disk, dissolved in 2 ml of solvent, and measured in a 1-cm quartz cuvette.

After a number of experiments had shown definite changes in NA contents in response to supplied IAA, effects of IAA over a wide concentration range were explored in two experiments. Figure 1 shows increases over controls of PNA, DNA, and fresh weight with IAA concentration and time. Figure 2 permits comparison of absolute changes in PNA, DNA, and fresh weight in control disks and disks treated with 0.014 and 10.0 mg/l of IAA. The results are: (*a*) both PNA and DNA contents in the IAA treated pith tissue rise above control values before an increase in fresh weight is apparent; (*b*) nearly maximal effects of IAA on PNA and DNA are reached within 4 days; (*c*) whereas DNA increases most at *ca.* 0.014 mg/l of IAA, the optimal concentration for PNA increase is at least a hundredfold higher; (*d*) with duration of the experiment, fresh weight increase becomes proportional to PNA increase over a wide range of IAA concentrations. The average ratio of PNA to fresh weight at 7 days is 1.08 with an average deviation of 0.08; and (*e*) material fixed and sectioned shows a correlation of cell division with DNA increase at low concentrations of IAA. At concentrations of IAA optimal for cell enlargement and PNA content, no cell divisions are found in spite of increases in nuclear material (*5*).

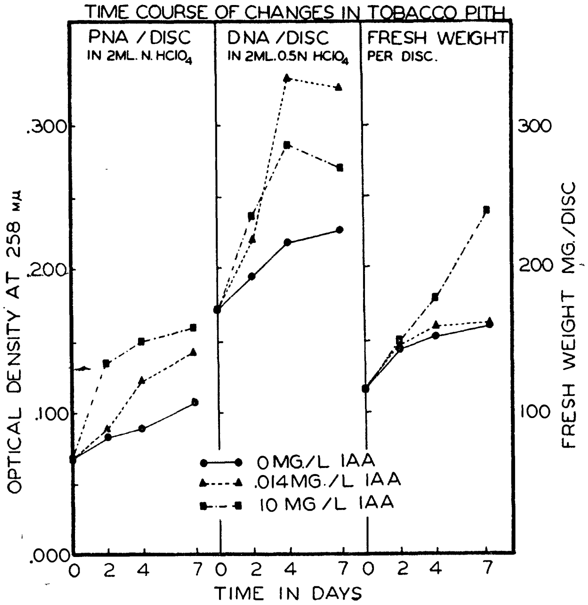

FIG. 2. Fresh weights, DNA content and PNA content of tobacco pith tissue disks cultured on sucrose agar media with 0, 0.014, and 10.0 mg/l IAA.

It should be noted that these changes result from utilization of products in tissues not supplied with nitrogen, phosphate, or organic growth factors. In the presence of such factors that permit rapid proliferation and continuing growth of the tissue, higher nucleic acid contents are found.

Inasmuch as striking zonation of cell division and elongation exists in the plant axis, these differential effects of IAA concentration on the nucleic acids are of special interest because of their morphogenetic implications.

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The Polarographic Investigation of Some Commercially Available Chlorophyllins

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Although the New and Nonofficial Remedies (N.N.R.) and Association of Official Agricultural Chemists' (A.O.A.C.) methods are being used extensively at present for the assay of the chlorophyllins and chlorophylls, they are not as reliable as would be desired. In an attempt to find a more reliable method for assaying these compounds, the use of the polarographic method was investigated.

This method has previously been applied to the study of some extracted chlorophylls by Van Rysselberghe *et al.* (*1*). They reported that the chlorophylls give a reduction wave, $E_{1/2}$ vs. saturated calomel electrode (S.C.E.) $= -1.88$ v, and believe it to be a hydrogenation reaction of the double bond between carbons 2 and 3 of the phytol side-chain in the chlorophyll molecule. Kolthoff and Lingane, however, state that the actual electrode process involved is not known (*2*). Van Rysselberghe's group also reported that no reduction wave was obtained, except for a negligible residue of the phytol wave, for the lithium and tetramethylammonium chlorophyllins they had prepared. No polarographic waves have been reported for the commercial chlorophyllins.

The instrument used in the present investigation was the Sargent Model XXI Visible Recording Polarograph. All potentials were measured directly against the saturated calomel electrode. The dropping mercury capillary had the following characteristics: at a pressure of 26 cm of mercury, the drop time (t) on open circuit in 0.1 M KCl at 20° C was 2.86 sec, the weight of mercury dropping/sec (m) was 3.511 mg, and $m^{2/3}t^{1/6}$ was 2.752.

The electrolysis cell of Lingane and Laitinen was used (*3*). Dissolved oxygen was removed from all solutions by passing oxygen-free nitrogen through the sample for 15 min. A constant temperature water bath was used to maintain the temperature at $20° \pm 1°$ C. All samples were examined over a potential range of 0.0 to -2.0 v.

Of the 14 commercial chlorophyllins used in this investigation, 10 were copper chlorophyllins, 3 were iron chlorophyllins, and 1 was not specified. These were produced by 7 different manufacturers. Varying amounts of each were dissolved and examined in 0.1 *M* KCl solution and in a solution 1.5 *M* in ammonia–ammonium chloride.

The following results were obtained: (1) Reduction in 0.1 *M* KCl: a reduction wave, characteristic for all the chlorophyllins examined, was obtained at an $E_{1/2}$ ranging from -1.22 to -1.38 v and the average $E_{1/2}$ was -1.26 v. Three chlorophyllins gave two additional waves and two gave one additional wave. The $E_{1/2}$ of these waves varied greatly.

(2) Reduction in 1.5 *M* ammonia–ammonium chloride: 11 of the chlorophyllins gave a characteristic wave with the $E_{1/2}$ ranging from -0.89 to -1.03 v, and the average was -0.98 v. A 12th gave a long drawn-out wave which was not measurable.

(a) Nine of the ten copper chlorophyllins gave two additional waves at an $E_{1/2}$ of -0.26 and -0.53 v, respectively. Five of these gave another wave, though poorly defined, at an $E_{1/2}$ ranging from -1.25 to -1.43 v.

(b) The 3 iron chlorophyllins showed a characteristic wave at an $E_{1/2}$ of -1.52 v.

The characteristic waves mentioned in 1 and 2 above are proportional to the concentration of chlorophyllin in each case.

The waves of the copper chlorophyllins at $E_{1/2}$ of -0.26 and -0.53 are believed to be caused by unreacted copper ions used in the manufacture of the chlorophyllins and not completely removed. In a like manner, the wave at -1.52 for the iron chlorophyllins is assumed to be caused by iron not completely removed after the manufacture of the iron chlorophyllins.

It is also our belief that the additional waves appearing in a few instances are due to other impurities that are not removed in the manufacturing procedure.

The reduction wave at $E_{1/2}$ of -1.26 obtained in KCl solution is proportional to the concentration of chlorophyllin in solution in each case, indicating that a component of the commercially available chlorophyllin reacts at the dropping mercury electrode. However, no correlation exists between the height of the diffusion current and the percentage of chlorophyllin stated on the label of the individual chlorophyllin. For example, calculation of the concentrations from the resultant diffusion currents obtained for 80 mg of each of the 14 chlorophyllins does not agree with the concentration as determined by the New and Nonofficial Remedies or Association of Official Agricultural Chemists' methods. The most logical conclusion drawn from this difference is that the polarographic method measures a different component than the other currently available methods. We are tentatively ascribing this reduction wave to the chlorophyllin *b* fraction present in the commercial chlorophyllins since it contains an aldehyde grouping that is presumably reducible at the dropping mercury electrode. However, it is possible that this wave may be due to some other fraction or fractions present since the chlorophyllins are mixtures of several substances as pointed out by Eddy (*4*) and by Voigtlander and Henning (*5*).

Further experiments may ascertain which of these fractions is responsible for this reduction wave.

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Photoperiodic Response of Some Indian Wheats[1]

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The materials of the present investigation are two newly evolved strains of Indian wheat. Ranjan (*1*) exposed the seeds and seedlings of the wheat New Pusa 52 to x-ray treatment and evolved 11 mutants. He subjected them to genetical studies for 8 yr and established the superiority of some of them over the local popular varieties. Pugh (*2*) grew them in large-scale field experiments under varying irrigation conditions and showed that of the 11 strains, two, R-1 (sarojini) and R-9 (Vijaya), are undoubtedly the best. Bhattacharya (*3*) and Ramchander and Bhattacharya (*4*) studied some of the biochemical and physiological aspects and showed that these two strains are higher in some of the protein and mineral contents than the parent wheat N.P. 52. The present investigation is designed to determine whether the photoperiodic response of these two mutants follows the general trend of the other Indian wheats and to note their stage of optimum response to photoperiods. In this study, no other Indian variety of wheat is included because their photoperiodic responses have already been noted by other workers (*5–7*). As long-day treatment, a 24-hr continuous illumination and as short-day treatment, an 8-hr photoperiod were used. The method of obtaining these different photoperiods is the same as in previous work (*8*).[2]

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[1] Grateful thanks are due to Shri Ranjan for his guidance, helpful criticism, and for the facilities provided in the Botanical Laboratory of Allahabad University for carrying out this piece of investigation.

[2] The 24-hr photoperiod was obtained by supplementing the natural daylight with artificial illumination from a 1000-w gas-filled Osram bulb hung at a height of 5 ft from sunset to sunrise, giving an intensity of approximately 30–40 ft-c at the soil surface of the pot. The 8-hr photoperiod was obtained by keeping the pots in daylight from 8 A.M. to 4 P.M. and then by removing them to a well-ventilated dark room for the remainder of the 24-hr cycle.