under a variety of conditions ranging from dense shade under warm, humid forest to edges of forest. There seem to exist several varieties or forms, differing in fruit size and taste and in leaf characters. Among the latter may be mentioned complete absence of thorns in leaves, more so than in the Smooth Cayenne cultivated variety. Others have thorns retrorsely and antrorsely oriented. One such variety differs so little from its relative, *Bromelia Pinguin* L., that only the expert natives (Piaroa Indians) could distinguish them. While only one variety growing wild was found sweet and palatable enough to be desirable, Piaroa Indians have had under cultivation since time immemorial some varieties which yield large, tasty fruits. The wild varieties have abundant seed, one ovary alone having yielded 14. This is in contrast to the present commercial varieties and the sparingly established Pan de Azúcar in P. R., which are largely seedless. Samples of all of these have been brought to the Institute of Tropical Agriculture, at Mayagüez, Puerto Rico, to be used for breeding purposes if they survive there.

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A Nutritional Concept of Cancer

While the etiology of cancer has been categorized under infection by a transmissible virus on the one hand and gene mutation on the other (not to mention a host of other hypotheses), there has been relatively little speculation on the biochemical mechanisms whereby any of these events could lead to the process recognized as neoplastic growth. Recent studies by Beadle, Tatum, and others, on the genetic control of biosynthetic reactions in the fungus, *Neurospora,* have provided a foundation for new concepts of the biological regulation of growth. In particular, a study by Ryan and Lederberg (*Proc. nat. Acad. Sci., Wash.,* 1946, 32, 163–173), on the "adaptation" of a *Neurospora* mutant deficient in the synthesis of leucine, has provided an experimental basis for speculative analogy with neoplasia.

Field strains of *Neurospora* will grow on medium containing only sugar, salts, and biotin, which is to say that the fungus is capable of manufacturing all other essential metabolites. As the result of mutations of single genes, the capacity for synthesis of various compounds may be lost. A similar process presumably accounts for the nutritional requirements of higher forms.

Following ultraviolent treatment, a mutant strain of *Neurospora,* #33757, has been isolated which is incapable of synthesizing leucine. As a consequence, this strain requires leucine, and its growth is quantitatively regulated by the available supply.

Occasionally, cultures of leucineless *Neurospora* grown on limiting amounts of this amino acid will "adapt"; that is, an exceptional fragment of the mycelium will grow autonomously, irrespective of the available leucine, and may under certain conditions overgrow the culture until the sugar is exhausted. By genetic analysis of crosses between adapted and wild strains, it has been shown that adaptation depends on the mutation, or reversion, of the leucineless gene to an allele capable of mediating the synthesis of leucine.

A culture of leucineless *Neurospora* has, then, two growth potentialities: a regulated growth corresponding to the leucine externally available to it, and, exceptionally, autonomous growth on the basis of a gene mutation leading to the synthesis of that metabolite.

If one correlates normal tissue cells with a culture of leucineless *Neurospora,* both regulated by their environment, a simple analogy for cancer is evident—the newly found capacity of a cell to synthesize an essential metabolite otherwise available only in limiting and regulatory amounts.

While the *Neurospora* experiments suggest a mutational origin for this capacity, virus infection, by providing a missing link for a blocked enzyme system, could play a corresponding role. A consequence of this simple concept is that cancer cells may be found to differ in their growth factor requirements from cells of normal origin when they are grown *in vitro.*

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Education and the Foundations of Science

It is no surprise that students and leading citizens should make as poor a showing on Dr. Ralph H. Ojemann's tests of their conception and appreciation of scientific research as that exhibited in his article (*Science,* 1946, **104**, 335–338). Dr. Ojemann has evidently presumed that a pupil who has studied sciences for some years will have learned what he calls "the basic concepts involved," including, especially, one which he identifies as "study through controlled variables" (which he also calls "the most dependable type of study"). Such a presumption is unfortunately not to be justified by reference to the laboratory or to popular textbooks. Rules and procedures are learned, more or less, as are the results they produce; but the idea or philosophy of the business is either wanting altogether, or else set forth without explanation or quite arbitrarily and dogmatically.

This, however, is no wonder. Suppose an explanation of the method of "controlled variables" were undertaken; if it were of scholarly competence, it would shortly lead to Mill's celebrated Methods of Experimental Enquiry, since this particular method is but an application of one or two of these. But alas—these themselves are far from rigorous, as the explanation would also demonstrate. Supposing that it was intended to seek farther for an explanation; the concept of method *per se* and of explanation *per se* would demand attention. These are chiefly logical and epistemological matters. But logical and epistemological matters are little considered in American education. It is then a matter of course that students and others, even though long devoted to science, should be at a loss when confronted with problems which presuppose competence in those unknown directions.

An interesting remark of Dr. Ojemann is that knowledge "grows by research and only by research." If he means here "experiment," then nearly everything in logic and mathematics will be excluded. So, too, will be the whole thinking, theoretical, hypothetical side of experimental science. If, on the other hand, Dr. Ojemann's meaning is that research and knowledge are synonymous, then many who never performed an experiment or did any other kind of scientific work must be considered research men, some of them very high in the scale.

This ambiguity of the term "research" may partly excuse the poor showing of those who submitted to the questioning which Dr. Ojemann describes. The uncertain or unexamined, status of some of the "basic concepts" to which he refers may be a further excuse. The complete absence of anything which could be considered philosophy of science will excuse still more (in the pupils, not the educators). Whether any sins are left for which the pupils are the ones responsible, or for which the scientists and educators themselves are excusable, is a nice question.

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On Methods of Food Appraisal

In a series of reports published by the Naval Medical Research Institute, Bethesda, Maryland, Cdr. C. M. McCay and associates have described the nutritive value of food consumed at several naval shore stations and at one Army camp. In each of these reports a comparison has been made between the analytical value of the diet consumed and the calculated value of the diet issued. While such comparisons could hardly be expected to show close agreement, they nevertheless serve the valuable purpose of emphasizing the inadequacy of ordinary Tables of Food Composition when used for purposes of appraising cooked, ready-to-serve food. This point is not particularly emphasized in Cdr. McCay's reports, however, and as a result, an occasional question has arisen concerning what might appear to be an unfavorable reflection upon the principle of appraising food "as issued."

The original purpose of appraising Army food as issued was to provide a check on the adequacy of menu planning in relation to levels of nutrients recommended for the promotion of nutritional health. This method was later extended to include the appraisal of uncooked food used in the kitchen. Finally, an average deduction was usually made in recognition of loss of food during preparation for cooking (*i.e.* inedible garbage), and also of the losses of fat (and therefore calories) as well as vitamins during the cooking process itself. Because of the wide variability of both preparation and cooking losses, the usual objective attained was the appraisal of the approximate nutritive value likely to be found at three levels of messing operations, *i.e.* good, fair, and poor.

It is quite obvious that such appraisals were aimed primarily at checking the adequacy of food planning, rather than the exact determination of the nutrients to be found in the food finally consumed. Therein lie the chief differences between the two methods of appraisal used for comparative purposes by Cdr. McCay. As mentioned above, the discrepancies in results point to a possible need for nutritive values of *cooked foods*—but at that point one is immediately faced with some difficult questions, chiefly concerning the degree of applicability of such values. In other words, who could assure duplication of the messing operations that were present when the original nutritive values of cooked foods were obtained? Kitchen operations vary not only from mess to mess but also from day to day within the same mess. Variability in recipes and in final moisture content would present innumerable difficulties. In addition, no one familiar with nutritional surveys would deny the attempts of mess personnel to do better during a survey, and the customary relaxation back to "normal" (poor) cooking practices upon the departure of the "inspectors" from the mess under survey. There are also other nonreproducible factors, particularly related to the variability of the initial nutrient content found in raw as well as canned foods.

It is apparent to the undersigned that in spite of inherent shortcomings, both methods can be used to advantage through the simple process of consolidation. Unannounced spot surveys carried out by the actual analysis of cooked food can give a continuous measure of adequacy of food actually consumed, and can also indicate where emphasis is required in courses of instruction given in service schools training mess personnel. In addition, the initial planning of the food to be issued should be checked routinely by preappraisal of the nutrients likely to be found in the uncooked (A.P.) food listed on the menu. Because of the multiplicity of factors that will affect the terminal nutritive value of such food when cooked, the desirability of spending too much time on preappraisal is doubtful. For this reason there has been developed and described in the literature a short method of evaluation of diets based on the use of nutritive values derived for 15 food groups. It has been shown that when this method is properly adapted, the appraisal of A.P. food which is obtained by its use is reasonably close to that obtained using the "long" method involving individual values for individual foods. It is regrettable that there can be no magic formula for conversion to the values found when the food has been stored, prepared for cooking, cooked, and then finally served, regardless of which method is used, either "short" or "long."

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Growth of Ragweed for Its Medicinal Virtues in the Dominican Republic

In the United States, in Argentina, and perhaps in other countries, ragweed, because of its irritating pollen, is very much condemned as a most troublesome weed.

The junior author of this note, who has been engaged for several years in rubber investigations in the Dominican Republic, wishes to report that ragweed in this