Cysticercus sarcoma there was a significant negative correlation $(-.527 \pm .008)$ between the number of cysts in the liver and the duration of infestation with the parasite. It follows that if the bearers of *Cysticercus* sarcoma are distributed according to the number of parasitic cysts, a general decrease in the duration of infestation is observed with each successive increase in the number of cysts. Also the mean age at autopsy of these tumor bearers is parallel to the duration of infestation and in each case exceeds it by approximately two months, the average age at which the rats were infested. For each number of cysts the mean duration of infestation and mean age are slightly higher for females than for males, but in many cases the differences are not statistically significant. The essential factor is the duration of the irritation and not the actual age of the rat. This is shown when the tumor bearers are classified according to the age at which they were infested, for the mean age at autopsy rises proportionately with the age at which they were fed *Taenia* eggs; but the duration of infestation remains constant instead of decreasing directly with the age fed, as would be expected if age were the important factor. The mean duration of infestation not only became shorter but also became less variable with the increase in the number of *Cysticercus* cysts. This is shown by a gradual decrease in the standard deviations of the duration of infestation.

If the frequencies of rats infested with successive numbers of cysts are cut off at the mean period of infestation for tumor hosts with the corresponding numbers of cysts, and the percentage of tumor bearers among these is calculated, it is observed that the proportion of tumor bearers increases almost directly from 31.5 per cent. of the individuals with one cyst to 85.7 per cent. of those with 50 cysts. Above 50 cysts the number of rats in each group is small, since such large numbers of parasites are detrimental to the host. Nevertheless, in general the proportion of tumor bearers continues to increase with increase in numbers of cysts, and in several cases reaches 100 per cent. of the survivors of the *minimum* period of infestation. The males show a tendency to a slightly higher percentage of tumor bearers than the females, but in most cases the difference is not statistically significant.

If the different strains are considered separately, it appears that they all show the same general tendency to an increase in proportion of tumors with an increase in the numbers of parasites, but in some the increase is more rapid than in others. Furthermore, if in each strain the number of infested rats which reached the mean period of infestation for tumor bearers with the corresponding number of cysts

is summed for the successive numbers of cysts, and the percentage of these which were tumor bearers is calculated, a marked difference is observed between certain strains. It can be demonstrated that this difference is determined by two factors, relative longevity and susceptibility to *Cysticercus* disease. That is, those strains which show a low proportion of tumor bearers show a low average length of life and a marked resistance to the *Cysticercus* disease, while the strains with a high proportion of tumor bearers show either a long average life span or a high degree of susceptibility to the disease.

Since an increase in the number of cysts, that is, an increase in the surface exposed to the irritant, decreases directly the time interval necessary for the onset of the malignant process and increases directly the probability of its occurrence until it becomes inevitable, it is apparent that *chance* is an important factor in the change of a normal to a *cancer* cell. Further, in the case of *Cysticercus* sarcoma hereditary factors influence the occurrence of malignancy only as they influence susceptibility of the individual to *Cysticercus* disease and longevity. Possibly when more is known about the etiology of other tumors for which there appears to be an inherited susceptibility and when the expression of genetic factors in the cells and tissues is better understood, it will be found that in the case of all neoplasms in all species the initial cell change occurs by a process analogous to somatic mutation and that hereditary factors determine this change only in so far as they influence longevity and the susceptibility of an individual to some specific irritant or condition which is favorable to mutation.

M. R. CURTIS
W. F. DUNNING
F. D. BULLOCK

INSTITUTE OF CANCER RESEARCH
COLUMBIA UNIVERSITY

BOOKS RECEIVED

Carnegie Institution of Washington. Year Book No. 31, 1931–32. Pp. xix + 392. The Institution.

FREUDENBERG, K., Editor. *Stereochemie.* 6 Lieferung. Pp. 159. Franz Deuticke, Leipzig. M 18.

GOLDENWEISER, ALEXANDER. *History, Psychology and Culture.* Pp. xii + 475 + xii. Knopf. $5.00.

LOGSDON, MAYME I. *Elementary Mathematical Analysis.* Vol. II. Pp. ix + 188. 74 figures. McGraw-Hill. $1.75.

MERRIAM, JOHN C., and CHESTER STOCK. *The Felidae of Rancho La Brea.* Pp. xvi + 231. 42 plates. 152 figures. Carnegie Institution of Washington.

NOWLAN, FREDERICK S. *Analytic Geometry.* Pp. xi + 295. 159 figures. McGraw-Hill. $2.25.

RAYMOND, ALLEN. *What is Technocracy?* Pp. vii + 180. Whittlesey House, McGraw-Hill. $1.50.

Tokyo Bunrika Daigaku. Science Reports. Vol. I, No. 4: Pp. 41 + 59; Vol. I, Nos. 5–10: Pp. 61–131. Tokyo University of Literature and Science.

TURCK, FENTON B. *The Action of the Living Cell.* Pp. xi + 308. 17 figures. Macmillan. $3.50.