THE EXPERIMENTAL STUDY OF CANCER

WILLIAM H. WOGLOM, M.D.

(From The Institute of Cancer Research, Columbia University, New York)

It is rather the fashion at present to belittle the results of the laboratory investigation of cancer, but when a colleague shows signs of pessimism it is the custom of the writer to ask whether he would rather have had malignant disease thirty years ago or have it today. The answer has always been in favor of the present, showing that even those who in their darker moments despair of ultimate solution of the cancer problem realize that some progress has been made.

Reflect for a moment on the magnitude of the problem. Here we stand, faced by the cancer cell, a foe so small that it cannot be seen, so tireless that it proliferates indefinitely, so relentless that it gives no quarter, so despicable that it wears no distinguishing uniform. And yet something has been learned of its nature and its methods of attack, although for about thirty centuries the last link in the chain of scientific method was lacking. Observation and hypothesis we could employ, but not experiment; only for the one-hundredth part of the total period has this last been available. Did the physician learn ninety-nine times as much about cancer before the beginning of the present century as has been learned during the past thirty years? He did not.

Measuring by ten-year periods we find that before the end of the first decade of experimental cancer research the limits within which malignant tumors can be transplanted had been mapped out, a method of protecting mice against inoculation had been found, the resistance of the cancer cell to various agents had been compared, its cultivation in vitro begun, the hereditary nature of cancer in mice foreshadowed, and a curiously interesting transmissible sarcoma of the fowl discovered and described.

In the second decade, the growth rate of the cancer cell was assessed, and two methods of producing tumors in animals were discovered. Yet this period was disrupted by a world-wide war!

In the third, still another means of inciting malignant growth was reported, and a good start made on such problems as the
chemical nature of the carcinogenic agent in tar, the intensity and duration of irritation required to initiate neoplasia, the relation of age to the development of cancer, and so on, while positions gained during the first two decades were consolidated and extended.

A surprisingly large fund of accurate information, in fact, has been gathered during this comparatively short period, some valuable because it is positive and some, while negative, because it permits the rejection of earlier hypotheses and to this extent clears the field for future investigation. Thus cancer has been found to occur rather frequently in fishes, so that it is clearly unnecessary to give any further attention to soil and climate as possible causes. This in itself seems a considerable advance to one who, only twenty years ago, had daily before his eyes a cancer map of the British Isles which pictured the distribution of cancer in respect to such physiographic features as surface water and soil. And as the disease affects all forms of animal life at least down to the reptiles, no more time need be wasted in examining habits and customs peculiar to man in search of a cause, except in so far as these involve chronic irritation.

Three decades ago it seemed that we should have to explain why sarcoma was more common in youth and carcinoma in advanced life; in other words, why the same process should attack connective tissues when they were young and epithelium when it was old. Today it is known that sarcoma, like carcinoma, becomes more frequent the greater the burden of the years, and it is strongly suspected that age in itself may really have nothing to do with the inception of malignant disease save only that long life means an extended period throughout which the action of an irritant can be exerted.

This suspicion is but one of the fruits of experimental production of malignant disease in animals. Another is the discovery that factors are involved other than the carcinogenic agent employed, for the incidence of cancer does not rise with increasingly intense irritation; in fact, certain unusually violent irritants have not produced cancer at all. Instead of looking for one cause of cancer, therefore, we are beginning to realize that there may be many causes, and are patiently searching out clues and following them up as they appear. To mention but one item more, it has been found that some animals, such as the rat, are almost completely resistant to the carcinogenic action of tar, which nevertheless incites cancer in almost every mouse to which it is applied,
and comparisons are now being made between the early lesions elicited in these two genera. How can anyone believe that all this is not a distinct advance over the days, not so long since, when soil, earthworms, and tomatoes were under examination?

A shallow and facile pessimism is far too common nowadays. It is true that the morphological study of cancer, so eagerly begun during the past century and so often derided during the present one, produced no cure and uncovered no etiological agent. But are we quite fair to those who bore the burden and heat of the day when we overlook the fact that they laid the foundation upon which the pathologist now relies in making his diagnosis, and the surgeon in planning the scope of his operation? We have inherited the task, and it is the firm belief of the writer that some day we, too, shall be known to have labored not in vain.