cytoplasm which, according to our observations on the rate of water output by the contractile vacuoles, is nearly equilibrated with the aqueous radioactive environment within 30 minutes after the beginning of exposure. Nevertheless, a definite answer to this dosage question must await solution of the difficult problems of microdistribution of T within the cell and the absorption of very soft β particles in water.

Summary and conclusions. Effects induced by metabolized radioactive hydrogen (tritium or T) and presumed to be genetic in nature have been measured in *Paramecium aurelia*. Organisms were allowed to divide 6 to 8 times during 2 days in culture fluid containing T in concentrations varying from 1 to 100 mc per ml. With increasing radioactivity of the medium, increasing death after autogamy was observed, but no preautogamous effects were noted. The response observed after exposure to T appears to be slightly lower than that induced by emitters of more energetic β particles at similar dosage levels. The conclusions are that no part of the effect can be ascribed to transmutation of T, the emitted electrons alone apparently inducing the biological changes; and that the difference in efficiency between T and $Sr^{89,90}Y^{90}$ in inducing the effects observed is consistent with the observations of others concerning the dependence of the mutation constant upon rate of energy loss by densely ionizing particles.

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Electron Micrographs of Newcastle Disease Virus Preparations from Chick Embryos Following Infection by Virus Propagated in the Short-tailed Shrew (*Blarina brevicauda*). (19117)

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The short-tailed shrew is one of the smallest of the mammals and has an extremely high rate of metabolism. Electron microscope studies were conducted to determine the morphology of Newcastle disease virus (NDV) recovered from this sensitive mammal following infection by intracerebral inoculation and intranasal instillation. In previous experiments tailed virus forms were demonstrated from purified egg-adapted virus material by Bang(1,2) and Cunha *et al.*(3). Tail-like forms were also demonstrated in hamster-adapted, mouse-adapted, and bat propagated NDV after culture in 10-day embryonated eggs by Reagan and his coworkers(4,5)

Procedure. Three-hundredth ml of allantoic fluid from 10-day embryonated White Leghorn chicken eggs infected with the 25th egg passage of California strain (No. 11,914) was inoculated into the right frontal lobe of each of three *Blarina brevicauda* short-tailed shrews. Three-hundredth ml of the same material was instilled intranasally in each of 3 additional shrews. Typical Newcastle disease symptoms developed within 24 to 30 hours in the shrews infected intracerebrally and within 5 to 6 days in the shrews infected nasally. The symptoms from both series were irritability, malaise, rhythmical contraction of muscles starting in the limbs and spreading over the entire body, and

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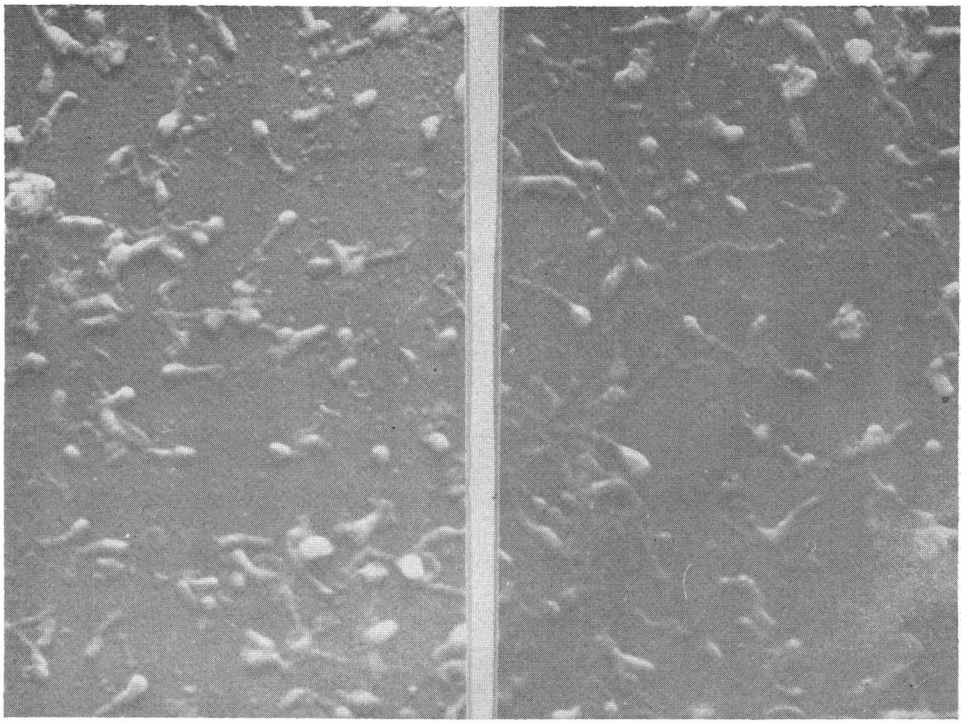

FIG. 1 (left). Newcastle disease virus from the brain of an infected short-tailed shrew (intranasal instillation) *Blarina brevicauda* (1 s.c.), after one subculture in embryonated eggs, shadowed with chromium at tangent 1/6. × 32,000.

FIG. 2 (right). Egg-adapted Newcastle disease virus in allantoic fluid of embryonated chicken eggs, shadowed with chromium at tangent 1/6. × 32,000.

paralysis of the fore and hind legs followed by complete prostration. There was no evidence of excessive salivation from pharyngeal paralysis which is characteristic in other animals infected with the hamster-adapted NDV(6).

When nervous symptoms developed in each shrew the brain was removed aseptically, ground in a mortar with alundum, and diluted to a 10% suspension with physiological saline. This virus-bearing material from each series was inoculated separately into the allantoic sac of 10-day embryonated chicken eggs. All embryos died within 72 hours. A pool of virus-bearing allantoic fluid was prepared for each series. The presence of virus in this material was verified to be that of Newcastle disease by neutralization tests using embryonated chicken eggs as the test host. Each pool of allantoic fluid was centrifuged in a horizontal centrifuge for 5 minutes at 2,000 rpm. The sediments were discarded and the supernatants were recentrifuged for 2 hours at 44,040 rpm in a Spinco ultracentrifuge. There was less than ½ degree change in the temperature of the refrigerated outer jacket. The sediment from each series was resuspended in 3% saline for 10 minutes and then spun lightly for ½ minute at 1,000 rpm in a horizontal centrifuge. The supernatant from each series was placed separately on parlodion-prepared screens (which had been prepared 24 hours previously), shadowed with chromium(7-9) at arc tangent 1/6 and examined under the RCA EMU electron microscope.

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Numerous fields chosen for electron examination showed many virus particles with tail structure. Fig. 1 shows broad tail forms from the intranasal shrew passage after virus cultivation in embryonated eggs. Virus particles from the intracerebral series appeared similar to those from the intranasal series. Fig. 2 shows an electron micrograph of the egg-adapted California strain carried only in embryonated eggs.

Summary. (1) NDV from short-tailed shrews infected by intracerebral inoculation and intranasal instillation was 100% pathogenic for embryonated eggs in the first embryo passage. Shrews infected by these two methods of exposure showed typical Newcastle disease symptoms. The virus in the allantoic fluid of eggs inoculated with the shrew brain material from both intracerebral and intranasal series was neutralized by positive Newcastle disease serum but was not affected by normal chicken serum. (2) Electron micrographs of Newcastle disease virus preparations from chick embryos following infection by the virus propagated in the short-tailed shrew showed a predominance of tailed forms. (3) Intracerebral and intranasal serial passages of NDV in the short-tailed shrew are being continued at the present time and will be reported in a later paper.

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Resistance in Leukemic Cells to a Guanine Analog, 8-Azaguanine. (19118)

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The development of resistance in mouse leukemic cells, lymphocytic in type, to folic acid antagonists has been reported(1,2). The resistant variants, in certain cases, proved to be partially dependent upon folic acid antagonists for optimal growth(3,4). Experimental evidence favors the assumption that specific changes in the hereditary mechanism of the cell have occurred, independent of the action of antagonists. The transformations produced were found to be stable, irreversible and heritable(4) and occurred generally in large populations of leukemic cells(5). The triazolopyrimidine analog of guanine, 5-amino-7-hydroxy-1H-v-triazolo (d) pyrimidine (8-azaguanine) has been shown to be moderately inhibitory to certain bacteria(6) and to *Tetrahymena*(7,8) and a definite inhibitory action toward certain experimental tumors has been observed(9) and confirmed (10-12). It is quite clear, however, that this metabolic inhibitor is entirely inactive against other tumors in mice and rats(10,11,13,14).

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