of knowledge by independent groups working on isolated phases of the problem. What is needed here is a well-planned and completely coordinated program, directed by a group of experts in the field and serving to organize the activities of all competent investigators. This program should be financed by a Congressional appropriation of $50,000,000–$100,000,000 annually, a pittance compared to the cost of some of our war projects. It would not even buy a great many heavy bombers. It should be used to support both clinical and laboratory research along every channel considered to be of possible interest directly or indirectly in attaining the goal. There are certainly promising leads to be investigated. Several clinical workers have found sex hormones to have definite suppressive influence on certain types of carcinoma. The new availability of radioactive isotopes opens numerous possibilities to the investigator of the metabolism of malignant tissue. These are only two out of many. If we await their development along the leisurely lines of individual peacetime research, a great deal of time and thousands of lives will be lost.

Dr. Hammett has pointed out the results obtained by a coordinated national research effort in the field of atomic physics. Other examples might be cited where, under the pressure of war necessity and as a result of cooperative effort, results were obtained in one or two years that would normally have required 10 or 15. Typical of these are the development of penicillin, antimalarials, agents for bacteriological warfare, etc. Certainly the need in the cancer problem justifies no less supreme an effort. It may well be true that any practical solution will have to await a chance discovery not yet conceived. The important point is that with a large number of trained investigators working in a coordinated program the opportunity for such a discovery to be made is increased almost proportionally to the number of workers. The statistical likelihood of the lucky accident occurring is greatly enhanced.

Furthermore, it is important that we do not delay. The present program for cancer research should be expanded tenfold, organized and coordinated by a group of our best experts, and financed by government appropriation. The bill recently proposed in Congress along these lines should be supported, if adequate, and action obtained on it without delay.

It is up to the scientists of the country to back such a program and see that it is put into effect. They are in by far the best position to realize what may be accomplished and how little progress is being made at present. The AAAS is the official organization representing the majority of scientists in this country. Is there not some way in which the influence of this organization may be brought to bear to expedite an all-out, large-scale research campaign against public enemy No. 2?

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### Human Breast Cancer and the Milk Factor

Dr. Hammett (*Science*, 1946, **103**, 714) appears to favor that women with a history of breast cancer should not nurse their children, this recommendation arising out of the observation that a milk factor or virus has been found to be productive of breast cancer in mice. The following facts and observations should be brought forward to make us cautious in having such advice until our facts with respect to breast cancer in man are better understood:

(1) There is as yet no proof that a baby *exclusively* fed with artificial formulas from the moment of birth on has as good a chance of survival as has a baby which is breast fed—at least, breast fed in the early months of infancy. Experimental evidence shows that a mouse put to the cancerous mother's breast even once will absorb enough of the virus to produce breast cancer later on. Therefore, until such time as we have reliable evidence that the baby raised exclusively on artificial feeding has as good a chance of survival as has the breast fed infant, it is doubtful whether we should run the risk of killing the child in infancy in order to save it from dying of breast cancer in middle age.

(2) Experimental evidence shows that stagnation of milk in the breast plays a role in producing breast cancer in mice. This would seem to be partially substantiated by observations (which should be thoroughly checked) that human breast cancer occurs with undue frequency in women who have not borne children, next most often in women who have borne children but who have not nursed them or have had the nursing period unduly shortened for some reason or other, and least often in women who have nursed successfully a family of offspring. If these observations should prove to be facts, we should be subjecting the mothers of this generation to an increased risk of breast cancer in order to prevent the child of the next generation from having the same condition. Although not exactly a case of robbing Peter to pay Paul, it would be one of inducing cancer in Jennie to save Jane.

(3) Breast cancer in women has its peak incidence around the ages 45 to 50, but many cancers of the breast arise in much older women. This means that such a woman may have had all her children, and they in turn have had all of theirs, before their mother develops her breast cancer. Are we then to urge that these granddaughters should refrain from nursing their children because their grandmother had breast cancer? Were breast cancer so obviously transmitted, we should find a much more frequent familial incidence than we do. Moreover, had the grandmother died a year or two before she developed breast cancer, and hence had she been listed as cancer free, her granddaughters would not have been warned against nursing their offspring, but would have been passing on the virus (if that is the explanation of human breast cancer) nevertheless. This brings us to the statement that I enunciated several years ago, namely, that we cannot breed out cancer, whether it be conditioned by a gene or a virus, unless it be a form of cancer that arises in early childhood before the age of procreation, or unless we stop all the race from breeding or all women from nursing.

(4) If the observations listed in (2) are correct, it is

obvious that the woman who is most likely to develop breast cancer is the woman who is least likely to transmit it; under such circumstances, breast cancer would gradually be eliminated. Such does not seem to be the case.

Finally, let us say that before we make any such radical recommendations as that of urging mothers not to nurse their female children if there is a history of breast cancer in the family, there should be an extensive survey to ascertain facts. An endeavor should be made to trace all women whose mothers died in childbirth or within two hours after, and who can definitely prove that they never were nursed by a wet nurse; and to estimate the percentages, if any, of these who have breast cancer, in order to compare this with those women who have been nursed by their mothers. Due attention must be paid to having comparable age groups in the two classes and to the elimination of those groups in which a possible true heredity of breast cancer from either paternal or maternal side of the family might exist. Should it then be found that women whose mothers so died, and who were not nursed at all, have none or significantly less breast cancer than have women in a comparable group but who were nursed, we may have some data on which to base conclusions. Even then, the late age at which cancer develops will serve as an obstacle in any program of elimination either by not breeding or by not nursing.

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# Book Reviews

*College mathematics: a general introduction.* **Charles H. Sisam. New York: Henry Holt, 1946. Pp. xiii + 561. $3.50.**

This book might well be subtitled *What every student of mathematics should know.* Beginning with a review of algebra, it includes plane and spherical trigonometry; analytic geometry, both plane and solid; college algebra; and an introduction to some ideas of the calculus. The review is not merely a repetition of a high school course but is presented in adult fashion with amplifications and applications which give the subject fresh interest. Teachers who cannot give class time to algebra will be glad to have in the volume they are using for other subjects the things to which their students so often need to be referred.

Both trigonometry and analytic geometry are compact but complete, covering all the usual theory in fewer than the usual number of pages but with plenty of explanation and exercises. The unusual method developed for the reduction of functions of angles greater than 90° is most economical for that purpose and for later use in connection with the addition formulas. It is interesting to find, in the first paragraph of the chapter on conic sections, pictures of the ellipse, parabola, and hyperbola cut from a right circular cone, with a reference to their historical background in Greek geometry, while after individual treatment of the curves is given their single definition in terms of focus, directrix, and eccentricity. This emphasis on the relationship of the conics is most desirable. With a discussion of tangents and normals comes naturally the basic idea of the differential calculus and its simplest geometric application, maxima and minima. To this, by a judicious mixture of definition and intuition, are added simple indefinite integrals, the definite integral, and area under a curve, making it possible for freshmen to get some notion of a subject whose name has often suggested only mystery. The chapters on the graph of an equation offer the student an opportunity to use all his acquired knowledge in the study of algebraic and transcendental curves, both in rectangular and polar coordinates and in parametric form. This might be an interesting conclusion for a course the emphasis of which has been largely geometric.

There is provision, however, for a more inclusive course as well as for one providing more variety of subject matter. Geometry may continue with a glimpse into three dimensions, dealing with the plane, line, and quadric surfaces in standard form. From the field of college algebra there is a selection of topics, interesting in themselves and valuable for a student who will continue mathematics. In connection with his treatment of probability the author distinguishes between mathematical and empirical probability, making it possible for the student to see applications to subjects from which the use of the classical definition alone would exclude it.

The final chapters, on spherical trigonometry, serve to complete all the material which commonly enters into a first-year course in mathematics. The average class would never cover all of it, though individual gifted students might conceivably gain a bird's-eye view of these fields through its use. Teachers will find here abundant choice for the course fitted to their purposes and will like the logical and direct method of presentation.

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*The Cavendish Laboratory.* **Alexander Wood. Cambridge, Engl.: At the Univ. Press; New York: Macmillan, 1946. Pp. 59. (Illustrated.) $1.00.**

This is a brief but stimulating history of the famous Physics Laboratory. The list of Cavendish professors