very large quantities or intravenously in moderate quantities is partly excreted by the kidneys.

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THE ARTIFICIAL SYNTHESIS OF A 42-CHROMOSOME WHEAT

COMMON wheat, *Triticum vulgare,* and the related species, *T. Spelta* and *T. compactum,* form a natural group (usually called the *vulgare* group) which is believed to have originated by crossing between a wheat of the emmer type and a species of the related genus *Aegilops*. This origin was first suggested by Percival on purely taxonomic grounds. Later it received strong support from genetical and cytological evidence.

The different species of both *Triticum* and *Aegilops* have their chromosome numbers in multiples of seven. The emmer wheats are tetraploid (2n = 28) and the *vulgare* group hexaploid (2n = 42). Cytogenetic studies show that all the fourteen haploid chromosomes of emmers have homologues among the twenty-one of *vulgare* and spelt. The remaining seven in the latter must, if our hypothesis of the origin of *vulgares* is correct, have come from *Aegilops*. And cytological evidence is not lacking that some species of *Aegilops* contain a set of chromosomes which are homologous with these seven.

Crossing a species of wheat which has fourteen haploid chromosomes (emmer) with one of *Aegilops* which has seven, produces a completely sterile hybrid which has twenty-one. If doubling of the chromosomes were to occur in the sterile hybrid, the somatic number (42) of the *vulgare* group would be produced, fertility should be restored, and, if the hypothetical origin of *vulgares* is correct, the characters might be expected to resemble those of *vulgares*.

Accordingly, *T. turgidum* (n = 14) was crossed with *A. speltoides* (n = 7). The seedlings were treated with colchicine to induce chromosome doubling. A special colchicine technique involving repeated daily injections with a hypodermic needle proved successful. A considerable number of heads on two different plants were found to have the doubled number. These heads with forty-two chromosomes showed nearly normal chromosome behavior (twenty-one pairs). They were fully fertile.

Several offspring from these heads have been raised to maturity. Their chromosome number is that of the *vulgare* group of wheats; their chromosome behavior is nearly regular; their fertility is reasonably good. They also have some of the characters of the *vulgare* group; this is true with respect to laxity of head, pubescence of leaves, shape of glume, shoulder and tip of glume and development of keel. In certain respects spelt resembles some of the 28-chromosome wheats more than it does *vulgare,* and in some of these points the synthetic type resembles spelt, notably in form and fragility of head and adherence of glumes. In certain other characters, such as the diameter and solidity of the stem, the new type resembles the emmers rather than either *vulgare* or spelt.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN ANTIMONY ELECTRODE FOR THE CONTINUOUS RECORDING OF THE ACIDITY OF HUMAN GASTRIC CONTENTS*

THE pH of gastric contents has been determined *in situ* by Eyerly and Brenhaus[1] for human beings and by Flexner and Kniazuk[2] for dogs. In both investigations the glass electrode was used. The disadvantages of using this electrode lie in the serious difficulty of adequately insulating the leads from the electrode, since the resistance of this insulation must exceed that of the glass electrode and the large size and inflexibility of the tubes that must be passed into the stomach.

The method for measuring the pH of gastric juice described here overcomes these difficulties by substituting for the glass electrode an especially prepared antimony electrode. No elaborate precautions are required for insulation. The electrode is 5 mm in length and 1 mm in diameter and the rubber tube containing the leads, which are 3 strands of No. 43 copper wire, is only 1 mm in diameter and entirely flexible. The electrode is swallowed without any difficulty and can be retained in the stomach for a long period of time without the slightest discomfort to the subject.

The potential of the antimony electrode is measured against a calomel half cell connected to saline in a basin into which the subject places a foot. The pH is recorded with any convenient type of measuring apparatus; for the record given here, a Leeds and Northrup continuous recording potentiometer was used.

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[1] J. B. Eyerly and H. C. Brenhaus, *Am. Jour. Digest. Dis.*, 6: 187, 1939.

[2] I. Flexner and M. Kniazuk, SCIENCE, 90: 239, 1939.