border parenchyma of the leaf eventually stops upward translocation. At the same time sugars are almost quantitatively exported from the blade against steep concentration gradients.

The reactions in maize are similar (*cf.* Table 1). Sucrose concentrations of 2 to 3 per cent. in the blade drop to 0.2 per cent. in 24 hours of darkness, while total sugar concentrations of 3 per cent. drop to 0.3 per cent. Removing or bagging the ears to prevent translocation to the grain gives a leaf drop of from 3 to 4 per cent. to 0.5 to 1.0 per cent. total sugars, showing some backing up into the leaf.

A reversed polarization shows in the cob where sterile (bagged) cobs show a drop in sugars after the plants are darkened, but fruiting cobs, from which sugars are being rapidly moved to the grain, may show sugar gains of 30 per cent. of their original concentration after 72 hours of darkness (*cf.* Table 1). A polarized movement toward the developing grain is indicated.

A still more striking demonstration of the polarizing action of developing grain may be obtained by removing all leaves from the main axis of a plant having well-developed basal branches or suckers. If these leaves are removed just before normal pollination, the ear shoot fails to develop and the stalk is barren. If the nearby leaves are left a few days until a polarizing action of the developing embryos can be established, full-sized ears can be produced by translocation from leaves on the sucker branches 8 or 10 feet from the ear. Typical data are shown in Table 3. No appreciable grain development, in terms of dry weight, had occurred in the plants defoliated eight days after pollination. Polarization had been established, however, and normal grain was developed with food obtained from the leaves of the sucker stalks. Normal yields could be obtained with defoliation at the time of pollination by first bagging the ear shoots and holding the plants without defoliation until they had built up a local food reserve sufficient to initiate embryo development. All grain produced by the plants defoliated two days before pollination (−2) was on stalks held in this way. When the main stalk was defoliated just before the ear shoot emerged from the sheath, all further development of the shoot was prevented.

TABLE 3

YIELDS OF MAIZE PLANTS WITH BASAL BRANCHES WHEN THE MAIN STALK WAS DEFOLIATED BEFORE AND AFTER POLLINATION

Defoliation—days after pollination						
−2	0	1	2	4	8	Ck
Yield as a percentage of check						
10.9	34.4	48.7	59.0	73.7	99.5	100.0

Unpublished and general evidence indicates that polarized translocation is a factor in many correlation and inhibition reactions of plants generally, as well as of maize.

SUMMARY

(1) The pith of maize shows a changing sugar content with changing sugar movement in the phloem which would not be predicted from our present picture of the morphology of the maize bundle.

(2) By all tests of changing concentration, sucrose is the important carbohydrate of translocation in maize. Interconversion of the several sugars is too rapid, however, to permit a final conclusion.

(3) An hypothesis of translocation in maize must not only account for movement against an osmotic gradient, but against gradients of each of the substances which might possibly be translocated. Such secretory translocation certainly occurs between the leaf mesophyll and the phloem and probably along the phloem itself.

(4) Translocation in maize is polarized, out of the leaf, out of the xylem and toward the developing fruit. Polarized translocation out of the leaf is established during the later stages of tissue differentiation. Polarized translocation toward the fruit is established in the early phases of embryo development and does not develop in the absence of pollination.

OBITUARY

RECENT DEATHS

DR. THOMAS F. HOLGATE, professor emeritus of mathematics and dean emeritus of the School of Liberal Arts of Northwestern University, died on April 11. He was eighty-six years old.

ALFRED VICTOR DE FOREST, professor of mechanical engineering at the Massachusetts Institute of Technology and president of the Magnaflux Corporation, died on April 5 at the age of fifty-six years.

DR. RAYMOND HASKELL, consulting engineer for the Texas Oil Company, died on April 6. He was sixty-six years old.

SIR WILLIAM NAPIER SHAW, F.R.S., meteorologist, a former director of the British Meteorological Office, died on March 23 at the age of ninety-one years.

DR. HANS FISCHER, professor of organic chemistry at the Technical High School at Munich, has died at the age of sixty-three years.