this region that most of the gastro-duodenal lesions occur. We propose the above described method of examination, because it gives us a more or less exact measure of the physiologic activity of this mixing chamber. Unlike most methods of gastric study, we are here dealing with known amounts of known substances.

We next tried the effect of certain operative procedures upon the stomach. First we cut the vagi, either intrathoracically or intraperitoneally, or we severed the intrinsic nerve supply by cutting around the stomach down to the mucosa. Examination of these animals later showed a decreased emptying time, which is what Hughson found in studying the motor function after vagotomy. There was also a more rapid neutralization. This is due to the fact that without vagus control the pylorus loses its tone, is more patulous and allows quicker neutralization. The latter also explains the decreased emptying time.

We next subjected normal animals to either gastroenterostomy, Polya-Balfour resection, or pyloroplasty. In all these instances there is decreased emptying and quicker neutralization, and this is particularly the case following pyloroplasty or resection. The neutralization in the gastro-enterostomy was about the same as after vagotomy.

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[1] Bloomfield and Keefer, *Arch. Int. Med.*, 1926, xxxviii, 141.

[2] Boldyreff, *Quar. J. Exp. Physiol.*, 1914, vii, 1-12.

[3] Elman, Robt., to be reported.

[4] Hawk, *Am. J. Physiol.*, 1916, xxxix, 459.

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Decerebrate Pigeon-Fear Signs

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Based on the statements of Flourens,[1] McKendrick,[2] Ferrier,[3] Vulpian,[4] Schrader[5] and others,[6] it is still believed that the pigeon deprived of its cerebral hemispheres, "exhibits no signs of fear." In the study of such a pigeon,[7] I observed repeatedly, indubitable signs of fear. Some of these signs were: dodging, starting, trembling, fleeing, struggling, staring, and crying out in a characteristic way. Since these signs, which show the semblance of fear, were produced

in this decerebrate pigeon by stimuli that ordinarily produce fear in nomal pigeons, they may, perhaps, be called signs of fear.

As examples of fear reactions we cite only a few, as follows:

Sound Fear Reactions—One hour after the operation, clapping of the hands caused the head to move, the body to tremble, and the wings to shuffle. Fifteen hours after the operation, clapping the hands caused the head to rise and the eyes to stare. On the 42nd day after the operation, snapping a ruler on a table 8 to 10 times in succession, caused the head and body to turn toward the sound, the neck to crane, and the eyes to stare. On the 5th day after the operation, the clock struck one out in the hall, about 30 feet away, the neck craned, the head turned toward the sound, and the eyes stared. On the 40th day, the noise and talking of the ice boys out in the hall, about 30 feet away, caused movements similar to those just mentioned, resulting in the attitude and expression of fear.

Reactions to Grasping and Sight(?)—Eleven days after the operation, the pigeon was grasped gently with both hands and tilted toward some water. This caused considerable struggling. On the 13th day, when the pigeon was lightly grasped, it struggled, with signs of slight fear, and tried to escape; grasping a leg caused vigorous struggling with leg and wings, and signs of fear. On the 43rd day, grasping a wing, lightly, caused hard struggling, signs of fear and fear sounds. On the 47th day grasping either wing or leg gave a reaction like that just mentioned, giving the semblance of fear.

Sight Reactions—On the 4th day, the rapid approach of a hand caused the eyes to close and the head to jerk. On the 9th day, a slow approach of the hand caused the eyes to stare with the semblance of fear. A brusque approach of both hands caused a quick, slight start of the body. This same stimulus, on the 18th day, repeatedly caused the eyes to close and both the head and body to jerk (dodging). On the 37th day, this stimulus caused a quick retreat of 4 or 5 steps. On the 40th day, a slow movement of the hand close to the head caused dodging. On the same day, reaching gently to take him up caused him to retreat with uneasy expression. On the 49th day, this caused fear sounds and actions.

Reactions to Pursuit—Sight and Sound(?)—On the 34th day, slow, close pursuit caused a retreat of 4 to 5 steps with attitude and expression of alarm. On the 40th day, rapid pursuit caused actual running away, with the utterance of low-pitched fear sounds. This was repeated several times on the succeeding days. On the 48th day, 3 or 4 times in succession, he fled, running, with head turned to the side, watching me; and one time, with flapping of the wings.

The pigeon was number 3 of the series reported by me in 1921.[7] It was a full grown pigeon, recovered quickly from the operation, and remained healthy and in good condition throughout the 49 days of study.

A microscopic study of the brain by means of serial sections prepared by Mr. Martin W. Schmidt, using the Krause method, was made by Dr. Albert Kuntz. A small residue of apparently living cerebrum was found distributed in three different regions. Two of the regions were contralateral duplicates of each other, located on the mid-ventral surface of the cerebrum, just anterior to the anterior plane of the optic chiasma; and each averaged roughly 1.5 mm. wide, 2.5 mm. high, and 2 mm. long. These regions revealed some good cerebral tissue, with some medullated fibers and neuroglia, apparently in good condition. They also showed in parts, evidences of degeneration and infiltration. The third region was roughly globular in shape, about 1.5 mm. in diameter, and, cut by the frontal plane of the optic chiasma. It lay near the ventral surface of the cerebrum, about 4 mm. from the sagital fissure. In it there was evidence of degeneration. There were no medullated fibers present. "Holes" showed where cells had been absorbed, and the cells remaining were scattered. The brain stem showed a large blood clot in its center with necrotic tissue around it.

[1] Flourens, P., *Recherches expérimentales sur les proprietés et les fonctions du system nerveux*, Paris, 1842.

[2] McKendrick, F. J., *Recent Researches on the Nervous System*, Edinburgh, 1874.

[3] Ferrier, David, *The Functions of the Brain*, London, 1876.

[4] Vulpian, E. F. A., *Leçons sur la physiol. du système nerveux*, Paris, 1866.

[5] Schrader, M. E. G., *Pflüger's Arch. f. ges. Physiol.*, 1889.

[6] Howell, *Textbook of Physiology*, Sept., 1927.

[7] Shaklee, A. O., *Am. J. Physiol.*, 1921, lv, 65.

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The Thyroid in Infections and Toxemias.

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The work of Baumann,[1] who demonstrated in 1895 that the thyroid gland contained iodine, and of Oswald,[2] who a few years later isolated thyro-globulin and the nucleoproteins, contained the