3 days in 33-79% of the urchins of the respective periods. It began in M. indomita after 50-60 hours; dividing specimens were present for about 2 days in 25-96% of the urchins. It began in B. gracilis after 20-30 hours, and dividing specimens were present in all the urchins after the second day.

Thus, division ceased when the urchins were starved and resumed when they were generously fed. Results compiled from various sources, including the present study, indicate that division proceeds uninterruptedly in B. gracilis, provided any appreciable amount of food is present in the urchin gut, but that it is a discontinuous process in E. borealis and M. indomita. However, it is doubtful that cycles of division are inherent in them. It seems more likely, in view of the present results, that their division is correlated with the copious ingestion of suitable bacteria, whose numbers are greatly augmented by the presence of abundant food in the urchin gut.

1962 #3

SOME EFFECTS OF FEEDING IN THE SEA URCHIN Strongylocentrotus droebachiensis ON DIVISION IN THREE OF ITS ENDOCOMMENSAL CILIATES

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Dividing individuals of Biggaria gracilis occur in nearly every adult urchin at Mt. Desert Island, but dividing specimens of Entodiscus borealis and Madsenia indomita are present in only about 3% of them. Thus, it was suggested earlier (Beers, 1948) that cycles of division are inherent in these two ciliates.

Urchins were starved for 2 weeks; dividing ciliates were absent in them. Groups of them, totaling 294 urchins, were then fed generously on Laminaria during 5-day experimental periods. They were examined at various hourly intervals and the condition of the ciliates with respect to division was recorded. The records were arranged by successive 8-hour periods, and the percentage of the urchins that contained dividing individuals of each species was calculated for each period.

Division began in E. borealis after 10-15 hours of feeding by the host, and dividing specimens were present for about 3 days in 33-79% of the urchins of the respective periods. It began in M. indomita after 50-60 hours; dividing specimens were present for about 2 days in 25-96% of the urchins. It resumed in B. gracilis after 20-30 hours, and dividing specimens were present in all the urchins after the second day.

The results indicate that division proceeds uninterruptedly in B. gracilis, provided any appreciable amount of food is present in the urchin gut, whereas it occurs discontinuously in E. borealis and M. indomita. It is doubtful that the cycles of division reported earlier are inherent. It seems more likely that they are correlated with the copious ingestion of suitable bacteria, the numbers of which are greatly increased by the presence of abundant food in the urchin gut.