of the gas tank afforded a simple and convenient closed system for handling the gases. Replacement of the spinal fluid by the gas was carried as far as possible—usually until bubbles returned through the needle. Then the needle was withdrawn and another lateral skull plate was taken. If the ventricular outline appeared, other views were taken to follow the course of the injection. Throughout the entire procedure, pulse, respiration, color, reflexes, tonus, etc., were observed closely and recorded. Repeated encephalograms were obtained on the same animal to compare under as nearly identical conditions as possible the effects of the various gases. Air injections were initially performed in all cases as a standard by which the results obtained with the anesthetic gases could be compared.

With improvements in technique, standardization of routine and experience this method proved quite satisfactory for determining the following information on the various anesthetic gases: (1) ease of handling; (2) early irritative effect; (3) sedative or narcotic effect; (4) after effects, both immediate and late; (5) safety; and (6) X-ray results, including time of absorption.

Using this method, 19 dogs were employed to test the following anesthetic gases: ether, divinyl oxide, ethyl chloride, vinyl chloride, nitrous oxide, ethylene, and acetylene. Special heating coils were used to volatilize the ether and divinyl oxide to body temperature before injection. The results obtained are summarized in Table I. Ethylene and nitrous oxide, because of their non-irritative action, safe sedative effect, lack of after effects and good X-ray results are being studied further.

7291 P

Studies upon Secretory Activity of Glands of the Oral and Pharyngeal Mucous Membranes.*

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These studies were undertaken to extend our very limited knowledge relating to the secretory activity of the small mucous and

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serous glands of the oral and pharyngeal mucous membranes. I have been unable to discover any adequate description of the nerve supply to the various groups of these glands. Therefore, to confirm and to amplify the fragmentary reports of previous workers I determined what nerves carry such secretory fibers by directly stimulating the nerve trunks in 12 anesthetized dogs. I found the innervation to be a dual one through both the sympathetic and cranial autonomic systems, as has been described. Stimulation of the cervical sympathetic trunk in the neck caused secretion homolaterally over all of the gland bearing areas of the oral and pharyngeal mucous membranes. The maxillary division of the fifth cranial nerve sends a branch to the orbital gland, and through its sphenopalatine branches supplies the glands of the hard palate, the soft palate, the tonsils, the pillars of the fauces, and the nasopharynx. Of the mandibular division of the fifth cranial nerve, the buccinator branch innervates the orbital gland and the glands of the cheek and lower lip. The lingual branch supplies the glands of the floor of the mouth. Secretory fibers from the glossopharyngeal nerve reach the glands at the base of the tongue and the posterior fourth of the side of the tongue, the hard and soft palates, the tonsil, the pillars of the fauces, and the nasopharynx. The vagus sends fibers to the nasopharyngeal and epiglottic glands, and to the glands at the base of the tongue over a small area near the middle line.

I believe these small glands do not secrete continuously, but only reflexly in response to an adequate stimulus as is the case for the salivary glands. Studies upon 5 intact, unanesthetized dogs and 4 human subjects have shown that the glands of easily observed areas, namely, the dog's lower lip and cheek and the human lips and palate, are reflexly excited by a large number of different stimuli, among which are pressure upon the tongue or palate, licking and swallowing movements, the odors of acetic acid, ammonia, and ether, and the taste of salt, sugar, hydrochloric and acetic acids, and magnesium sulphate. By observing the lower lips of resting dogs for periods of 30 minutes I demonstrated that in the absence of any stimulation, no secretion occurred during this interval, but as soon as licking and swallowing movements were induced, the glands secreted promptly and copiously. Other areas were not studied because they could not be observed without mechanically stimulating the mouth. I obtained additional indirect evidence on the absence of a continuous secretion from 8 dogs without parotid, submaxillary, sublingual, and orbital glands, the remaining oral and pharyngeal secretions of which were collected from an esophageal fistula. In

such dogs, when at rest, each stimulation of the esophageal stoma and resulting swallowing movement expelled a quantity of secretion which varied within the same limits whether the interval between stimulations was one minute, 5, 30, or 60 minutes. My conclusion is that either very little or no secretion at all was produced in the interval, and that the material obtained was secreted reflexly in response to the licking and swallowing movements alone.

Using these 8 dogs, I have also determined the approximate amounts secreted in response to weighed quantities of various materials placed in the mouth and collected through the esophageal fistula together with the secretions produced. It appears that hydrochloric acid is the most potent of the stimuli used, followed in diminishing effectiveness by magnesium sulphate, sodium chloride, and sucrose. Of the foods administered, raw meat induces relatively little secretion; dry meat, much more; and peptone powder, the most of the three. Dry bread crumbs are a much more efficient stimulus than moist bread. In their responses, therefore, the small oral and pharyngeal glands closely resemble the salivary glands.

7292 C

Iodobismitol in Experimental Syphilis.

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In a previous report,[1] it was shown that iodobismitol (N.N.R.) exerts prophylactic and curative effects on the experimental syphilis of rabbits. Since then, confirmations of the antisyphilitic action in rabbits have been made by Levaditi, Vaisman, Manin and Schoen[2] and by Strandberg and Sjögren,[3] da Nova Gomes and de Oleveira,[4] and Carrillo, Schujman and Campos[5] in clinical syphilis, the latter authors agreeing with Mehrtens and Pouppirt.[6] These reports also

[1] Johnson, Hanzlik, Marshall, and Mehrtens, *J. Pharm. Exp. Therap.*, 1932, **45**, 469.

[2] Levaditi, Vaisman, Manin, and Schoen, *Bull. de la Soc. Franc. de Dermat. et de Syphil.*, 1933, No. 5, p. 738.

[3] Strandberg and Sjögren, *Acta Dermato-Venereologica*, 1933, **14**, 1; Strandberg, *Nord. Med. Tidsk.*, 1932, **4**, 834.

[4] da Nova Gomes and de Oleveira (personal communication).

[5] Carrillo, Schujman, and Campos, *La Semana Méd.*, 1933, No. 48, p. 1.

[6] Mehrtens and Pouppirt, *Arch. Neurol. and Psychiatry*, 1931, **26**, 1220.