

injuries inflicted upon the central nervous system by the tetany toxin. These nervous lesions develop even in the presence of calcium or magnesium and even without any convulsions at all, and finally lead to the death of the animals.

The most dangerous and important action of the tetany toxin is its highly injurious effect upon the central nervous system as expressed by the lesions of the muscular system (permanent spasmodic contractions and paralysis). The most important function of the parathyroids is to prevent the tetany toxin from coming in contact with the central nervous system, and this function cannot be substituted by any substance such as calcium or magnesium, since these substances do not antagonize the tetany toxin.

15 (1390)

Malignancy of the crown gall and its analogy to animal cancer.

By ISAAC LEVIN and MICHAEL LEVINE.

[From the Department of Cancer Research of the Montefiore Hospital and Home, New York.]

In a study reported recently on the influence of X-Rays on the development of the crown gall the writers have come to the conclusion that this growth presents an ideal material for the cellular study of the cancer problem. Dr. Erwin F. Smith, of Washington, considers this parasitic disease of plants to be identical with human cancer to such an extent that since crown gall is caused by a microorganism he maintains that all human cancers must be due to the same parasite. It seemed desirable to repeat Smith's experiments from the standpoint of human pathology and this was the object of the present investigation.

A large number and a great variety of plants were inoculated with a pure culture of *Bacterium tumefaciens* and a gross and microscopical study of the resulting crown galls was made. The analysis of the material shows that a certain number of these plant-tumors behave morphologically as well as biologically as benign growths. They grow very slowly, do not interfere with the development of the inoculated plant, compress but do not injure the neighboring normal tissues. Other crown galls appear to

be true malignant tumors. They dwarf the inoculated plant. The parts of the inoculated stem become necrotic above and even below the point of inoculation. Microscopically the galls show invasion and destruction of the neighboring normal tissues. In accordance with the findings of Smith a number of crown galls were obtained containing leafy shoots. Smith considers the latter condition to be analogous to human embryomata. A close microscopical study of the crown gall revealed characteristics which differ materially from the conditions obtained in animal cancer. In the majority of the specimens investigated the entire gall presents a uniform morphological appearance of small, young, undifferentiated cells. In other tumors the central growing part presents the usual appearance of a crown gall, while the periphery shows the development of adult differentiated tissue (parenchyma). This parenchyma is a part of the new growth and not of the normal tissues of the inoculated plant. The same is true of rudimentary organs (conducting system) or even a whole rudimentary organism (leafy shoot) which may appear at the periphery or in other parts of the ordinary crown gall. Such an appearance of highly differentiated tissues subsequently to and as a part of the development of a malignant tumor is unknown in animal cancer.

The conclusion to be arrived at from this study is that a fast developing simple crown gall presents a great deal of analogy to animal cancer and offers an ideal material for the cellular study of the latter condition. On the other hand the structure of the growing central part is identical in practically all the crown galls investigated thus far. It represents therefore only one type in the large group of pathological processes designated under the common name of cancer. It is hardly possible to assert on the basis of the study of the crown gall that all human cancers are formed through the activity of one and the same microörganism.