



Fig. 2. Relation between rate of discharge (5 seconds in plateau) and concentration of sodium and potassium chloride.

the canal neuromast. However, the threshold of the pit organ fiber to touch on the skin surface is strikingly higher than that of the canal organ fiber, and there is no sign that the canal organ responded to various salt solutions introduced into the lateral line canal.

Thus the pit organ of the shark, unlike the canal neuromast, will respond to salinity changes in the environment. However, it is uncertain whether, under natural conditions, it serves as a salinity detector.

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7. Supported in part by NSF grant GB-5768 and NIH grant NB 06890-02 to Laboratory of Sensory Sciences, University of Hawaii. Contribution of A.L.T. and J.I.K. supported by ONR contract Nonr 2756(00).

20 August 1968; revised 15 November 1968

Normal Incidence of Brain Hernia in the Mouse

Anomalies appear in births of both mice and men, and their origin may be genetic or congenital. Some 5 percent of all human births carry some congenital anomaly, and although most of these are tolerable in that they do not contribute to the shortening of life, they emphasize the fact that normality does not infer 100 percent perfection.

Flynn (1) singles out the anomaly of brain hernia, or exencephaly, and states that 12.2 percent of 90 litters of mice contained exencephalous fetuses. The 12.2 percent does not indicate the incidence of this anomaly. When all fetuses were counted (1056) some 1.04 percent were exencephalous. This figure does not differ radically from our own. The mouse used was the CF1 white strain, and the data were derived from several generations from an original stock.

When one counts only the firstborn which appear to be perfectly normal, it has been shown (2) that virgins of 3 to 5 months produce 83.03 percent normals; older virgins of 7 to 9 months have 81.57 percent normals; multiparas of 7 to 9 months show 83.70 percent normals; and ex-breeders of 10 to 12 months had 73.65 percent normals. Thus if one wishes to downgrade any mouse stock it is possible to show that about 20 percent are "not normal." This includes those that are stunted (less than 1 g at 18 days), are resorbed *in utero*, or possess various anomalies such as multiple digits, crooked tails, persistent amnions, extruded gut, and other abnormalities. However, if among those classified as anomalous we count *only* mice with definite brain hernias (exencephalia) we find in 150 litters of 1530 CF1 mice that there was an incidence of only 0.17 percent of exencephalia. In 328 litters of CF1-S mice at one time only 0.68 percent, and at another time 365 litters with 0.43 percent of the fetuses had such brain hernias. Thus, we admit freely that this anomaly does occur in normal and presumably healthy stock, but not in great numbers, never (in our experience) exceeding 0.68 percent. Since x-irradiation does in fact increase the incidence of this anomaly (3) the increase above the normal incidence may be attributed to the effects of ionizing radiations, providing, of course, there are statistically

adequate numbers. We have examined over 300,000 mouse fetuses at 18 days (about one-third of these were unirradiated controls) and have never found the normal incidence of this anomaly to exceed 0.68 percent. The fact that it does occur spontaneously makes it a good test object for the study of the effects of x-irradiation, which dramatically increases the incidence of exencephaly.

There is some evidence of a genetic predisposition to exencephalia. Some males that sired litters with different females produced offspring showing more than a normal incidence of exencephalia. In fact, such litters may sometimes have more than a single exencephalous fetus. One cannot rule out genetic considerations, and this area merits further investigation.

Possibly the low incidence of exencephalia that we found was due to the fact that most of our litters are primipara, derived from mice received directly from Carworth Farms. The offspring therefore do not represent a common ancestry but a very wide sampling, thus reducing any inherent genetic predisposition to exencephalia. Flynn reported on first, second, and third generation descendents of an original and limited stock, which means that any unrecognized but inherent tendency to develop exencephaly would be exaggerated. Although the percentage reported by Flynn could be misleading (12.2 percent of the litters with exencephaly rather than 12.2 percent incidence) we concur that brain hernias do occur spontaneously, whatever their origin, and must be considered in light of increased incidence when the developing fetus also receives x-irradiation. The higher incidence (1.04 percent above our 0.68 percent) reported by Flynn cannot have statistical significance.

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16 September 1968

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Science **163** (3865), 407.
DOI: 10.1126/science.163.3865.407

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