

of the horse, rabbit, guinea-pig, calf, and sheep are equally affected. The differences become well marked after a few minutes' exposure to the different temperatures, and thereafter bringing them to one temperature fails to equalize the hemolysis even after many hours. The effect, then, is on the corpuscle rather than on the surrounding fluid and is exerted chiefly in the first moments of exposure.

Temperatures above  $37^{\circ}$  C. act variously according to the particular species whose blood is used. Horse corpuscles give distinctly more hemolysis at  $42^{\circ}$  C. than at  $37^{\circ}$  C. The corpuscles of the guinea-pig and the calf give still less hemolysis at  $43^{\circ}$  C. than at  $37^{\circ}$  C.

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#### **A carcinoma of the rat (Flexner-Jobling) considered from the standpoint of immunity.**

By **F. P. GAY.**

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Experiments have been in progress for the last year and a half with the Flexner-Jobling rat tumor for the purpose of gaining some insight as to the normal and artificially produced conditions of resistance to this tumor.

The tumor as originally described by Flexner and Jobling was a sarcoma and later became carcinomatous in structure. It has shown no marked variations in histological structure during the eight generations which we have cultivated it. White rats from different dealers varied considerably in their susceptibility to inoculation with this tumor. Animals from the most susceptible source gave 100 per cent. of "takes" whereas the next most susceptible strain gave only 50 per cent. Following inoculation into the region of the axilla metastases occur regularly in the lungs but rarely in the adjacent lymph-nodes. The time of occurrence of metastases would seem to be relatively constant in the most susceptible rats. Metastases occur later and at more irregular intervals in less susceptible animals.

The tumor may be transplanted from the metastases and such "metastatic" tumors would seem after several generations to have

become somewhat more "virulent" in that such tumors grow more rapidly and produce more extensive metastases of a more epithelial type.

Animals that have failed to take the first inoculation of tumor are very seldom susceptible to a second or third implantation. The blood serum of such refractory animals gives no reaction of fixation with cancer extract, and when injected simultaneously with cancer in susceptible rats leads to no prevention of the growth of the tumor. The refractory blood, however, when injected previously to or at the same time with the tumor in naturally insusceptible rats gives a larger percentage of "takes" than in control animals.

If a tumor is removed during the "premetastatic" period a second implanted tumor seldom grows. Subsequent to this period a second implanted tumor does grow.

When a primary growing tumor is left and a second implanted during the premetastatic period, not only does the second tumor fail to grow but the first tumor entirely disappears in many instances. In cases in which the resorption of original tumor was incomplete, from lack of sufficient time the primary tumor showed regressive changes in the nature of cell degeneration or a marked increase of connective tissue stroma.

A reaction of fixation was found with the blood of a few animals with tumor during the premetastatic period but never during metastatic period. The premetastatic period then would seem to be characterized by an active defence on the part of the animal body and during this period reimplantation of tumor increases this resistance to such an extent that the original tumor is destroyed. When this period is passed metastases occur and a second implanted tumor grows.

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### **Influence of temperature upon pepsin.**

By **A. O. SHAKLEE.**

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While studying the destruction of pepsin by shaking pepsin solutions it was thought essential to make some study of the spon-