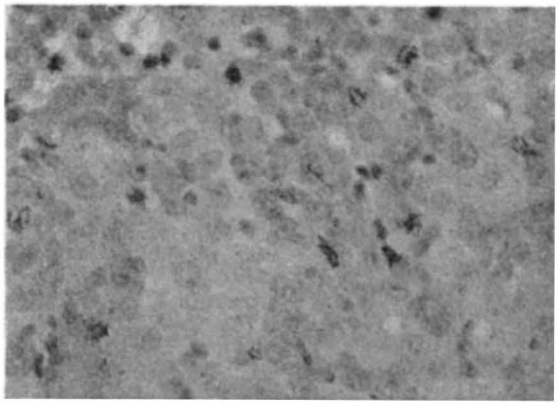

Fig. 2. Radioautograph of liver of rat fed ethionine for 7 weeks and then given tritiated thymidine. Labelled cells are all ductular cells. Hæmatoxylin. (× 120)

as shown by cell counts and autoradiography. Allometric analysis of the individual results for DNA and total protein shows a close relationship, indicating that the increase in liver weight and total protein are functions of proliferation of ductular cells. The smaller rate of increase in total protein and RNA than in DNA is explained by the much smaller cytoplasm to nucleus ratio of the ductular cell. In addition, the disappearance of excess protein and ductules during recovery run parallel. After a high-fat – low-protein diet, bile duct ligation and administration of α-naphthyl isothiocyanate and 2-acetyl aminofluorine, the same chemical and histological relationships hold true.

The excess protein and DNA are thus the structural protein of another cell type pre-existing in the normal liver rather than the accumulation of abnormal proteins as a reflexion of metabolic alterations of the hepatocytes. That the average cell size becomes smaller[5,6] is also explained by the proliferation of this new cell type. Radioautographs demonstrate that the previously observed increased uptake of thymidine-^{3}H (ref. 2) in ethionine intoxication is merely a reflexion of proliferation of ductular cells. No evidence exists that proliferation of ductular cells in the rat is related to carcinogenesis. The correlated approach applied emphasizes the value of morphological controls in the study of liver injury.

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BIOLOGY

Translocated Heat Injury in Plants

TRANSLOCATED heat injury is common in burns of human beings[1] but is apparently not recorded in plants. When one of the two primary leaves of pinto bean (*Phaseolus vulgaris* L.) or cowpea (*Vigna sinensis* ((Torner) Savi) or the cotyledons of National Pickling cucumber (*Cucumis sativus* L.) was heated in water (5 sec. at 70° C. was suitable) and the opposite leaf abraded as in mechanical inoculation with viruses, the heated leaf was killed and the unheated leaf was severely injured. There was no apparent injury to the petioles and stem through which the injury stimulus passed. When the heated leaf was removed from the plant within 4 hr. after heating, the translocated injury to the opposite leaf was prevented, or recovery was favoured. Translocated injury still occurred if heating followed abrasion by as much as 12 hr., or if abrasion followed heating by as much as 16 hr., but comparable injury never occurred from abrasion or heat only. As the ratio of the area of the heated leaf to that of the unheated leaf was increased by removal of part of the leaf area, translocated injury was increased. The time of day to produce maximum translocated injury quickly was in the morning, but translocated injury could be produced at any time of day. Translocated injury was favoured by light and high temperatures in the environment. As the age of plants was increased from 12 to 23 days the degree of translocated injury was increased. The temperature coefficient for translocated heat injury was about 10. This translocated heat injury had various effects on infections which will be reported elsewhere. While no chemical responsible for translocated heat injury has been demonstrated, these results suggest a similarity between translocated heat injury in plants and animals.

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A Distinction between Bolting and Flowering Effects on Senescence

IT is well known that flowering and fruiting processes bring about the senescence of most annual species of plants. Molisch[1] interpreted this senescence as due to the mobilization of food materials into the fruits. His interpretation has been questioned by Leopold, Kamien and Janick[2], for staminate as well as unpollinated pistillate plants of spinach show senescence after flowering. Both staminate and pistillate spinach plants develop a large seed stalk with the commencement of reproductive development, and it may be that Molisch's interpretation could be made more correct by including the mobilization of food materials into the stalk as an explanation of the imposition of senescence. The application of gibberellin to spinach which has not experienced photoperiodic induction will result in the formation of a stalk without the further development of flowers, providing an opportunity for distinguishing between the effects of bolting and of flowering on senescence.