Plant Physiology in Canada

The seventh annual scientific and business meeting of the Canadian Society of Plant Physiologists (La Société Canadienne de Physiologie Végétale) was held in conjunction with meetings of the Canadian Botanical Association and the Canadian Phytopathological Society at the University of British Columbia, Vancouver, in June 1966. The major symposium, jointly sponsored by the three societies, was concerned with the biochemical, cytological, and genetical changes associated with host parasite relationships in plant disease. M. Shaw (Saskatoon) discussed the importance of the initial events of infection which determine the ultimate fate of the parasite. Within 48 hours of rust inoculation, the mesophyll nuclei of wheat leaves experience a decrease in histone and an increase in RNA. In flax, within 24 hours of rust inoculation, resistant varieties undergo a sharp drop in free phenolics associated with the collapse of local cells. This was considered part of the resistant reaction completed within 24 hours of inoculation. Susceptible varieties undergo an initial increase in free phenolics before infection flecks are visible. C. Person (Edmonton) noted Flor's hypothesis that physiological specialization in the parasite is determined by a gene-for-gene relationship with its host. This continues to provide a useful framework in which to interpret the results of genetic studies, but supporting evidence is derived entirely from studies of cultivated species, and it may not be generally applicable. It is possible that gene-for-gene interactions will be discovered less frequently in systems containing nonobligate parasites. H. W. J. Ragetli (Department of Agriculture, Vancouver) discussed the virus plant interaction and considered the virulent genome to be translated into protein, thus acting as the true cytopathic agent. Electron microscopy of infected, susceptible host cells has shown fatal intracellular disorganization which is suggestive of cytolytic processes. In a search for lysosome-type organelles, particle-bound acid phosphatase was detected in vitro and confirmed by electron microscopy.

L. Siminovitch (Toronto) described the relation of genes to the biochemistry of phage development. Two hundred temperature-sensitive and defective mutants of lambda bacteriophage have been isolated and characterized by genetic, physiological, and biochemical tests. Several isolates have been discovered mutant in genes hitherto unrecognized. The genes controlling early phases of lambda phage development are located on the right arm of the chromosome while those controlling later stages of morphogenesis are found on the left arm. It was concluded that there is considerable clustering of genes governing related functions in the lambda chromosome.

A. Oaks (McMaster, Hamilton) reported that the progressive deterioration in growth rate frequently observed during the subculture of root tissue in maize is due to a deficiency in the synthesis of RNA and DNA. G. Adams and G. Setterfield (Carleton, Ottawa) found no change in the nuclear stainability of DNA of cut artichoke tissue aged on water, but did notice a decrease in the nuclear histone. Treatment with indole acetic acid (IAA) under conditions which stimulated cell division restored the stainability of the histone. This reversal can be inhibited if DNA synthesis is blocked by 5-fluorodeoxyuridine. The apparent drop in histones coincides with a period of rapid RNA synthesis and may be associated with preparation for growth induction.

C. Willemot and P. K. Stumpf (Davis) discussed the formation of fatty acid synthetase as a function of protein synthesis during aging of potato tissue. A metabolic change in the synthesis of fatty acids occurs immediately after cutting. Incorporation of sodium acetate-1-C^{14} into lipids increases tenfold and the percentage composition of the labeled fatty acids is greatly altered. Fresh tissue synthesizes mainly oleic acid, while tissue cut and aged for 24 hours synthesizes oleic and linoleic acids. Inhibitors of protein and RNA synthesis used in conjunction with C^{14}-labeled leucine and uracil demonstrated that the changes are dependent on the synthesis of new protein. D. S. Bendall, W. D. Bonner, and M. Plesnicar (Johnson Foundation, Philadelphia) presented evidence for an unidentified oxidase in mitochondria isolated from spadices of skunk cabbage. Evidence was based on studies of electron transport with succinate as substrate in the presence of cyanide and antimycin A. The oxidase operates in the presence of inhibitors and is connected with the normal respiratory chain at the flavo-protein level. T. T. Lee (Department of Agriculture, Delhi) noted that the inhibition of oxidative phosphorylation is the primary effect of ozone poisoning. Severe inhibition occurred in mitochondria treated in vitro and also in mitochondria isolated from leaves treated with ozone. Inhibition occurs before the appearance of visible injury. A. O. Olson and M. Spencer (Edmonton) discussed the action of ethylene in senescence. The locus of the ethylene reaction was thought to be associated with changes in membrane permeability because it appears to influence the action of adenosine triphosphate (ATP) and adenosine diphosphate (ADP) in causing volume changes in mitochondria. M. S. Gibson and C. H. Wang (Corvallis) reported radiorespirometric studies carried out on the thermophile *Humicola lanuginosa*. Specifically labeled glucose was assimilated by the fungus at 45°C. Both the EMP and the pentose phosphate shunt pathways were operative, the latter functioning to a greater degree in young cultures. At 55°C, the utilization of glucose was partially inhibited. The Krebs cycle was demonstrated in both young growing pellets and in mature cultures at 45°C.

K. F. Wong and E. A. Cossins (Edmonton) reported the partial purification of N^5,N^{10}-methylenetetra-hydrofolate dehydrogenase from pea shoots. Extracts from a number of different plant tissues have shown the production of reduced nicotinamide-adenine dinucleotide phosphate (NADPH) when incubated with N^5,N^{10}-methylenetetra-hydrofolate and NADP. It was suggested that this enzyme system plays a central role in Cl metabolism in plants. D. T. Canvin and Y. Yao (Queens, Kingston) reported a reversion to the normal growth habit by all dwarf wheats examined when grown above 26°C in continuous illumination. W. Vidaver and H. Lue Kim (Simon Fraser, Vancouver) found an inhibition of lettuce seed germination at applied pressures of over 450 atmospheres. The magnitude of pressure exposure influences recovery from the inhibition with increasing pressures extending the germination period. B. Stavric and P. R. Gorham (National Research Council, Ottawa) have isolated and partially characterized a toxic compound from cultures of the blue-green alga *Anabaena flos-aquae*. It has a low molecular weight, shows a strong absorbance at 229 mμ, has a tertiary amine structure, and consists in part of a six-membered ring with a β-unsaturated ketone group. Studies by R. Grover (Department of Agriculture, Regina) on the fate of the herbicide picloram (4-amino-3,5,6-trichloropicolinic acid) in heavy

clay topsoil have established its degradation by soil microorganisms. The herbicide does not affect the nitrogen metabolism of the soil microorganisms but above 1 part per million the respiratory activity of the soil is enhanced. The relation between photosynthesis, photorespiration, and dark respiration in plants continues to be of interest to a number of groups across Canada. B. Tregunna (Vancouver) commented that among a variety of algal species dark respiration is inhibited during photosynthesis and in many is not replaced by photorespiration. F. Poskuta and G. Krotkov (Queens, Kingston) and C. D. Nelson (Simon Fraser, Vancouver) observed that dark respiration is a different process from photorespiration in spruce seedlings and in detached leaves of a number of higher plants. DCMU inhibits photosynthesis, stimulates dark respiration, but has no effect on photorespiration. Increasing the oxygen concentration in light stimulates photorespiration, whereas the dark respiration component is almost unaffected. Of further interest is the marked stimulation of photorespiration in blue light but not in the red. Among several papers presented on translocation, P. V. Rangnekar and D. Forward (Toronto) found very slow rates of C^{14} movement from the branches to the stems of red pine. The main utilization of translocated C^{14} in the stems appears to be in the formation of new tracheids. P. Trip and P. R. Gorham (N. R. C., Ottawa) fed tritiated sucrose to mature Cucurbit leaf blades and found tritium movement confined to phloem tissue. M. Suzuki and D. C. Mortimer (National Research Council, Ottawa) found no correlation between sugar gradients and translocation in the sugar beet. Changes in sugar gradients with the development of leaf blades do not alter the smooth linear patterns of translocated sucrose from the blade to the root.

Officers of the society elected for 1966–67 were: president, D. C. Mortimer (National Research Council, Ottawa); vice president, F. R. Forsyth (Department of Agriculture, Kentville); secretary-treasurer, D. T. Canvin (Queens University, Kingston); eastern director, A. R. A. Taylor (University of New Brunswick, Fredericton); western director, E. B. Tregunna (University of British Columbia, Vancouver).

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