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Development of Somatic Activity in the Albino Rat Fetuse.

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The earliest reflex activity elicited by light tactile stimulation in the albino rat has been described.[1] Further investigations have been made upon the fetuses described as non-motile in that contribution. These fetuses do not respond to light tactile stimuli or to the fixative (chemical stimulation). The younger fetuses of this period are also irresponsive to ligation of the umbilical cord (endogenous stimulation). However, the majority of the fetuses of the non-motile stage responded to strong stimulation applied by means of a porcupine quill when stimulated in the neck and fore-limb region. The responses consisted of lateral flexion of the head towards the side stimulated and extension of the fore limbs respectively. Also, some of the older fetuses of this period responded to endogenous stimulation with lateral flexion of the head only. It is evident from these observations that somatic activity, other than that elicited by light tactile stimuli, develops at an earlier period than that described in my previous paper. In addition, these observations show that the younger fetuses responded only to strong mechanical stimuli and the older fetuses responded to both strong mechanical and endogenous stimulation. The responses in respect to these 2 means of stimulation are distinctly different in quality, that is, the contractions elicited by endogenous means are slow, feeble and quickly followed by relaxation; while those elicited by strong mechanical stimuli are also slow and feeble, but maintained. A very long latent period was noticed when strong mechanical stimulation was used.

The fetuses of the early motile stage responded to light tactile stimulation of the snout only, to endogenous stimuli, and to strong mechanical stimulation applied with a porcupine quill. Here again the response differs in relation to the means of stimulation used. The light touch stimulation upon the snout elicited responses of lateral flexion of the head away from the side of stimulation. The endogenous stimulation elicited response of lateral flexion of the head, and often this contraction spread caudad so as to involve the fore limbs in this movement. These contractions were also slow,

[1] Angulo y Gonzalez, A. W., *J. Comp. Neur.*, 1932, **55**.

feeble, and quickly followed by relaxation. The strong mechanical stimulation elicited responses similar to those obtained in the previous stage. However, the responses to stimulation of the neck region with the quill were towards the side stimulated, while those elicited with light tactile stimulation of the snout were away from the side stimulated. Fetuses of the 19 day stage were also tested in the fore limb region with strong mechanical stimuli. Even after the definite establishment of reflex activity in this region,[1] the fetuses responded to this type of stimuli in the same characteristic manner, except that the contractions were maintained for a much longer period, and the latent period was a great deal shorter than in the younger stages.

The method employed for the investigation of the latency of period is too crude to withstand critical quantitative analysis. However, the following general ideas have been obtained that may be useful as a point of departure for further investigation: The latent period increases in a cephalo-caudal and proximo-distal direction. Within certain limits it decreases with the strength of stimuli, and it also decreases with the age of the fetuses.

The foregoing observations indicate that there are 3 phases in the development of somatic activity in the albino rat fetuses. The movements of the first phase are believed to be myogenic in nature, elicited by direct strong stimulation of the muscle. Other means of stimulation fail to elicit response. The long latent period observed in these cases might be construed as indicative of neurogenic activity. However, the undeveloped striated muscle has a long latent period (31.6 sigma for premature baby).[2] Therefore, the exceedingly long latent period obtained in the above experiments cannot be used as indicative of neurogenic activity. The second phase in somatic activity seems to be purely neuro-motor in nature, indicated by the fact that responses were obtained endogenously where tactile and chemical stimuli had failed. The third phase is sensory-motor nature, that is, reflex activity in the strict sense.

[2] Krasnogorski, N., *Jahrb. f. Kinderh.*, 1914, **79.**