seeds are like the rose in having dormant embryos and in requiring a low temperature period in a germinator for after-ripening. This is true of basswood, Juniper, fall-seeding maples . . ." Chittenden (1926)[3]: "The difficulty seems to be due to the impervious seed coat and rudimentary embryo." Grimsley (1930)[4]: "Seed coats at no time appear to be a limiting factor in the absorption of water. Dormancy in *Tilia* seeds exists in the embryo or in the endosperm, probably in both." There is nothing in these papers to indicate that the authors attempted to germinate naked embryos.

The writer finds that embryos of un-after-ripened seed exhibit geotropic curvature within twenty-four hours and at least one millimeter elongation of the hypocotyl within forty-eight hours when placed on a moist substratum at room temperature. These results occur whether the embryo is entirely freed of the enveloping endosperm or merely freed at the tip by dissecting away a small portion of the endosperm.

From experimental evidence the writer concludes that the effect of the nucellar membrane on oxygen intake is an important factor in the dormancy of *Tilia*. Apparently, one of the after-ripening changes is increased permeability, whereby the seed is enabled to germinate under ordinary oxygen pressure. This change takes place readily in moist stratification at refrigeration temperatures, but in some instances it occurs also in air dry storage at room temperature.

Impermeability of the testa to moisture is a factor in prolonging the dormancy of *Tilia*. Under natural conditions it may be responsible for delaying germination several years. Such impermeability may be overcome by treating seeds, freed of their pericarps, with concentrated sulphuric acid. When so treated fresh seeds or seeds from air dry storage after-ripen perfectly and germinate over a wide range of refrigeration temperatures.

J. NELSON SPAETH

YALE FOREST SCHOOL,
NEW HAVEN, CONN.

ORIGIN OF A TETRAPLOID SHOOT FROM THE REGION OF A TUMOR ON TOMATO

IT has been known for some time that polyploid cells occurred frequently in the tumorous tissues of plants infected with *Bacteria tumefaciens*. Such conditions suggested the possibility of obtaining from these areas shoots whose chromosomal constitution would be changed should they arise from polyploid cells initiated under the influence of the bacterial parasite. In order to test this 120 tomato plants were inoculated internodally in the spring of 1931 with cultures of *Bacteria tumefaciens*. One hundred nine of these inoculations were successful and tumors were formed. When the tumors reached the size of a pea the stems were cut off about 3 to 5 centimeters above them to induce shoot formation. In many cases shoots originated from the tissue about the tumors; in 7 instances a shoot formed from the region where the tumor was developing. These seven shoots, together with a small portion of the stem and the tumor, were removed and the stem, tumor and lower part of the shoot buried in soil to induce rooting. Two of the seven shoots died. One of the five successfully rooted proved to be tetraploid. All the roots coming from this shoot three centimeters and more above the point of origin from the tumorous stem were examined and showed 48 somatic chromosomes as compared with the 24 somatic chromosomes of the plant from which it originated. Two months after rooting this shoot was separated from the tumorous stem and transplanted. The resultant plant had leaves the same size and general appearance as the stem plant, but the flowers were a little larger.

This is another instance which would seem to show that polyploidy can not be treated as a cause for the tumorous growths, as sometimes suggested, but may be a harmless sequence of the conditions initiated in the tumorous region. Explanations of the manner in which such polyploidy may be effected have been considered in earlier studies of the protoplasmic state under similar conditions.

The present method and the results obtained might prove useful in attempts to experimentally bring about an increasing occurrence of polyploidy and the production of plants with altered chromosomal constitution. Cutting itself has given rise to polyploidy in shoots arising from the callus tissue; in this instance, however, the shoot originated well outside of any region of injury. The slight injury at the inoculation point was on the opposite side of the stem and the removal of the upper portions of the stem was purposefully well above the tumorous region.

DONTCHO KOSTOFF

DEPARTMENT OF GENETICS,
ACADEMY OF SCIENCES,
LENINGRAD, RUSSIA

JAMES KENDALL

DEPARTMENT OF BIOLOGY,
COLLEGE OF THE CITY OF NEW YORK

[3] A. K. Chittenden, *38th Ann. Rpt. Mich. Agr. Expt. Sta.*, 293.

[4] G. Grimsley, *Jour. Elisha Mitchell Sci. Soc.*, 46, 73.

PHOTO-PRINTING

IN the issue of SCIENCE for May 6 appeared an article by Professor Tracy I. Storer, of the University of California, on "What is a Publication?" Professor Storer discussed a definition of "publication"