On the Ohio project the rainfall maps are being used as in Oklahoma for the study of rainstorm morphology, but in addition they will be used to determine the amount of rainfall and the time of its occurrence on the minor watersheds above stream-gaging stations. These data will be related to the runoff as measured at the gaging stations in the expectation that it will be possible to forecast discharge and stage from the records of selected rain gages.

Rainstorm morphology is seen to have implications in a number of related fields. It reveals the limitations in existing determinations of rainfall intensity-frequency and indicates ways in which such determinations may be improved; it suggests a new approach to the problem of flood hazards and forecasting; has a definite bearing on the statistical study of the relation between climate and crop yields, and suggests important refinements in soil erosion experiments. In addition, it raises the suspicion that variations in annual rainfall may be due to the random distribution of individual rainstorms, in which case forecasting of rainfall through extrapolation would be quite impossible. The maps of wind velocity and direction have revealed facts regarding the characteristics of surface fronts, of basic importance to air mass studies in meteorology, which could not have been obtained in any other way. The value of these microclimatic studies lies not so much in continued observations over a long period of years as in the obtaining of simultaneous observations at sufficiently short intervals to permit the study of many individual rainstorms. In a few years enough could be learned about the characteristics of storms in these two areas to make it possible to approach the climatic problems relating to soil and moisture conservation, land use and flood control on a more intelligent basis.

C. W. THORNTHWAITE

SOIL CONSERVATION SERVICE,
WASHINGTON, D. C.

CHROMOSOME ALTERATIONS BY CENTRIFUGING

IN my previous publications[1] I showed that in centrifuging of germinated seed of *Vicia Faba, Nicotiana Langsdorffii,* wheat, etc., various alterations were induced in the somatic chromosome sets. Monosomic, trisomic, tetrasomic and polysomic cells and cell regions were found as well as such with tetraploid and hypertetraploid chromosome number. Occasionally cells with chromosome fragments were also observed. A student of mine (I. Rajably) induced the same chromosome alterations by centrifuging in barley, *Vicia sativa* and in *Matthiola.* He even produced a tetraploid *Matthiola* plant.

[1] D. Kostoff, *Archivio Botanico,* 11: 91–96, 1935; *Compt. Rend. Acad. Sci. USSR,* 2: 71–76, 1935; *Zeitschr. Induct. Abstamm. Vererbungslehre,* 69: 301–302, 1935.

The results of my more recent experiments are:

(1) *Nicotiana Langsdorffii.* Besides the chromosome alterations, I obtained in F_2 generation a variegated plant (leaves and flowers), which gave in F_3 green: variegated : white, in various ratios, depending on the capsule from which the seed was collected. I grew during the last twelve years each year thousands of seedlings of *N. Langsdorffii,* from which only 30 to 100 were usually transplanted for raising adult plants; nevertheless, I never have found variegated seedlings among those I grew. It should be mentioned here that variegated plants develop only from variegated seedlings.

(2) *Crepis capillaris.* Professor Dr. G. Lewitzky, of Leningrad, sent me kindly seed from *Crepis capillaris,* for which I wish to express here my gratitude. Centrifuging germinating seeds, collected last year, chromosome alterations were induced as those mentioned above, involving A, B and D chromosome.

(3) *Hybrid. Nicotiana rustica* × *N. tabacum.* A large number of seed was produced by crossing *N. rustica* with *N. tabacum.* Germinated seed were centrifuged and then transplanted. Many of them died. One plant out of 81 adult hybrids came out to be a chromosome chimera, forming a branch with doubled chromosome number ($2 \times 48 = 96$). This branch was self-fertile, giving rise further to amphidiploid *N. rustica* × *tabacum,* while all F_1 hybrids and the other branches of the chromosome chimera were self-sterile.

A more detailed description of the experiments will be given later.

DONTCHO KOSTOFF

INSTITUTE OF GENETICS, ACADEMY OF SCIENCES OF USSR, MOSCOW

A SIX-CHROMOSOME ASCARIS IN CHINESE HORSES

A BRIEF note with the above title was published in Volume 9 of the *Peking Natural History Bulletin* in December, 1934. As that scientific journal does not have a wide circulation in America, and the chromosomes of *Ascaris megalocephala bivalens* and *univalens* have had so much historical and practical value for biologists, I am asking for the privilege of announcing this discovery in SCIENCE. The first material came from six worms brought to this laboratory by a man who had been asked to collect Ascaris from Chinese horses because we wanted to make our own slides to illustrate mitosis and maturation phenomena for classwork. In 1935 he brought six more, but these were all dead, and now this year he has brought twenty-two new ones in very good condition, and we have plenty of material to work out oogenesis, spermatogenesis and cleavage.

The behavior of the chromosomes is just the same as in the classical Ascaris material, except that there