ПОСЛЕДНЯЯ СТАТЬЯ Ф.Я. ДЗЕРЖИНСКОГО

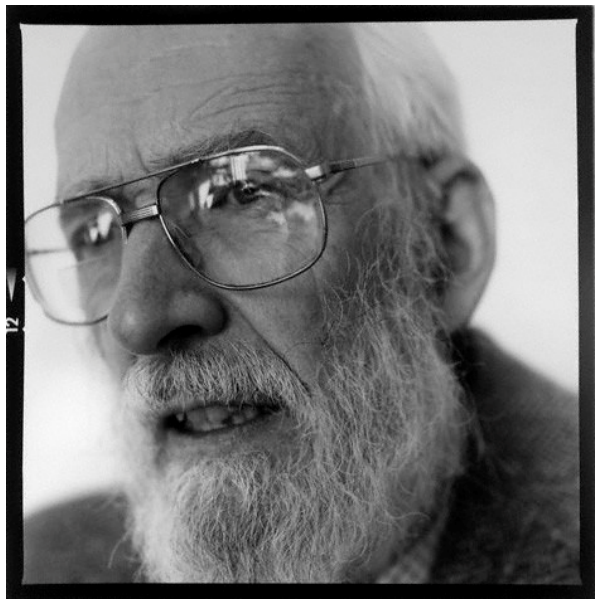
40 ЛЕТ ОТ ИДЕИ ДО ВОПЛОЩЕНИЯ

предшественники

Millot J. & Anthony J. (1958). Anatomie de *Latimeria chalumnae*

- Шмальгаузен И.И. (1964)
- Thomson K.S. (1966, 1967, 1970, 1973)
- Cracraft J. (1968)
- Alexander R.McN. (1973)
- Robineau D. & Anthony J. (1973)
- Adamicka P. & Ahnelt, H. (1976)
    - Дзержинский Ф.Я. (≈1975-1980 придумал и выпилил)
- Lauder G.V. (1980)
- Hitchcock C.E. (1995)
        - Дзержинский Ф.Я. (1998 опубликовал)
- Канюкин А.А. (2009)
- Johnston P. (2011)
- Dutel H., Herrel A., Clement G., & Herbin M. (2013, 2015)

противоположные ошибки Шмальгаузена и Александера



plex). In any case the elastic notochord sheath which attaches to both parts of the cranium must resist elevation of the snout

скости черепа. С другой стороны, антагонистами подчерепной мышцы являются не только указанные мышцы (особенно m. coracohyoideus), но и очень массивная здесь хорда, которая при сокращении подчерепной мышцы сжимается, а после этого в силу большой ее упругости вновь расширяется и раздвигает оба блока с вентральной стороны. В результате этого

30-Mar-2015 – 14-Apr-2015

Thank you for your interest in the **Zoological Journal of the Linnean Society**. Unfortunately, I have to tell you that focus and format of Professor Dzerzhinsky's manuscript do not fall within the scope of the ZJLS. It seems to include an important review of the biomechanics of the skull of sarcopterygian fish, and would be more appropriately submitted to a journal devoted to functional morphology and biomechanics. I understand the delicate situation attending this submission and suggest that the ms be withdrawn, rather than rejected, so that it may be submitted elsewhere.

Kind regards,

15-Apr-2015 – 21-Apr-2015

Thank you for submitting this interesting manuscript to **Journal of Anatomy**. I am so sorry to hear about Felix Dzerzhinsky. A great scholar.

Unfortunately, in format it is not a good fit for the journal. We would also not be in a position to offer you a commitment to a quick publication time. Peer review takes several months and then revisions would be required with a second turn of peer review prior to acceptance. Also, since we are a print publication, our duration prior to publication is longer than online-only journals.

Since your aim is to quickly get this out in time, given the condition of your friend and colleague, I would suggest that you consider one of the rapid open access journals such as Peer J or PLOS. They often offer a fee waiver.

I am sorry we can not be more positive in this case. I hope these comments may assist you and again, I am so sorry to hear about Dr. Dzerzhinsky. My colleagues at JOA send our best wishes for his improved health.

Sincerely,

25-Apr-2015 – 16-Mar-2016

Journal of Zoology - Decision on Manuscript

During the two rounds of peer review, we have received two negative reviews for this paper and only one positive, and the criticism from the first round of reviews had not been fully addressed in the second version. In such cases, we commonly reject the paper. We understand that there is an emotional context to this paper, but we must apply the same rules to all the papers we evaluate.

Therefore, the Editor will not reverse the decision to reject this manuscript. However, we can consider a new version of this paper as a new submission written as an opinion paper, what we call a 'Letter to the Editor', as you are mainly presenting ideas that have not been fully demonstrated but that can be discussed, BUT only if you are able to fully address all the comments from the reviewers. If you feel that you are not able to address all the comments, then you should not send us a new version, as it would then be directly rejected by the Editor, and that decision would be final.

Please consider carefully before you decide how you would like to proceed. If you have any questions, please let me know.

Kind regards,

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Please consider carefully before you decide how you would like to proceed. If you have any questions, please let me know.

Kind regards,

Journal of Zoology

ZSL LET'S WORK FOR WILDLIFE

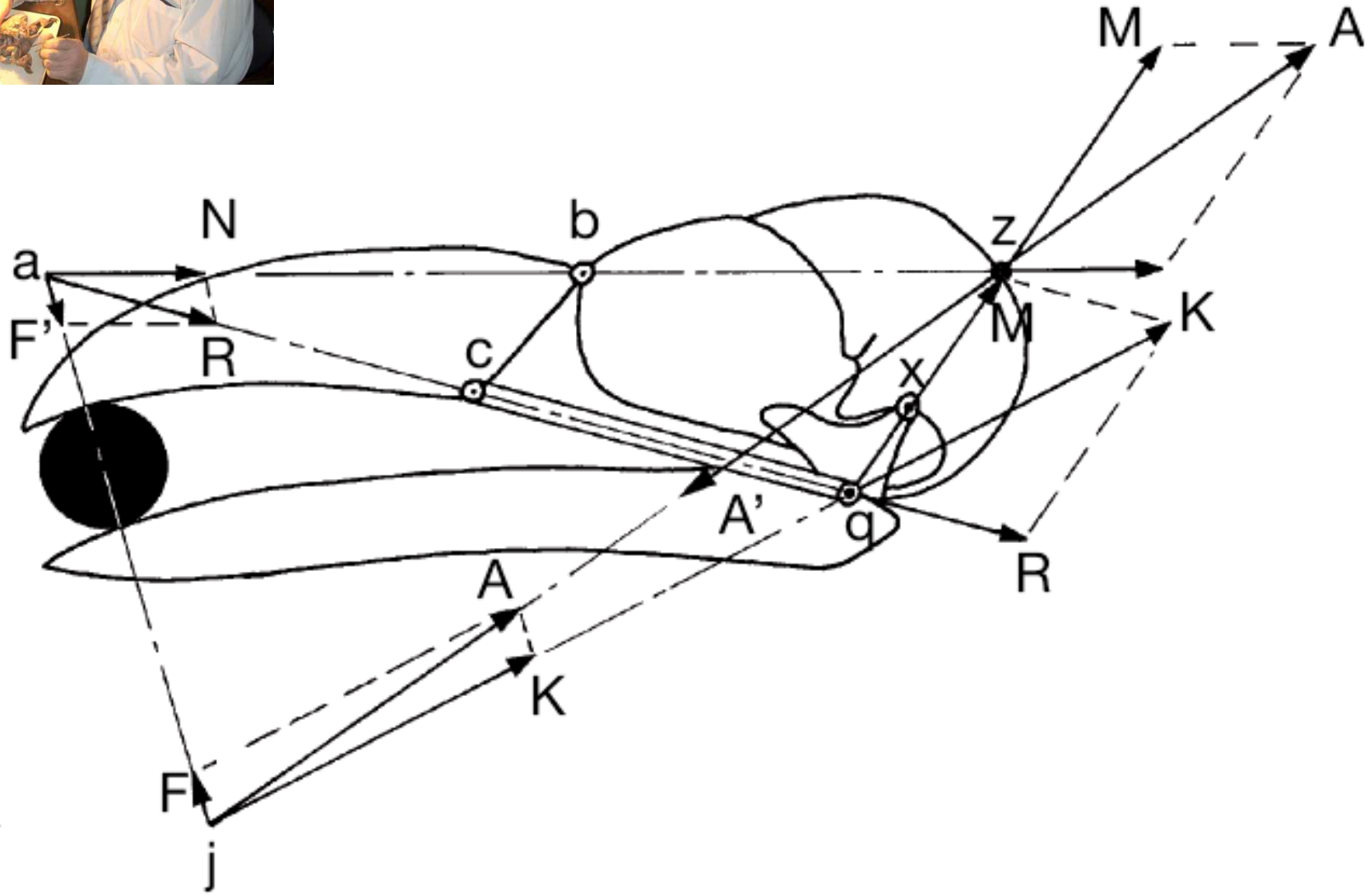
Journal of Zoology. Print ISSN 0952-8369

REVIEW

The mystery of the two-unit skull of the Sarcopterygii: a trap for functional morphologists

F. Ya. Dzerzhinsky†

Journal of Zoology **301** (2017) 85–101


M
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Current Biology

Bite Force in the Extant Coelacanth *Latimeria*: The Role of the Intracranial Joint and the Basicranial Muscle

Current Biology

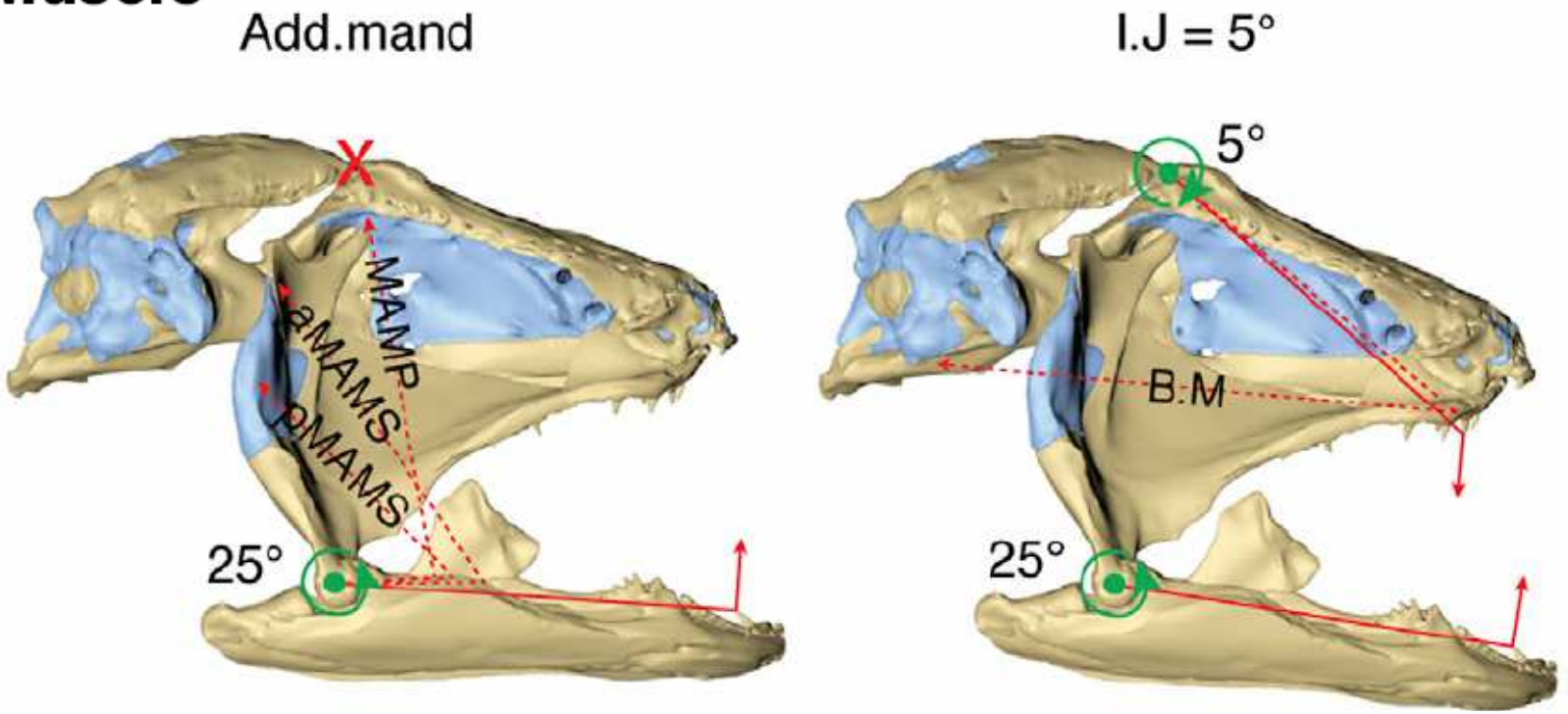
Bite Force in the Extant Coelacanth *Latimeria*: The Role of the Intracranial Joint and the Basicranial Muscle

neurocranium (Figures 1D and 1E). This joint was thought to allow an elevation of the snout by 15° to 20° relative to the posterior portion of the skull, thereby enlarging the gape and allowing for powerful suction [4–7]. In previous functional models, the basicranial muscle was thought to depress the anterior portion of the skull from its elevated state, returning it to its resting position [4–7]. However, a recent re-description of the anatomy of *Latimeria* has demonstrated that there is no clear mechanism that could drive the elevation of the anterior portion of the skull [8, 9]. By contrast, a distinct ventroflexion of the anterior portion of the skull from its resting position under the action of the basicranial muscle is anatomically permitted [8] and was reported in a living specimen [15]. As such, we suggest that the intracranial joint and the basicranial muscle are associated with an enhancement of bite force rather than mouth closure during suction feeding.




Current Biology

Bite Force in the Extant Coelacanth *Latimeria*: The Role of the Intracranial Joint and the Basicranial Muscle



We used a static equilibrium model to calculate the bite force [15, S16, S17]. We first considered the mandible as a free body and performed the bite force calculation generated by the *m. adductor mandibulae* on the mandible without the contribution of the basicranial muscle and intracranial joint (Figure 2). The magnitude of the perpendicular prey reaction forces on the mandible was estimated by calculating the moments exerted by the bundles of the *m. adductor mandibulae* on the palate-mandible joint. We calculated prey reaction forces for gape angles ranging from 5° to 30°. Next, the anterior portion of the skull, comprising the palate, the mandible, and the ethmosphenoid portion of the neurocranium was considered as a free body. The calculation of the moments exerted by the basicranial muscle in conditions of static equilibrium allowed calculation of the prey reaction forces generated by the ventroflexion of the upper part of the head at an angle of 5 and 10°. Finally, the total bite force of the coelacanth was calculated by summing the bite forces generated by the jaw adductors and the basicranial muscle and multiplied by two to incorporate left and right sides.

Владимир Игоревич Арнольд

Известно, что французский министр просвещения (геофизик), желая понять, как учат математике детей, спросил одного отличника-младшеклассника:

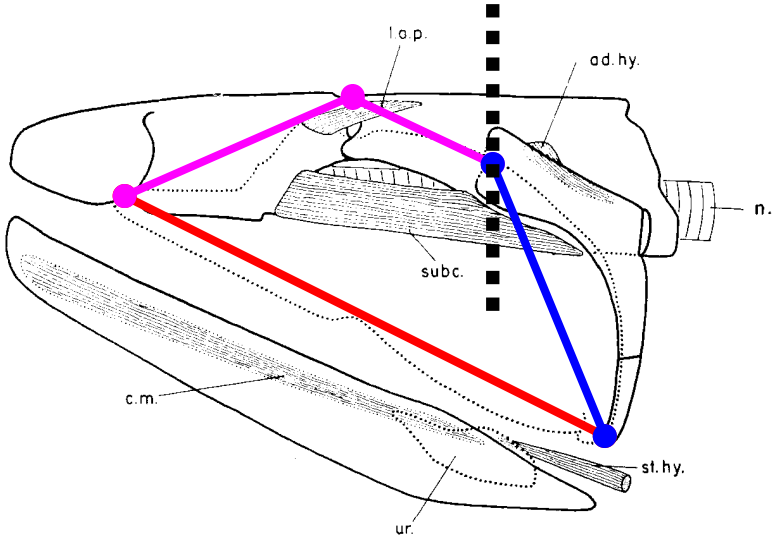
"Сколько будет 2 + 3 ?"

Бурбакисты-учителя не научили мальчика считать, и он не знал, что это 5, но он ответил так, как они с него требовали в школе:

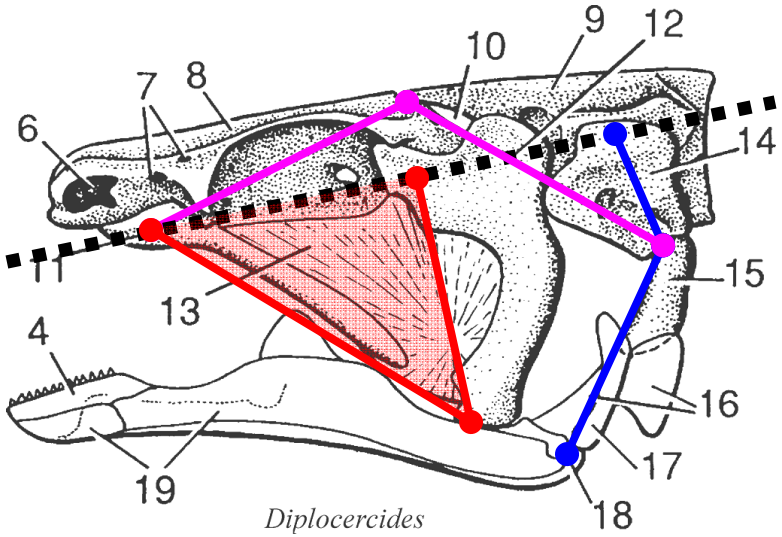
"Это будет 3 + 2, так как сложение коммутативно".

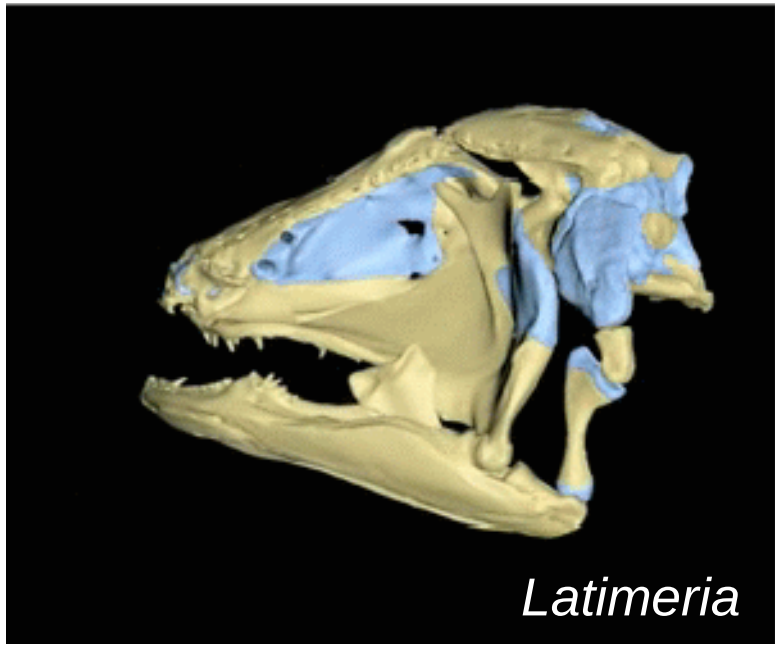
Министр объявил, что такое обучение никуда не годится, что подобных учителей "математиков" надо гнать из школ, а считать детей пусть учит кто угодно другой - химик, инженер и т. п. Но результат подтвердил социальную устойчивость бурбакизма: министра сняли с поста (и даже его министерство не сохранили, а разделили на два независимых).

двублочный череп Sarcopterygii

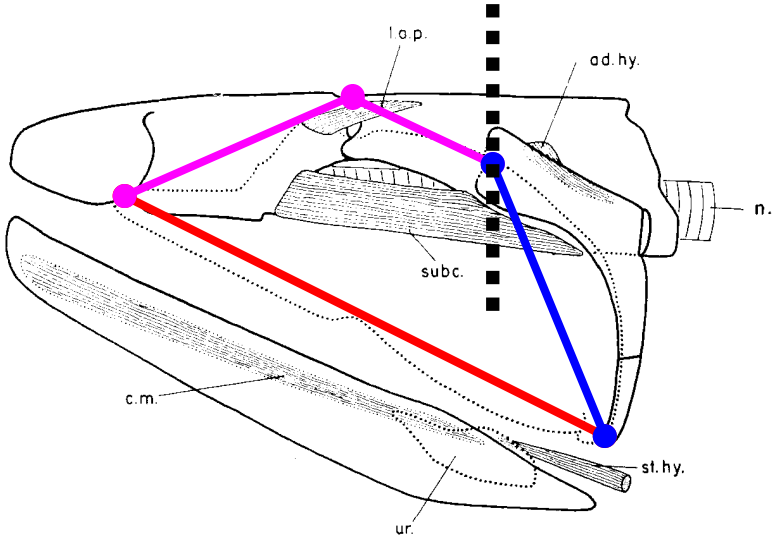


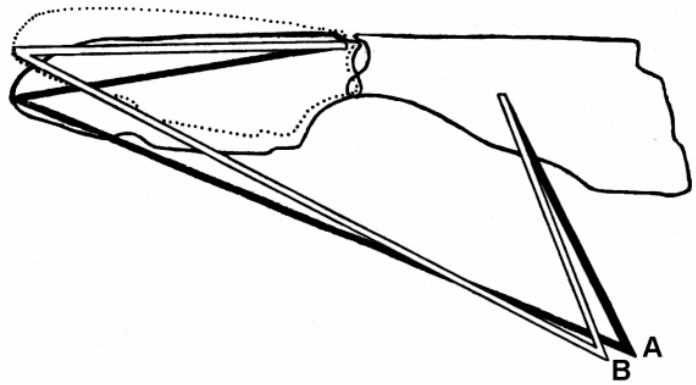
реконструкция
"рипидистий"





стремянка Томсона





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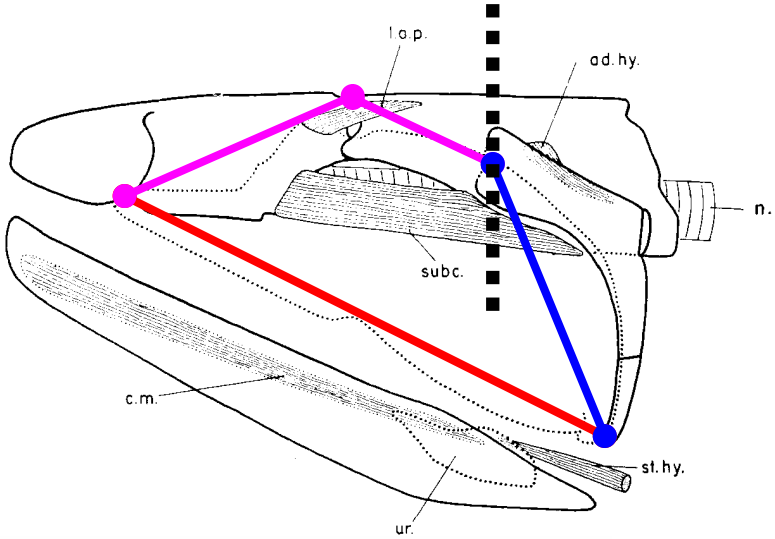

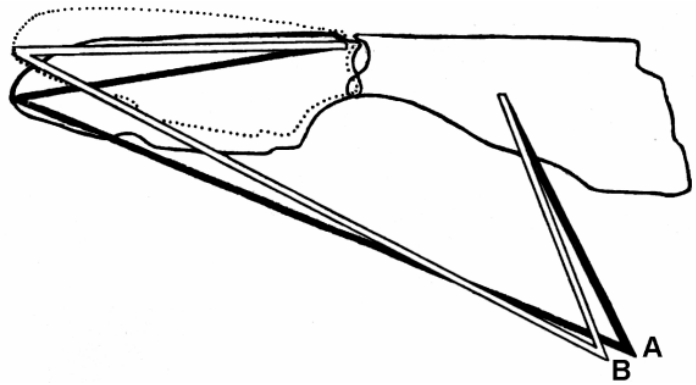

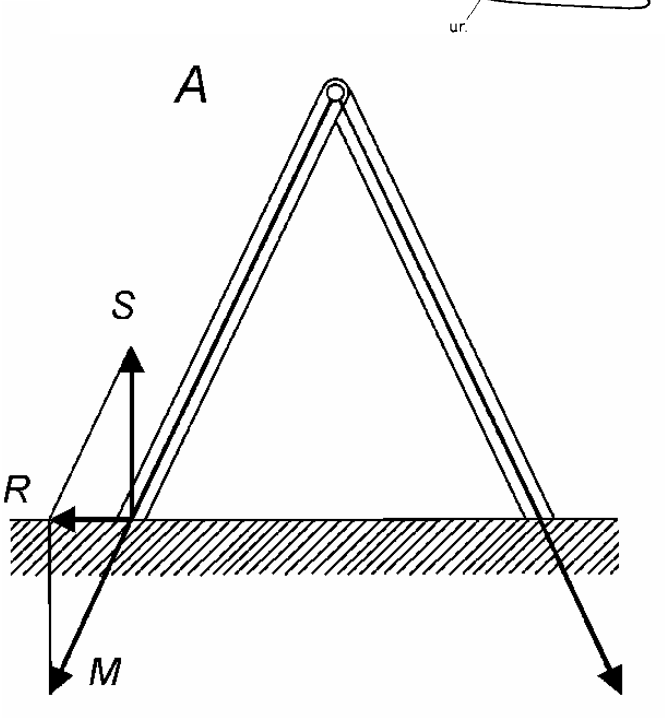

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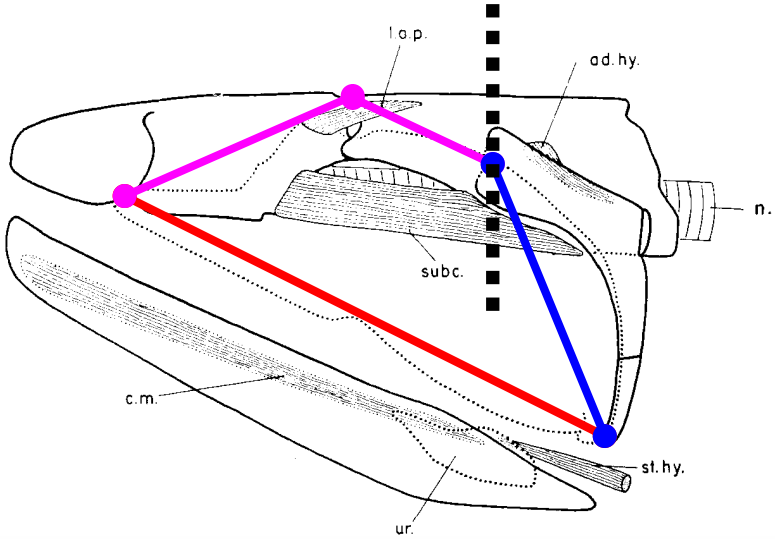

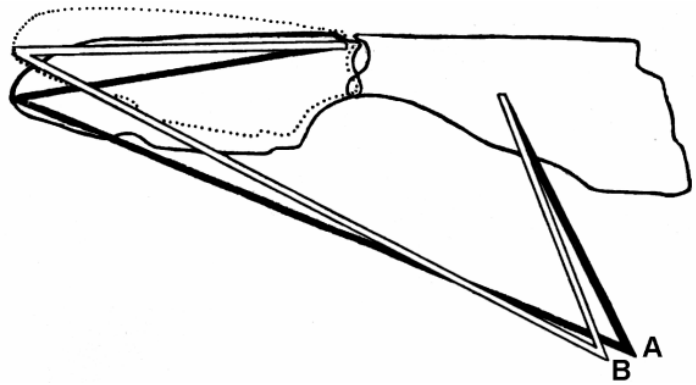

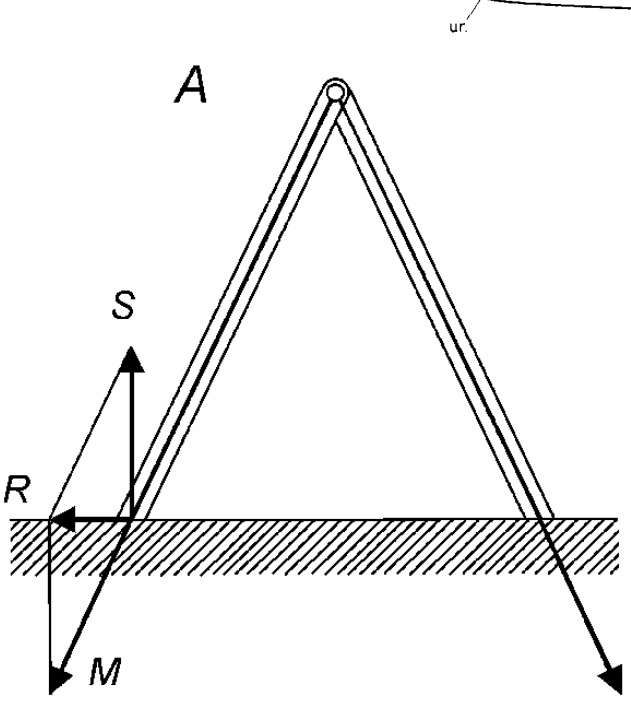

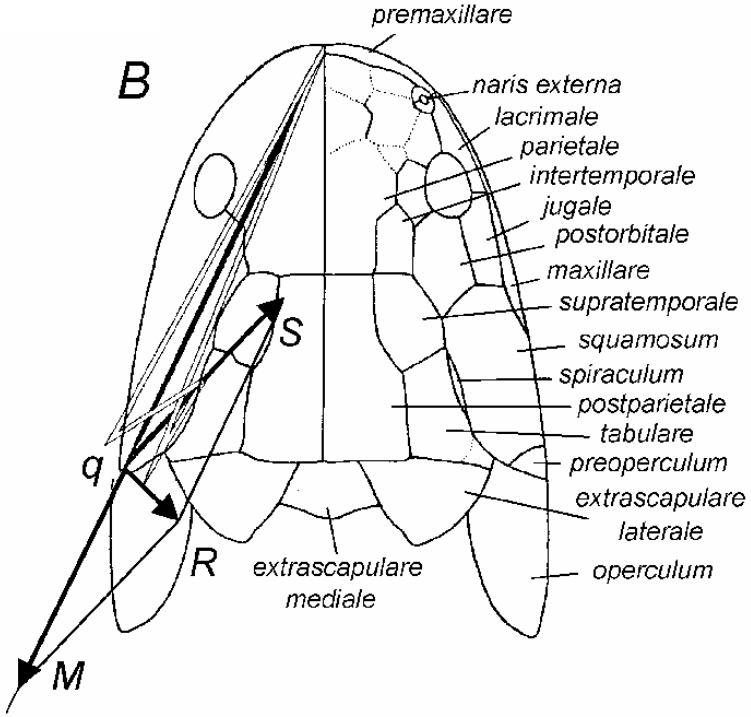

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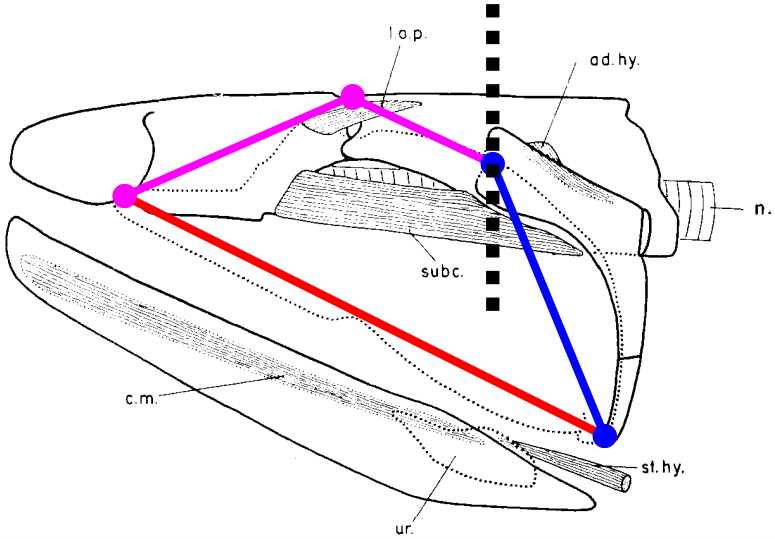
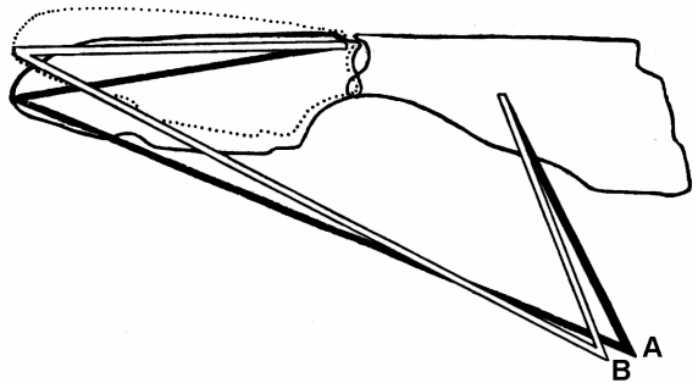
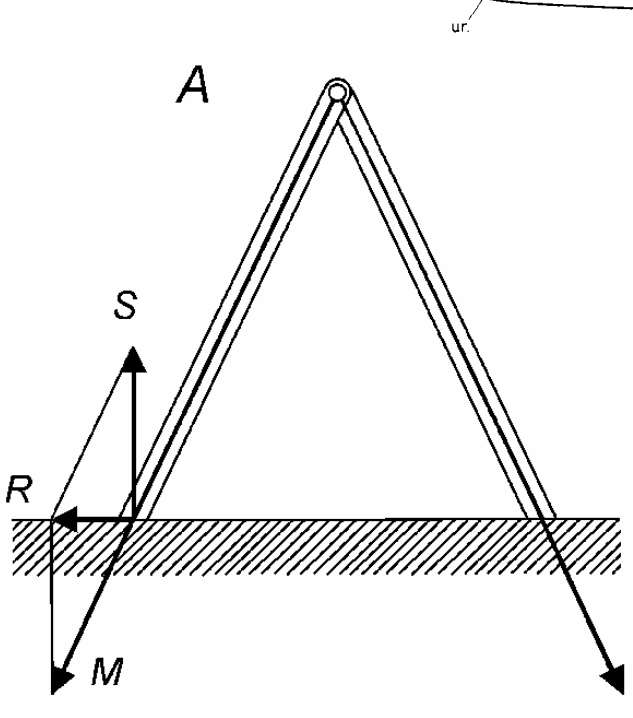
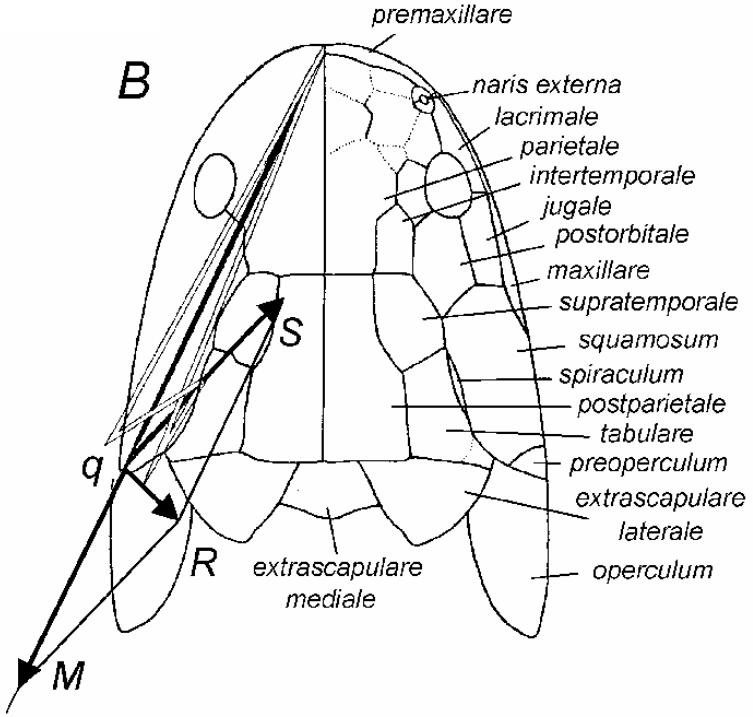
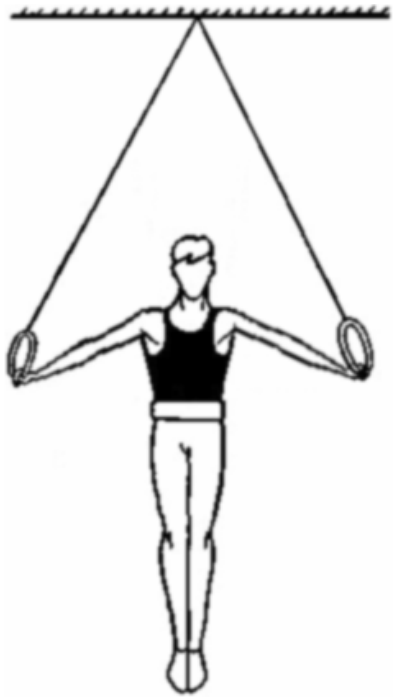


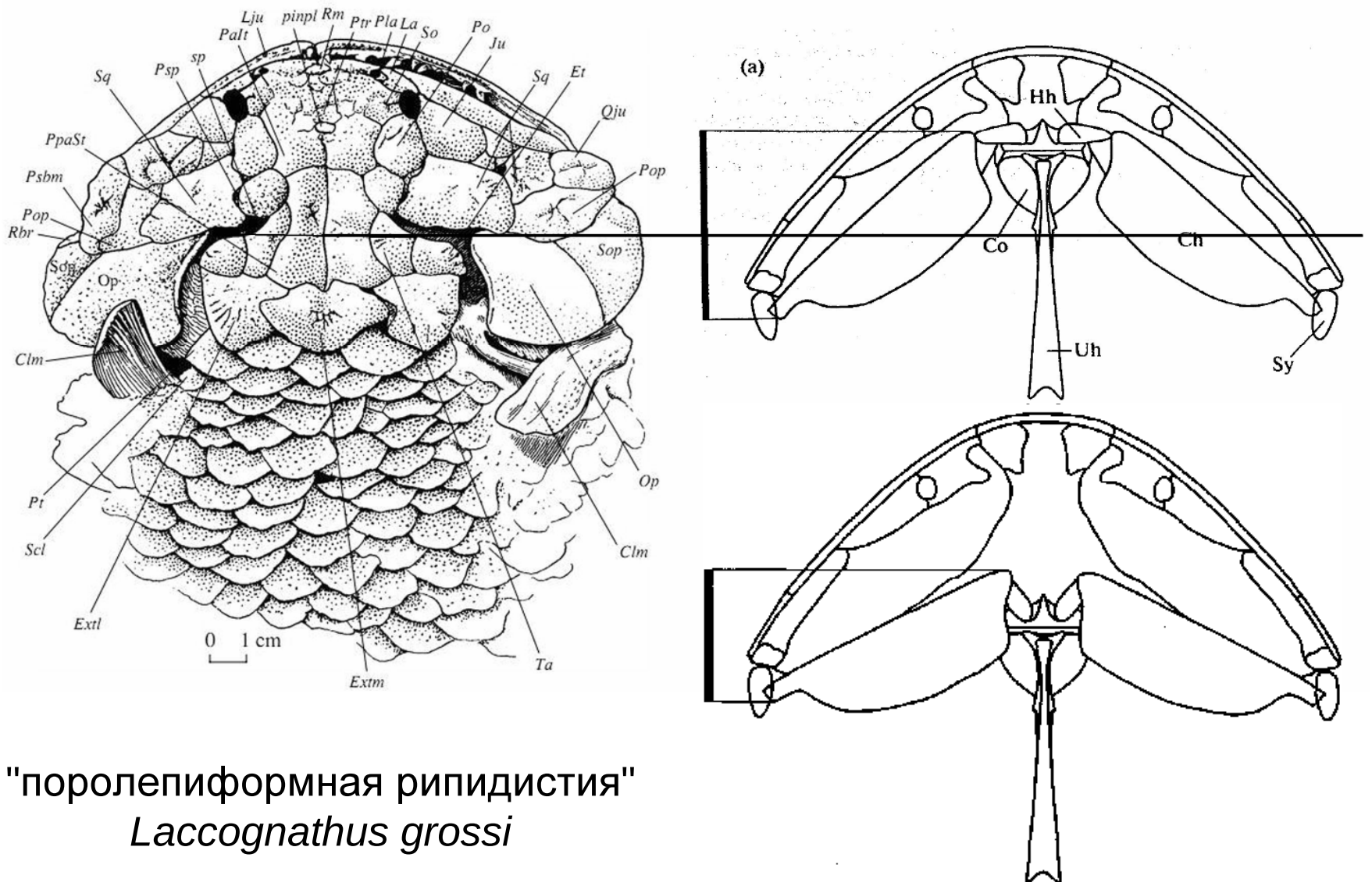








механизм Канюкина



"поролепиформная рипидистия"
Laccognathus grossi

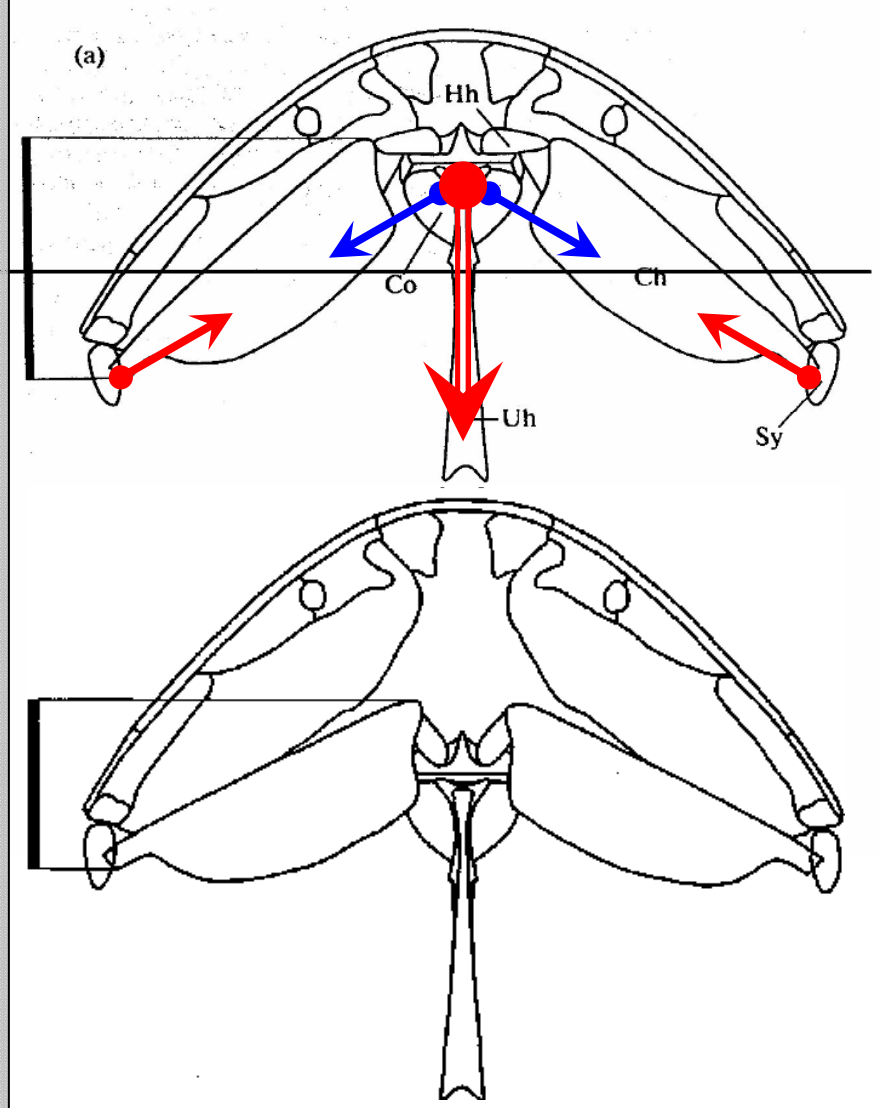
механизм Канюкина

Канюкин:

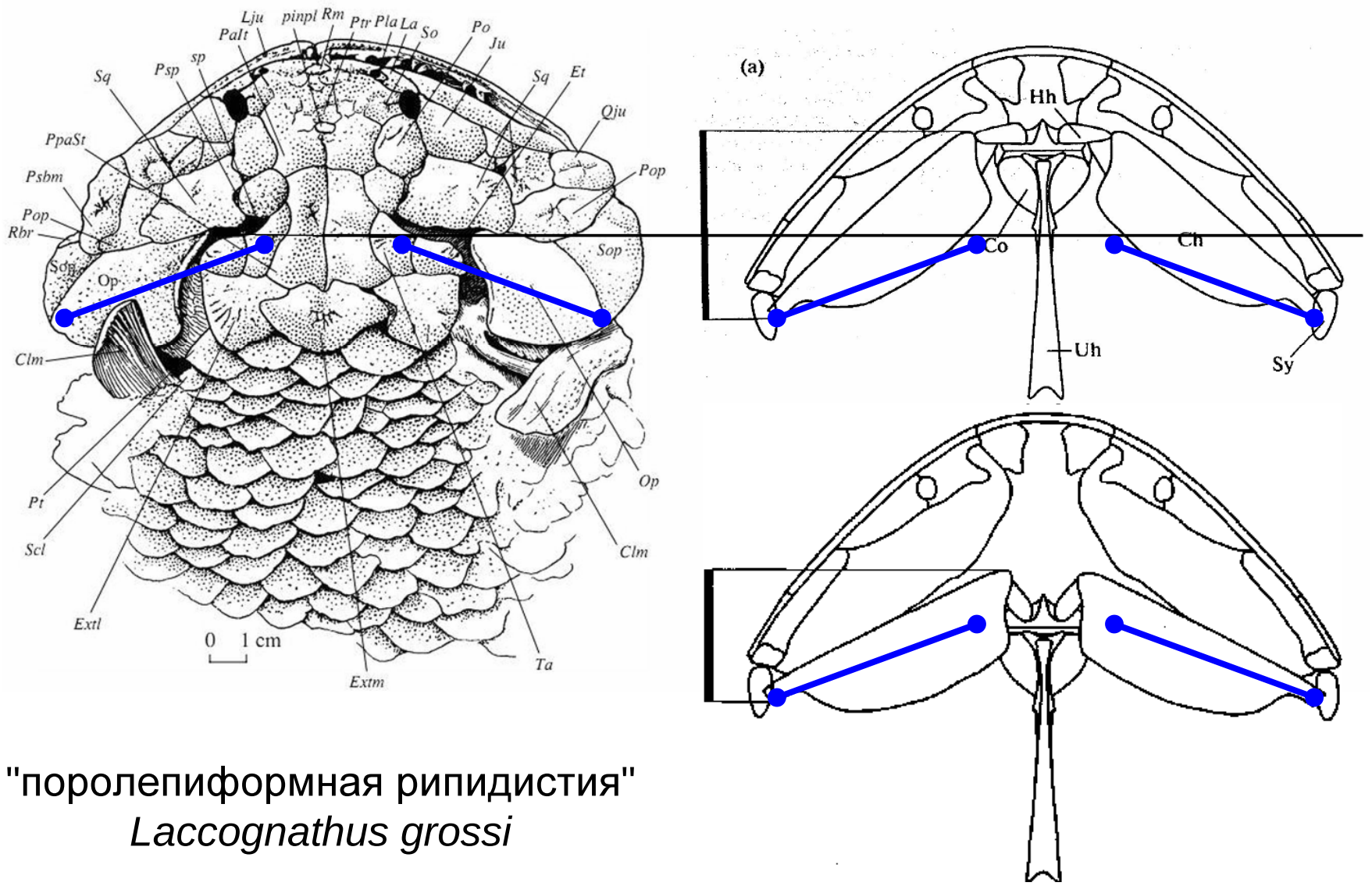
"При одновременном сокращении гораздо более мощного m. sternohyoideus, передняя межгиоидная мышца будет получать точку опоры в виде смещающегося вентрально основания гиобранхиального скелета, и ее сокращение будет вызывать антеровентральное смещение проксимального конца ceratohyale."

Дзержинский:

"На самом деле межгиоидный мускул не может, опираясь на копулу, сдвигать гиоид вперед по отношению к отико-окципитальному блоку, как не мог барон Мюнхгаузен поднять сам себя за волосы."

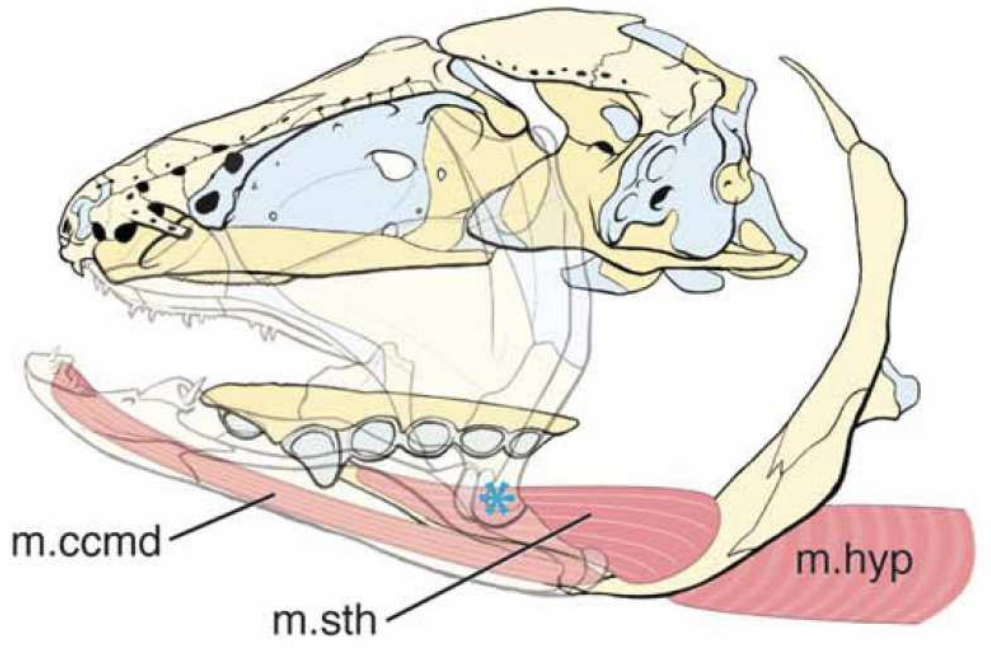


Гиоидная стремянка?

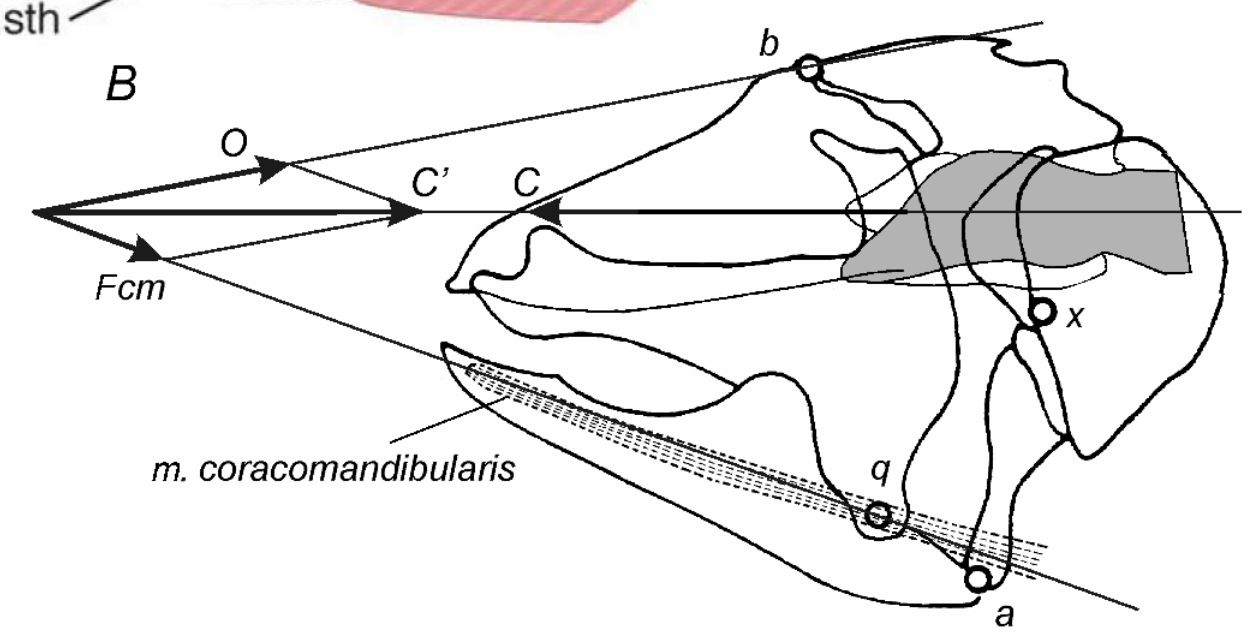


"поролепиформная рипидистия"
Laccognathus grossi

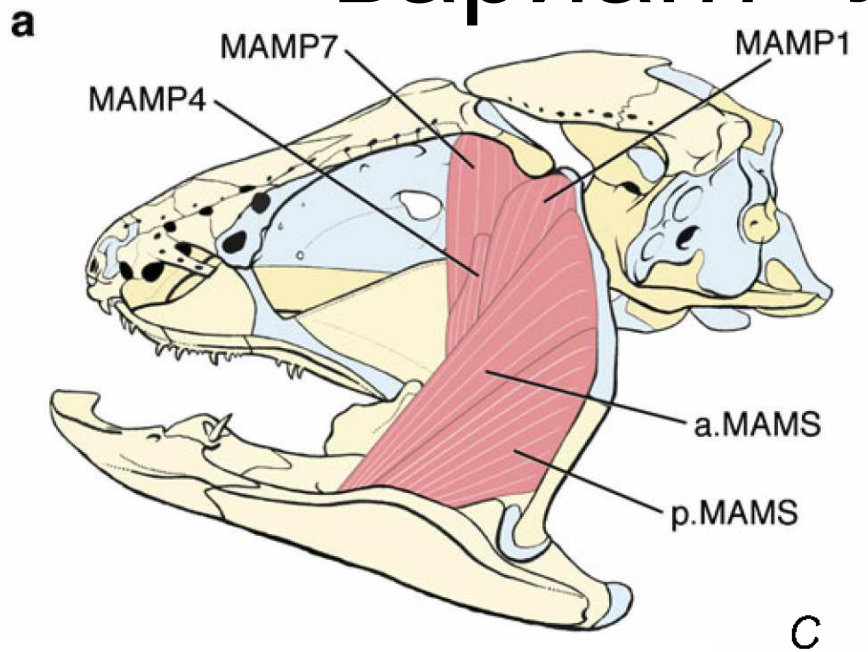
вариант "латимерия"



подъязычные мышцы

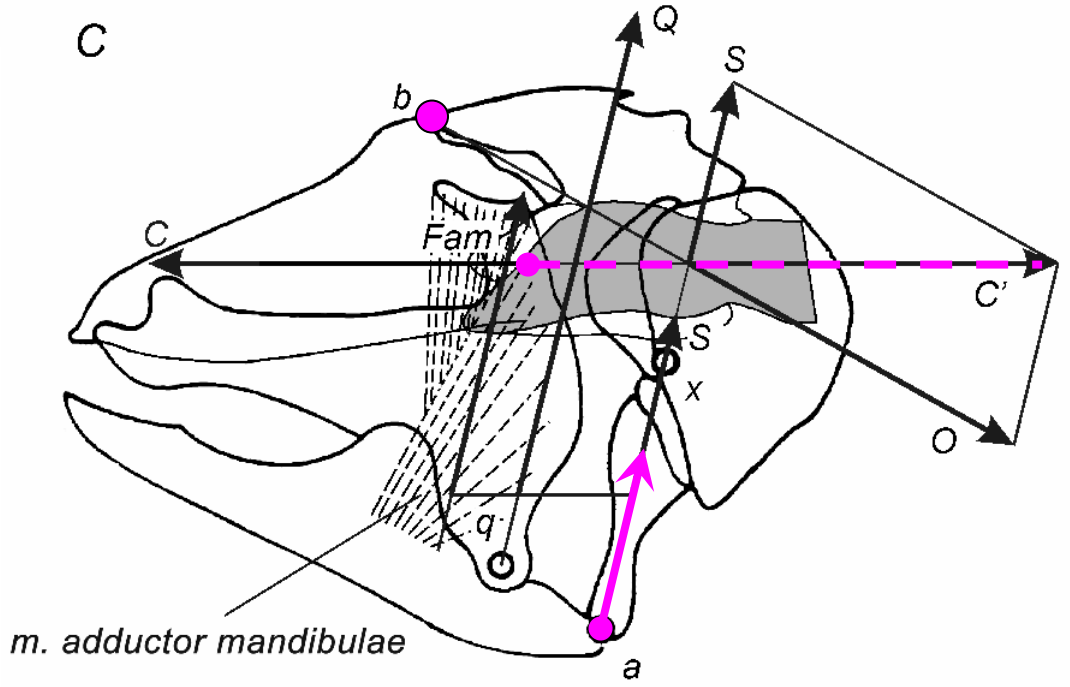


вариант "латимерия"

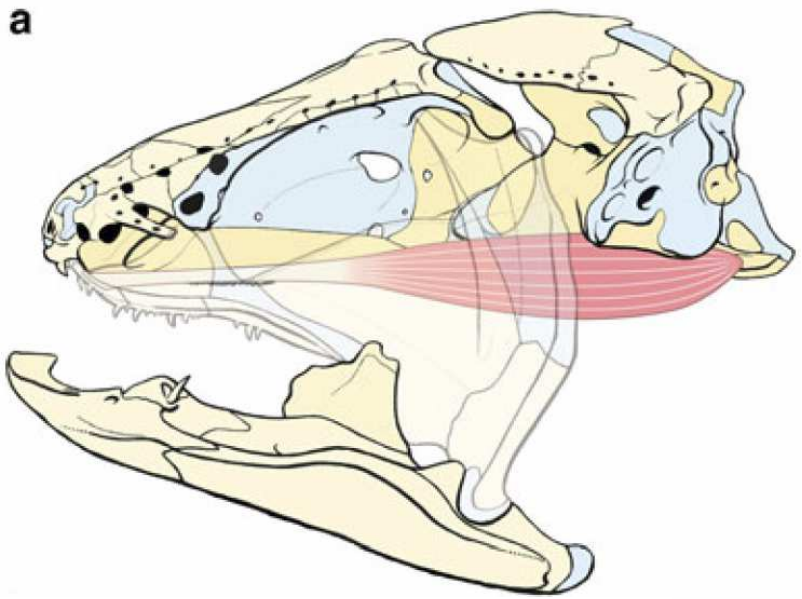


аддуктор нижней челюсти

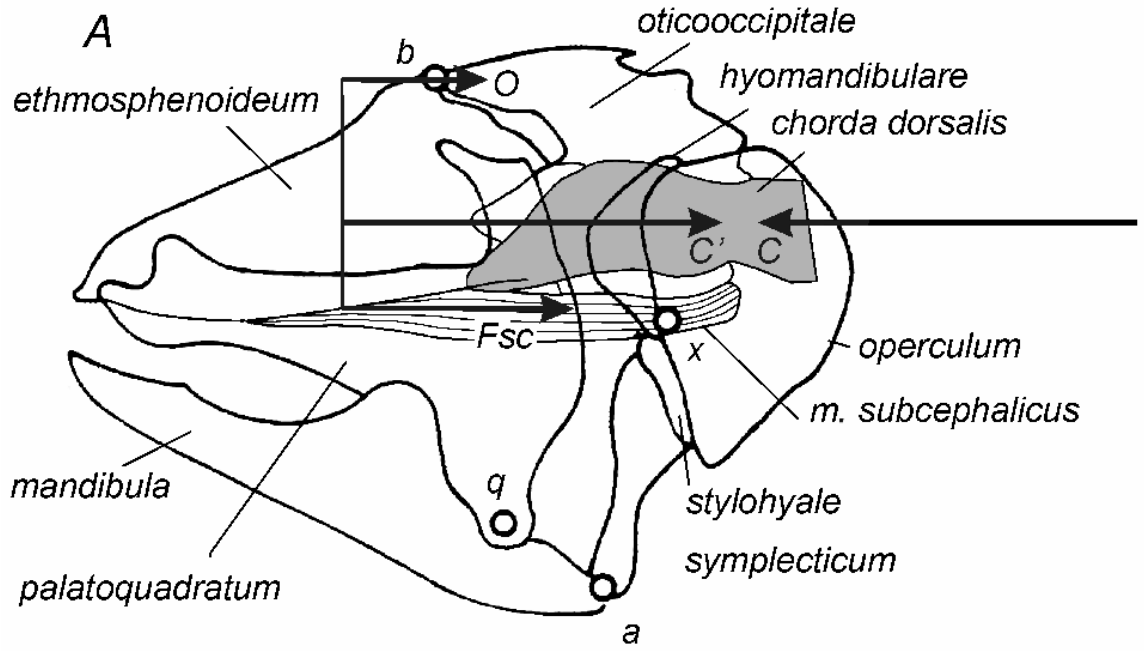
(3) the contraction of the adductors affects the moment at the quadrate-mandible joint (and to some extant the palatoquadrate-ethmosphenoid joint). I really don't see how the force generated by this muscle can affect the ICJ, since this muscle doesn't span this joint!



вариант "латимерия"

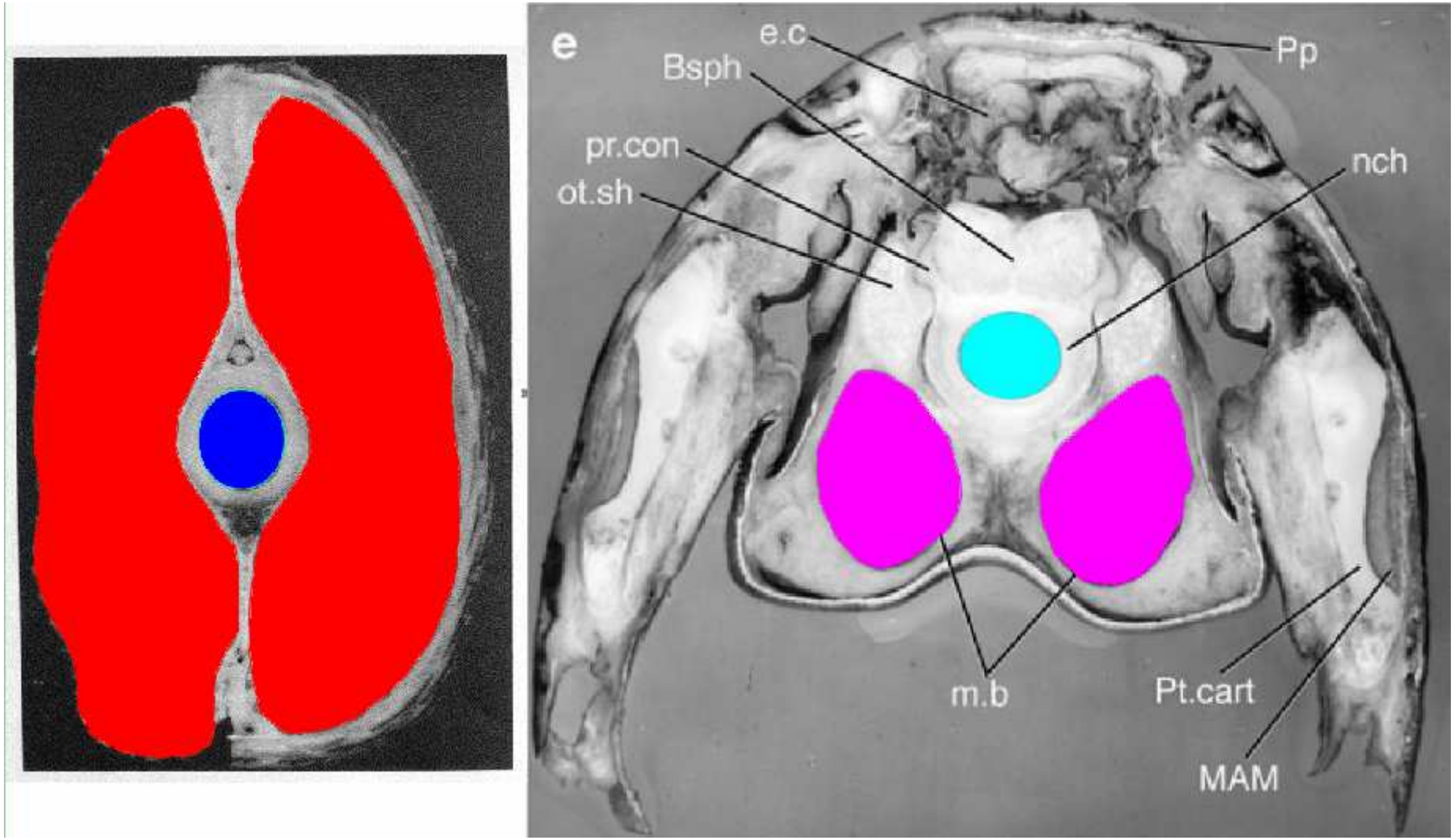


подчерепной мускул



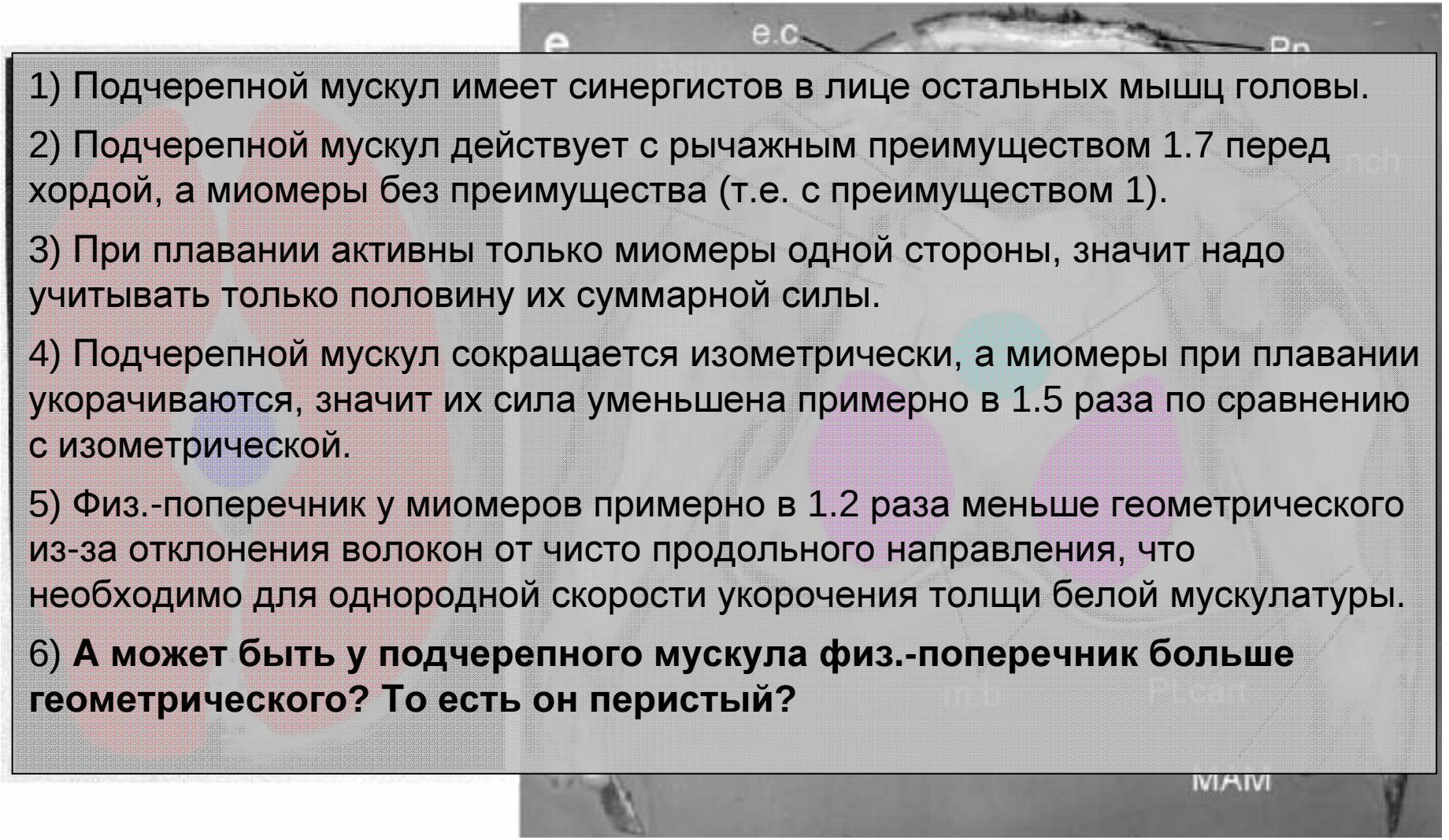
Площадь геометрического поперечника миомеров в 30 раз больше, чем у хорды, а двух подчерепных мускулов – в 6.5 раз больше, чем у хорды.

Как же подчерепные мускулы могут противостоять миомерам?



Площадь геометрического поперечника миомеров в 30 раз больше, чем у хорды, а двух подчерепных мускулов – в 6.5 раз больше, чем у хорды.

Как же подчерепные мускулы могут противостоять миомерам?



1) Подчерепной мускул имеет синергистов в лице остальных мышц головы.

2) Подчерепной мускул действует с рычажным преимуществом 1.7 перед хордой, а миомеры без преимущества (т.е. с преимуществом 1).

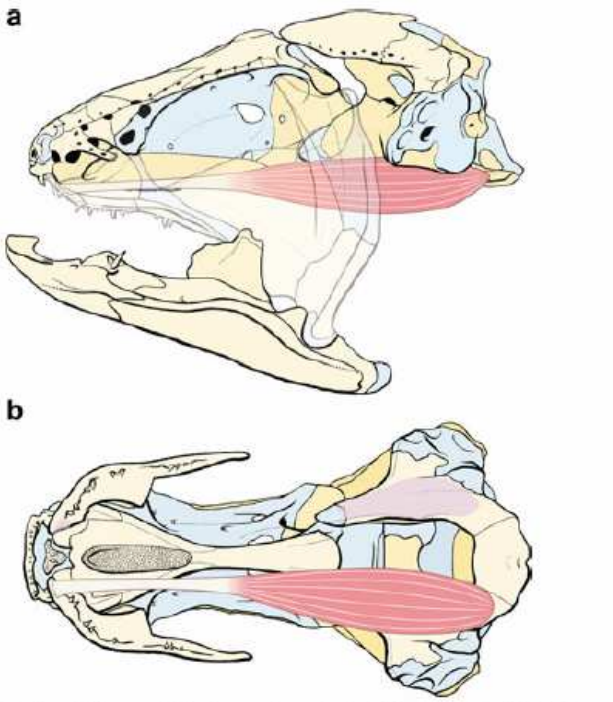
3) При плавании активны только миомеры одной стороны, значит надо учитывать только половину их суммарной силы.

4) Подчерепной мускул сокращается изометрически, а миомеры при плавании укорачиваются, значит их сила уменьшена примерно в 1.5 раза по сравнению с изометрической.

5) Физ.-поперечник у миомеров примерно в 1.2 раза меньше геометрического из-за отклонения волокон от чисто продольного направления, что необходимо для однородной скорости укорочения толщи белой мускулатуры.

6) **А может быть у подчерепного мускула физ.-поперечник больше геометрического? То есть он перистый?**

Traveller (Fisher Scientific, Pittsburgh, PA, USA). Next, muscles were placed for 24 to 72 h in a 30 % aqueous nitric acid solution (Loeb and Gans 1986). Nitric acid was removed and replaced by a 50 % aqueous glycerin solution once the connective tissue surrounding the muscle fibers had been digested. Fibers were separated gently, and 10 to 15 were



the m. adductor mandibulae profundus). The PCSA of the basicranial muscle was directly measured on the CT scan since the presence of short fibers in series throughout the length of the muscle overestimated the PCSA. The PCSA of the anterior adductor of the palatoquadrate as well as that of the MAMP 7 were also measured on the CT scan slices since they were damaged during the dissection.

Table 1 Summary of the morphological data collected in this study

Muscle	Weight (g)	Mean fiber length (cm)	PCSA (~~1~~/cm^2)
Anterior adductor of the palatoquadrate[a]	–	–	1.061
Posterior adductor of the palatoquadrate	9.250	3.734	2.337
Posterolateral bundle of the MAMS	26.000	5.039	4.867
Anterolateral bundle of the MAMS	15.000	5.698	2.483
MAMP 1	14.000	3.089	4.275
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[a] Physiological cross-sectional area measured on the coronal slices from CT scan acquisition

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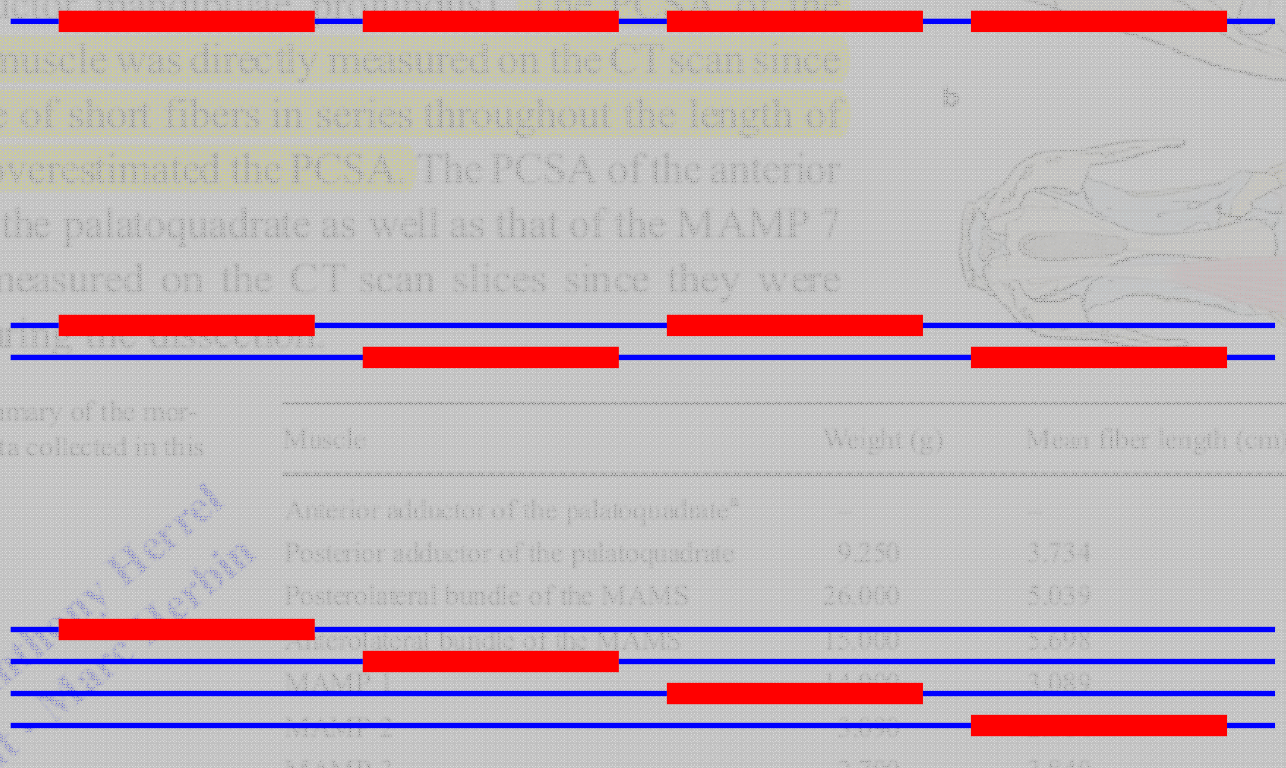

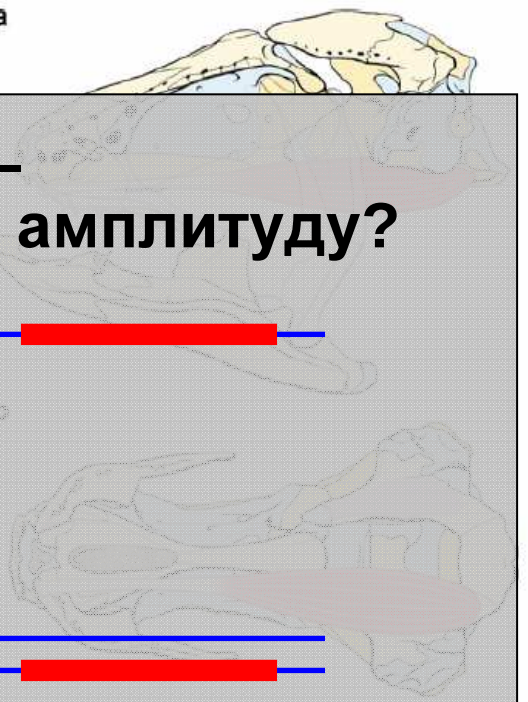

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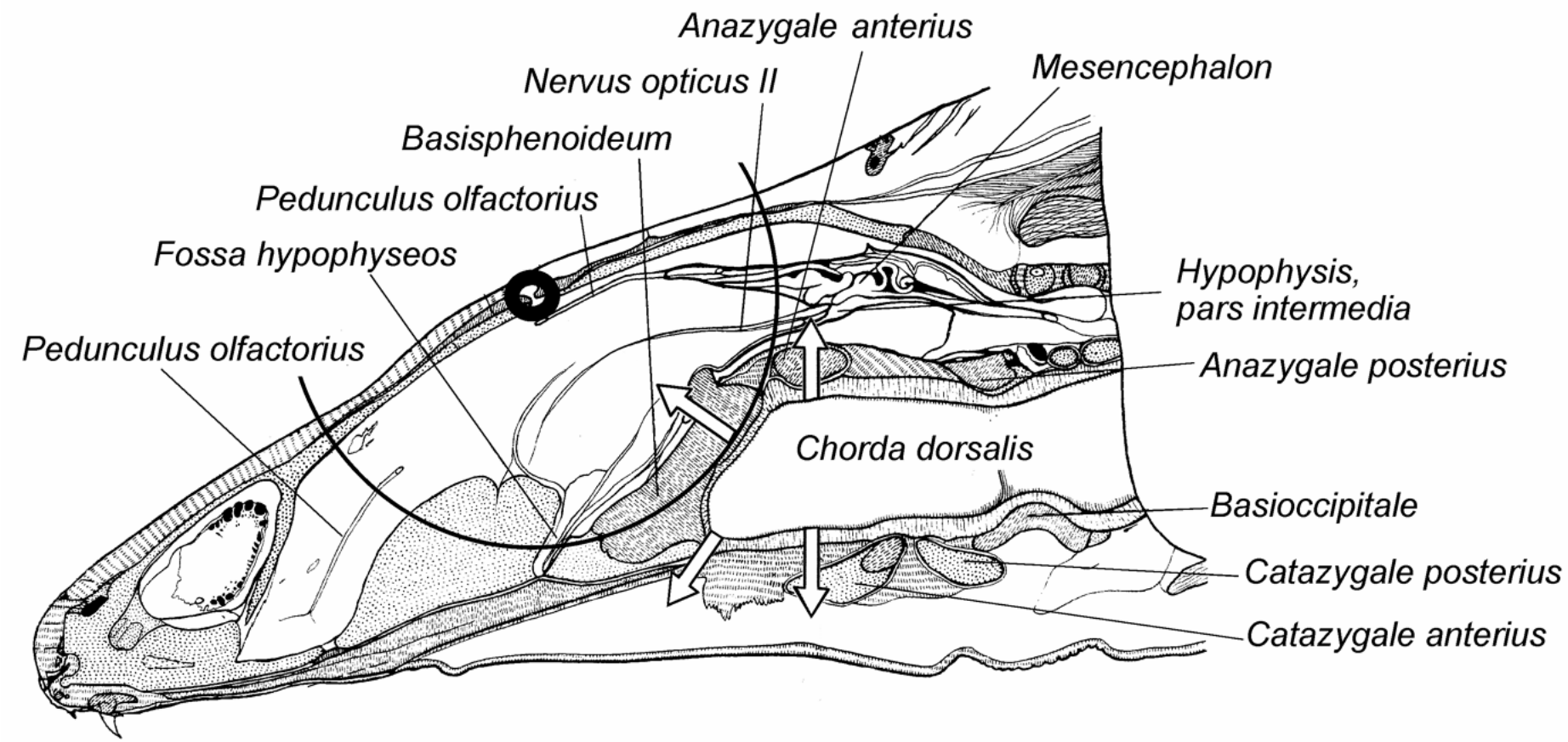
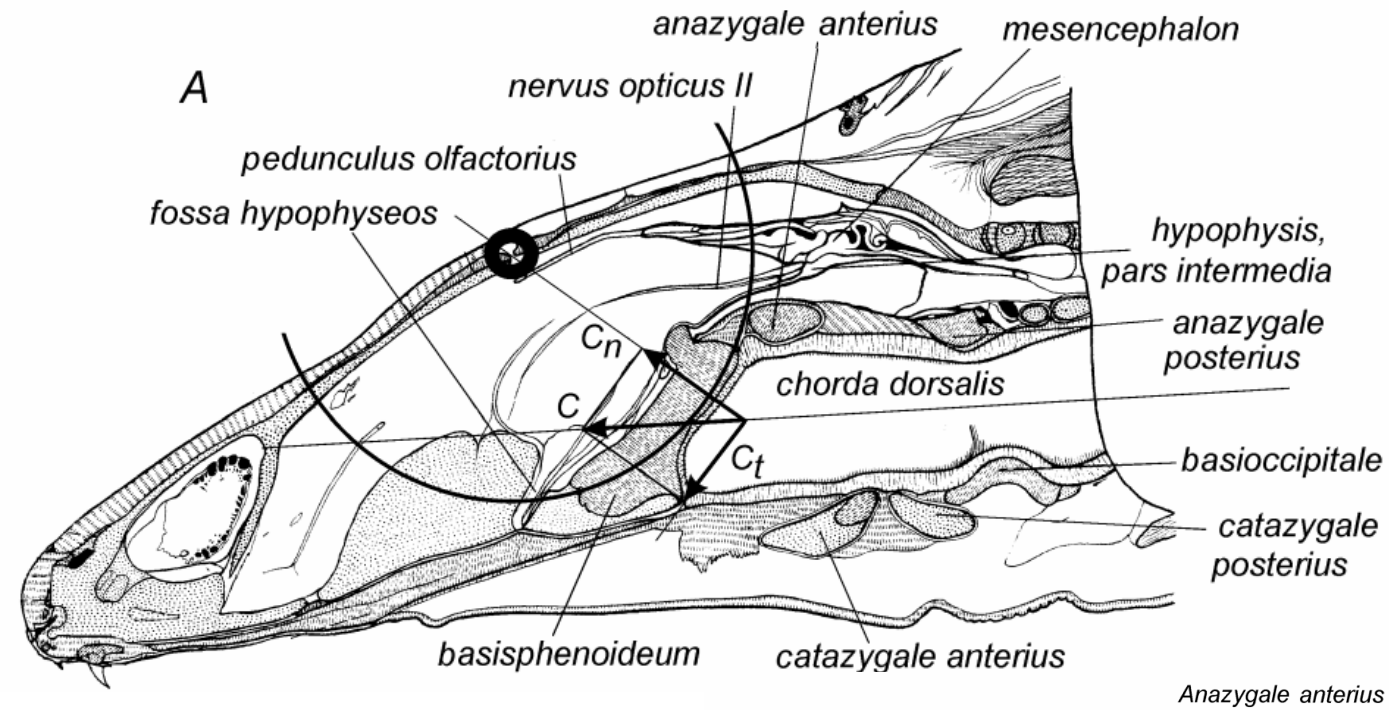
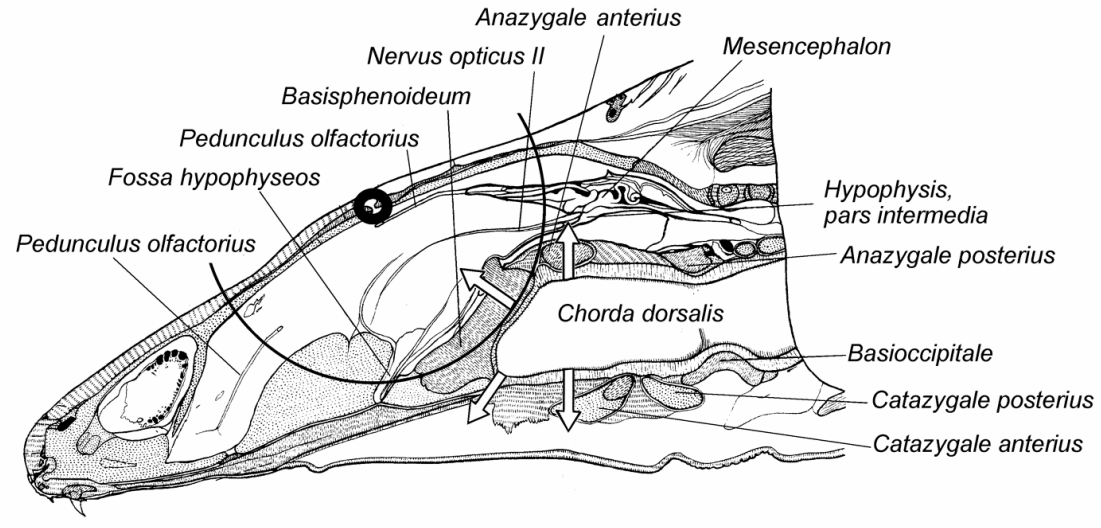


Светлые стрелки показывают направления сил, которые находящаяся под высоким давлением хорда прилагает к базисфеноиду и вентральной стенке соединительно-тканного канала.

клин Дзержинского





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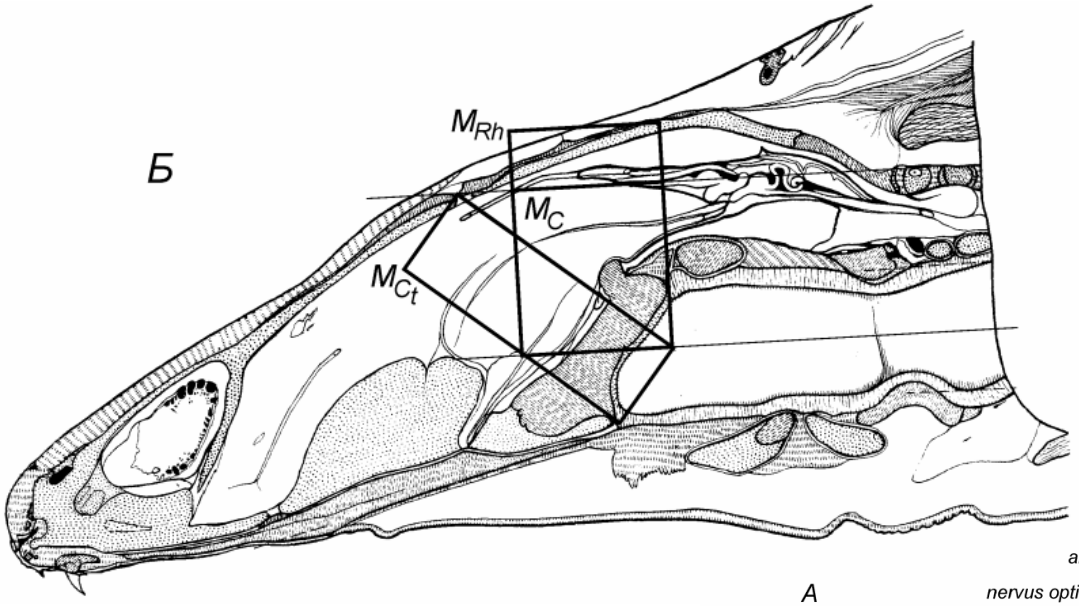

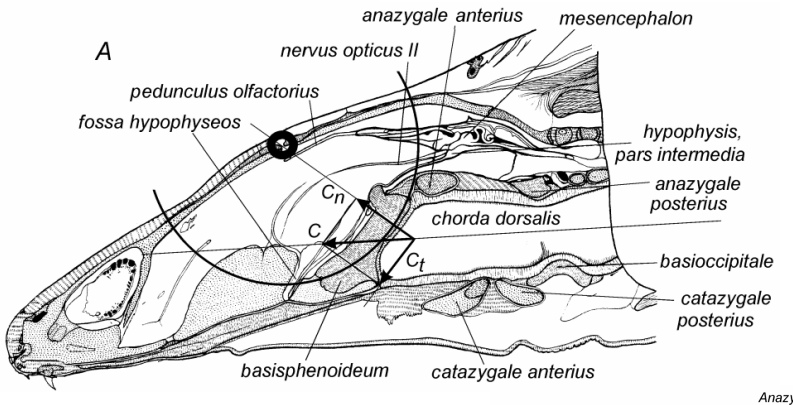

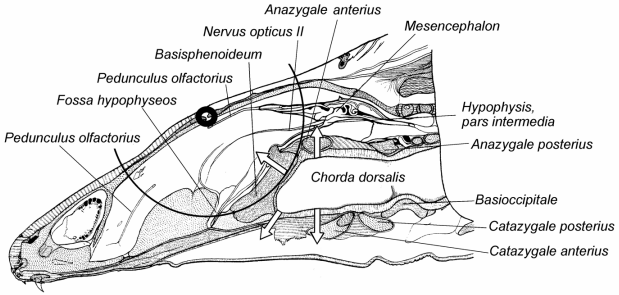

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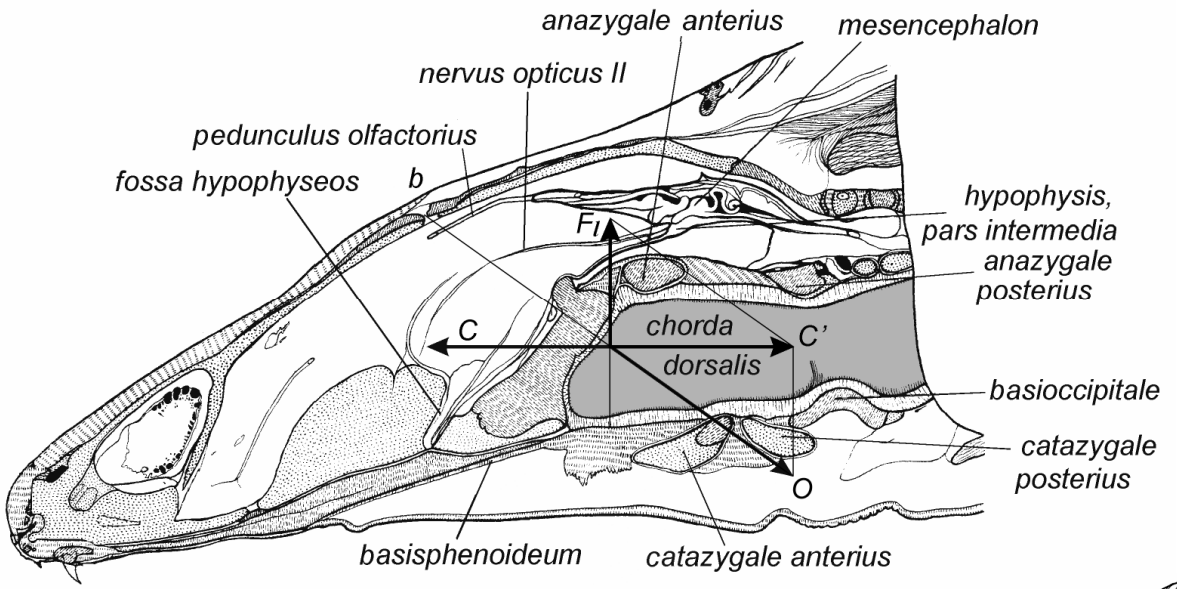
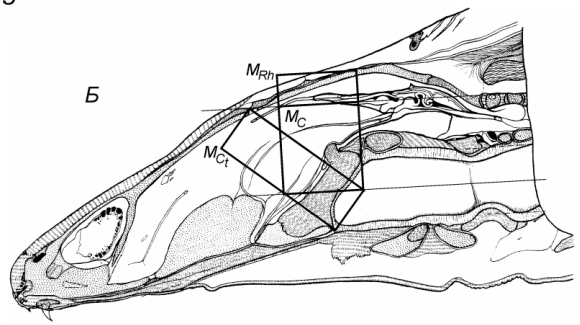
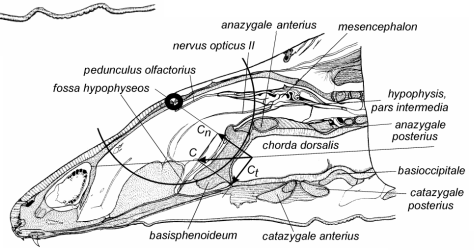
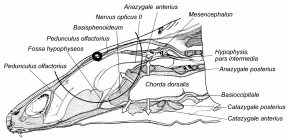
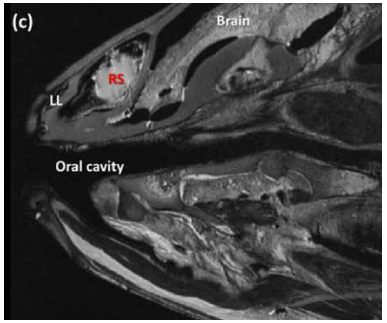


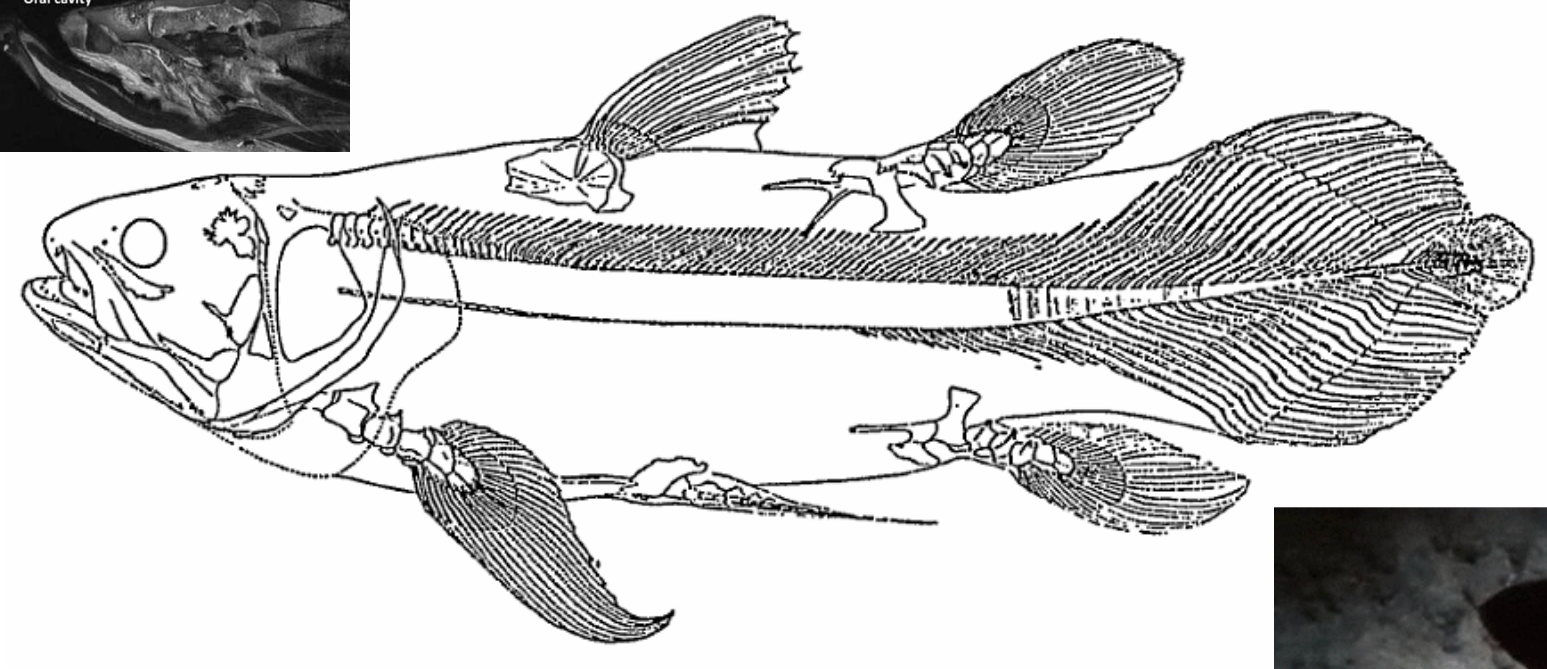




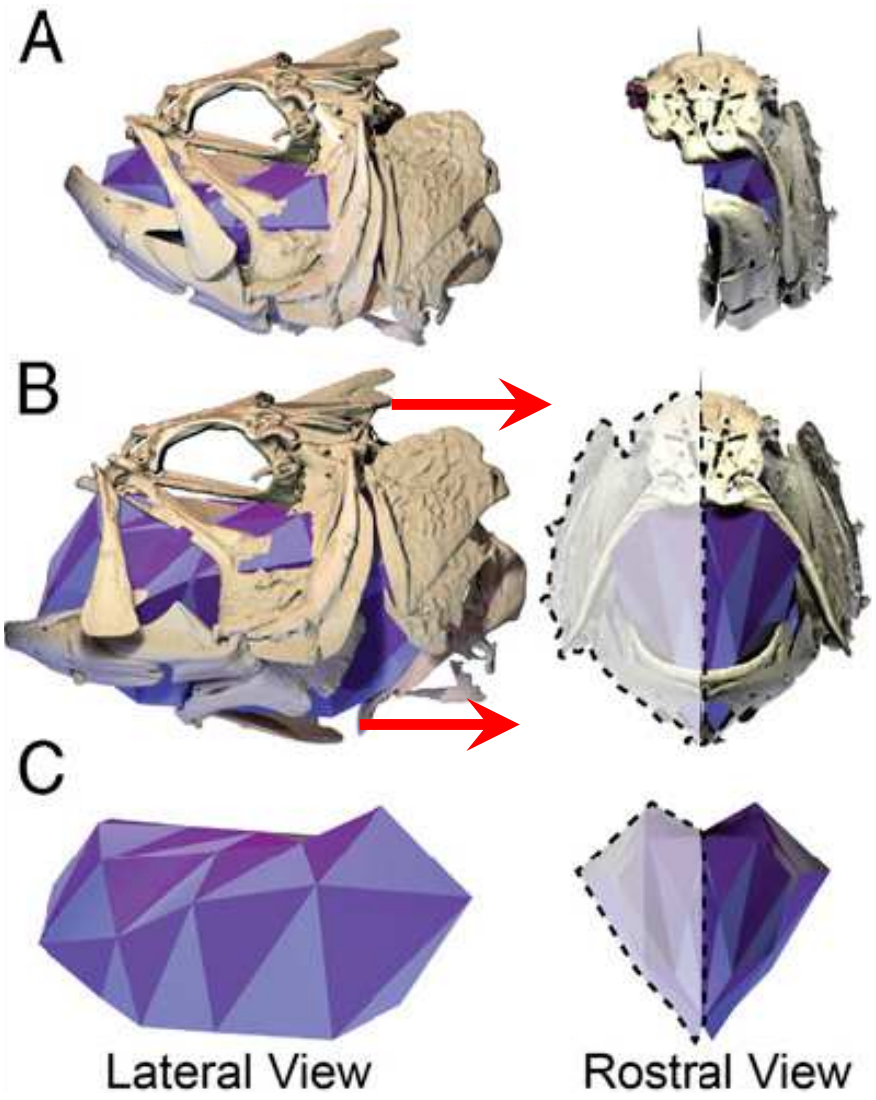


латимерия избегает махать хвостом, а мерно гребет шестью ластами

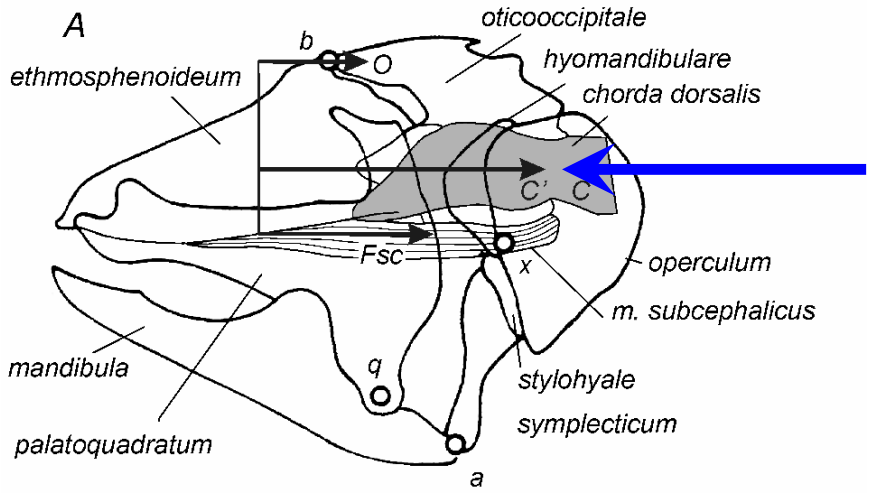


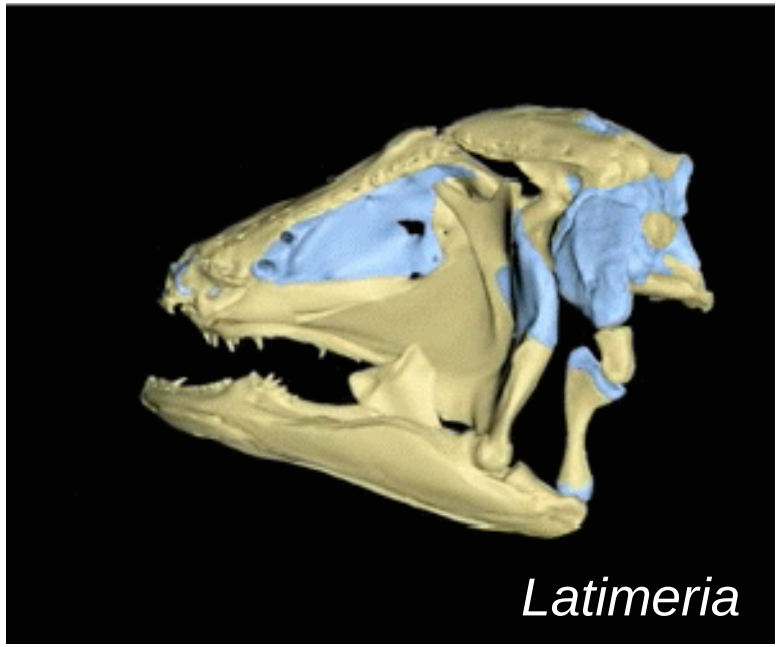


Actinopterygii



Sarcopterygii





моё самоуправство

Four modes of operation of sarcopterygian kinetic skull can be specified now, as follows.

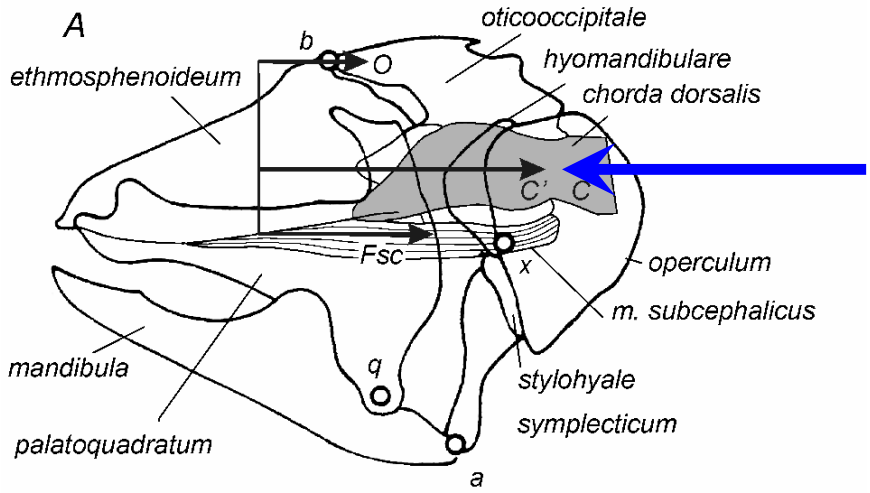
(1) Fish at rest: all muscles are relaxed, and mouth is closed due to prevalence of tonic force of the mm. subcephalici and their synergists in the jaw apparatus over the tonic force of parietal musculature; this prevalence comes from the above calculation of PCSAs of these muscles compared to the cross-sectional area of the notochordal liquid core.

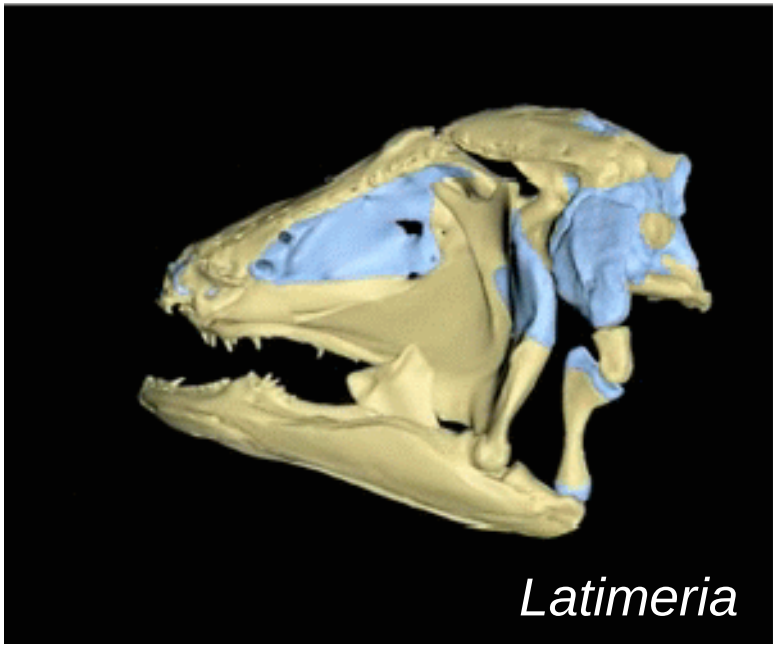
(2) Prey sucking from ambush: powerful burst of contraction of myomeres of both sides of the trunk causes forcible forward protrusion of the notochord, which immediately surmounts the tonus of relaxed cranial muscles and produces expansion of the oropharynx.

(3) Swimming: mouth is closed due to prevalence of isometric force (static contraction without shortening) of the mm. subcephalici and their synergists in the jaw apparatus over the force of powerful contraction of parietal musculature causing body undulations; this prevalence comes from the aforementioned calculation of PCSAs and from the well-known fact that the muscular stress progressively falls with the fibers' shortening speed.

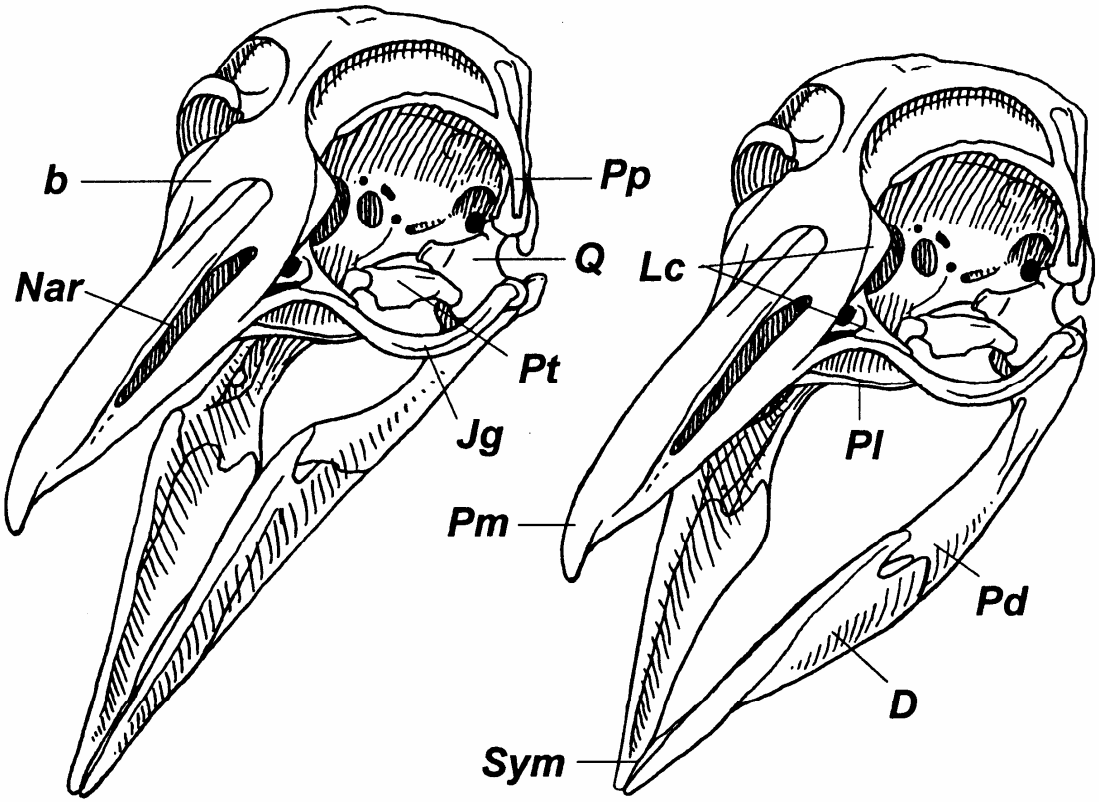
(4) Prey sucking while swimming: immediate relaxation of the mm. subcephalici and their synergists in the jaw apparatus is enough to allow fast forward protrusion of the intracranial segment of the notochord being driven forward by continuing swimming performance of the trunk myomeres.

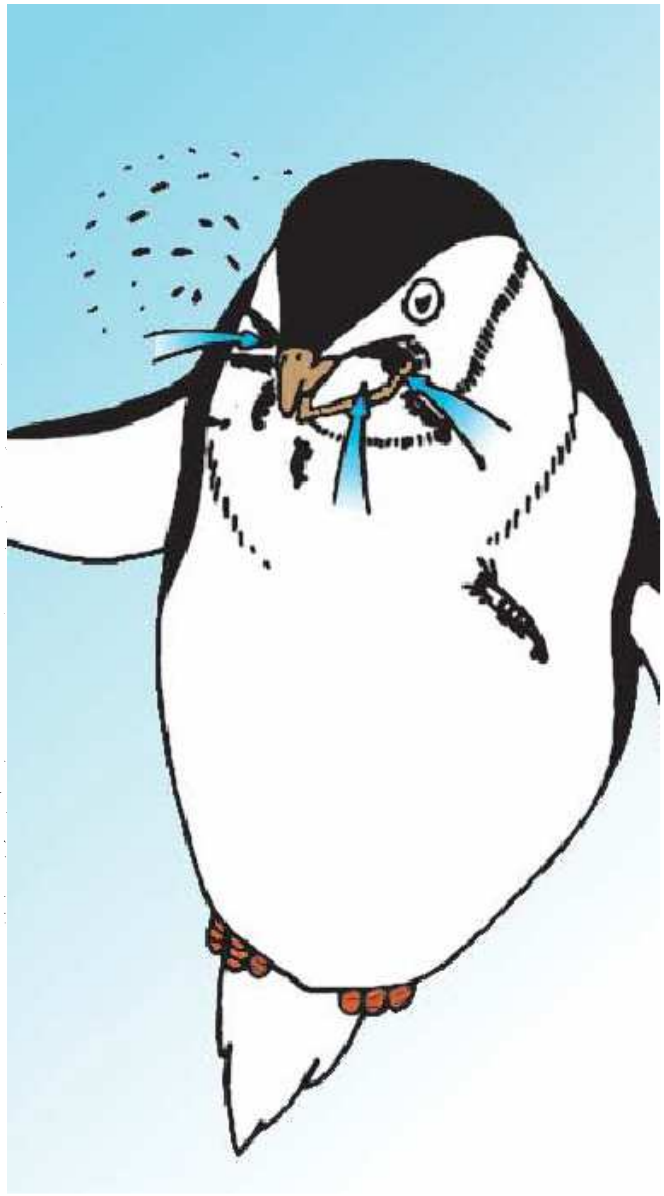
Sarcopterygii





вот и пригодились пингвины…






СПАСИБО ЗА ВНИМАНИЕ
doi:10.1111/jzo.12405

POST SCRIPTUM

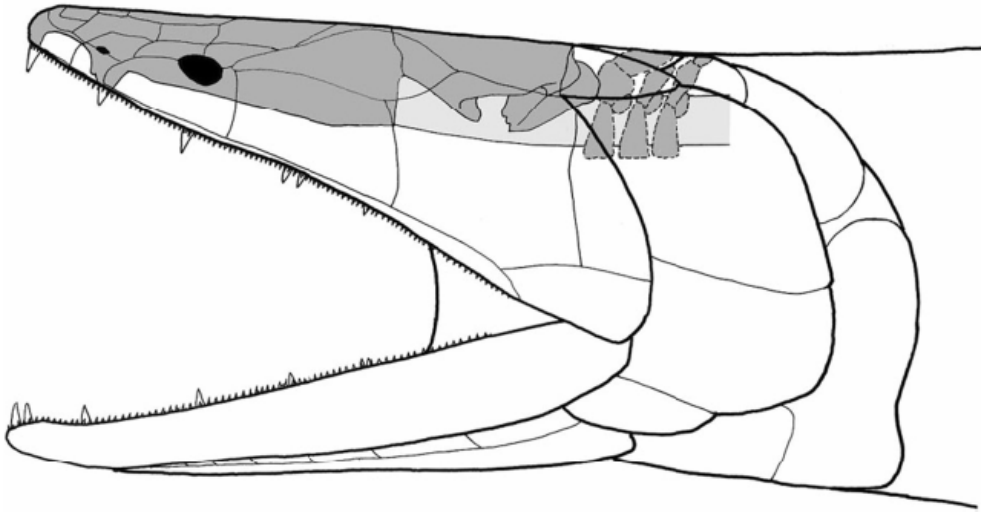
Reviewer: 1

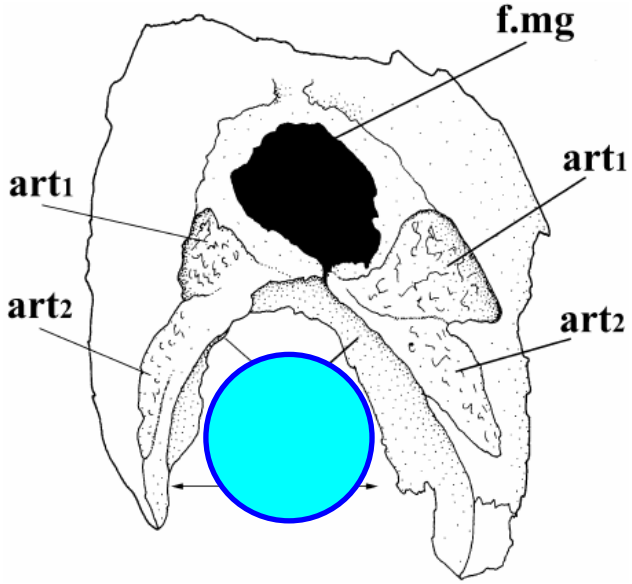
Dear Dr Kuznetsov,

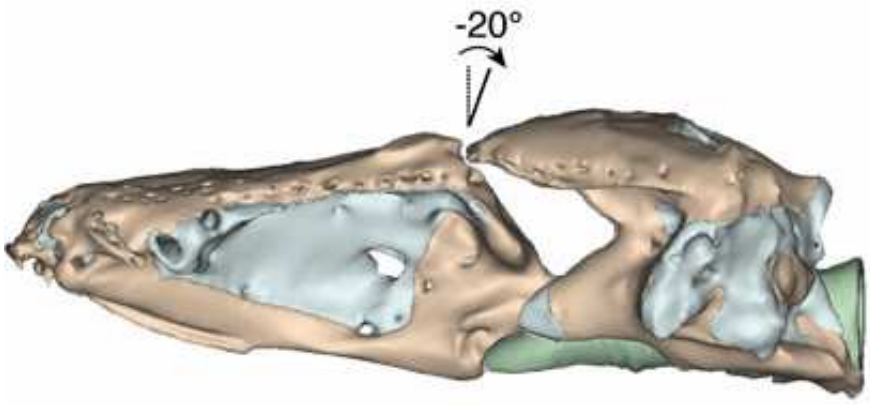
I was very sorry to learn from your Response to Reviewers of the death of Prof. Dzerzhinsky. It is all the more of a pity because, as you note in the Response, he would probably have engaged positively with some of my suggestions, and could have developed the manuscript further as a result. I fully appreciate the constraints that prevent you from making major modifications to it on your own. Suffice it to say that I support publication of the manuscript in its present form (subject to some very minor corrections, listed below). It isn't in perfect shape, but it puts across some interesting ideas that should definitely be in the public domain, and as it is Prof. Dzerzhinsky's last paper I feel it would be a great pity for it to remain unpublished.

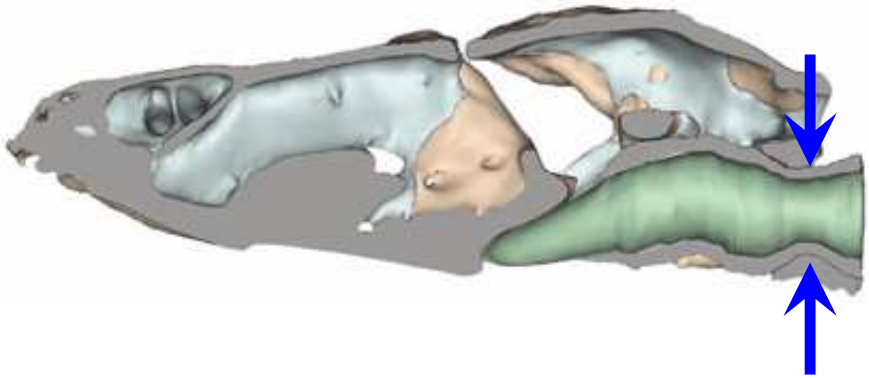
Best wishes, Per Ahlberg

Mandageria fairfaxi



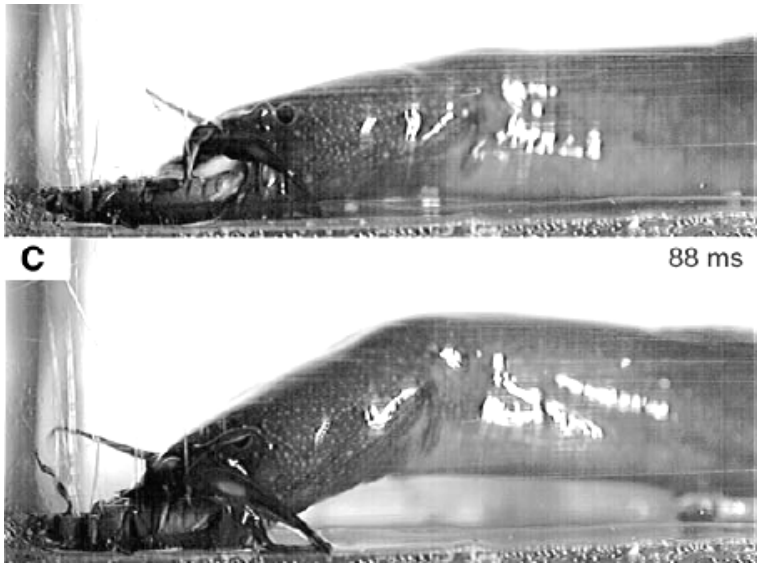


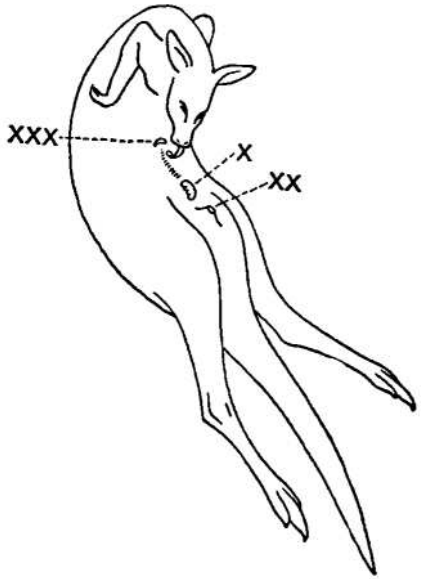




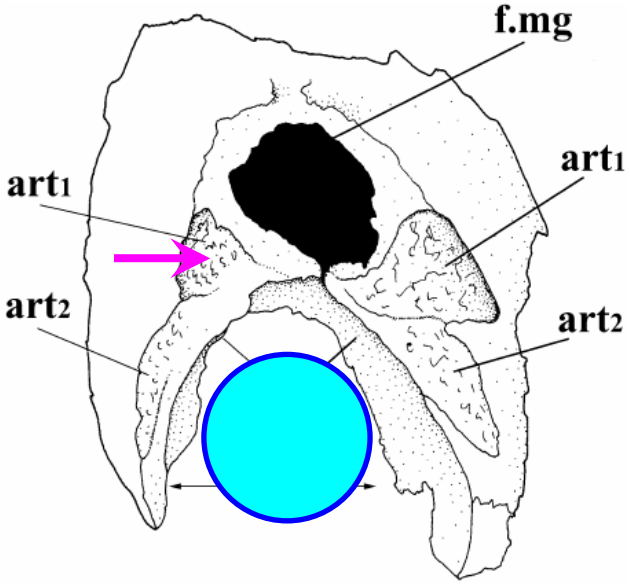
Latimeria chalumnae

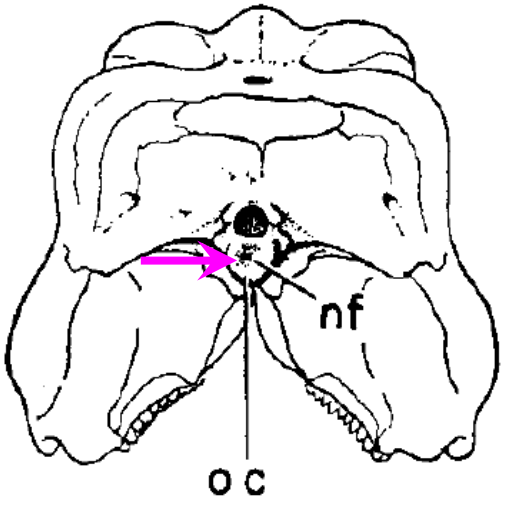
Channallabes apus

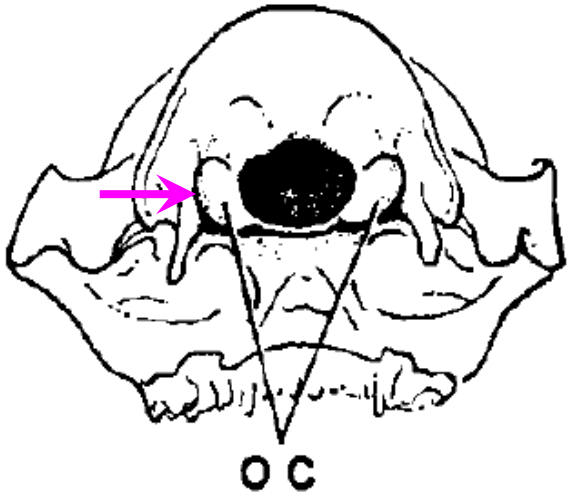




Mandageria fairfaxi







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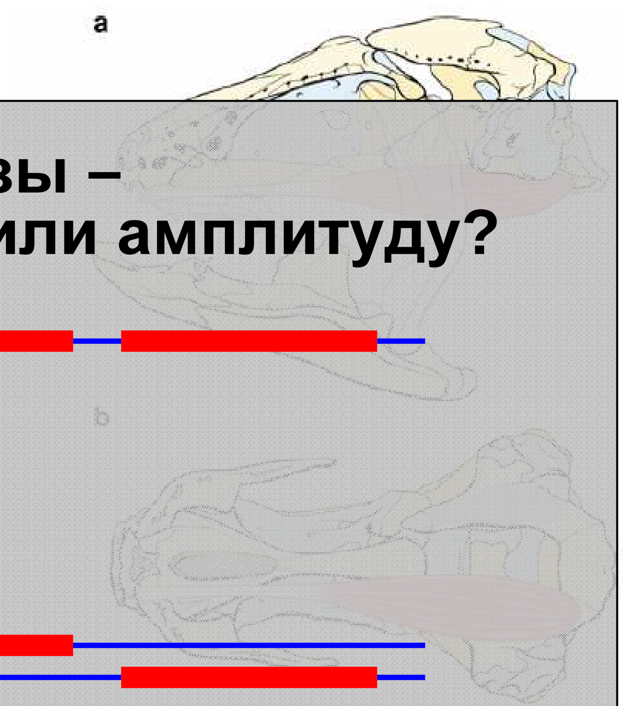

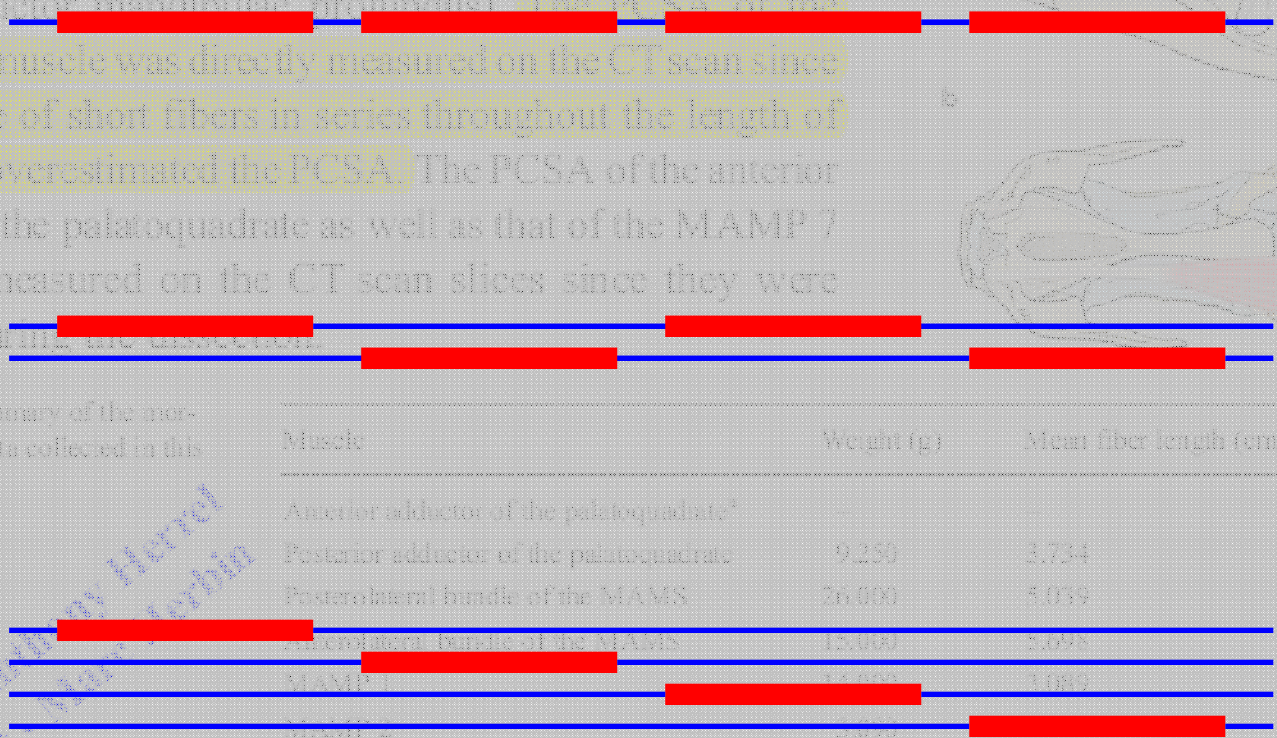

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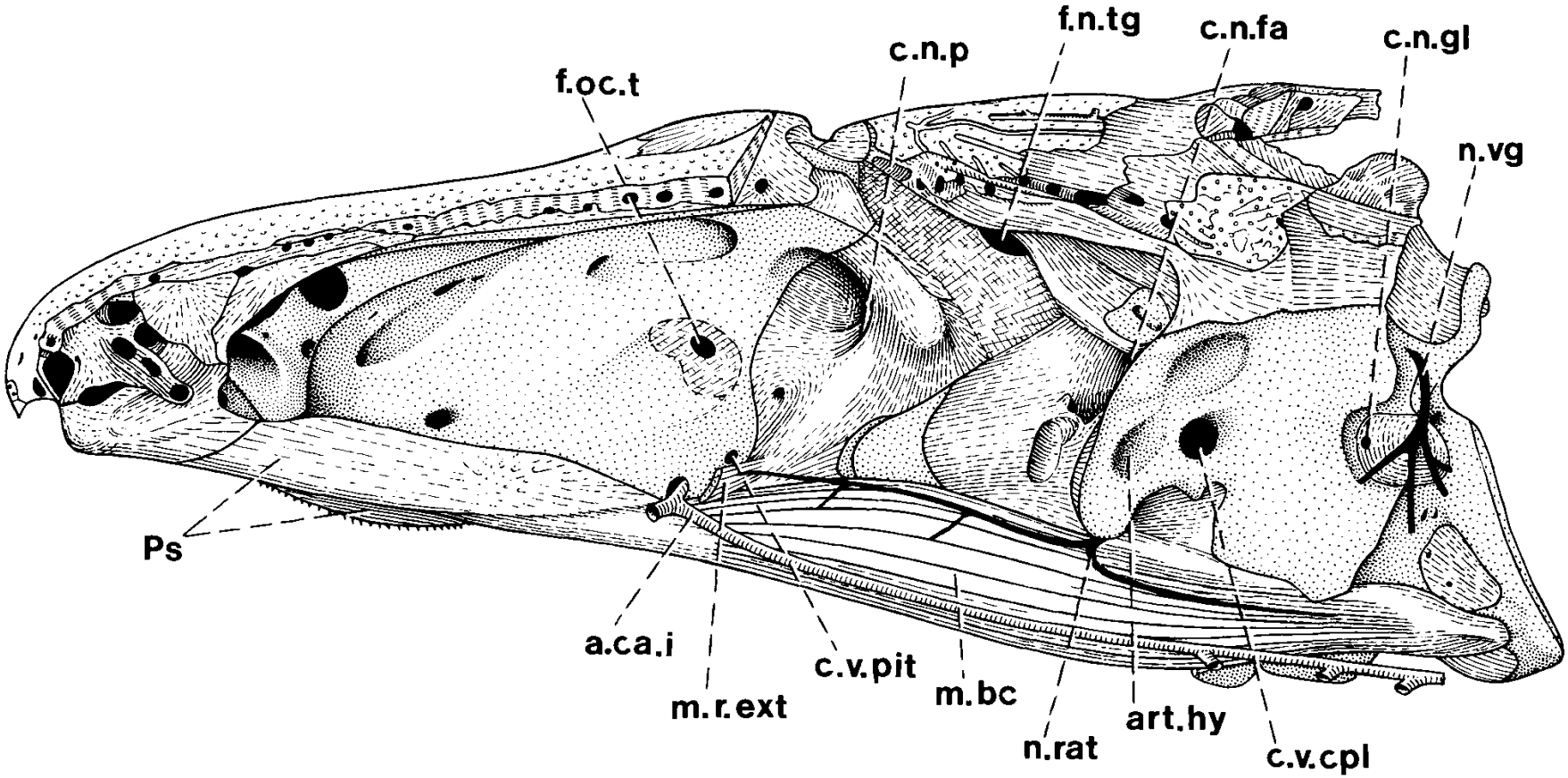
Hugo Dutel · Anthony Herrel
Gaël Clément · Marc Herbin

Hans Christian Bjerring



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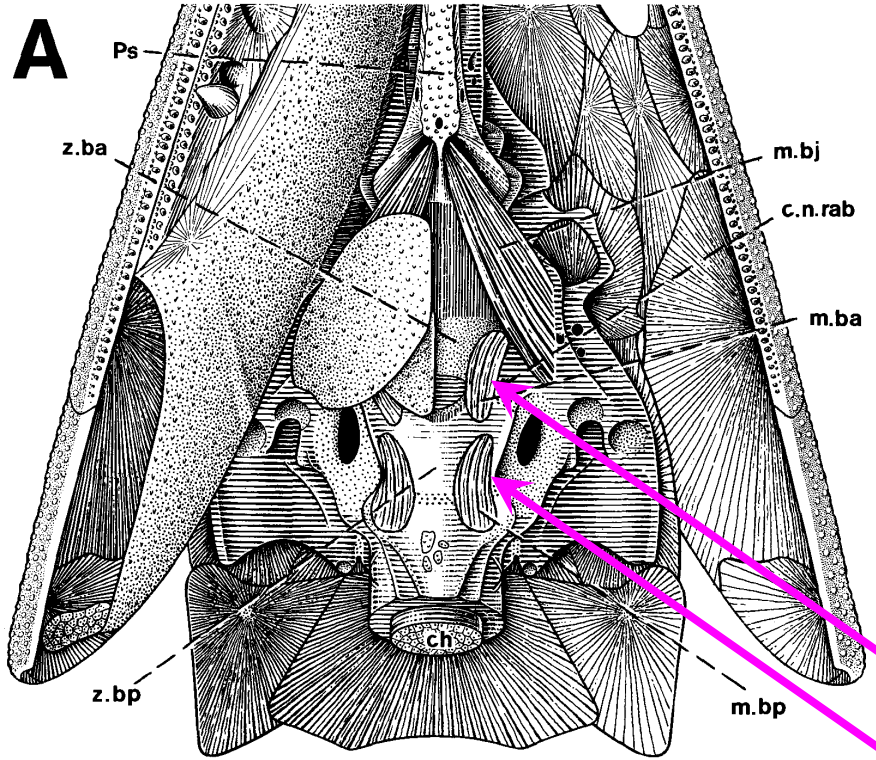

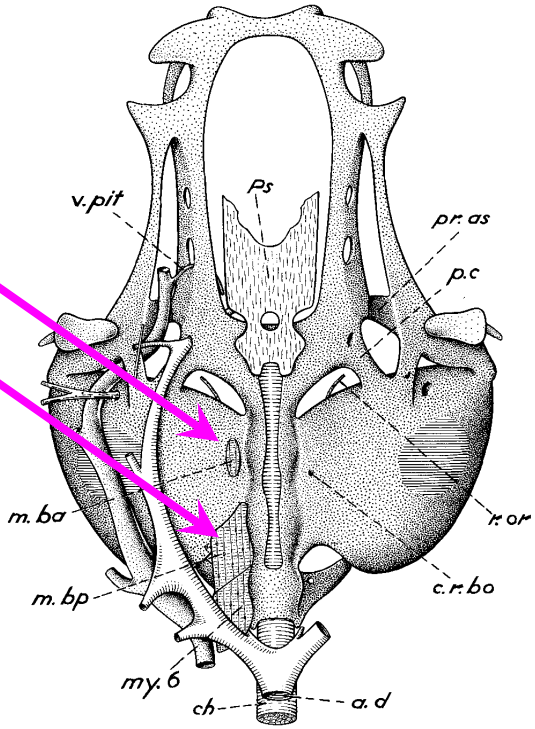

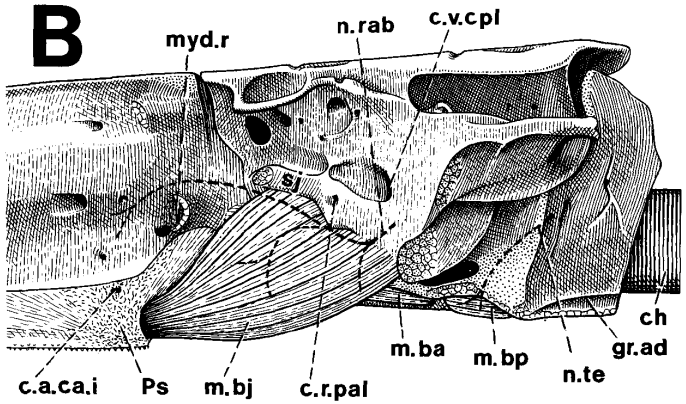

Eusthenopteron foordi

Ranodon sibiricus
22 мм

Hans Christian Bjerring