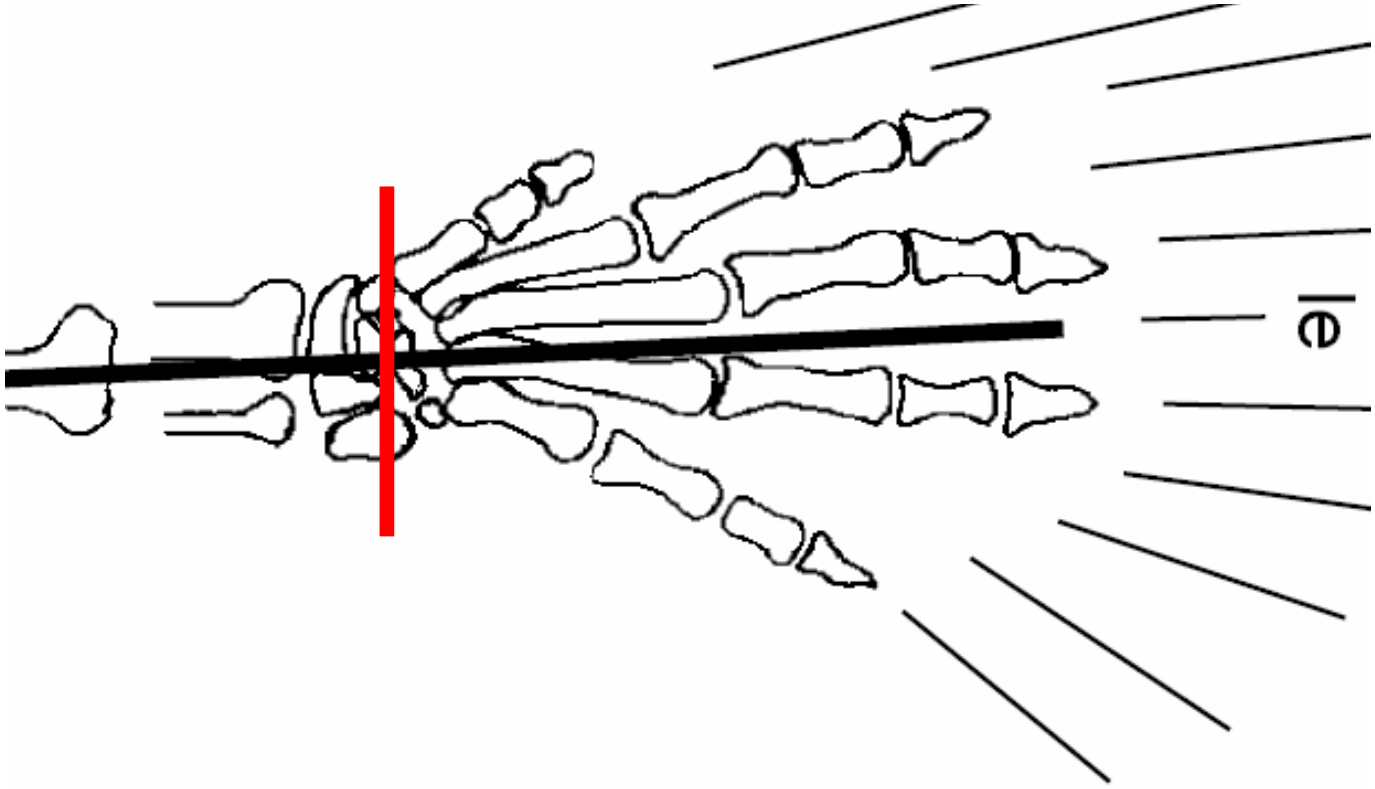
ПАЛЬЦЕВАЯ ДУГА – ЭТО СОВСЕМ НЕ МЕТАПТЕРИГИАЛЬНАЯ ОСЬ, А ОРТОГОНАЛЬНОЕ К НЕЙ НОВООБРАЗОВАНИЕ



холизм Гудвина

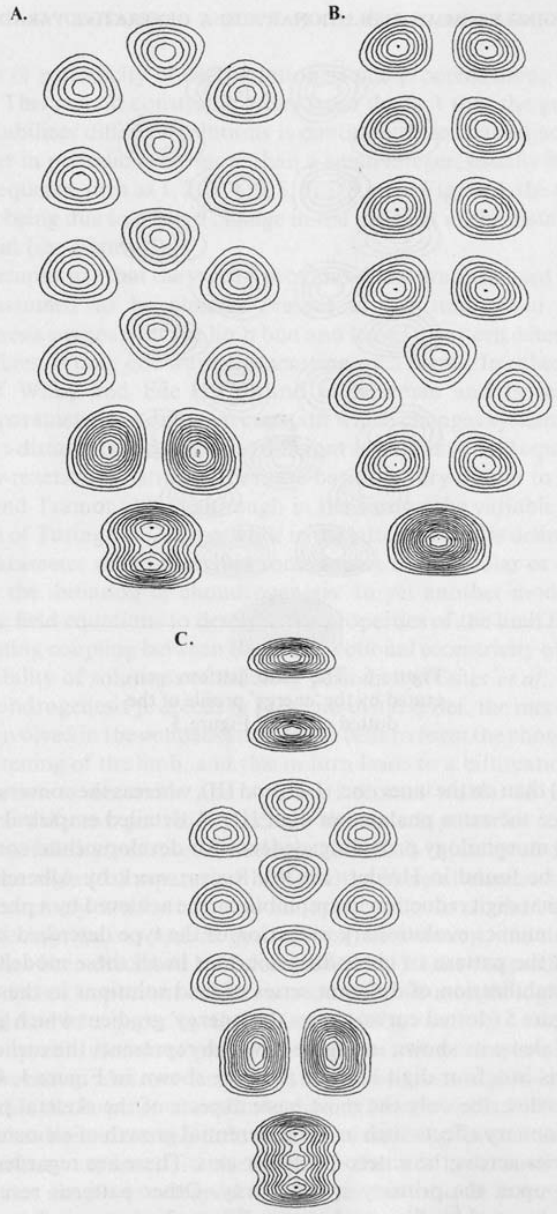


Figure 7. Limb patterns generated by modifications of the proximo–distal 'energy' profile of the limb bud, corresponding to limbs with three, two, and one digit

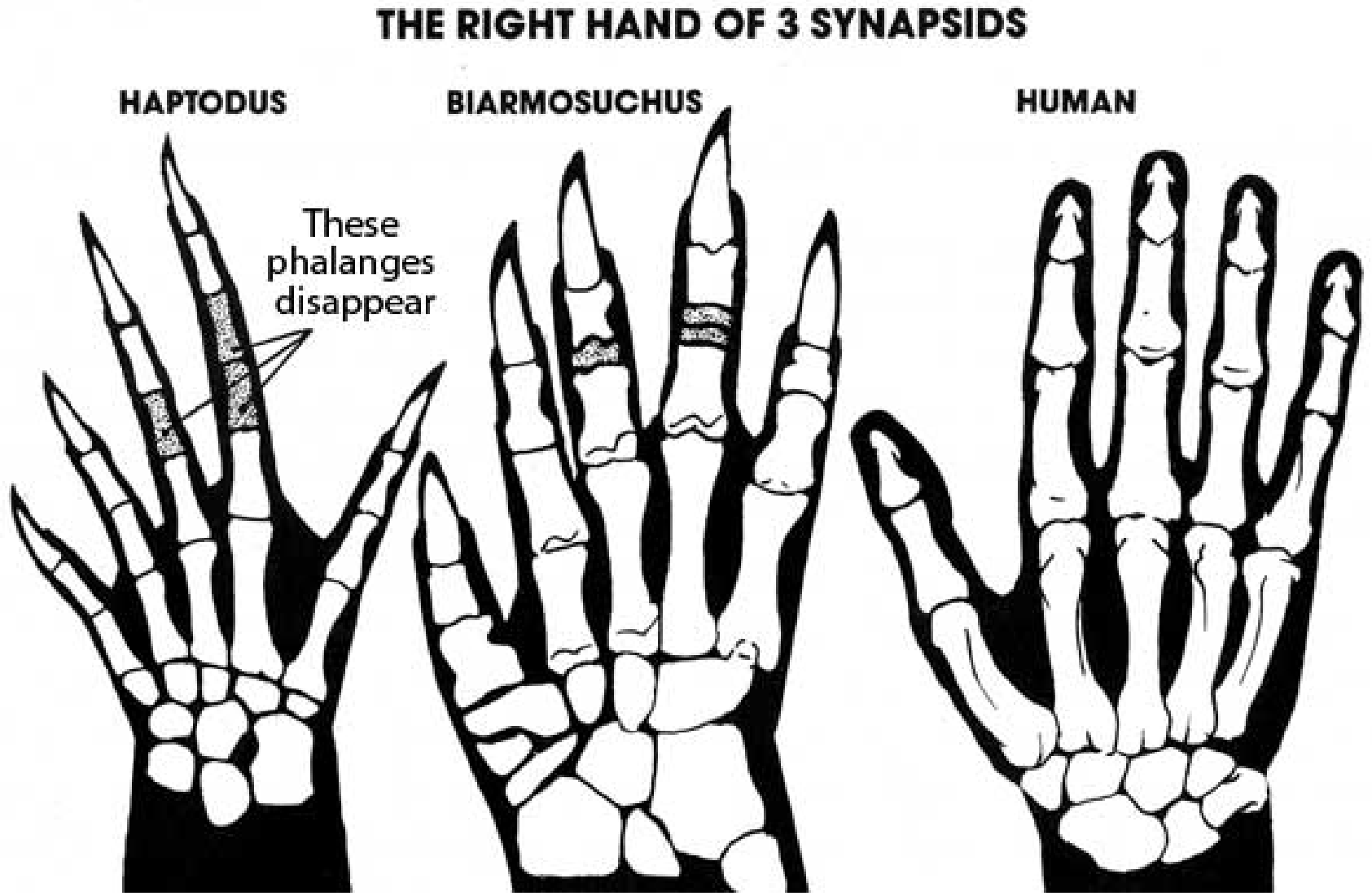
constraints on the generative process, so that they belong to a class which constitutes a 'typical form'. We thus arrive at a justification of the pre-Darwinian definition of homology, equivalence of forms under transformation, understood now in generative terms.

We can now ask more precisely what may be the nature of the transformations between the different limb patterns. What we see from the patterns shown in Figures 4, 6, and 7 is that, because of the constraints on the generative process, a transformation from one type of limb to another does not involve the loss or gain of individual elements, but a change of whole aspects of the pattern. Thus if we compare the five-digit pattern of Figure 4 and the four-digit pattern of Figure 6, we see that there is no way of numbering or labelling the phalanges, say, in such a way that we can describe which digit has been lost or gained in going from one to the other. A field solution with five-fold periodicity is simply a different solution to one with four-fold periodicity. They are transformations of one another under changes in some parameters, an 'energy' level, a diffusion constant, or a viscoelastic parameter. And the actual patterns are created anew in each generation. Thus from this viewpoint, tetrapod limbs are united in their structure not by virtue of descent from a common ancestor, with functional variants showing loss or gain of identifiable elements in the ancestral limb form. They are all members of a logical class of structure united by common generative principles. What actually happens in the historical lineage of these forms tells us something about adaptation to external contingencies but nothing about internal organizational principles. It is now necessary to recognize that biological process conforms not only to extrinsic functional stability criteria of the type expressed in the concept of fitness, but also to intrinsic principles of order or organization arising, in the case of morphology, from the spatial ordering properties of generative fields. Organisms are not aggregates of elements, whether molecules, cells, organs, skeletal or other components, whose random variation results in an unconstrained variety of forms. They are self-organizing wholes governed by laws describing spatial and temporal organization such that processes of biological change involve constrained transformation, whether ontogenetic or phylogenetic. Evolution and development then emerge as aspects of this generative process over different time-scales and constrained by different categories of parametric change.

4.5. THE GENERATIVE PARADIGM IN BIOLOGY

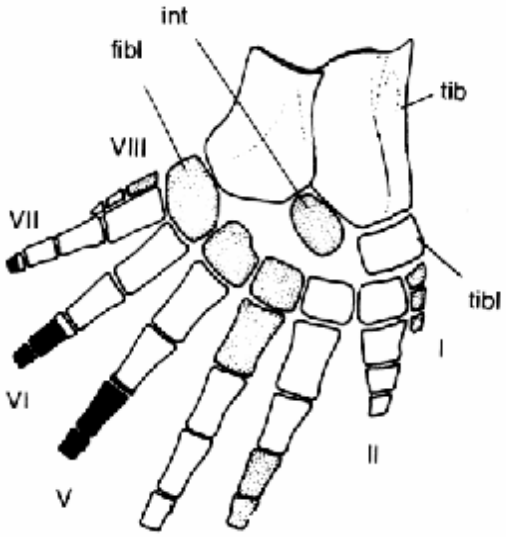
In order to pursue the above propositions further, it is necessary to get a clearer idea of the nature of the morphogenic fields which are being proposed as the source of developmental and evolutionary potential, and what factors are involved in the selection or stabilization of specific field solutions from the potential set, resulting in specific morphology. Changes in these factors will then result in changes of form, i.e., in the constrained transformations which explain

опровержение Гудвину

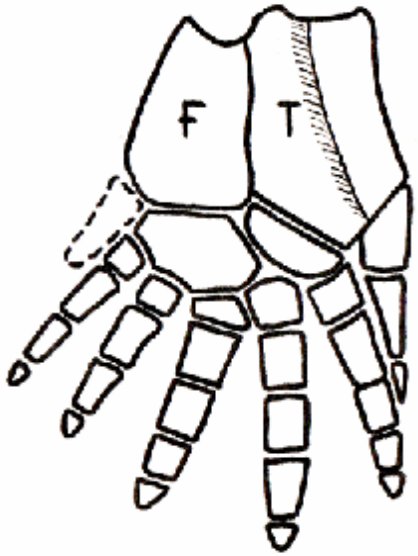


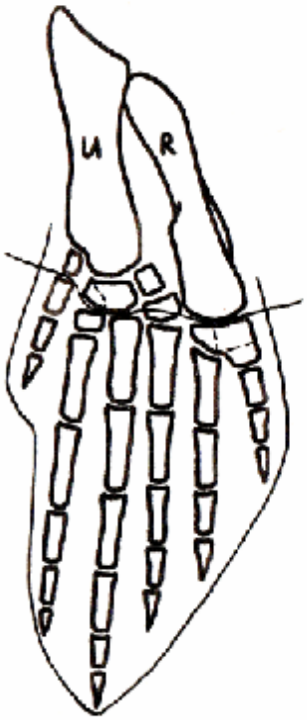
все девонские лапы

Acanthostega

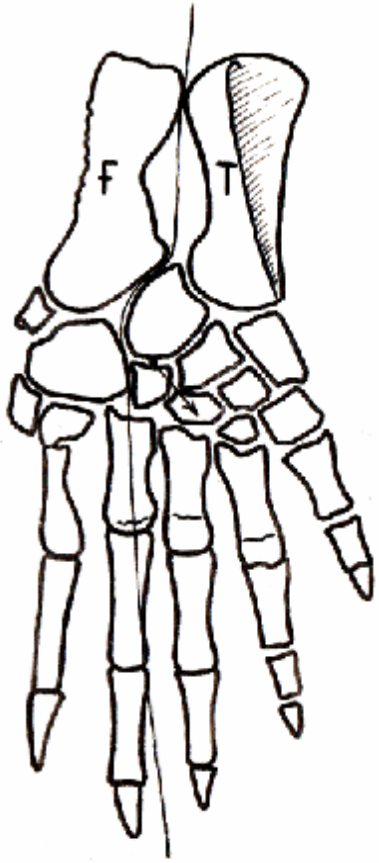


Ichthyostega

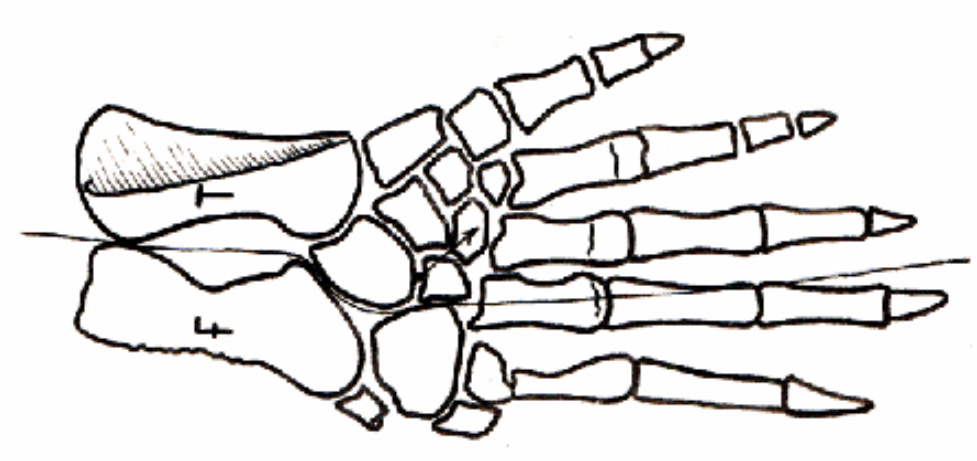


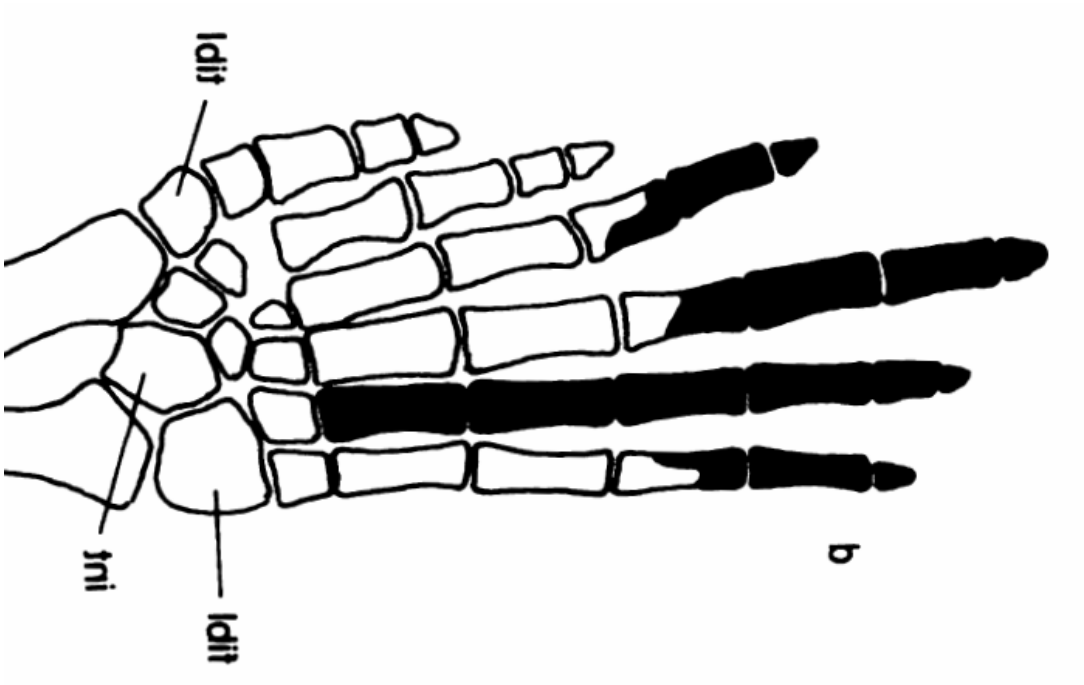


Tulerpeton

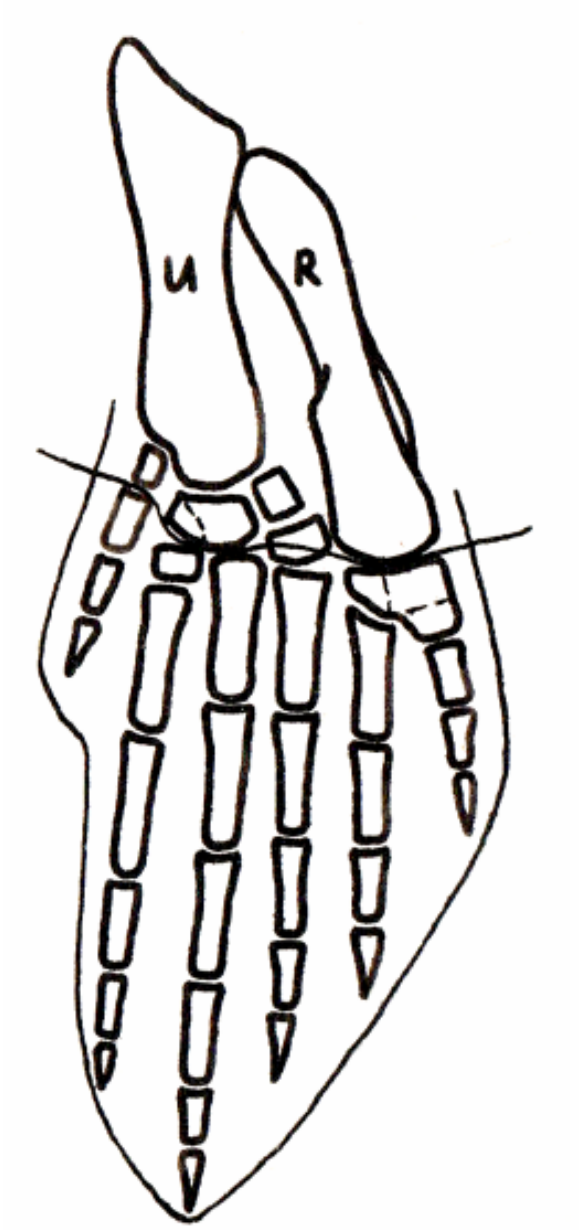


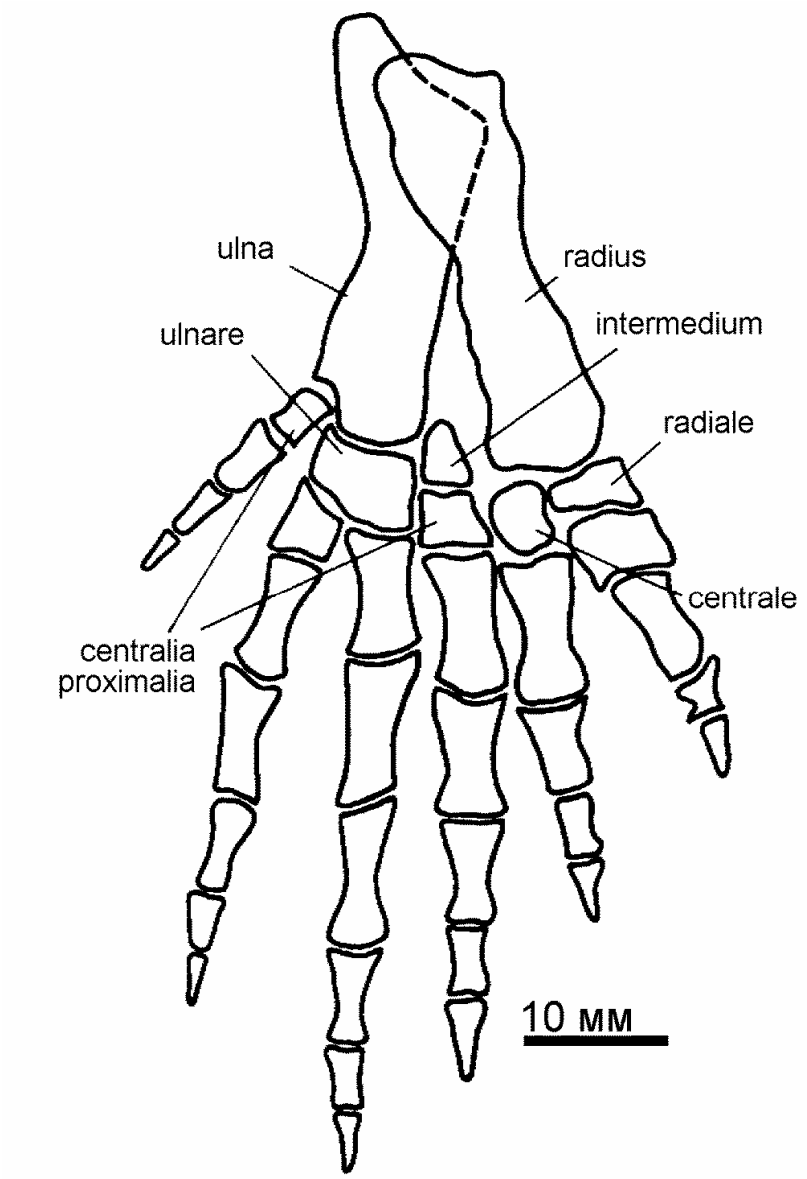
ступня тулерпетона



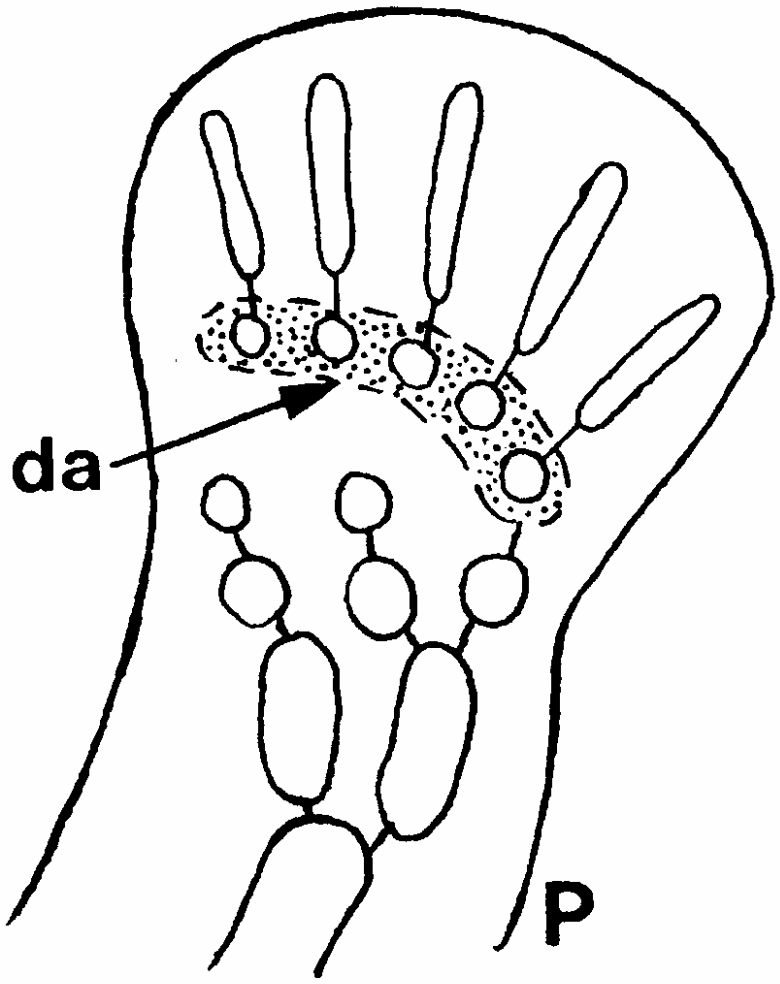


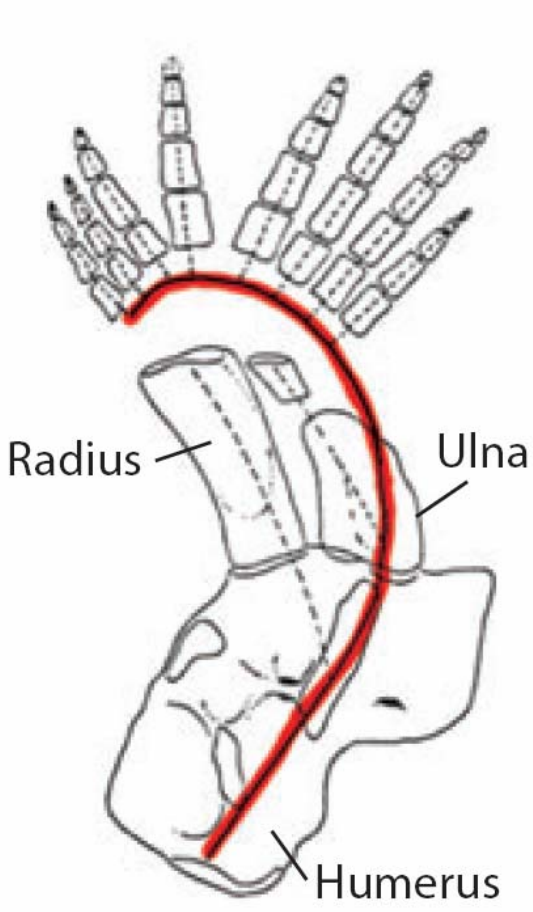
кисть тулерпетона



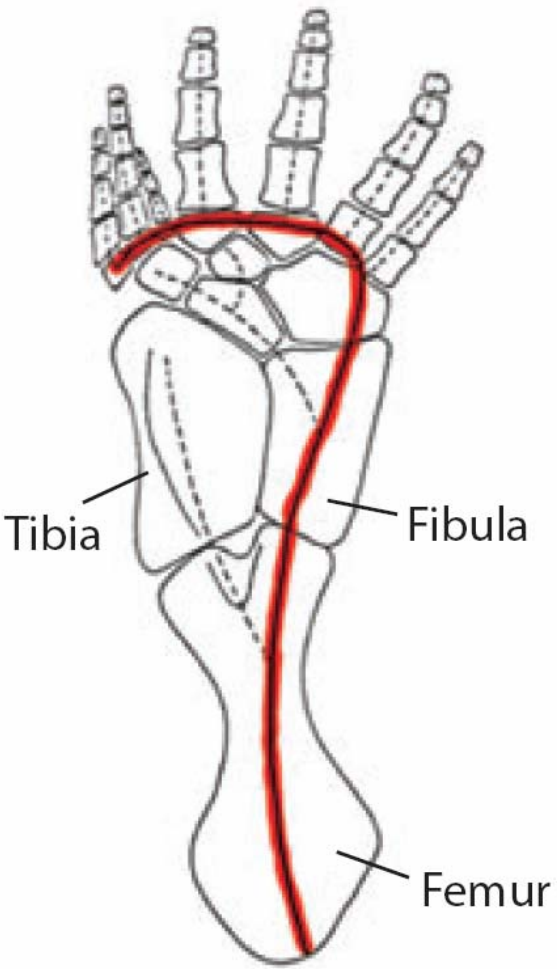


пальцевая дуга у разных …стег



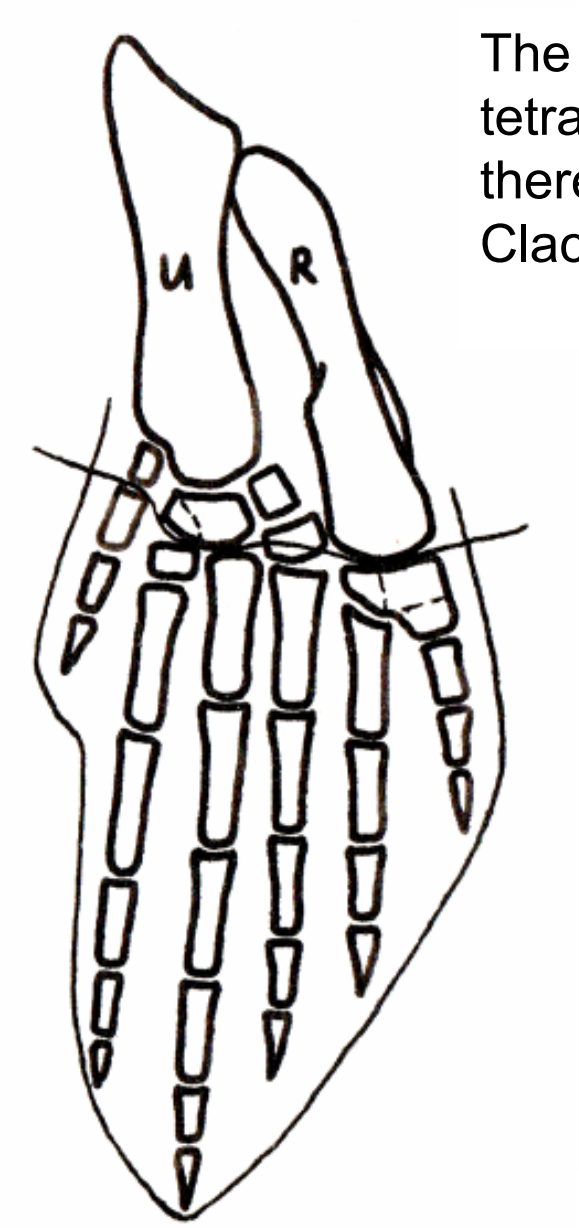


Forelimb of
Acanthostega

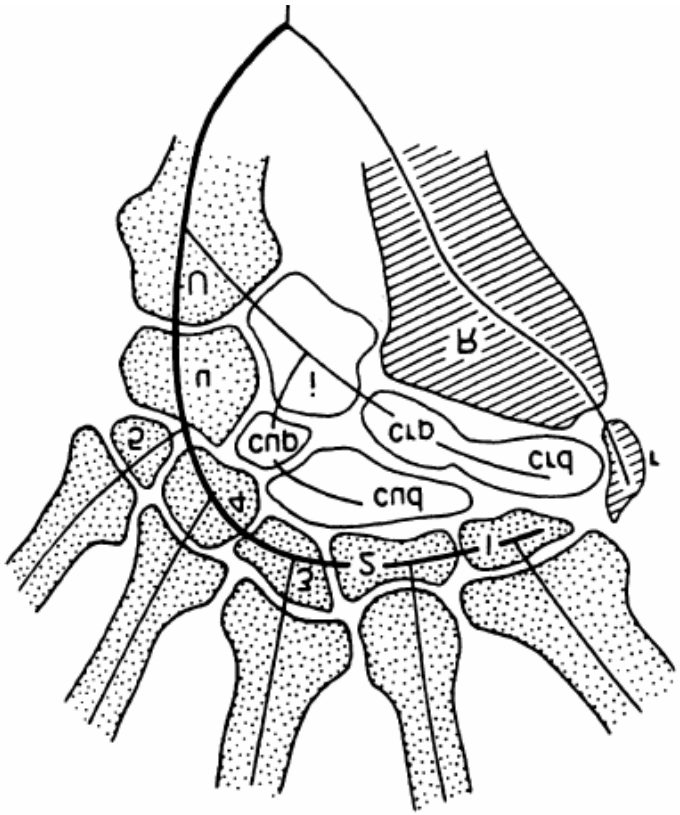


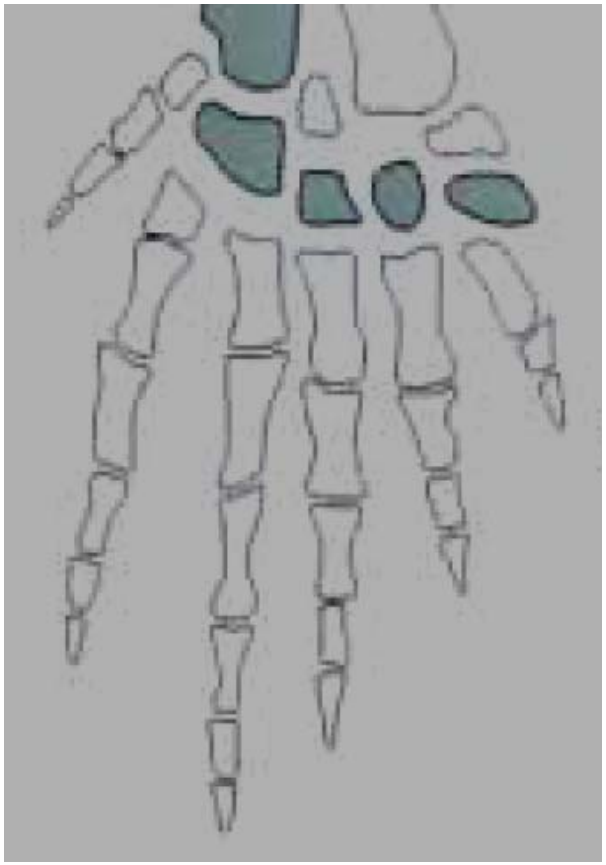
Hind limb of
Ichthyostega

пальцевая дуга у тулерпетона ?!

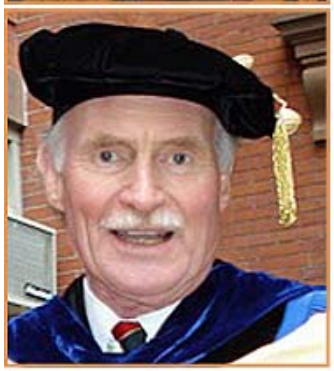


The wrist contained fewer bones than those of Carboniferous tetrapods and had no identifiable distal carpals. *Tulerpeton* therefore remained an anomaly. (The fin to limb transition… Clack, Annu. Rev. Earth Planet. Sci. 2009. 37:163–79)

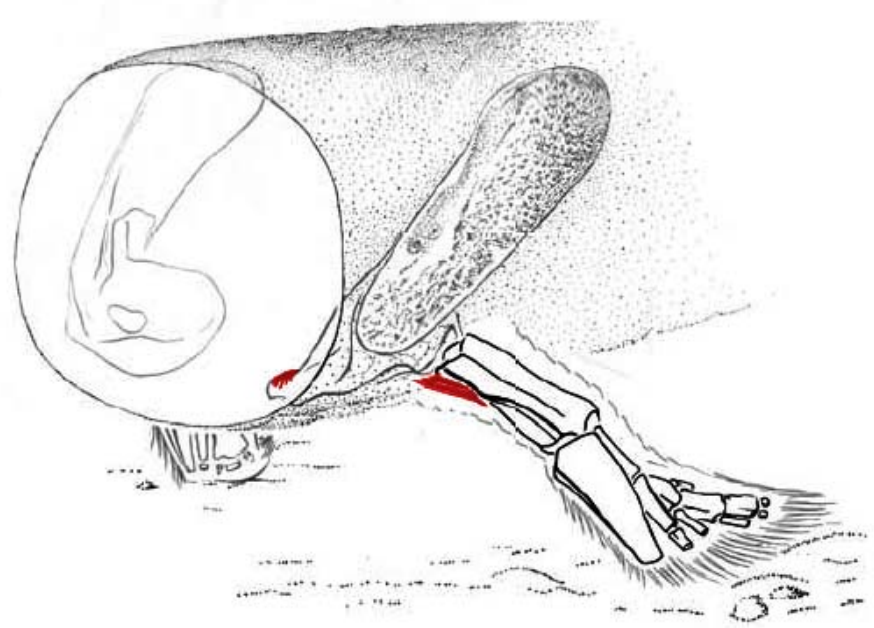


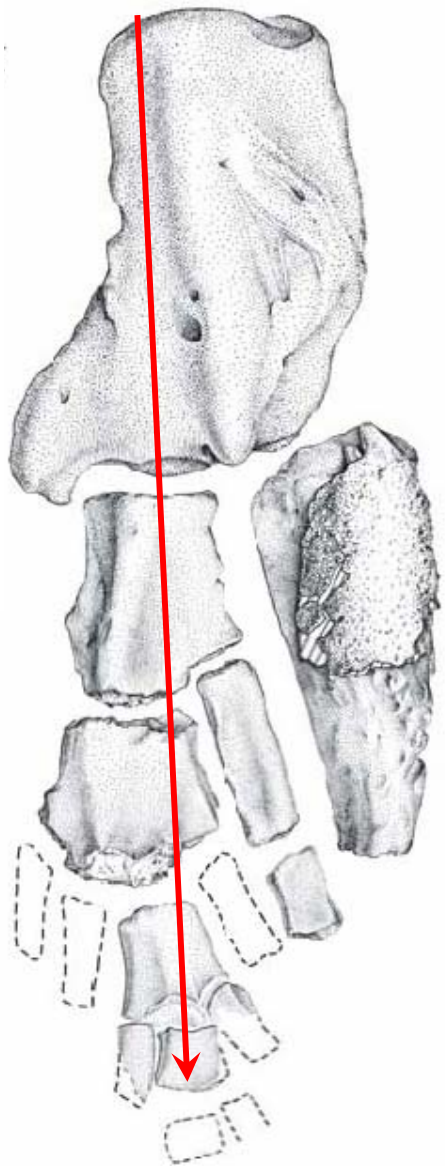


у тиктаалика нет пальцевой дуги

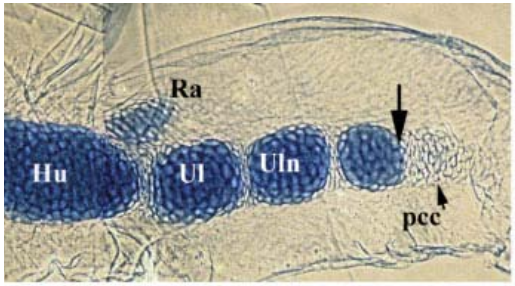


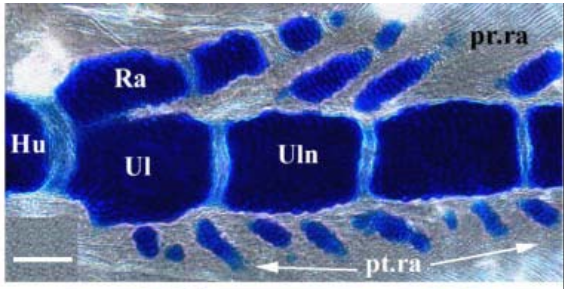
A fin axis that extends distal to the ulnare has been unknown in any tetrapodomorph until the discovery of *Tiktaalik*. As in porolepiforms and dipnoans, the axis of *Tiktaalik* lies in the centre of the fin. If the five radials of *Tiktaalik* are homologous to digital rays, then the axis of the tetrapod limb would extend from the humerus through digit three. Unfortunately, the absence of a well-defined axis in other tetrapodomorphs leaves uncertain whether a central axis is primitive for tetrapods or if it evolved separately in *Tiktaalik*. Testing these competing hypotheses awaits the discovery of other tetrapodomorph fins with axes that project into the distal fin.

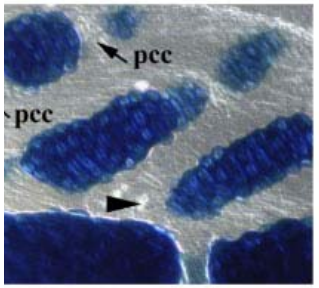


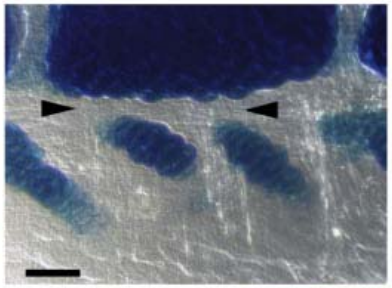


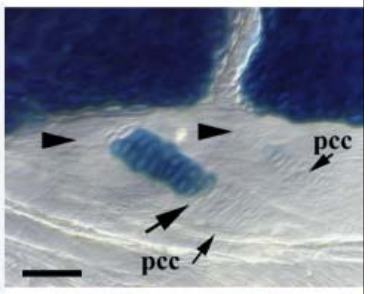
Теория двуветвистой конечности А.Н. Дружинина

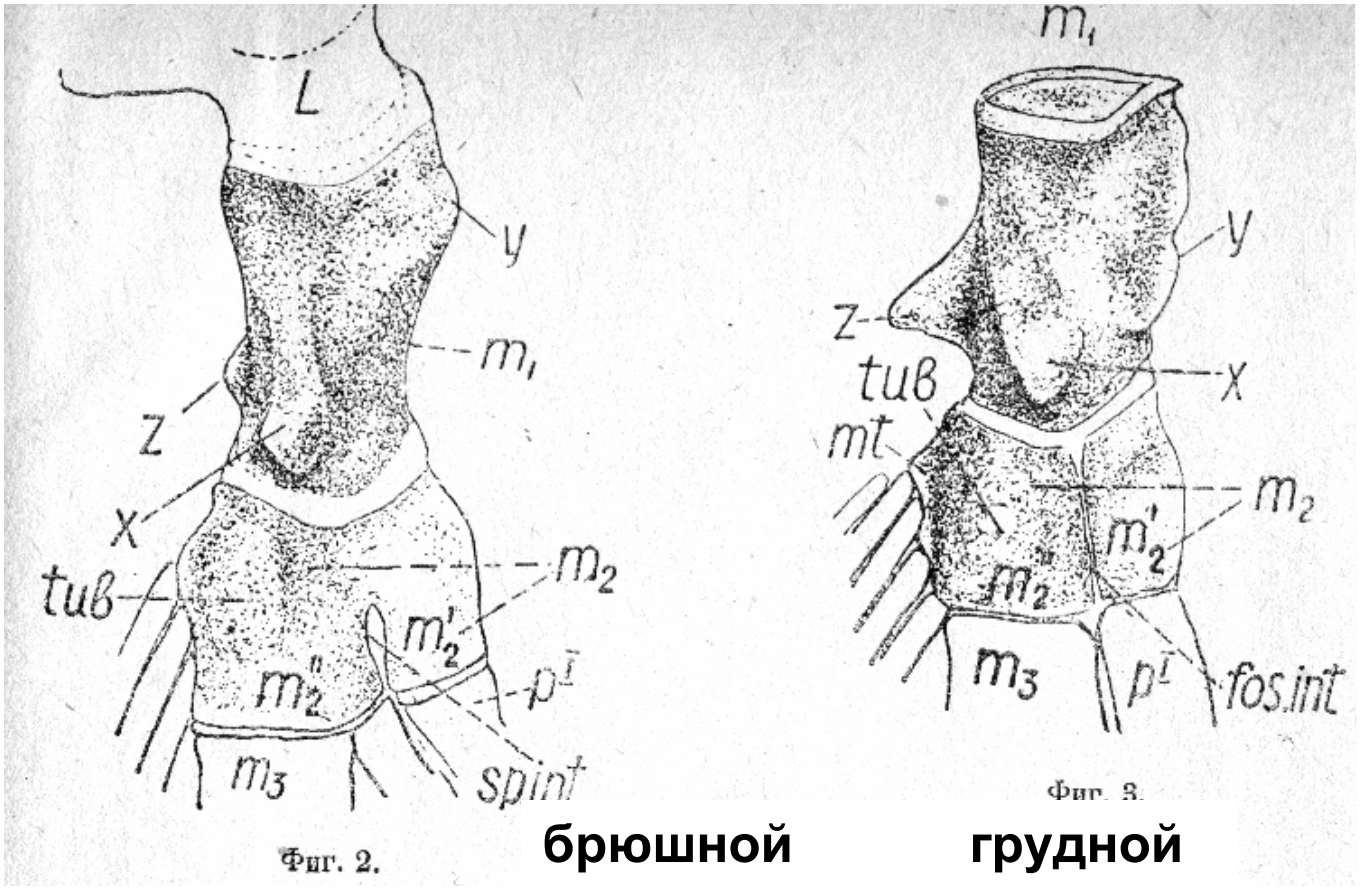






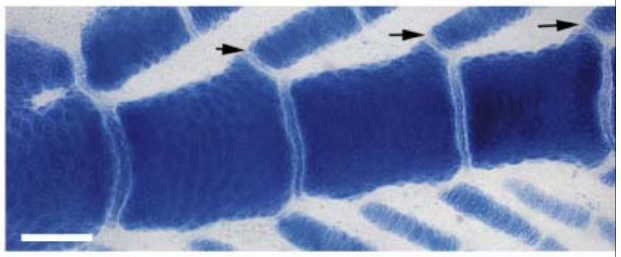


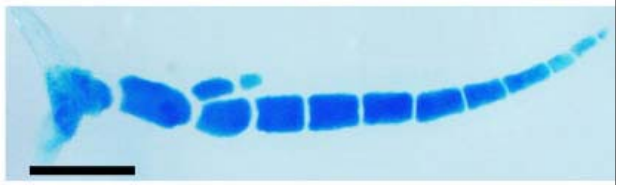


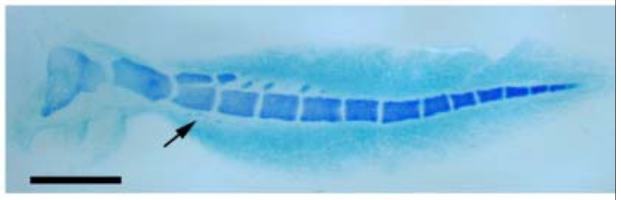


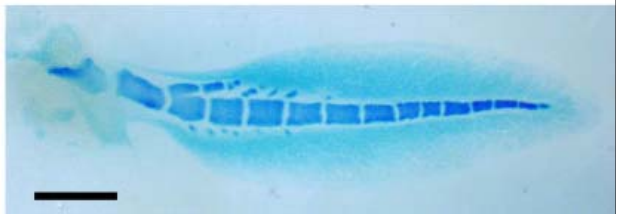
Фиг. 2. Фиг. 3.

брюшной грудной

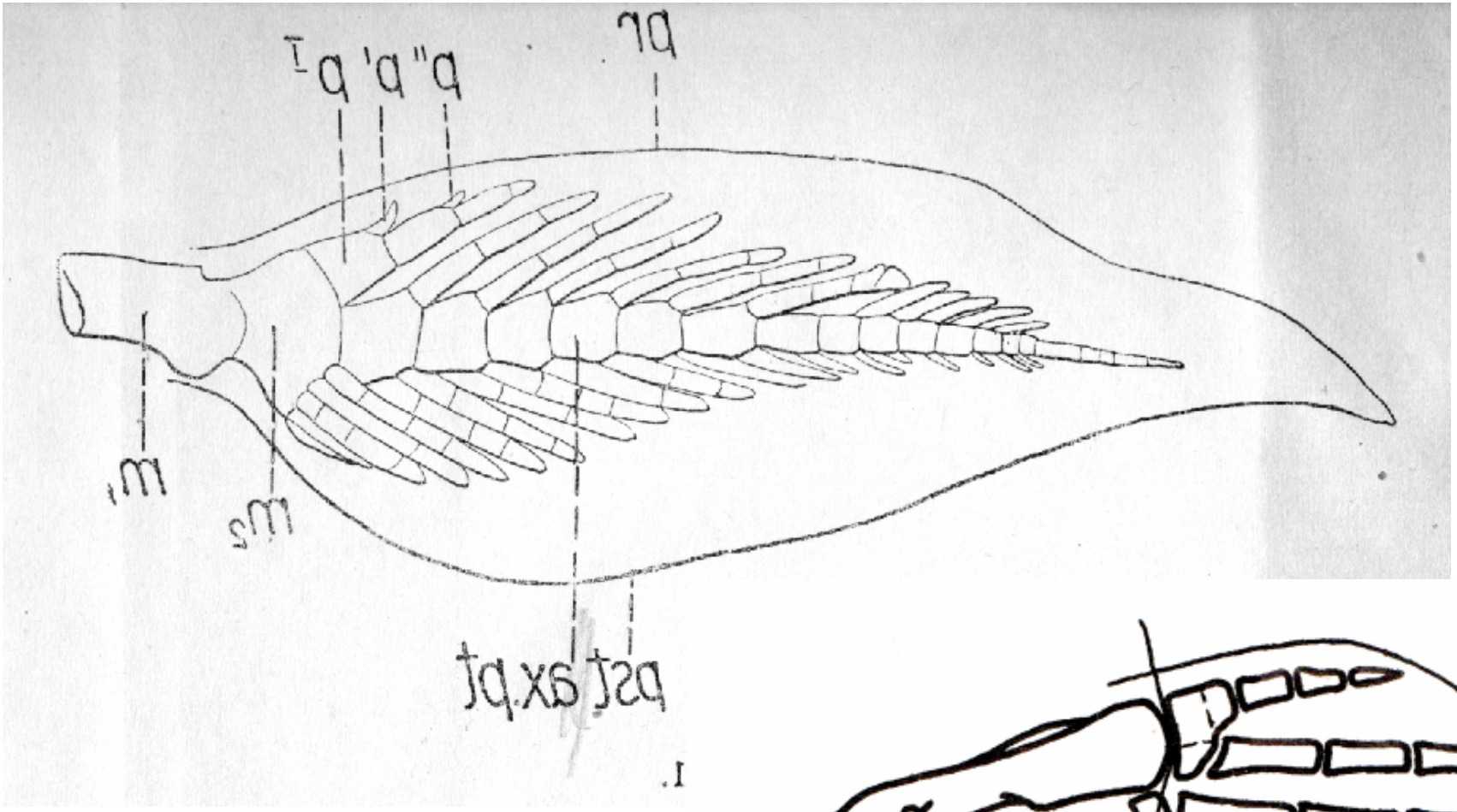


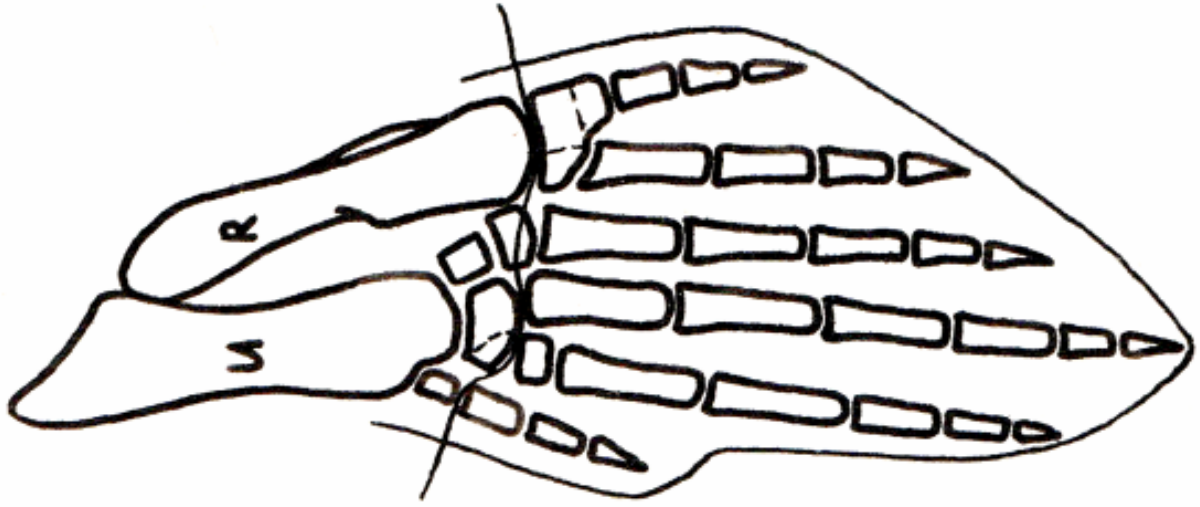




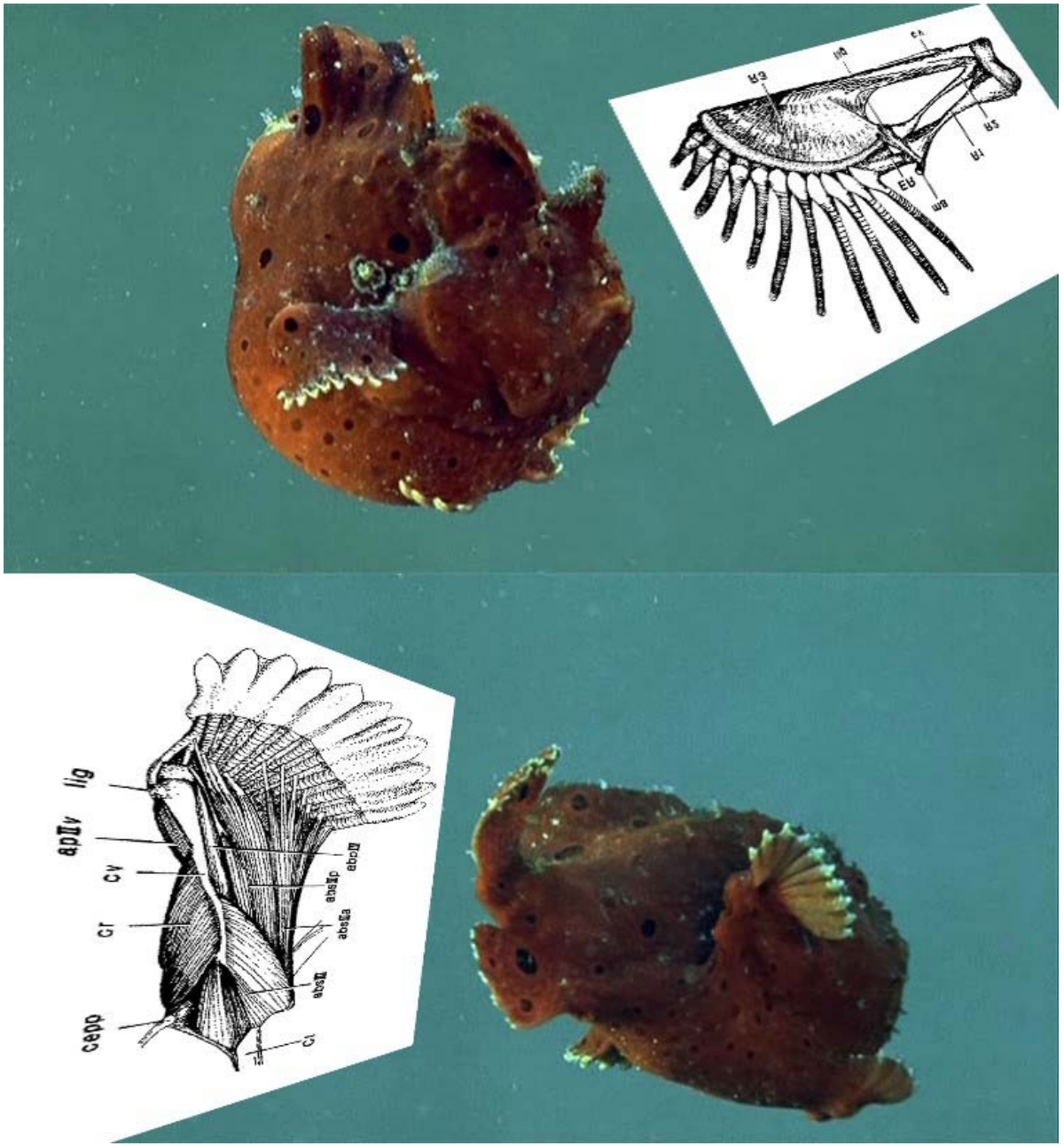


равноправие двух ветвей

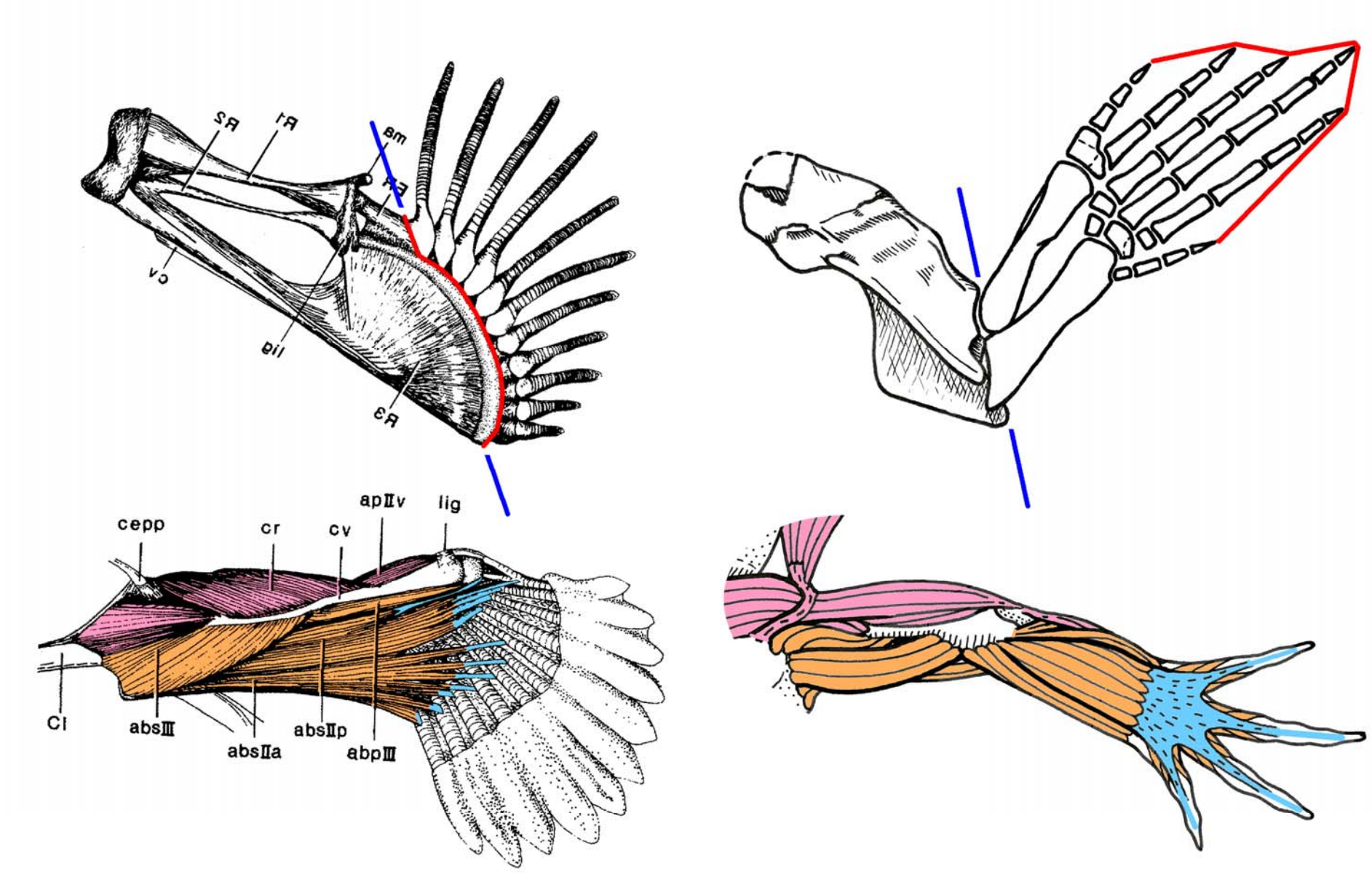




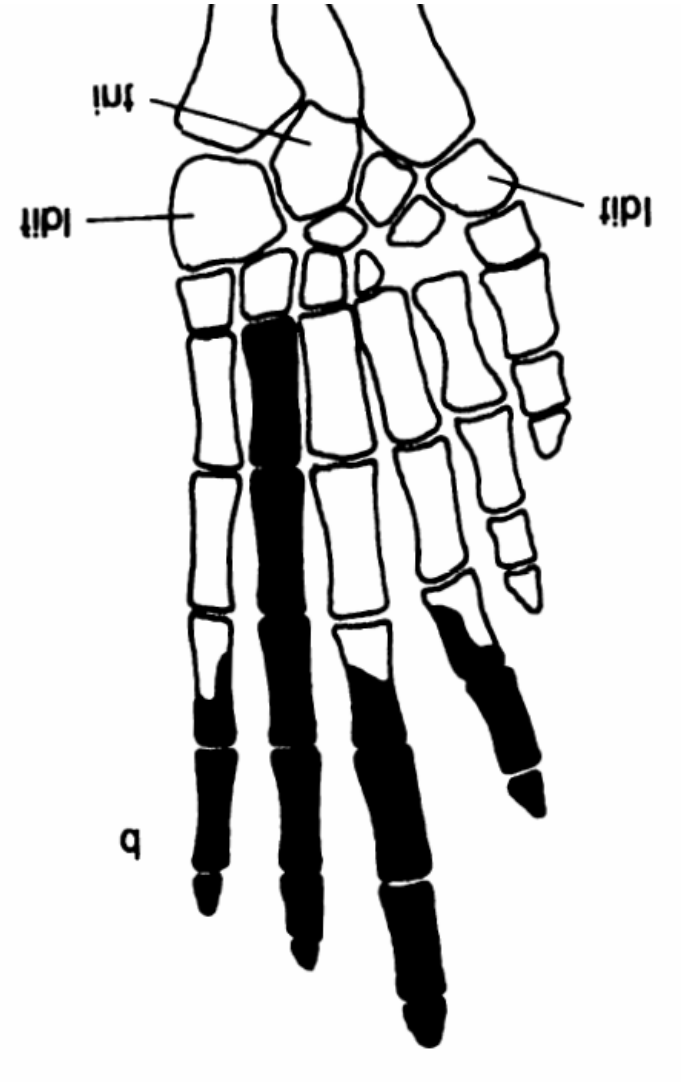
Теория Эдвардса о подводной лапе

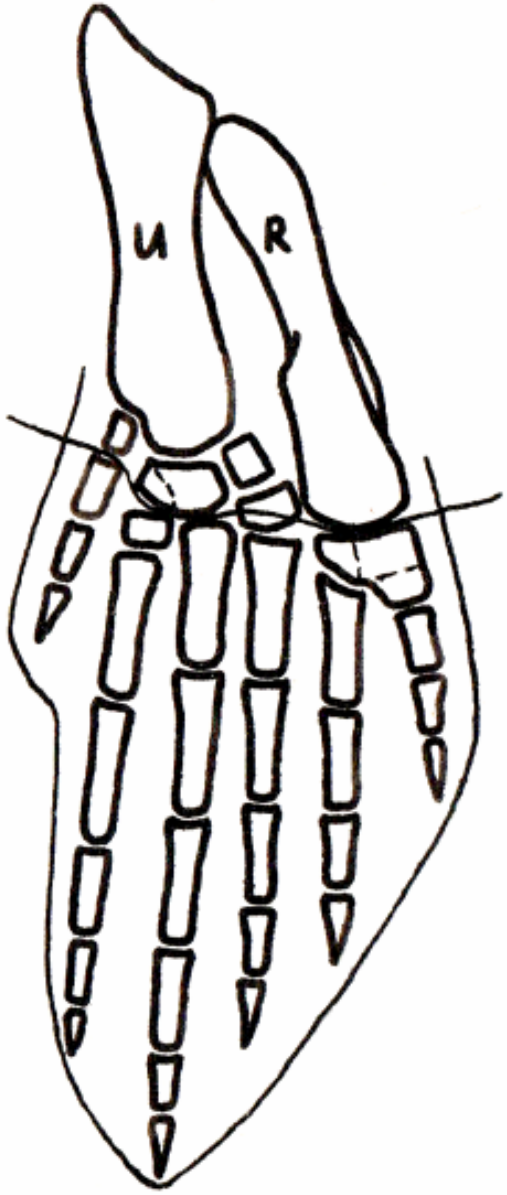


общий сгибатель пальцев

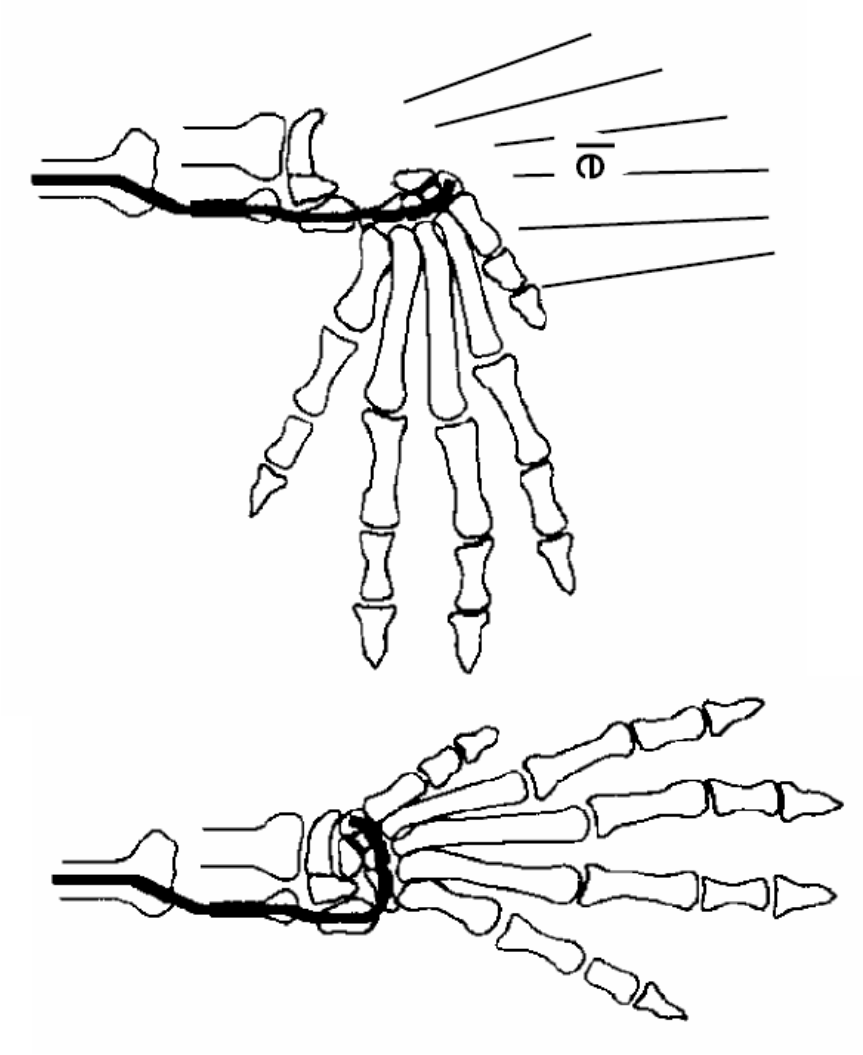


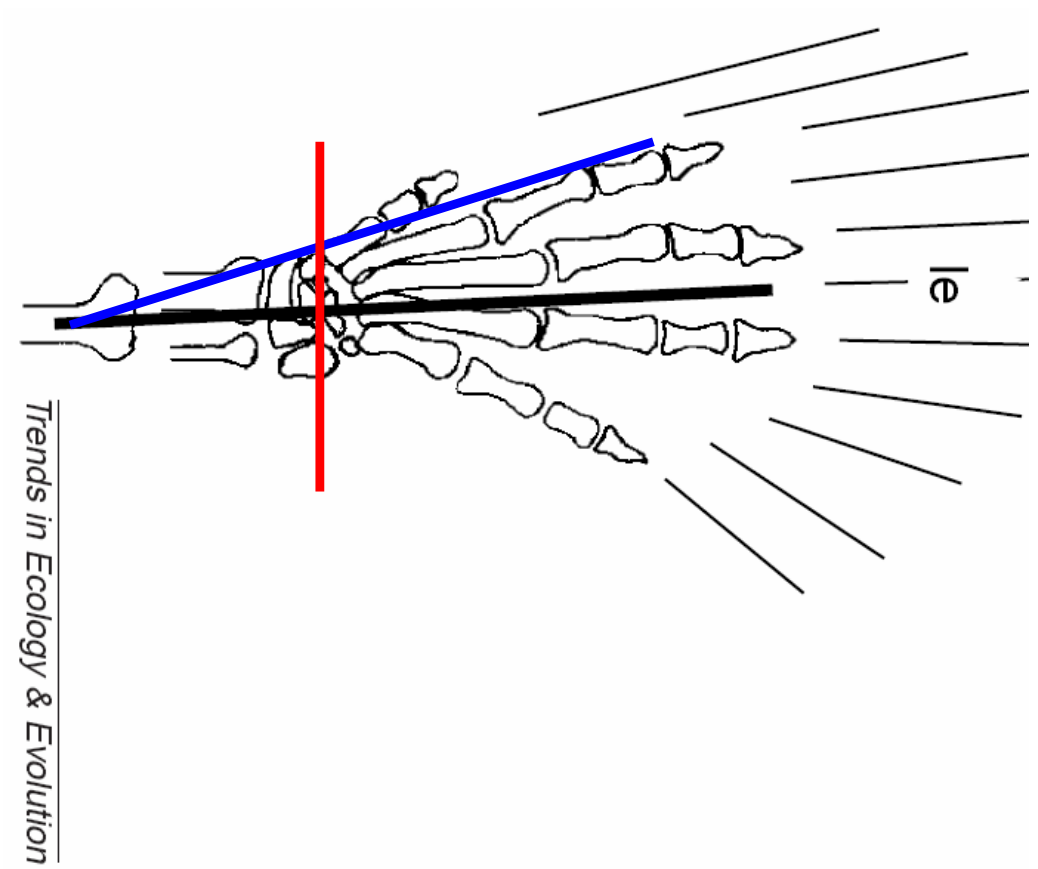
«кирпичная кладка» у тулерпетона есть только в стопе



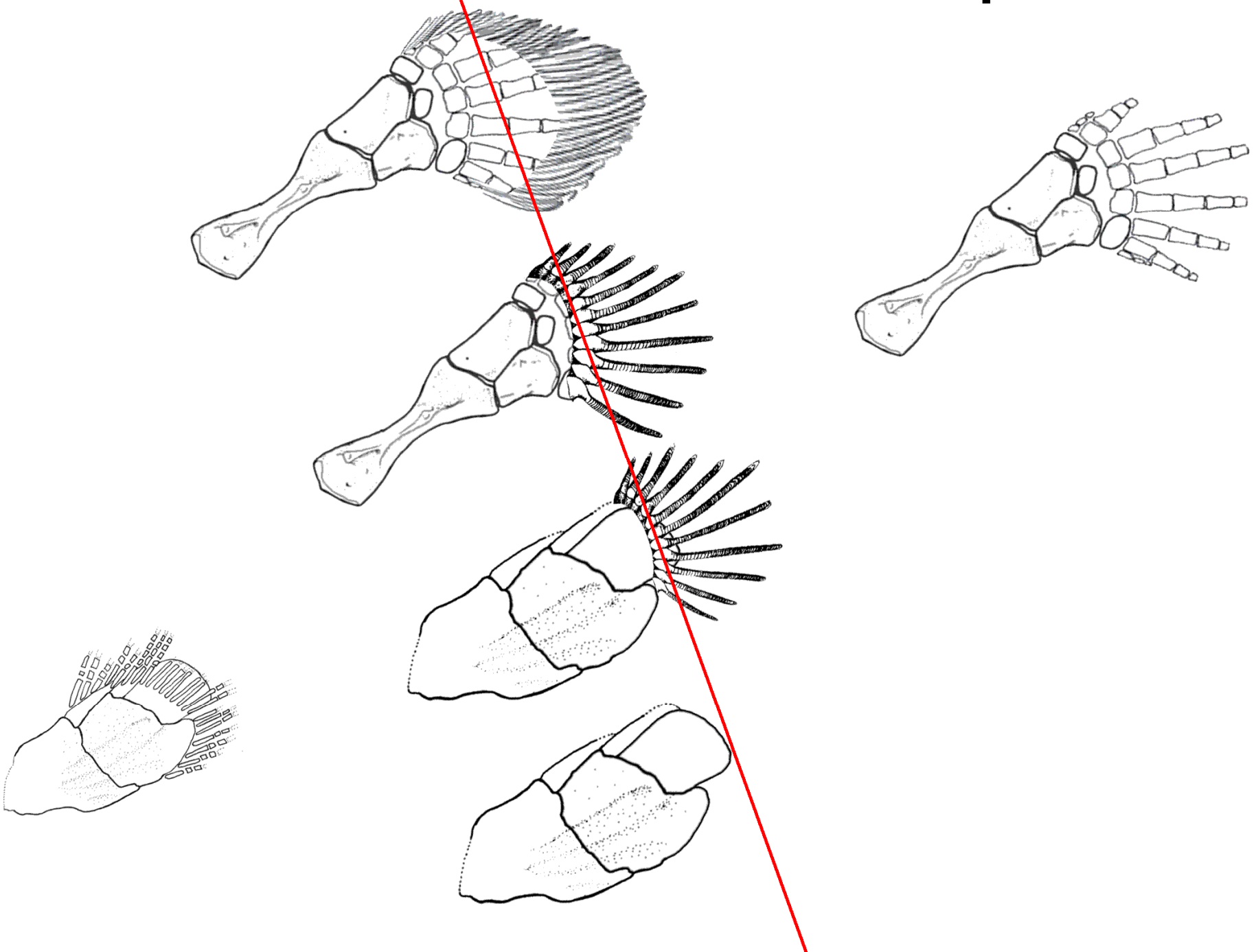


пальцевая дуга –
это совсем не метаптеригиальная ось,
а ортогональное к ней новообразование





пальцы или лепидотрихии



гомология примордиальных клеток лепидотрихий и пальцев