dehydrogenase or some other TPNH-producing enzyme is an important component of the soluble fraction. Substantiation of this hypothesis was afforded by the finding that the substrates in Table 1 are metabolized in washed microsomes incubated with TPN, glucose-6-phosphate, and glucose-6-phosphate dehydrogenase at rates comparable to those in the whole homogenate. The addition of chemically prepared TPNH to washed microsomes also effects the metabolism of the various drugs—direct evidence that TPNH is involved in the various reactions. It may be concluded from these results that the drug enzyme systems are located in the microsomes and that the soluble fraction participates by maintaining TPN in the reduced form.

A number of observations indicate that the metabolic pathways in Table 1 are not catalyzed by a single enzyme system. For example, microsomes prepared at *p*H 7.0 rapidly lose their ability to hydroxylate aniline and acetanilide but not to dealkylate monomethyl-4-aminoantipyridine; SKF 525-A inhibits most of the reactions in Table 1 but does not appreciably affect the hydroxylation of aniline and acetanilide; the inhibitor blocks the ether cleavage of phenacetin but not of codeine.

It is unusual for enzyme systems to require both TPNH and oxygen. A common step in the various microsomal reactions could involve the production of hydrogen peroxide by the oxidation of TPNH. The generated peroxide might then be utilized by peroxidaselike enzymes to catalyze the transformation of the various foreign compounds. It is likely that the number of these enzymes is relatively small and that they are unusually nonspecific.

The distribution of the drug enzyme systems in various rabbit tissues was examined and, in general, the various drugs were found to be metabolized only by the microsomes in liver. The localization of these functions in liver is of particular interest since it imparts an unusual specialization to the submicroscopic particles of this tissue.

Table 3. Cellular localization of enzyme systems catalyzing hydroxylation of acetanilide and demethylation of monomethyl-4-aminoantipyrine in rabbit liver.*

	Percentage of total activity†	
	Hydroxylation	Demethylation
Whole homogenate	100	100
Microsomes	1	3
Soluble fraction	0	3
Microsomes + soluable fraction	77	102

* *Incubation conditions.* Hydroxylation system : Flasks contained 1 ml of liver homogenate (1 : 2) in isotonic KCl, 5 μM of nicotinamide, 0.25 μM of TPN, 10 μM of acetanilide, and 0.5 ml of 0.5*M* tris-phosphate (1 : 1) buffer, *p*H 8.5 ; final volume, 3.5 ml. Incubation was for 1 hr at 37°C in air. Dealkylation system : As described in Table 2.

† Whole homogenate activity taken as 100 percent.

It is interesting to consider the question of whether or not the metabolism of foreign compounds by the microsomal enzyme systems is merely incidental to the normal regulation of body processes. In view of the relative nontoxicity of SKF 525-A, one can speculate that these systems are not essential to the normal economy of the body, but operate primarily against the toxic influences of foreign compounds that gain access to the body from the alimentary tract.

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Dicentrics in Wheat

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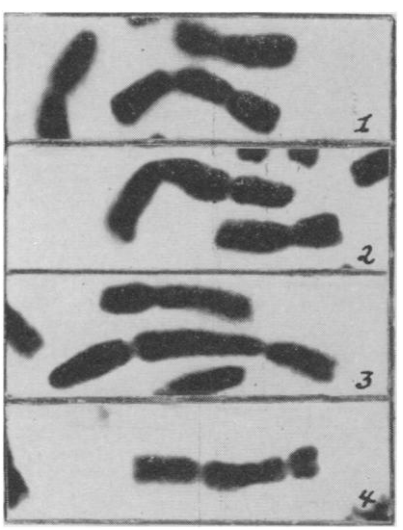
Dicentric chromosomes are chromosomes that have two centromeres. They are no longer oddities in biological research because they commonly occur after breakage and reunion in chromosomes following irradiation or a treatment with some radiomimetic substance. No observations of the behavior at meiosis of artificially produced dicentrics have been reported, because few of them have persisted. Usually they are altered or eliminated in the mitotic divisions and do not reach the germ line. There have been only a few naturally occurring dicentrics (*1*). Two naturally occurring dicentrics persisted in wheat and have been studied at both mitosis and meiosis (*2*). The behavior of dicentrics at meiosis is especially interesting because the centromere plays an important role in pairing, chiasma formation, and chromosome movement—phases of activity about which there is still very little known. This report concerns the progress of a 2-yr investigation into a possible source of dicentrics.

In a previous paper I outlined a theory for the formation of dicentric chromosomes. I proposed that the dicentrics arose after fracture of univalent chromosomes at meiosis with the fusion of two broken ends in a subsequent resting stage. This theory was based on observations of meiotic stages in parental pentaploid material and also, of course, on the occurrence of a dicentric chromosome in one plant of an F_2 progeny. To test this hypothesis further, the interspecific cross *Triticum aestivum* ($2n = 42$) × *T. durum*

($2n = 28$) was made. The F_1 plants were partially fertile (about 45 percent) and I now have on hand 75 g of F_2 seed. The number of chromosomes in each seedling will be determined by germinating the seeds on absorbent paper and examining metaphase of mitosis in the primary roots. The chromosome number of the seedlings should vary from 28 to 42. Fragment chromosomes should be fairly common, and I had originally hoped for a dicentric in every 100–200 seeds. So far, 40 seeds have been examined, and out of these I have isolated two plants that have a dicentric chromosome.

One seedling had 27 normal chromosomes and a dicentric. Some variability in number existed among cells, depending upon how the dicentric separated and upon the inclusion or exclusion of broken arms following rupture of bridges (Table 1). The variability in the length of the intercentric region also shows that some bridges were formed by the separation of the dicentric chromatids. The dicentric was present in only two of the three roots examined. The third root had 28 chromosomes. The distal arms of the dicentric were not equal—thus, the dicentric is not an isodicentric. All other viable F_2 seeds have had four satellited chromosomes. In the cells of this plant only three satellited chromosomes are obvious and possibly one satellited chromosome is involved in the dicentric.

The other dicentric was found in a seedling with 39 normal chromosomes. The chromosome number varied considerably in the cells of this plant. The dicentric was present in only about one-quarter of the cells of the one root examined in detail. It was present in two of the three roots examined. Many of the cells with resting nuclei had micronuclei, indicating a loss of some chromosome material. This dicentric is probably less stable than the one first described.



Photomicrographs from wheat root-tip cells of dicentric chromosomes with some normal chromosomes for comparison. Figures 1, 2, and 3 are dicentric A, and Fig. 4 is dicentric B. Note the dissimilar distal arms in the dicentric B. Workers unfamiliar with wheat chromosomes may confuse these chromosomes with those that have a secondary constriction. Those who are familiar with wheat chromosomes will note the differences in length and the position of the two constrictions. (×2000)

Table 1. Variability in chromosome number and the presence or absence of dicentrics in the root tips from the two plants.

Dicentric A		Dicentric B	
No. of chromosomes	No. of cells	No. of chromosomes	No. of cells
27 plus a dicentric	19	39 plus a dicentric	8
28 no dicentric	2	39 no dicentric	2
29 no dicentric	1	40 no dicentric	16
	—	41 no dicentric	5
	22		—
			31

Since the dicentrics were not isodicentrics, it is unlikely that they arose from sister reunion after a break in a chromosome. I feel that they support my original theory on the origin of dicentrics in wheat. In any event their presence shows that F_2 seed of an interspecific cross is a likely source of experimental material. Whether these dicentrics will persist until meiosis remains to be seen. They are present in combinations of chromosomes that should have considerable fertility. Seed set may be good, and the dicentric may be transmitted intact. It may also be possible to use these stocks in a planned breeding program. They offer several possibilities.

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Non-Mendelian Segregation in a Single Tetrad of Saccharomyces Ascribed to Gene Conversion

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Gene conversion (*1*) is the interaction, occurring at meiosis, between the dominant and the recessive allele in a heterozygote, resulting in the transformation of one or more dominant alleles into the corresponding recessive allele, or vice versa. Gene conversion is essentially a directed mutation occurring at meiosis as a result of the effect of homologous alleles upon each other; it does not occur (or is not apparent) at the meiosis of homozygous diploids.

Conversion of white to pink yeasts has been pre-