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*DISCUSSION AND CORRESPONDENCE*COUPLING *vs.* RANDOM SEGREGATION

TO THE EDITOR OF SCIENCE: The suggestion offered by Morgan, in SCIENCE of September 22, to account for the coupling and repulsion of factors for various characters in inheritance in such forms as *Abraxas*, *Drosophila*, fowls, sweet peas, etc., incites this note.

Briefly Morgan's hypothesis is (1) that the materials representing factors that couple are "near together in a linear series" in the chromosomes; (2) that, when pairs of parental chromosomes conjugate, "like regions stand opposed"; (3) that "homologous chromosomes twist around each other," but that the separation of chromosomes is in a single "plane"; (4) that, thereby the "original materials will, for short distances be more likely to fall on the same side of the split," while more remote regions will be as likely to fall on one side as on the other; (5) that, in consequence, whether characters are coupled in inheritance or are independently inherited depends upon the "linear distance apart of the chromosomal materials that represent factors."

Leaving for cytologists to determine what has become of the "individuality" of the chromosomes, we may well inquire whether this hypothesis can account for the facts of Mendelian inheritance as exhibited in coupling, allelomorphism and independent segregation of the factors that represent characters. If parental chromosomes twist together and then separate in a single plane so that materials near together in a linear series are usually left together on one side of the split while more remote materials fall by chance on either side, it would seem that somewhere between these two regions the material representing some one character at least must be divided by the split so that part of it would lie on one side and part on the other. That

is, there would result a quantitative division of the material representing the character in question. This brings us back, at least so far as certain characters are concerned, squarely to the position taken by Morgan last year in his paper: "Chromosomes and Heredity" (*Amer. Nat.*, 44: 449-496).

While the hypothesis there presented, including the proposition that the plane of division of homologous chromosomes may be at any angle to the plane of union and the assumption that a certain quantity of the material representing a character must be present in order that the character develop, will doubtless account for the results (ratios) obtained in F_2 of a cross, *it certainly will not account for the purity of extracted recessives and dominants as exhibited by their behavior in F_3 and later generations. To overlook this is to neglect the fundamental part of Mendelism.*

A hypothesis that does not explain how extracted recessives can breed true generation after generation without the production of so much as a single individual having the dominant character will hardly be accepted by present-day students of genetics.

R. A. EMERSON