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Early Behavior of the Embryos of Carrier-Pigeons.

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Active movements, as opposed to the passive movements due to heart-beat, begin in embryos of the pigeon of 105 ± 5 hours' incubation. These earliest movements, weak and infrequent, are extensions and flexions of the head. By 115 ± 5 hours these movements have come to involve the neck, trunk, rump and tail in the order mentioned. All these movements are spontaneous, and the wings and legs move only in perfect integration with the trunk. These total movements increase in frequency and amplitude, and eventually several parts of the axial musculature move discretely. Even at this stage the embryos do not respond to chemical or tactile stimulation, except possibly in rare cases in the latter part of the period.

The first reactions to tactile stimuli are in response to stimulation on the snout at 125 ± 5 hours, although in rare cases sensitivity to touch on the upper part of the neck may appear at about the same time. The response is at first flexion of the head and neck, and sometimes the trunk. After several hours the reaction comes to involve the tail and rump, and then the wings and legs, which, under these circumstances also, move only in complete integration with the trunk. Meanwhile the reflexogenous zone extends to the shoulder, trunk and rump in cephalocaudal progression. In embryos of 135 ± 5 hours the tail moves with the rump, sometimes also with the leg, in response to touch on the base of the tail; and a little later the wing and the leg respond to stimulation on the shoulder or lower part of the neck, but embryos of this age do not respond to stimulation on the wing or leg. Embryos of 155 ± 10 hours exhibit local reflexes of the wings, legs and tail in response to stimulation on the respective appendages.

The development of reflexes of the eyelid, eyeball, digits, mandibles and anus, together with hatching, will be described in the final paper.

* The study was carried out at the Japanese Military Carrier-Pigeons Corp. in Tokyo, where nearly 2000 pigeons are kept.