symptoms of cortical depression and subcortical release such as sweating, one of the earliest signs, and the Babinski. When hypoglycemia is prolonged further, the other parts of the central nervous system are progressively affected. The significance of the differential depression of the various parts of the central nervous system awaits further analysis. Nevertheless, the present results reveal the primary importance of the reduced metabolism of the brain in the alleviation of schizophrenia.

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CHEMICAL CHANGES OF FRUITS RIPENED IN THE PRESENCE OF ETHYLENE

THE physiological reactions of fruits ripened in the presence of ethylene have been interpreted in various ways. In some cases it has been considered that ethylene has a definite chemical effect, since more sugar, less starch and increased rate of respiration were observed in the treated fruit. In other cases, the experience has been that the effects of ethylene, if any, were more of a physical nature, since the only results observed after treatment were possibly an increased rate of softening and more rapid color development.

In experiments with pears and certain other fruits, the writer has found that ethylene definitely affects certain phases of the metabolism as well as the chemical composition of the fruit. These effects, however, have been obtained only during a definite stage in the life of the fruit. Thus, pears picked and treated with ethylene while still containing starch in the tissues had more reducing and total sugars and less starch than the untreated fruit. Pears treated at later stages of maturity or after being held in cold storage for short periods of time until the starch had disappeared, showed no increase in sugars as a result of ethylene treatment.

After starch hydrolysis has been completed in the fruit, it has been found that there is still a period of short duration when the softening of the fruit can be markedly accelerated by ethylene. That this increased rate of softening in the presence of ethylene is due to an acceleration of the pectic changes occurring in the cell walls is indicated. Before being ripened, pear fruits normally contain approximately 0.8 to 0.9 per cent. insoluble protopectin, but less than 0.1 per cent. of soluble pectin. During ripening the protopectin in the cell walls is hydrolyzed with a corresponding amount of soluble pectin appearing in the juice. These changes are accompanied by a definite softening of the tissues of the fruit. It has been found that these pectic reactions occur much more rapidly in the presence of ethylene than when this gas is withheld from the atmosphere surrounding the fruit. Thus, pears will contain 60 to 85 per cent. of the total pectin in the soluble form at the end of four to six days of treatment, while only a very small amount of soluble pectin has developed in the untreated fruit during this period.

Further evidence that ethylene accelerates the rate of protopectin hydrolysis has been obtained with fruits other than the pear. Gooseberries, for example, contained 54 per cent. of the total pectin in the soluble form at the end of four days' ethylene treatment, while the untreated fruit contained less than 0.1 per cent. of this amount. Green peaches exposed for a three-day period to an atmosphere containing ethylene developed five times more soluble pectin than the untreated lot.

A very marked pectic change resulting from ethylene treatment was observed in the rind of the Ponderosa lemon. Before treatment the rind of samples of this fruit, picked in a green condition, contained approximately 3 per cent. protopectin, but less than 0.1 per cent. soluble pectin. At the end of a fourteen-day period, the soluble pectin in the rind of the treated fruit had increased over 40 per cent., while the insoluble protopectin had decreased a corresponding amount. In the untreated fruit, however, there was only a slight increase in pectin and no noticeable decrease in protopectin.

The results of these experiments indicate that certain ripening changes, such as softening of the tissues, formerly referred to as "physical" in nature, are really a result of chemical changes which can be influenced by ethylene treatment.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A NEW TYPE OF GNOMONIC RULER

A MODIFICATION of existing gnomonic rulers has been devised in this laboratory in an effort to shorten the time necessary to obtain gnomonic projections from Laue patterns. The method developed is suitable for such projection purposes and is capable of being applied to numerous similar problems. The design and operation of the ruler can be most clearly observed by examining the schematic diagram given in Fig. 1. The ruler consists of a plate so mounted on the Laue pattern that the entire ruler can be rotated about the center of the pattern, a straight edge always passing through the center. On this plate at a fixed distance from the center point of the pattern

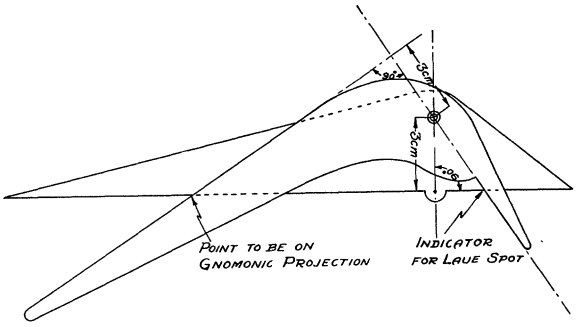

FIG. 1.

(C) in Fig. 2 is a small bearing holding a movable part, so designed that when one of its arms (CD) indicates the position of a Laue spot by its intersection with the straight edge, the other arm (AC) intersects with the straight edge at the correct position for the projected point.

To use the device, a pin is mounted through the small hole at (O) and through the center of the Laue pattern, which has previously been mounted on the sheet of paper intended for the gnomonic projection. The straight edge and the proper movable arm of the ruler are made to intersect at the position of the Laue spot and the corresponding point on the gnomonic projection is marked on the paper with the usual needle point. Rather complicated patterns can be transferred in this manner in a remarkably short time.

The theory is rather simple for the special case in which a definite distance, say c cm corresponds not only to the sample to film distance, but also to the radius of the fundamental circle of the gnomonic projection. Fig. 2 indicates the direction of the

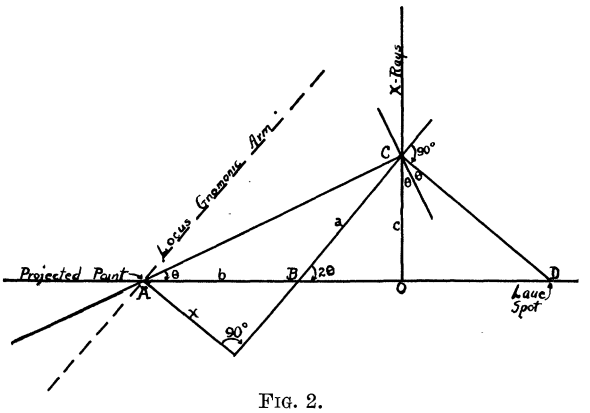

FIG. 2.

x-ray beam producing the Laue spot and shows where the gnomonic point for the same set of planes should lie. Since ABC is an isosceles triangle, $b = a$, but $\sin 2\theta = c/a = x/b$, so that $c = x$. It is evident that the arm intended to designate the position of the point on the gnomonic projection will be perpendicular to the indicating arm for the Laue spot, and at c cm above the bearing C. The bearing, of course, will lie c cm from the center of the Laue pattern at all times. Such a ruler as this can be made in a few moments from bristol board, using for the bearing a rather large eyelet, such as can be obtained from any stationery store. Suitable formulas can be derived for other more general cases, and the curve necessary for the gnomonic arm can be plotted on a piece of graph paper, and mounted on bristol board.

The necessary length of the indicating arms and of the straight edge depends upon the radius of the fundamental circle, and the size of the gnomonic projection desired. The accuracy with which points are located depends to a large extent upon the care used in properly placing the bearing.

Rulers such as this have been successfully employed in this laboratory, and make this type of projection a matter of only a few minutes rather than the somewhat tedious series of operations usually employed. For ordinary work we have found the special case at 3 cm to be very convenient.

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HYDROPONICS SOLUTION USED FOR DAPHNIA CULTURE

FOR the past year and a half we have had considerable success in raising *Daphnia* and other Crustacea and in maintaining cultures for long periods of time, using Gericke's hydroponics[1] solution as a culture medium. *Ankistrodesmus* developed rapidly in this solution and was consumed by the Crustacea. By employing the alternate aquarium method *Daphnia* cultures were kept going throughout the year. Besides *Daphnia pulex,* many other common aquarium forms have been successfully grown in this solution. The extremely common ostracods, *Cyprinotus incongruens* and *Cypridopsis vidua,* amphipods, copepods, planarians, snails and in fact all the usual inmates of aquaria thrive in this nutrient medium. Gericke's solution was also found to be excellent for growing *Elodea, Cabomba* and other aquatic plants to supply aquaria in our department. The added growth and vigor of the plants was noticeable within a day or two after transferring them to the culture medium. Recently, in order to show quantitatively the gain obtained by this method, we have made a series of controlled determinations of total organic matter, plankton counts and chemical changes, the results of which are given below.

In these experiments two five-gallon glass battery jars were placed in a window with a southern exposure,

[1] W. F. Gericke, SCIENCE, 85: 177, 1937.