lowing the freeze was accompanied by a rapid increase in bark thickness of about the same magnitude as the previous decrease. For example, between 2:45 p.m., April 9, and 5:45 a.m., April 10, a freeze occurred, and the difference between the readings of the bark thickness for those two observations was $-83\ \mu$. Between 5:45 a.m., and 2:45 p.m. April 10 a thaw occurred, and the bark increased $+80\ \mu$. During the flow period there was some decrease in bark thickness. Changes also occurred during the period of elevated temperatures, but none of great magnitude occurred until the stem again froze.

To correlate changes in bark thickness with those in the xylem, changes in the diameter of the xylem cylinder were measured. A hole was drilled through the stem and

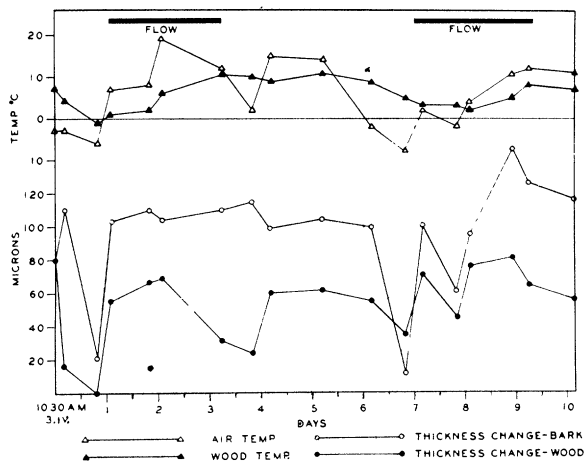

FIG. 2. The lower graph illustrates the changes in thickness of the bark and the xylem cylinder for the 2 trees measured. The upper graph illustrates air temperature and wood temperature for the same period.

an invar steel rod of a length equal to the tree's diameter was placed in the hole. The rod was fastened to the xylem on one side of the tree and the measurements were made between the end of the rod and the surface of the xylem cylinder on the other side of the tree. Corrections were made for thermal changes in the length of the rod. The observed changes in bark thickness, wood thickness, and wood temperature are illustrated in the table (experiment 2) Fig. 2. The changes observed are comparable to those found in experiment 1.

The xylem cylinder also changed in diameter at the time the changes occurred in the bark, and the change was in the same direction as that observed for the bark (see experiment 2). The magnitude of the change in the xylem is quite different from that of the bark. The bark changes were measured for a thickness of about 1 cm; the changes for the xylem, for a xylem cylinder 46 cm in diameter. Thus, the change recorded for the wood for any period should be multiplied by .022 to compare the two tissues on a unit of thickness basis. For example, between 5:45 a.m. and 12:15 p.m. on April 4 the bark increased $82\ \mu$ in diameter, and the xylem cylinder $55\ \mu$ in diameter. However, 1 cm of the xylem diameter increased only $1.20\ \mu$; thus, the change recorded for the wood per unit of thickness was much less than that of the bark. A detailed analysis of the factors responsible for these changes is in progress.

The present observations which show that flow is preceded by a transient decrease in bark thickness induced by a transient freezing ambient temperature indicates that the bark must at least be considered in a discussion of the mechanism of sap flow.

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The Effect of Water Diuresis on Renal Plasma Flow[1]

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The effect of water diuresis on renal plasma flow in the human being has never been clearly defined. The subject has, however, been studied in various laboratory animals. Dicker and Heller (*3*), working with rats and

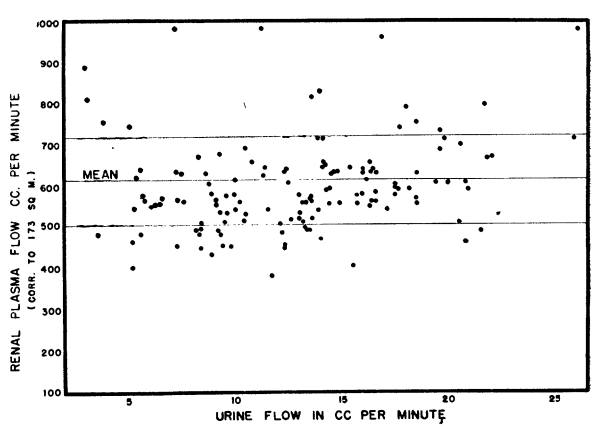

FIG. 1. Renal plasma flow at various rates of urine flow. Each dot represents a separate clearance period.

rabbits, found that in the former species water diuresis had little or no effect on glomerular filtration rate or renal plasma flow; in the latter species both clearances rose as urine flow increased. The authors did not extend their studies to the human subject.

In devising a technique for the study of renal plasma flow in the human subject during exercise (*1*) we found it desirable to institute moderate water diuresis in order

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to overcome the antidiuretic effect of exercise. Since water diuresis, itself a stress of a sort, might conceivably affect renal plasma flow in the human subject, it was necessary to obtain specific information on the point.

Full details of the method have been reported elsewhere (*1*). Renal plasma flow was determined under basal conditions in 9 normal young men by the *p*-aminohippurate clearance technique. There was a total of 59 experiments and 140 basal clearance periods. Water was given by mouth in varying amounts before and during the clearance determinations. Urine samples were collected by voluntary micturition.

Fig. 1 shows that there is no significant trend in renal plasma flow at rates of urine flow varying from 5 to 20 cc/min. Renal plasma flow at lower rates of urine flow were not studied, but the mean figure obtained in the present work (613 ± 107 cc) is not significantly different from that obtained by other workers (*2, 4*) employing low rates of urine flow. This suggests that neither moderate water diuresis nor substitution of voluntary micturition for catheterization affects renal plasma flow in healthy young men.

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Acid Phosphomonesterase Activity of Human Neoplastic Tissue[1]

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Since the development of a method of histological demonstration of enzymes hydrolyzing mono-phosphate esters in acid hydrogen ion concentrations (*3*), it has been shown that the nuclei of cells of almost all human tissues react strongly (*10*). Neurones and prostatic epithelium alone exhibit heavy cytoplasmic staining (*1, 2, 10*). In most of this work, however, the deleterious effects of protein denaturation during fixation and heating for paraffin embedding have been ignored, resulting in inconstant staining and variable localization of the precipitate forming during incubation. In developing our method for simultaneous quantitative estimation of activity of this enzyme along with its cytological localization, we noted, as did others (*1, 3*), these factors which are to be avoided in precise work. In addition we have attempted to preserve cellular integrity to a greater extent than that usually attained in biochemical methods used in the past to measure tissue phosphatases (*11*).

Utilizing the procedures outlined below we have been able to obtain reproducible measurements of activity of this universal nuclear component of human tissues on specimens no larger than those obtained in the usual surgical biopsy. We have found that it appears definitely related to rate of tissue growth and secretion. Moreover, human cancers exhibit a uniform increase in nuclear acid phosphatase when compared with homologous tissues of origin.

FIG. 1. Advancing margin of carcinoma of stomach, stained for acid phosphatase after 30-min incubation. Central area of normal muscularis with infiltrating tumor on each side. The black areas indicate lead sulfide precipitate within nuclei, at the site of maximum phosphatase activity. The cytoplasm has been lightly counterstained with fast green. (400×).

The methods used have been as follows: small blocks of tissue 1–2 cm in length and a few mm wide and thick are removed from freshly obtained surgical specimens, usually adjacent to blocks obtained for pathological diagnosis. Normal gastrointestinal epithelium for control studies in gastrointestinal cancers is dissected free from the muscularis. In the case of fibroids, blocks from the central but nondegenerated part of the fibroid are removed for comparison with adjacent blocks of homogeneous and grossly uninvolved myometrium. In malignant tumors it is always a problem to obtain a block which will be rich in viable cancer tissue, approaching the epithelium of origin in density of cells. We have usually sampled the

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