

Comments on the manuscript “A new species of *Allodaposuchus* (Eusuchia, Crocodylia) from the late Maastrichtian (Late Cretaceous) of Spain: Phylogenetic and paleobiologic implications.”.

The paper describes new material of *Allodaposuchus* from Spain. This taxon is particularly important to resolve the phylogenetic relationships of Crocodylia. Many characters are provided to justify the erection of the new species, but as the material is poor (as for many species of the genus), the comparisons are difficult. As often when the material is fragmentary, the authors try to find diagnostic characters, and often, in my opinion, use poor characters (intraspecific variability, weak differences...) (see below). So, I am not convinced by this new species.

At least, the presentation of the characters should be revised, and a comparative diagnosis would be clearer when the character differs from only one other *Allodaposuchus* species (differs with ... in having...).

The phylogenetic analysis is well conducted, but I strongly disagree with the phylogenetic results obtained by the authors, and with some of the coding, but it is beyond the scope of this review, and that will be discussed in a paper in preparation. Nevertheless, the results should be more extensively discussed (see below), and the matrix in a nexus format should be provided.

I think some grammatical mistakes are present in the text, but I am not a native English speaker. So, the English should be reviewed.

Detailed comments

L23: *Crocodylomorphs*: Crocodylomorphes

L149: *Diagnosis*:

Allodaposuchus hulki shows the following autapomorphies:

Quadratojugal does not extend along the infratemporal fenestra. : known only in *A. subjuniperus*, unknown in other species. It is not possible to know if it is an autapomorphy.

Spine of quadratojugal significantly reduced. known only in *A. subjuniperus*. Is its preservation allow a clear observation in present specimen?

Absence of fossa at anteromedial corner of the supratemporal fenestra.

L448: ***Additionally, A. hulki and A. palustris are the two species that do not show a fossa around the supratemporal fenestrae.*** As it is present only in *A. subjuniperus* and *precedens*, its absence is a plesiomorphy. Moreover, its presence or absence cannot be observed in the present specimen, as the fossa is within the supratemporal fenestra, this one being obscured by sediments.

No ridge surrounds the foramen aërum.

L455: ***in A. hulki no ridge surrounds the foramen aërum, unlike the other three species of Allodaposuchus.*** No ridge in *A. precedens*. And not sure that the difference was such significant to be considered as anything else than individual variation.

No elevation rounds the rim of external naris. also absent in *A. precedens* and it is weak in *A. subjuniperus* (slightly elevated). So if this character is diagnostic (I doubt...) it is its presence in *A. subjuniperus*, not its absence in other *Allodaposuchus*.

Incisive foramen abuts first and second premaxillary teeth. The distance 1st tooth-FI is equal to the 1st tooth diameter in *A. subjuniperus* and *A. precedens*, and slightly lesser in the new specimen. The difference is weak, and it strongly depends on the angle of the photo in *A. subjuniperus*, and *A.*

precedens.

Teeth bear smooth enamel, low-developed mesial and posterior carinae, and absence of longitudinal grooves in lingual side. Related to intraspecific variability, and insignificant differences with *A. subjuniperus* (see below). The lingual groove is present only in Premaxillary teeth in *A. precedens*. So, the tooth ornamentation varies along the tooth row, and the difference (if there is) is only with *A. precedens*.....

Exclusive combination of the following synapomorphies: External naris opens in anterodorsal direction: as in all *Allodaposuchus*, except in *A. subjuniperus*.... It should a *A. subjuniperus* autapomorphy, but must not be included in the present diagnosis.

Premaxilla is wider than long: as posterior process of the premaxilla is not preserved this cannot be evaluated. But I think that the authors mean that the premaxilla is wide laterally to the external nares. This is mainly due to the size of the external nare, large in *A. precedens* (Delfino, 2008 and Martin, 2010), but it is comparable here to this is observed in *A. subjuniperus*, and *Acynodon*.... So, this is more probably a plesiomorphy. If the authors mean that the premaxilla is wider than the length from tip of snout to lateral premaxillary-maxillary suture, this is also the case in all other *Allodaposuchus*. Moreover, the posterior margin of the premaxilla seems to be strongly damaged. Is the premaxillo-maxillo suture preserved ? I am not sure on the figures.

Four premaxillary alveoli, being the third the largest. As in *A. subjuniperus*.

Premaxillary-maxillary suture does not reach the posterior margin of the incisive foramen. As in all *Allodaposuchus* ! Even if the distance between the suture and posterior margin of the foramen incisivum is longer in *A. subjuniperus* and present form compared to *A. precedens*, it is also large in *Acynodon*. This character (if you don't retain the possible intraspecific variability), could be a *A. subjuniperus* autapomorphy.

L430: **In palatal view, the incisive foramen is located more anteriorly than *A. precedens* and *A. subjuniperus*.** No, the FI is not more anterior than in *A. precedens* .

Wide and short orbits, without interorbital ridge in the frontal. How can you evaluate the size of the orbits, when they are not preserved ?? To evaluate the orbital width, its lateral margin is required! Moreover, comparing the authors reconstruction with *A. subjuniperus* and *A. precedens*..... the difference is weak or absent. Not sure that it is possible to exclude the presence of a frontal crest. The anterior portion is absent herein, and it cannot be excluded that it was present anterior to the preserved portion (see *A. subjuniperus*).

Quadrate bears two crests in ventral surface for muscle attachment. As in many eusuchians.... Its absence should be a *A. palustris* autapomorphy.

Capitate process of the laterosphenoid is anteroposteriorly oriented.

L463: **In ventral view, the capitate process of the laterosphenoid is anteroposteriorly oriented in *A. hulki* and *A. subjuniperus*, but is laterally oriented in *A. precedens*.** This character is not clear. See Buscalioni et al. (2001) Fig. 2, where the capitate process is anteroposteriorly oriented....

Aside of the previous characters, *A. hulki* has the following ambiguous autapomorphies: Anterolateral, anteromedial and olecranon processes of the ulna well developed. Ulnar shaft lateromedially compressed with lateral and medial grooves. Distal condyles of the ulna turned lateroposteriorly, causing a lateral crest in the shaft. We prefer coding all these autapomorphies as ambiguous, due to the absence of postcranial remains in other species of *Allodaposuchus*. New discoveries may reveal if they are autapomorphies of the genus.

As they cannot be compared with other *Allodaposuchus* (as many other Eusuchians), these characters should not be included in the diagnosis.

L180: *quadrates*: quadrates

L181: *quadratojugal*: quadratojugal

L217: *In lingual view, an uncommon large medial jugal foramen*: equivalent to the jugal foramen observed and coded as large in *A. precedens* (cf Brochu, 2011; char. 102)?

L224: *Quadratojugal spine is nearly absent and low in position*: preservational artifact ?

L234: *Both articular hemicondyles are similar in size, although the medial hemicondyle is slightly smaller and ventrally deflected*: in Fig. 2C-D, the quadrate condyle is figured as damaged.... How their shapes can be evaluated ?

L276: *lateral margin of the supraorbital fenestra*: supratemporal fenestra ?

L330: *In the same side, but in a most ventrally position* : In the same side, but in a more ventral position ?

L331: *and immediately superior to supraglenoid*: and immediately dorsal to supraglenoid ?

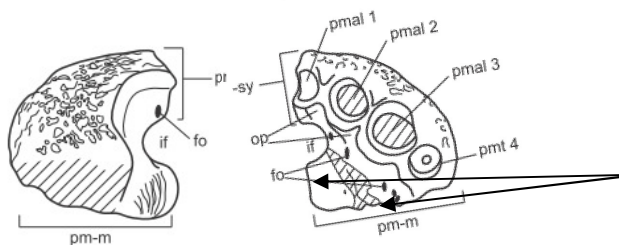
L346: *the humeral head seem to have the same high*: the humeral head seem to have the same height.

L351: *several rugous areas around itself* : not clear..... what does that mean?

L370: *In proximal view is triangular-shaped*: In proximal view it is triangular-shaped

L405: *decrease in high respect the centrum*: decrease in height respect the centrum... ? not clear.

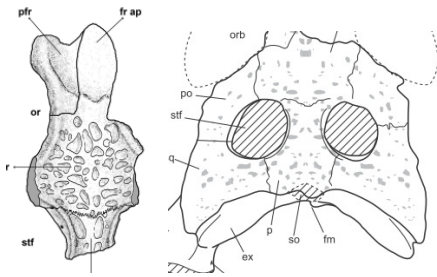
L430: *In A. hulki the anterior rim of incisive foramen is located between the first and second alveoli, whereas in A. precedens and A. subjuniperus, reaches the third premaxillary alveolus*. It depends on the orientation of the fragment. If the ventral view is oriented as the dorsal view, the anterior margin is located at the same level as the 3rd tooth (see below).



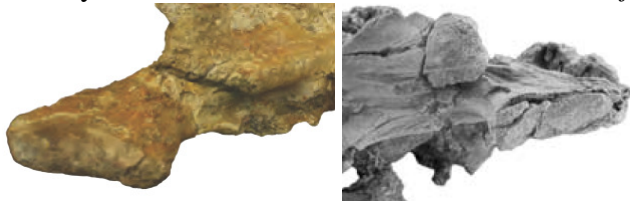
Is this really the sutures between both premaxillae, and between Pmx-Mx, or too damaged areas ?

L435: *Moreover, A. hulki shows a pattern of occlusal pits different to A. precedens and A. subjuniperus*. How ? Does not seem so different...

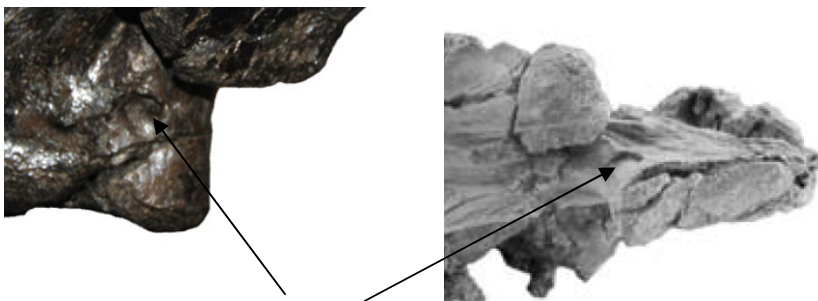
L446: *The frontoparietal suture of A. hulki is nearly linear, like A. subjuniperus and A. precedens. Allodaposuchus palustris is the only 'allodaposuchian' that shows a concavoconvex frontoparietal suture.* The suture is not really concavoconvex in *A. palustris* (compare with *Crocodylus*), and no more than the specimen described herein (see below).



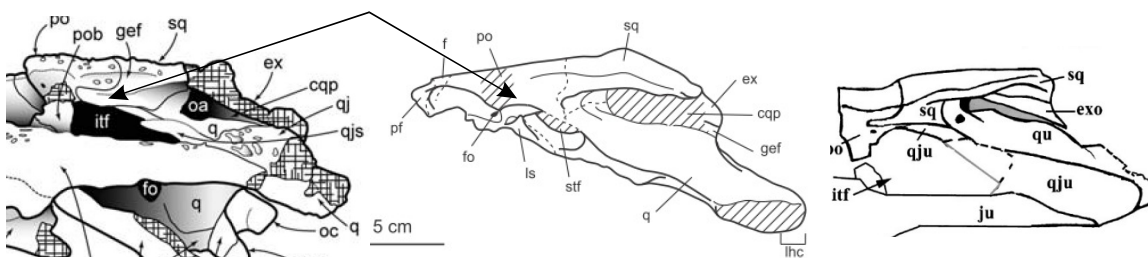
L450: *Like A. precedens, both articular hemicondyles of the quadrate of A. hulki are similar in size, although the medial hemicondyle is slightly smaller and ventrally deflected. In turn, A. subjuniperus shows a ventral expansion in the medial hemicondyle.* in Fig. 2C-D, the quadrate condyle is figured as damaged.... How their shape can be evaluated? The medial hemicondyle does not seem to differ between *A. subjuniperus* and described form.



L452: *The foramen aërum of A. hulki is small, like A. precedens and A. subjuniperus, but large in A. palustris.* Not significantly larger in *A. palustris* (evident compared with *A. subjuniperus* below). More probably individual variations.



L465: *Unlike A. precedens and A. subjuniperus, quadratojugal does not extend to superior angle of infratemporal fenestra.* Due to poor preservation, the participation of the quadratojugal is not larger in *A. subjuniperus* than in the present form, and in *A. precedens* is not so longer.



L469: *The dentition of A. hulki also shows several characters that distinguish itself from the other species of the genus. In A. hulki, the enamel lacks ornamentation, both anterior and*

posterior carinae are poorly developed, and there are not longitudinal grooves in lingual side. In contrast, A. palustris and A. precedens show ornamented enamel with well-developed carinae, whereas A. subjuniperus and A. palustris bear well-marked longitudinal grooves in lingual side. First, the size of the carinae can vary according to the position of the tooth in the tooth row (as the ornamentation of the enamel). The tooth enamel of *A. subjuniperus* is described as smooth. Moreover, the ornamentation is weak, smooth in *A. palustris*, and micrometric in the apex, and the difference with the specimen described herein is probably not significant (micrometric ornamentation also ?). Differs only with those of *A. precedens* (considering the differences between the premaxillary and maxillary teeth...).

Discussion

Phylogeny

L547: *The most parsimonious hypothesis obtained in our analyses suggests that the clade 'Allodaposuchia' belongs to Crocodylia.....L567: would be a reverted state in the other members of the clade 'Allodaposuchia' (Blanco et al., 2014)* : All this paragraph is nearly identical to paragraph from the discussion in Blanco et al., 2014.....! This paragraph is not clear ! It would be more useful to discuss the character distributions in the results obtained by the authors, according to the different position of the *Allodaposuchus* in the trees (unresolved position of *Allodaposuchus* in the consensus tree, but what are their distributions in the various trees obtained???) Which consequences on the character distributions and history ??). I do not understand if the characters listed in the paragraph are those that support the presence of *Allodaposuchus* within Crocodylia, or those proposed by Brochu ? How these characters are distributed in your trees ??

Moreover, some of the characters cited are problematic:

3) *frontoparietal suture concavo-convex*: the suture is not concavoconvex in *Allodaposuchus*.

1) *slender postorbital bar*: The postorbital bar is huge in *Allodaposuchus*.

L573: *supretmporal*: supratemporal

L664: *Crocodylus*: *Crocodylus*

S. Jouve