by a process of breakage and rejoining. Furthermore, since normal recombination frequencies can be attained in the absence of DNA synthesis (Fig. 1), breakage and rejoining is probably the major mechanism for recombination in this virus. The possibility that a small amount of DNA synthesis may be involved in the recombination process is not excluded. However, the basic process is clearly one of physical exchange between molecules rather than a copying of genetic information from two molecules in the process of making a third (*17*).

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13. Since the action of 2-aminopurine could not be completely inhibited with any combination of nucleotides, it is conceivable that 2-aminopurine can cause mutation by a mechanism other than incorporation and that, in fact, there is no DNA synthesis under these conditions.
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23 July 1965

Cestode in North Dakota: Echinococcus in Field Mice

Abstract. *Field mice* (Microtus pennsylvanicus *and* Peromyscus maniculatus) *are naturally infected with* Echinococcus multilocularis. *Thus, the sylvatic cycle (fox to field mice to fox) has been established in North Dakota. This cestode is expected to extend its range to other agricultural regions of the continental United States where similar conditions favorable for the completion of its life cycle exist.*

Echinococcus multilocularis (Leuckart, 1863) was reported first from the continental United States by Leiby and Olsen (*1*) who found the adult cestodes in red foxes (*Vulpes vulpes*) from Ward County, North Dakota. Biologic and morphologic studies (*2*) on the larval stages which developed in experimentally infected cotton rats (*Sigmodon hispidus*) have confirmed that the North Dakota cestode is *E. multilocularis* and is indistinguishable from the species found in Alaska (*3*).

Preliminary investigations in North Dakota, during the late spring of 1965, have revealed a high prevalence of sylvatic multilocular echinococcosis. Of 47 field mice examined for natural infections, 3 of 32 *Microtus pennsylvanicus* and 3 of 15 *Peromyscus maniculatus* harbored *Echinococcus multilocularis*. With the exception of a single *Peromyscus maniculatus*, in which the cystic stages occurred in both the liver and spleen, the infections were confined to the liver. In all cases, the larvae seemed normally developed with large numbers of scolices. To the best of my knowledge, this constitutes the first report of *E. multilocularis* occurring naturally in the above rodents; however, experimental infections with the Alaskan strain have been established in both *Microtus pennsylvanicus* (*4*) and *Peromyscus maniculatus* (*5*).

The work by Leiby and Olsen (*1*) and my study confirm that the sylvatic cycle of *Echinococcus multilocularis* (fox to field mice to fox) is well established in North Dakota. In view of present knowledge, it should be expected that its range will eventually extend throughout the agricultural regions of the United States where conditions for completion of its life cycle are favorable.

Vogel (*6*) ascertained that dogs, cats, and foxes served equally well as definitive hosts for the Eurasian strain of *E. multilocularis*. Therefore, it is reasonable to assume that dogs and cats in rural areas will become infected when they feed upon field mice harboring the larval cestode, and occasional infection of man in the United States could occur as a result of his association with these domestic animals. Also, as indicated by Rausch (*3*), there is some risk in the handling of foxes by trappers, hunters, and fur handlers.

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Periodic Respiratory Pattern Occurring in Conjunction with Eye Movements during Sleep

Abstract. *With each flurry of rapid eye movements during the sleep of human subjects there is a decreased amplitude of respiration and a slight increase in rate. Occasionally the rhythmic breathing pattern may even resemble Cheyne-Stokes respiration. The consistency of this breathing pattern suggests that respiration in this stage of sleep is not a direct function of dream content.*

The initial report (*1*) regarding the occurrence of a rapid eye movement (REM) stage of sleep indicated that the cardiac and respiratory rates were slightly elevated during that stage as compared with either the preceding or following stages. In the decade that ensued, these results were essentially confirmed, although great stress (*2, 3*) was placed on the purported irregularity of the respiratory pattern in the REM stage of sleep. Inasmuch as respiration (sighing, hyperventilation, compulsive breath-holding, and so forth) reflects