

the central and peripheral parts of the sympathetic system are well developed; the adrenals show their 2 constituting anlagen and the intestinal walls contain nervous elements.

The 2 experimental series strikingly confirm each other and they show that, in the frog, the neural crest represents the exclusive source of sympathetic elements, that the visceral branch of the vagus nerve is derived from the medullar neural crest and that the nervous elements in the intestinal walls are to be related to the sympathetic system.

The study of a series of normal chick embryos, stained with ordinary techniques or impregnated by various silver methods, gives very clear pictures concerning the different points of the development of the sympathetic system. There is no evidence of a succession of 2 independent sympathetic chains. Around the sixth day of incubation, the communicating rami become shorter, thus probably corresponding to a neurobiotactic phenomenon resulting from the penetration of motor fibers into the sympathetic ganglia. The exclusive origin of the elements of the sympathetic chains seems to be the ganglionic crest and no migration was found along the ventral roots. The vagus nerves supply the primary innervation to the lungs, to the heart and to both gastric pouches. The small intestine, from the pylorus on, is innervated primarily by sympathetic branches and there is no evidence of any participation of the vagus nerves as late as the eighth day of incubation, when the intestinal walls show a perfectly developed nervous supply with myenteric and submucous plexuses.

The neural crest origin of the sympathetic elements and the sympathetic origin of the intestinal nervous structures are the main conclusions of this contribution.

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I. Effect of Intravenous Injections of Sodium Sulphide and Sodium Cyanide on Reflex Response of Anterior Tibialis Muscle.

HAROLD H. GAY. (Introduced by Robert Gesell.)

From the Department of Physiology, University of Michigan.

Glazer¹ has shown that intravenous injection of sodium cyanide increases the reflex response of the anterior tibialis muscle to electrical stimulation. The purpose of this group of experiments was

¹ Glazer, W., *Am. J. Physiol.*, 1929, lxxxviii, 562.

to make a similar comparison of the effects of intravenous injections of sodium sulphide on reflex response and respiratory movements.

The anterior tibialis muscle was isolated, its insertion severed and secured by a thread to a writing lever. A large copper indifferent electrode was fastened to the shaven side of the neck, and a sharp point electrode thrust into the plantar surface of the foot. The trachea was connected to a rebreathing tank for a recording respiration.

An increase in reflex response always followed an injection if it were large enough. Forty-four injections of varying amounts were given to 17 dogs. Two injections caused an increase before hyperpnea had begun, 8 increases began with hyperpnea, and ended with it, 10 began during hyperpnea and lasted into apnea, 12 began during hyperpnea and lasted through apnea and 4 began after hyperpnea and lasted through apnea. Eighteen injections were followed by no apnea. Fatal injections always caused a pronounced increase in reflex response.

Since hyperpnea leads to increased elimination of carbon dioxide it was essential to determine whether the increased reflex response was of this origin. This was accomplished by repeating the above experiments during constant artificial ventilation after the establishment of pneumothorax. The results of 21 injections on 10 animals were comparable to those obtained in the intact animal with ventilation under normal control.

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II. Low Alveolar Oxygen and Response of Anterior Tibialis Muscle to Reflex and Motor Nerve Stimulation.

HAROLD H. GAY. (Introduced by Robert Gesell.)

From the Department of Physiology, University of Michigan.

Glazer and Winkler^{1, 2} have shown that the administration of low percentages of oxygen in nitrogen under normal conditions of respiration caused an associated increase in reflex response and respiratory movements. The augmented reflex response might be due to the blowing off of carbon dioxide by the augmented respiration. To investigate this possibility a group of 6 experiments were done in which low percentages of oxygen (4% to 7%) in nitrogen were

¹ Glazer, W., *Am. J. Physiol.*, 1929, lxxxviii, 562.

² Winkler, A., *Am. J. Physiol.*, in press.