

average, tend to contain one lethal factor after 100 generations—which means about four years in *Drosophila*. The rate of change for the X in *Drosophila* is thus about one detectable mutation in four years. This immediately shows us that *Drosophila* must have a different rate from some other organisms—man for example—for if the X chromosome of man mutated at anything like a similar rate, all the X chromosomes in a female would contain several lethal factors by the time she was ready to reproduce, and none of her sons would be viable.

The rate of one mutation in four years is the rate for the whole chromosome. It is of greater interest to know the rate for the individual factors. There is good reason to believe that there are at least 500 factors in the X chromosome of *Drosophila*—probably many times that number. But, taking this undoubtedly much too low minimum figure, it is easy to see that, if 500 factors show only one mutation in four years, each individual factor must on the average show a change in its composition only once in 2,000 years. (Yet this is in the mutable *Drosophila*.) It will be interesting to observe the difference in mutation rate in different organisms and under different conditions.

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### The influence of lactic acid upon the metabolism of the dog.<sup>1</sup>

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Lactic acid, when given to a dog, causes the same increase in metabolism that is noticed when a similar amount of alanin is administered. It was also noted that the metabolism was increased after giving 500 c.c. of water in which there was 2.5 c.c. of Liebig's extract of beef, whereas the administration of 150 c.c. of water had no influence whatever. When a large quantity of water was given about 100 c.c. per hour were eliminated in the urine. This indicates that for the transport of a large volume of fluid through the circulation increased energy is needed.

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<sup>1</sup> A brief report of this work was also published in the *Compt. rendus de l'academie des sciences*, 1919, 168, No. 20, 1012.