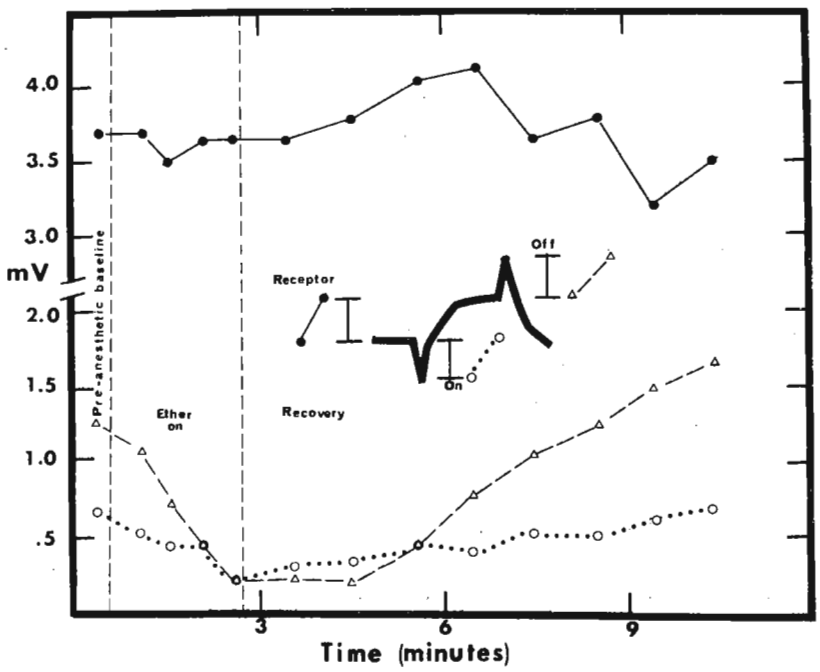
Stark, W.S. University of Wisconsin, Madison, Wisconsin. The effect of ether and carbon dioxide on the components of the ERG of Drosophila.

By fixing adult Drosophila melanogaster on the surface of hardening agar at room temperature, one can prepare specimens for recording the electroretinogram (ERG) without prior anesthetization. This preparation can be used to study the effects of anesthetics on the ERG during recording. The agar fixation is gentle enough to permit subsequent release of flies which can live for several weeks and mate. With the agar block in the bottom of a chamber, ether vapor or pure CO_2, both heavier than air, can be made to surround the preparation and can later be removed by blowing fresh air into the chamber.



The accompanying figure shows the typical effect of anesthetic ether on the ERG of an Oregon-R wild-type male eclosed within the past 24 hr. It was consistently found that the off-transient was diminished most, while the on-transient was also selectively reduced. Short etherization was usually followed by complete recovery. Etherization for longer than 3 min often irreversibly blocked both transients and sometimes also lowered the receptor wave. It cannot be determined how the time scale in these experiments corresponds to the typical 20-30 sec. anesthetization of flies in an etherizer since the agar might protect the fly with a small pocket of air.

Carbon dioxide also diminished both transients selectively and reversibly. The off-transient usually disappeared in less than 5 sec., and the on-transient in less than 10 sec. when pure CO_2 was applied to the preparation. Recovery usually took about the same time as the period of exposure. Long exposure sometimes permanently altered the ERG, although recovery from 5 min exposure has been seen. Probably permanent alterations in the ERG with ether or CO_2 are cuased by near-lethal effects of over-anesthetization and would not take place with normal anesthetization.

These anesthetics cause the ERG to look like the ERGs of the blind mutants such as tan and ebony whose ERGs have been characterized by Hotta and Benzer and Pak, Grossfield, and White. The metabolic and synaptic effects of CO_2 and ether may provide a clue to the mechanism of action of the genes causing blindness without impairing receptor function.

References: Hotta, Y. and S. Benzer 1969 Nature 222:354-356; Pak, W.L., J. Grossfield, and N.V. White 1969 Nature 222:351-354.

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Chinnici, J.P. Virginia Commonwealth University, Richmond, Virginia. The effect of age on crossing over in the X-chromosome of Drosophila melanogaster.

Recently, I have published the results of a bi-directional section experiment (involving both family and chromosomal selection) which resulted in an increase and a decrease in the amount of crossing over between the sex-linked genes sc and cv in Drosophila melanogaster (Chinnici 1971). Recombination of the regions cv-sn^3 and sn^3-m were also followed throughout the course of the experiment. In odd-numbered generations, the progeny of 14 to 37 single-pair (family)