various degrees of inhibition in the subsequent development and function of flowers, leaves, shoots and roots, is shown most markedly after reproduction has progressed towards completion, *viz.*, fruit and seed formation.

An examination in detail of some of the earlier, very significant though less evident, stages of reproduction has disclosed, that, in addition to an inhibitory or retarding influence, as is exhibited during fruit and seed development, a more or less specific stimulation also occurs with initiation of fruit development and the early stages of fruit setting.[3] Hence coincident with sexual reproduction, vegetative growth is first stimulated and later retarded, in tandem order as it were.

The concept that, as a result of gametic union, growth is stimulated was introduced and demonstrated some time ago (Murneek, 1926),[3] while later observations suggested a similar stimulation during synapsis (Murneek, 1937).[3] As a result of further study of the problem we have now on record considerable proof, details of which will be presented in a forthcoming publication, that during the process of sexual reproduction metabolism is indeed accelerated, specifically at the approximate time of union of the chromosomes at meiosis (synapsis) and during union of nuclei at fertilization (syngamy). The two periodic stimulations in growth, therefore, have their origins in the process of fertilization with its two cytogenetically important phases, chromosome conjugation and gametic union, accepting the view long current that synapsis is the final or culminating phase of the sexual process, and disconsidering for the present exceptional cases or alternating mechanisms, as in certain polyploids or parthenogenetic organisms (Sharp, 1937).

It has been possible for us to demonstrate repeatedly by means of removal of reproductive organs at different stages of their development from a variety of plants (spinach, cucumber, strawberry and sour cherry) that a period of renewed growth, presumably arising from increased metabolic efficiency of the roots and leaves, follows each of the above two crucial phases of reproduction. These intervals of accelerated activity in the plant manifest themselves by increases in vegetative extension, the production of fresh and dry matter, the absorption of soil nutrients, and the accumulation of products of photosynthesis. In inflorescences of many plants the post-synaptic and post-syngamic periods are characterized by an augmented elongation and changes in movement of the pedicels. Two spurts in growth and alterations in movement usually occur, one during bud development, the other following fertilization of the egg.

[3] A. E. Murneek, *Mo. Agr. Exp. Sta. Res. Bul.*, 90, 1926. SCIENCE, 86: 43–47, 1937. S. H. Wittwer and A. E. Murneek, *Proc. Am. Soc. Hort. Sci.*, 40: 205–208, 1942.

Determinations of catalase activity in developing flowers and accessory tissues of the pear tree and corn plant showed two prominent peaks. The first increase followed synapsis in the microspore mother cells, the second occurred after nuclear fusion in the majority of the embryo sacs.

Following the initiation of chromosome conjugation in the staminate and fertilization in the pistillate flowers of corn, substances possessing marked growth stimulating properties (growth hormones) were produced, the greatest concentration being attained within the tassels 10 to 14 days after beginning of synapses, and in immature kernels an equal period subsequent to syngamy. The pre-synaptic stage in the male and the pre-syngamic period in the female inflorescences were distinguished by an absence of growth substances in the respective reproductive organs. The two maxima representing hormone concentration correspond quite precisely with (a) the peaks in catalase activity, and (b) the spurts in growth following gametophyte and embryo inception.

Extracts of the immature corn kernels, applied in lanolin paste, were active in fruit setting and parthenocarpic fruit induction in the tomato. The set, yield and size of the fruit were superior to that obtained by means of artificial pollination and by the use of synthetic growth substances.

These results have an unexpected confirmation and permit the interpretation of certain heretofore unintelligible results secured by Kreusler and his coworkers on the growth of the corn plant and published some 60 years ago.[4] A critical reexamination of their data and consideration of the time factor in morphogenesis of the corn plant reveal a striking correlation between (a) periods of greatest vegetative extension, accumulation of dry matter, absorption of soil nutrients and accumulation of photosynthetic products (Kreusler's data) and (b) peaks in production of growth hormones in the reproductive organs, as disclosed by our studies. The intervals of maximal increase in stimulating substances followed closely in all cases the beginning of synapses in the flower buds and embryo initiation in the young fruit.

A. E. MURNEEK
S. H. WITTWER
UNIVERSITY OF MISSOURI

NAME AND CLASSIFICATION OF THE CURLY-TOP VIRUS

SYMPTOMS induced in affected plants are the best characteristics now known for the classification of phytopathogenic viruses. The symptoms induced in beets as well as in other hosts by the curly-top virus complex would lead to the placing of this virus in the

[4] U. Kreusler, *et al.*, *Landw. Jahrb.* 6: 759–786, 787–800, 1877; 7: 536–564, 1878 and 8: 617–622, 1879.

leaf-curl group described by Holmes[1] as the family *Rugaceae* with the one genus, *Ruga*. Holmes has placed the curly-top virus in the yellows group, the family *Chlorogenaceae,* and in the single genus, *Chlorogenus,* but the symptoms induced by the curly-top virus have little in common with those used to describe the family *Chlorogenaceae.*

The specific epithet, *eutetticola,* is in error from an orthographic viewpoint because the proper root for the first member should have been *eutettig-*. The specific epithet should, therefore, be changed. Changing the specific epithet affords the opportunity to choose a term that characterizes the curly-top virus and is not out of accord with present knowledge. The specific epithet, *eutetticola,* was assigned by Holmes to the curly-top virus when no other vector was known except the beet leafhopper, *Eutettix tenellus* (Baker). It is now known that this leafhopper failed to transmit the variety of the curly-top virus that occurs in Argentina. Another vector, *Agalliana ensigera* Oman, serves as vector there.

Because the curly-top virus causes in sugar beet and other host plants arrested development of invaded tissues, leaf curl, enations and other deformities rather than the symptoms used to describe the genus *Chlorogenus,* we propose that the curly-top virus be shifted to the genus *Ruga.* And, in view of the fact that the virus causes rough, pointed enations on the veins and rough distortion of the leaves and also in view of its vector relationships, we propose that its specific epithet be changed to *verrucosans,* to mean causing rough swellings. The name of the curly-top virus then will be *Ruga verrucosans.*

Detailed studies on the Argentine curly top will be published later in a more extensive paper.

EUBANKS CARSNER
C. W. BENNETT
DIVISION OF SUGAR PLANT INVESTIGATIONS,
U. S. DEPARTMENT OF AGRICULTURE,
RIVERSIDE, CALIF.

THE PREPARATION OF SODIUM IODOACETATE

IN a recent issue of SCIENCE[1] there appeared a request for sodium iodoacetate in the section devoted to "Rare Chemicals." It is difficult to obtain this reagent in pure form by the procedure customarily employed.[2] The present note describes a simple method for preparing pure sodium iodoacetate in good yield from monochloroacetic acid.

Monochloroacetic acid (10 gm) is dissolved in pure dry acetone (150 ml) containing sodium iodide (24 gm). The solution turns brown and separation of sodium chloride begins almost immediately. The reaction is complete in 6 to 8 hours at room temperature. The sodium chloride is removed by filtration through sintered glass and washed with a little acetone. The combined filtrates are adjusted to pH 6.8, using 40 per cent. sodium hydroxide. The precipitate which separates is filtered and washed with acetone, with chilled absolute alcohol and finally with dry ether. The product is powdered and dried *in vacuo.* It is quite colorless and free from halide ion. Yield: 20 gm (91 per cent.).

LEON GOLDBERG
SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH,
JOHANNESBURG

ISOTEL, ISOTELIC

IT is surprising that no one has previously suggested (so far as the writer is aware) the use of the term *isotelic* (Gr. isos = same; telos = purpose) to designate the relationship between entities which have the same purpose.

The familiar term *isomer* (pl. isomers) is used in chemistry to designate compounds made up of the same parts (Gr. isos = same; meros = part). In an exactly analogous way it seems logical and convenient to designate compounds which perform the same function as *isotels* (Gr. isos = same; telos = purpose).

In biochemistry the need for such terms appears real in view of the fact that numerous cases can be cited of distinct chemical compounds which can replace one another, for example, in the diet. Thus there are numerous *isotelic* forms (*isotels*) of vitamin D as well as other vitamin *isotels* (including biotin *isotels*).[1] In animal nutrition methionine and choline may be said to be partially *isotelic.* In yeast nutrition β-alanine and pantothenic acid may be said to be *isotelic,* since one may replace the other in nutrient media.

The term *vitamer* has been suggested[1] to designate vitamin forms which can replace one another. This term was obviously suggested also by the word isomer. Unfortunately, however, the wrong portion of the word isomer was used and as a result *vitamer,* aside from having a mixed Latin and Greek origin, has a definite but false etymology, meaning, life-part. This is meaningless so far as the proposed use of the term is concerned.

ROGER J. WILLIAMS
THE UNIVERSITY OF TEXAS,
BIOCHEMICAL INSTITUTE, AND
CLAYTON FOUNDATION FOR RESEARCH,
AUSTIN

[1] F. O. Holmes, "Handbook of Phytopathogenic Viruses." Burgess Publishing Company, Minneapolis, 1939.
[1] SCIENCE, 97: 304, 1943.
[2] W. A. Drushel and G. S. Simpson, *Jour. Am. Chem. Soc.,* 39: 2453, 1917.

[1] D. Burk and R. J. Winzler, SCIENCE, 97: 2507, 57–60, January 15, 1943.