is 16.34% stronger than the average for the total fifteen drug store samples, and 24.5% stronger than the ten samples supposedly prepared by the U. S. P. IX method.

The ten samples manufactured according to the U. S. P. IX method showed an average activity of but 38.1%.

The five samples prepared according to the method of Hatcher and Eggleston, referred to above, showed an average activity of 95%, which is 48.74% stronger than the fifteen drug store samples' average, 32.4% stronger than the average of the five samples made by diluting the Fluidextract, and 56.9% stronger than the average of the ten samples made according to the U. S. P. IX method.

The results obtained are interpreted as indicating:

(*a*) A decided variability in the strength of the U. S. P. IX Infusion of Digitalis, all drug store samples examined falling well below the theoretical activity.

(*b*) A decidedly more active "Infusion" when prepared by dilution of the Fluidextract than when made by the U. S. P. IX method.

(*c*) A practically "100%" preparation when prepared according to the method of Hatcher and Eggleston.

(*d*) The need for an improved method for the preparation of Infusion of Digitalis, U. S. P. Several major faults in the case of the present official method are doubtless: (1) an insufficient amount of solvent actually employed for extraction, (2) too short a period of infusion, (3) the employment of an insufficiently fine powder. The adoption of the method of Hatcher and Eggleston would give the pharmacist a method that is simple and easily carried out in the retail drug store, and would provide the physician with an Infusion of Digitalis that would be reliable and of practically uniform strength.

(*e*) The possible need for standardizing Infusion of Digitalis. Many will doubtless look upon this as theoretically desirable, but at the same time impracticable.

(*f*) The fact that the present Infusion of Digitalis might be dropped from the Pharmacopoeia without handicapping modern medicine in any way. There is serious doubt in the mind of the writer as to whether a *standard* Infusion of Digitalis possesses any advantages over the more stable standard Tincture. Laboratory investigations and clinical experiences have certainly shown that the tincture is more uniform, reliable, and stable than the infusion.

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CANCER, CAUSE AND CURE.

BY ALBERT SCHNEIDER, M.D., PH.D.

Everything has a definite cause and cancer is no exception. As to disease, physicians recognize two distinct cause factors. That factor which *must* be present before the disease can develop is known as the primary cause. Certain factors and influences may and often do encourage, stimulate or assist the primary cause and thus constitute the secondary cause or causes of the disease. For example, the primary cause of tuberculosis is the *Bacillus tuberculosis;* that is, this partic-

ular microbe must be present in order that the disease known as tuberculosis may exist. Among the secondary causes of this disease are: close housing, lack of fresh air, low vitality, inclement weather, tubercular inheritance, etc. No matter how numerous the secondary causes or how marked in their effects, the disease will not and cannot have its inception until the primary cause arrives upon the scene.

Conjecture has long been rife as to the primary and secondary causes of cancer. One suggests a lack of vitamines as the cause, another errors in diet, hot foods and drink, indulgence in coffee, eating tomatoes, excessive meat diet, etc. Injuries to tissues, prolonged irritation of tissues, surgical interference, are among the factors said to induce cancer; further, excessive smoking, the use of clay pipes, and indulgence in alcoholic beverages and irritating spices. Medical writers give homely advice to the family physician, urging upon him to watch and study his patient constantly in order that he may ascertain the exact moment when said patient is dipping toward the cancer maelstrom; but it does not mean anything, because almost without exception the "dipping point" has long been passed when the family physician finally admits to himself that his patient actually has cancer. There are no early cancer signs or indications known to the medical profession and such as are cited and discussed in medical literature are very largely guess work and mere pretense. The whole cancer literature is a kaleidoscopic ever-varying grotesque display of ignorance. Many a so-called cancer specialist has admitted his ignorance on the subject and has written an obese tome about it. Just at the present time none but surgeons receive recognition as cancer specialists and the gist of their opinionations may be summarized as follows:

1. We do not know what the primary cause of cancer is, but we are convinced that it is not a disease of parasitic origin and none can convince us to the contrary.

2. Let us operate in all cases where an operation is possible. In all cases of doubt as to the malignancy of the growth, operate anyway. (The non-surgeon here raises the query—How many scar tissues following the removal of a benign growth have, a long time after, shown cancerous growths?)

3. Radium and X-ray treatments give at least temporary relief in some cases and may in rare cases effect a cure.

4. There is no drug which will cure cancer and we will steadfastly refuse to try any cancer remedies of any and all kinds. All cancer cures are fakes.

This summary harmonizes quite closely with the actual situation. Only recently an eminent surgeon of one of our leading colleges of medicine made the following statement at a cancer clinic: "I do not believe that cancer is of parasitic origin. It appears to be epithelial cells gone on a rampage," certainly anything but an authoritative and scholarly statement.

Is cancer inheritable? This question has recently received much attention. Some make emphatic denial; others suggest that certain family traits and life habits which encourage cancer are handed down from one generation to another; and a few declare that cancer is inheritable. Miss Maud Slye in a recent number of the *Journal for Cancer Research* states that cancer is inheritable, that it is recessive according to the Mendelian law, and that it could be almost completely eradicated by always mating cancer with non-cancer.

The idea that cancer is transmissible from the sick to the well, hence infectious if not contagious, is slowly but surely gaining ground. It is not admitted to be strongly infectious, but rather erratically and indefinitely so, and perhaps largely *via* certain avenues, as the conjunctiva, the circulatory and lymphatic systems, the digestive tract and at the sites of traumata. Watch any surgeon who operates on cancer and you will observe that, in every way, he conducts himself as though he were dealing with an infectious disease, despite which he vehemently disclaims against the parasitic origin of the disease. The infectiousness of cancer is not unlike that of tuberculosis. In cancer infection, age plays an important part, for the susceptibility is represented by a definite age curve, the zenith of which is reached at about the 60th year; after which there is a rather abrupt decline. The great majority of cases occur between the ages of 40 and 65. Cancer may, however, occur at any time of life although it is rare in the very young and in the very old.

The cancer mortality is steadily on the increase despite surgery radium and the X-rays. Its victims number many thousands each year, not to say anything about the months and even years of misery that precede death. A few of the pessimistically inclined have even suggested that this dread malady will in time exterminate the human race unless science finds the remedy which will prevent such a catastrophe. Cancer also occurs among the lower animals, perhaps no race being wholly exempt. However, some animals are more susceptible than others. Rats, white mice and the higher carnivora have cancer. Cancerous growths occur among the amphibia, as the frogs. Cancer transplantation from the human into lower animals has been done experimentally, but this is no more remarkable than normal tissue transplantation. Attempts have been made to inoculate cancer into healthy animals but the results have been largely negative. Several scientists (Nicholas Senn and others) have attempted to inoculate themselves with cancer, apparently also with negative results. These tests in no wise disprove the parasitic origin of cancer. Fibiger of Copenhagen is of the opinion that certain species of nematodes harbor the infection capable of transmitting cancer to rats and he has actually succeeded in producing cancer anew by feeding healthy rats with the infected nematodes. A notion prevails among the laity that old houses overrun by rats are spreading centers for cancer. It has been known for some time that cancer cases appear and recur in certain houses usually in tenement districts and such places are designated as "cancer houses."

Certain experiments and observations made by the writer* warrant the following deductions as to the cause of cancer.

1. Cancer, sarcoma, and probably also other tumor formations, are caused by plasmodia belonging to the group sporozoa, the same group to which the malerial organism belongs.

2. The sexual cycle of this plasmodium completes itself in a species of ameba.

3. The asexual cycle is in part completed in human tissue cells, giving rise to the specific tumor formation. The sporocyst stage of the asexual cycle which develops within the cell plasm and always outside of the nucleus, acts as an irritant inducing abnormal mitosis and tissue proliferation.

4. Infection of the human tissue cells apparently takes place *via* the eosinophile polymorphonuclear leucocytes, usually at the site of some inflammatory process.

* "Plasmodial Life Cycles in Amebae of Carcinoma and of Sarcoma," *The Woman's Medical Journal*, 1921.

It is a noteworthy coincidence that Dr. Bertha Van Hoosen of Chicago has been treating cancer with emetin hydrochloride with remarkable success, using this remedy on the assumption that cancer is caused by amebae. Although in error in her assumption, the treatment is nevertheless entirely rational. Emetine is our best amebicide and by destroying the amebal host the sexual cycle of the cancer plasmodium is likewise destroyed and the cancerous growth is as a result completely checked. Nor is emetine the only likely cure for cancer. There are other amebicides worthy of a trial, some that are less toxic than emetine, as acriflavin, amargosin (experiments with this drug are now under way), thiophen, berberin, and even arsphenamin and quinine sulphate. Dr. Abrams of San Francisco claims that cancer can be cured by means of carefully adjusted X-ray emanations or vibrations, the effects produced being closely similar to the effects following the use of large doses of emetin hydrochloride, and he cites numerous cases to substantiate his claim.

To some up briefly, the indications are that cancer is of parasitic origin and that it can be cured without the use of the knife. Experiments are now under way to find a test which will make it possible to ascertain the existence of cancer in its early stages so that the cure may be applied early. Such a test is of the greatest importance, for if the remedy is not administered until the disease is well advanced, fatal toxemias often follow due to the resorption of the great mass of dead cancer tissue. Apparently cancer may be as easily cured and controlled as malaria, as yellow fever, and as syphilis. Perhaps the greatest existing obstacle in the way of an early control of cancer are the surgeons.

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ALKALOIDS IN RHIZOMES AND ROOTS OF IPECAC.*

BY ARNO VIEHOEVER AND CLARE OLIN EWING.

Ipecac is a low, straggling, soft-wooded shrub growing in rich forest loam, the base of the stem partly prostrate and more or less covered with vegetable debris. This habit of growth results in a sharp distinction between the lower and upper portions of the stem, the lower portion being quite largely collected with the roots.[1] It is owing to this circumstance, no doubt, that the United States Pharmacopoeia VIII defined ipecac as "the dried root to which may be attached a portion of the stem, not exceeding 7 cm. in length, * * *." Lots complying with this definition might contain as high as 25 percent of stems. The present Pharmacopoeia, however, limits the "stems and other foreign matter" to 5 percent.

A study of the habit of growth of the plant (see illustration) suggests that the lower portion of the axis really represents the rhizome from which the root system branches out. Inasmuch as plants with alkaloids usually contain them in the rhizomes (if these are present) as well as in the roots, one might expect

* Presented to Scientific Section, A. PH. A., New Orleans meeting, 1921.

[1] H. H. Rusby, Nat. Stand. Disp. (1916), p. 866.