to March. Correspondingly, without cyclones, the summers are practically rainless.

The diverse rainfall types of the United States as well as the essential features of the distribution of rainfall may be held in mind if the essential faetures which produce rainfall are remembered.

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SPECIAL ARTICLES

A PARALLEL MUTATION IN DROSOPHILA FUNEBRIS

A mutant of *Drosophila funebris* Fabr. has recently appeared that is so strikingly similar to a well-known mutant of *D. melanogaster* Meig. (*ampelophila* Loew) that there can be litle doubt that the same mutation has occurred independently in the two species. The new form, called notch, agrees with the notch *melanogaster* in at least eight different respects, as will appear below.

Origin.—A female *funebris* of a stock from Mitchell, S. D., was mated to a male of a stock from New York City. The descendants were mated in pairs for several generations, and no variations were observed except an occasional fly with one of the anterior scutellar bristles missing. Such flies were found also in the uncrossed New York stock. In the line under consideration selection was carried on, in an attempt to increase the percentage of such flies, but no marked result was obtained. In F_5 one pair (5201) produced 35 normal females, 34 notch females, and 36 normal males. The sex ratio here is significant, since an excess of males is more frequent than an excess of females in this species. The pair from which the parents of 5201 came produced 19 females and 31 males, which is not an unusual excess when complete counts are not obtained. In *D. funebris* the males usually emerge in a little less time than the females. This relation is just the reverse of that found in *D. melanogaster*. Evidently the female parent of 5201 was genetically notch. She was not observed to be abnormal, and had been destroyed when her offspring began to emerge. It seems probable that she did not have notched wings, but she may well have had the characteristic veins and acrostichal hairs, since these would more easily have been overlooked.

Description.—Notch *melanogaster* is characterized by having the wings somewhat nicked, more especially at the apical posterior corner. But this character is somewhat variable, being often unlike in the two wings of the same female, and sometimes even entirely absent.[1]

In addition the eyes are often smaller than those of the wild-type flies and somewhat roughened.[2]

Furthermore the veins of notch are somewhat thickened, more especially the apical portions of the second and fifth longitudinal veins. This character is the most invariable and convenient index of the presence of the notch gene. The anterior scutellar bristles of notch are often doubled. The acrostichal hairs are more numerous than those of the wild-type fly, and are irregularly arranged, instead of being in eight fairly definite rows.[3] The notch gene thus produces an unusually large number of morphological peculiarities.

Notch *funebris* agrees in all of the above respects. The wings are nicked in the same way, but are often asymmetrical and sometimes normal; the eyes are often small and roughened; the wing veins are thickened even more than those of notch *melanogaster*, the second and fifth being affected most, and this character being again the most convenient and reliable for purposes of classification; the anterior scutellar bristles are often doubled, in spite of the fact that notch arose in a family selected for the absence of these bristles; the acrostichal hairs are irregularly ar-

[1] See Morgan, 1917, "The Theory of the Gene," *Amer. Nat.*, 51, for figure and a discussion of this variability.

[2] Bridges has shown that notch is probably an allelomorph of the roughened eye known as facet. Metz and Bridges, 1917, "Incompatibility of Mutant Races in *Drosophila*," *Proc. Nat. Acad. Sci.*, 3.

[3] The peculiarity of the acrostichal hairs was not observed here until it was looked for after notch *funebris* was found to have unusual acrostichals.

ranged, but differ from those of notch *melanogaster* in being entirely wanting on each side in a narrow band just inside the dorso-central row.

The unusual features of notch in *melanogaster* are not limited to its morphological nature. Notch is one of the few dominant mutant genes, and in addition is sex-linked and has a recessive lethal effect. The result is that a notch female gives equal numbers of wild-type and notch daughters and of wild-type sons. Notch males never appear. This is the only known dominant sex-linked gene that is also lethal—except *funebris* notch. We have seen that the original notch culture, 5201, gave the characteristics 1: 1: 1: 0 ratio; and this has been repeated by the notch females produced in that culture, both when mated to their brothers and when mated to unrelated wild-type males.[4]

The striking parallel between these two mutants makes it highly probable that they represent the same genetic change. This view is strengthened by the fact that notch is one of the most frequent mutations in *melanogaster* (known to have occurred seven times), and might therefore be expected to be one likely to occur in another species.

Summary.—Notch *melanogaster* and notch *funebris* agree in the following respects:

1. Wings usually irregularly nicked at tip.
2. Certain veins thickened.
3. Eyes often small and roughened.
4. Acrostichal hairs not in definite rows.
5. Anterior scutellar bristles often doubled.
6. Character is dominant.
7. Gene has a recessive lethal effect.
8. Gene is sex-linked in *melanogaster*, almost certainly so in *funebris*.
9. Mutation is one of the most frequent in *melanogaster*, and the first certain one in *funebris*.

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COLUMBIA UNIVERSITY,
May, 1918

[4] It is theoretically possible that *funebris* notch is not sex-linked, but that the gene is dominant in females, lethal in males. This can be determined by finding gynandromorphs, or by finding other sex-linked genes and observing their linkage to notch.

THE KENTUCKY ACADEMY OF SCIENCE

THE Kentucky Academy of Science held its fifth annual meeting at the University of Kentucky on Saturday, May 4, 1918, with Mr. J. E. Barton, vice-president, in the chair. After a brief business session, at which several new members were elected, the following program was presented:

President's address, by J. E. Barton, acting president, "The regenerative forests of eastern Kentucky and their relation to the coal-mining industry." The extensive coal-measures of eastern Kentucky support a valuable forest growth, which is of great usefulness in the mining of coal. At the present time it takes about three acres of timber to mine one acre of coal. The ratio should be nearly one acre of timber to one acre of coal. This condition can be brought about by careful management, which is justified by the fact that the coal supply will last about one hundred years, at present rate of production. Timber can be raised in a thirty-year rotation, of sufficient size and character for mining purposes, by a proper selection of species, an area fully stocked and adequate *protection* against fire and live stock.

Differences in the ossification of the male and female skeleton: DR. J. W. PRYOR.

Scientific education: J. J. TIGERT. The rapid development of scientific agriculture. Education followed agriculture in scientific progress. Scientific procedure dependent upon quantitative measurement. Statistical methods and measurements in education. Standard tests. The measurement of intelligence. Charts and tables showing results of measurements in the Cynthiana schools in 1916–17 and the Lexington schools in 1917–18. Age-grade table, Cynthiana, shows 22 per cent. of pupils retarded. Comparison of promotions in Cynthiana and other American cities shows a larger percentage of promotion in Cynthiana than elsewhere. Ayres Spelling Test in Lexington and Cynthiana shows Lexington three points above the average of 84 American cities, and Cynthiana equal to the average of 84 American cities. Handwriting tests in Lexington and Cynthiana show both these cities below the average city in speed and quality of handwriting. Arithmetic tests in Cynthiana show Cynthiana below standard measured by the Woody Scale. A comparison of boys and girls in spelling and handwriting shows the girls to be superior to the boys.

The effect of manganese on the growth of wheat: J. S. MCHARGUE. After reviewing briefly some noteworthy results obtained by previous investi-