THE ANATOMY OF A THREE-LEGGED KITTEN

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THREE FIGURES

The animal which is the source of this paper was an ordinary, tiger-striped, female kitten which came into the possession of the laboratory through the kindness of our colleague, Dr. Henry Laurens. It lived in the laboratory for a number of weeks, and when about six months old was killed and dissected to determine the exact nature of the anomaly.

The female parent of this kitten had previously given birth to other litters of normal offspring, and this animal which we studied was one of a litter of three, of which the other two were normal. Furthermore, all the members of a litter born since our specimen are normal. The male parent of our kitten is unknown.

The kitten, aside from its having only three legs, was a lively, healthy animal, with sleek fur, and a playful disposition. It balanced itself well, planting the right fore foot under the mid-line of its body to compensate for the missing left limb (fig. 1). There was no external evidence of any part of the left fore limb except a lump at the shoulder which indicated the presence of at least a part of the shoulder girdle, and the skin was drawn smoothly over the shoulder without any sign of puncture or folding.

As soon as the animal was chloroformed the skin was reflected from the left side of the body, and at once there came to view, beneath a thin layer of fascia, a point of bone (fig. 2). The shoulder muscles (deltoids, clavo-brachial, supra- and infra-spinatus, teres major and minor, and subscapular) were all

Fig. 1 Photograph of the three-legged kitten when about six months old. The right fore limb is swung under the body to compensate for the missing left limb.

Fig. 2 Left scapula, rudimentary humerus, and deep shoulder muscles of the three-legged kitten. 1, scapula; 8, spinodeltoid; 9, acromiodeltoid; 10, distal end of the humerus; 11, capsule of the shoulder joint; 12, mass of muscle fibers representing the combined latissimus dorsi and the pectorals; 13, anomalous band of muscle fibers encircling the rudimentary shaft of the humerus. The unnamed stumps of muscles appearing below the joint capsule are those of the supra- and infraspinatus.

normal on the left side of the body with respect to origin, insertion, and innervation. This is not surprising, since the skeletal parts with which they are connected were only slightly abnormal, as described in detail later on.

The appearance of the left fore limb after the removal of most of the shoulder muscles is shown in figure 2. Two muscle anomalies were clearly evident. First, the fibers of the latissimus dorsi, pectoralis major and pectoralis minor muscles, all three of which were thinner than usual, but possessed of normal origins, became fused into a common sheet which was inserted on the inner surface of the humerus, where normally the latissimus dorsi alone is inserted, the normal place of insertion of the pectorals having failed to develop in this humerus. The second muscle anomaly was a mass of fibers which was wrapped completely around the humerus from the point of insertion of the pectorals and deltoids to within a short distance of the tip. Into this mass of muscle ran the musculospiral, musculocutaneous, median and ulnar nerves, but we feel no justification in offering a theory as to the homology of this anomalous mass of fibers. In addition to the above mentioned anomalies should be noted the entire absence of any recognizable triceps, biceps or coracobrachial muscles, a fact to be correlated with the absence of their points of origin from the abnormal left scapula and humerus. Possibly these three muscles are among those represented by the unnamed mass mentioned above.

The right and left scapular and humeral bones of the three-legged kitten are shown, drawn to the same scale, in figure 3. The clavicles, which are not represented, were normal on both sides. The left scapula differs from the right in the following respects: (a) the anterior superior border, owing to the narrow neck, forms a greater angle with the axillary border, (b) the spine of the left scapula, perhaps owing to the undeveloped state of the infraspinatus muscle, is lower than that of the right, (c) the suprascapular notch, on the anterior superior border, is missing, owing to the absence of the coracoid process, (d) the axillary border of the left scapula shows, in correlation with the abnormally narrow neck and head, a decided thickening at its

junction with the neck, (e) the neck of the left scapula is only about half the width of that of the right, (f) there is an entire absence from the left scapula of the coracoid process, including the areas for the attachment of the coracobrachialis and biceps muscles and the supraglenoid fossa, (g) correlated with the complete absence of the coracoid process, the glenoid cavity of the left scapula is imperfectly developed, possessing not more than half its usual area, and it is convex rather than concave. In connection with the above mentioned anomalies it should be noted that according to Jayne ('98) the coracoid process and the

Fig. 3 Outer aspect of the right and left scapular and humeral bones of the three-legged kitten, all drawn to the same scale. 1, left scapula; 2, left humerus; 3, epiphysial groove; 4, shaft; 5, right humerus; 6, abnormal depression in neck of left scapula; 7, right scapula; 8, epiphysial groove; 9, shaft.

upper portion of the glenoid cavity of the scapula develop in the cat from distinct ossification centers. Also, the work of Braus ('08) and of Harrison ('15) has shown that in Amphibia the anlagen of the shoulder girdle and of the fore limb are entirely distinct, since experimental removal of the latter does not prevent the development of the former.

The left humerus of this specimen is chiefly characterized by its representing so small a part of the normal bone. Like the right humerus the left shows a clearly defined epiphysial groove, but on the left humerus there is an entire absence of the lesser tuberosity, together with about half of the articular surface

adjoining that tuberosity. The part of the shaft present on the left humerus corresponds to the lateral surface of the normal bone from the anterior mid-line laterally to the deltoid ridge. It is everywhere covered with a thick layer of compact bone, and possesses no marrow cavity, its whole interior being filled with spongy bone.

What caused the production of this three-legged animal must probably await conclusive settlement until such anomalies are experimentally controlled, but taking into account all of the available evidence it would appear that after starting to grow out normally from the body the left fore limb bud encountered some obstacle which pressed it against the body, as well as checked its increase in length; such of it as had already grown then underwent further development into bone, muscle, connective tissue, etc.

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