

pseudohemoglobins is not more than 2% of the total blood iron. 2. Under the influence of very dilute acids additional iron is split from the hemoglobin molecule itself. 3. Carbon monoxide inhibits the liberation of iron. 4. This inhibitory effect can be used for diagnostic purposes and confirms the presence of carbon monoxide in the blood of tobacco smokers.

13703

Permanent Devocalization of Dogs by Removal of both the True and the False Vocal Cords.

G. L. DONNELLY. (Introduced by W. deB. MacNider.)

From the Laboratory of Pharmacology, the Medical School, the University of North Carolina.

In many institutions where it has been necessary to devocalize the laboratory dogs the results have not been satisfactory. In 1932 the writer made a study of the usual devocalizing methods with the object in view of improving the results obtained from such methods.

By using a pair of Miles nasal cutting forceps it was found that the true vocal cords could be rapidly and completely removed.¹ The procedure was carried out on 20 dogs under morphine-ether anesthesia. There were no complications and the animals recovered within 24 hours. After about 3 months, however, each dog developed a hoarse, unpleasant bark. The immediate assumption was that the operative technic had been faulty and that the vocal cords had not been completely removed. Later, when some of the same animals came to autopsy, laryngeal examinations showed a complete absence of the true vocal cords. Further studies of the autopsy material revealed in each case a well developed pair of soft mucous folds or pockets at the base of the epiglottis and just above the true vocal cords. These folds were identified as false vocal cords and seemed to be the only remaining structures by the use of which sound might be made.

The surviving dogs whose vocal cords had been removed with poor results were again prepared for operation. The soft folds or pockets of the false cords were removed as completely as possible with a pair of straight, back-cutting Ostrom forceps. Upon recovery these animals were no longer able to produce any noise other than

¹ Andrews, Justin M., *Science*, 1926, **64**, 502.

soft whispered sounds even with their most vigorous barking efforts. Since that time approximately 200 animals have been devocalized by the method of removing both the true and false vocal cords. Animals still living 8 and 9 years after the operation have had no return of vocal powers. It is probably worth noting that they seem to derive as much pleasure from the whispered bark as from the noisy one.

The following is a brief description of the procedure. The animal is given 0.25 cc per kilo of a 2% solution of morphine sulfate with 0.5 mg atropine sulfate subcutaneously from one to 2 hours before the operation. It is then tied to the operating table back down but with head dependent. Following the induction of complete ether anesthesia the mouth is held open by an assistant who pulls out on the tongue with a pair of Allis tissue forceps. Proper illumination is obtained with a head light. The operator by pulling the epiglottis forward with a pair of Tydings tissue forceps is able to visualize the vocal cords clearly. When both true vocal cords have been removed and no tags of tissue remain, the epiglottis is again pulled forward and the operator inserts the hinged tip of the Ostrom forceps under the false cord. The fold or pocket is removed as completely as possible and the procedure is then repeated on the other side. Due to the soft, stringy nature of the tissue in these cords the cutting is more difficult and the bleeding is more profuse than with the true cords. Following operation the animal is laid in the cage with head slightly lowered to prevent aspiration of blood. In well nourished animals, however, the danger of complications is small.

In conclusion, the author has found from his own experience and from the experience of others that no matter how completely the true vocal cords are removed the dogs learn to bark again. If, however, both true and false vocal cords are removed the dogs remain completely and permanently devocalized.