triangular area marked * to indicate whether it belongs to the arm or face subdivision. Most striking is that, in broad outline, the sensory cortex of the chimpanzee is essentially similar to that of the macaque and occupies such a large area on the outer surface of the hemisphere.

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Recovery of Carbon-Monoxide Poisoned Rats After X-ray Treatment.*

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It has been shown that illumination with visible light removes the effect of carbon-monoxide poisoning in small, transparent organisms which absorb the poison from water solutions.[1] This report concerns the effect on larger, more opaque, air breathing organisms, of a more penetrating type of radiation—the X-ray. Acknowledgments are gratefully made to Dr. L. J. Stadler, of the U. S. D. A. and the Department of Field Crops, University of Missouri, for use of the X-ray equipment and services of an operator.

Albino rats descended from Wistar stock were used; each experiment consisted of one treated and one control animal. The 2 animals were of the same age and sex and not more than 10% difference in weight was allowed. The 2 negative cases reported were cases where great difference in weight existed.

Carbon monoxide was generated by dropping formic acid into hot sulphuric acid and collected by displacement of water in storage bottles.[2] To each bottle was added 5% of oxygen from a commercial cylinder. The gas mixture was administered to the rats by passing it into a tightly covered glass jar under pressure of a constant head of water in an elevated funnel opening into the gas bottle. Each experiment was conducted as follows. The 2 rats were placed simultaneously in the gas chamber and the gas admitted. Two or 3 observers watched through the sides of the gas chamber to note any differences in apparent susceptibility and to determine when both

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1 Warburg, Otto, and Negelein, Erwin, *Biochem. Z.*, 1928, **193**, 339.

2 Fisher, K. C., and Cameron, John A., *J. C. and C. Physiol.*, 1938, **11**, 433.

rats seemed to have stopped breathing. The gas being shut off, the rats were simultaneously removed and laid on their backs in similar glass battery jars of 9-inch diameter. Each jar was covered with 2 sheets of wet paper toweling and the jar containing the rat adjudged to be the weaker and showing the smaller signs of recovery was placed under the X-ray tube which had already been "warmed up" by its operator. The Victor machine used supplied 123 r per minute with no filter except the paper toweling, running at 165 K. V. P. on a tube current of 4 ma., and at 12 inches target distance. Exposures of 5 to 10 minutes were made in each experiment. Recovery was judged to have taken place when the animals behaved in a normal manner on the day following the experiment and remained apparently normal for 3 days thereafter.

The 41 experiments performed on pairs of rats from 8 days to 18 months old yielded results of all the 4 possible types.

In 3 cases the carbon monoxide administered was insufficient to kill either rat, both animals recovering.

In 21 cases the animals were "over-gassed" and neither rat recovered.

Two of the earliest experiments matched X-rayed rats weighing 32 and 44 g against control rats weighing 52 and 66 g. Here the controls recovered and the X-rayed rats died. In subsequent experiments not over 10% difference in weight was allowed.

Fifteen experiments ended in recovery of the X-rayed rat and the death of the control in spite of the fact that the least promising member of the pair was always chosen for X-ray treatment. In 5 of these cases the X-rayed rat had recovered sufficiently to rise to its natural quadrupedal position by the time the exposure was over and the X-ray compartment opened.

It is concluded that X-ray treatment applied to the surface of the body in amounts readily tolerated by the subject was the critical factor determining recovery in these cases.