Notes on Matt Lamanna's comments on Carnegie *Diplodocus* manuscript

I have stayed with the term "forefoot" throughout as it pluralizes more clearly than "manus" and is no less explicit.

> Mike, up to you, but I might go with something a little more specific, since there are lots of Diplodocus specimens here at the Carnegie Museum, not just the mounted D. carnegii holotype and the other fossils that supplement it. Maybe something like, “The history and composition of the Diplodocus skeleton mounted at Carnegie Museum of Natural History” instead?

Having considered this, I take your point, but I've concluded that the present, punchier, title is better: yes, that are other Diplodocus specimens held at the Carnegie Museum, but it's not like anyone is going to be in any doubt about which is THE Carnegie Diplodocus — a term that's already in widespread use.

> Is it more appropriate to say “…had casts of this specimen made for museums in nine prominent cities…”? I ask because I don’t know whether Carnegie himself paid for the mounting of these casts or whether that cost (i.e., the mounting itself) was borne by the European and Latin American institutions in question.

In general Carnegie paid for the mounting, leaving it for local institutions to provide the wooden plinths on which the mounted skeletons would stand.

> Definitely a surprise visit? I don’t recall hearing this before.

Yes indeed: see Ilja's 2019 book, which on page 50 quotes Carnegie's offical biographer: "Carnegie was enjoying his daily siesta and the news, when he was awakened, rather startled him. He jumped up, however, and prepared to give an appropriate welcome. Glancing out the window, the King’s motor was visible proceeding up the driveway, and Carnegie, clad in his informal togs, met His Majesty at the doorway. The piper had barely time to get into his Highland garb, and the organist, who had been in the swimming pool, just managed to scramble into his clothes and strike up ‘God Save the King’ as the royal guest appeared."

> Maybe add an “arguably” here? As much as I’d like to think that our beloved Dippy is the world’s most familiar or most famous dinosaur, there are others, such as SUE the T. rex, that might have a reasonable claim there…

I don't think so. Everyone knows *T. rex* (or, rather, "T-Rex") but relatively few people know the names of individual specimens such as Sue or Stan. But everyone knows Dippy.

Thank you for catching the surviving Britishisms (e.g. verbs ending "-ise" instead of "-ize". I tried to write in American, but I suppose I am blind to a lot of the violations of that rubric.

Relatedly, thanks for catching the places where I missed Oxford commas.

I'm also grudgingly accepting your "correction" to the American style in which punctuation marks are inexplicably placed outside the quotes of which they are a part. It's so wrong, but I acknowledge that the journal will want it that way. We live in a fallen world.

> I’m mystified as to why I’ve never included CM 33985 in this list of component specimens too (i.e., why I always say “CM 84/94/307” instead of “CM 84/94/307/33985”). Maybe I’m implicitly trying to set a cut off at the relatively substantial specimens in the mount, and not including CM 33985 because it was just a partial distal hind limb? Who knows.

Only Matt Lamanna can tell us! :-)

> This museum is currently called the Houston Museum of Natural Science; I’m not sure if it was called the Houston Museum of Natural History back in 1963 when this sale was made, though. Assuming that was indeed the case, I’ve added a parenthetical statement in an attempt to clarify the situation.

No, I'm pretty sure this was just a mistake on my part. Thanks for catching it!

> Should we explicitly distinguish between casts and sculptures too?

I tried to do this, but found myself writing "A sculpture is distinguished from a cast in that is is sculpted rather than cast"! So, no, I assumed people will not need this explained.

> The spelling of Peterson's first name is unclear to me; it's sometimes given as "Olaf" and other times as "Olof." I get around the problem by just referring to him as "O. A."

See the email thread with Ilja that I forwarded to you.

> I try not to mix the terms "proximal" and "distal" vs. "anterior" and "posterior" when discussing caudal vertebrae. I've made appropriate changes below as well.

Thank you. For some reason, this is a favourite mistake of mine.

> > renowned sauropod expert John S. McIntosh considered D. carnegii legitimately distinct from the type species, D. longus (Rea 2001:ix)
>
> And so does basically everyone else who studies diplodocids, I think.

Not quite, but I added "and this separation has been widely followed".

> FWIW, this specimen was regarded as referable to Apatosaurus ajax by Upchurch et al. (2004) and Apatosaurinae indet. by Tschopp et al. (2015) (not Brontosaurus).

Given the uncertainty surrounding this specimen (see https://svpow.com/2015/05/09/what-should-we-tell-people-about-the-amnh-apatosaurine/), I judged it best to go with the historic designation. It was certainly billed at *Brontosaurus* at the time of the mounting.

> We seem to alternate back and forth between including the "th," "nd," "st," etc. after dates (and not doing so). Maybe just leave these suffixes off throughout the manuscript? So, for example, this would be rewritten as "16 February 1905"?

I'm OK with that solution. Are we confident the Annals will be happy with that? The guidelines at https://carnegiemnh.org/wp-content/uploads/2017/08/CMNH-PUBLICATIONS-AUTHORS-GUIDE-6-Jan-2010.pdf don't seem to mention it.

> FWIW, in 2009, the Museo Giovanni Capellini held a conference on vertebrate paleobiogeography to coincide with the centennial of the debut of their Diplodocus cast. The keynote speaker was yours truly.

I would like to include a note to this effect in the manuscript: do you have a reference? A conference abstracts volume, for example?

> The Carnegie Museums do have a substantial endowment, and I'm pretty sure at least a bit of that came from Carnegie himself. I can double-check this if it's important.

I got this from Brinkman (2010:109), who wrote:

"Carnegie had already lost much of his enthusiasm for dinosaurs in his twilight years. His generous appropriations dried up significantly and he neglected to make any permanent provision for paleontology at the museum. After his death, money for dinosaur hunting was hard to come by. The Pittsburgh party was forced to abandon their fieldwork at the Carne- gie Quarry in Utah, which was far from exhausted."

Was Brinkman wrong?

> I love the idea of including the word "hippies" in a peer-reviewed paper, but is there some other, more professional-sounding replacement? I honestly can't think of one.

My approach in writing is always to favour the word that most clearly communicates the intended meaning, and I don't give a damn whether it sounds "scientific" or not. "Hippes" is correct here :-)

> Consider my curiosity piqued! Also, total shot in the dark, but is there any chance whatsoever that some of Ernst Stromer's fossils from Egypt could've been transferred to this convent too?! If you're still in touch with your anonymous sources, could you maybe ask them?

It's someone that Ilja is in sporadic communication with -- I don't have a name, and there have been difficulty in getting further information from him or her. I suggest you get in touch with Ilja about this.

> If they don't want the plaster original, we'll take it back.

It did occur to me to make the same offer!

What would the Carnegie do with a plaster cast?

> One of which, I believe, is now indoors at the Field House. I have photos of this mount from the mid-2000s if you want them.

I discuss all this in great detail in Taylor et al. (2022) :-) That said, I would definitly like to see your photos if they predate 2004, as I have only even been able to locate two photos of the lightweight cast in its original location in the old building. (These both appear in the 2022 paper as figure 8).

> Stupid comment, but I recently had a reviewer ask me to say "antedate" instead of "predate," to distinguish from the act of predation! So I'm passing on that glorious observation to you.

I've made this change because, sure, why not? But honestly ... could anyone anywhere ever possibly misinterpret this?

> Sorry, another weird Americanism involving commas.

I am enjoying how often you're apologizing for this :-)

> But at least a few "other sauropods" could probably place the long axis of the skull more or less in line with that of the neck, correct? See, for example, fig. 8a of Vidal et al. (2020) (which depicts *Spinophorosaurus*).

Judging by Figure 2 at https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0006924 it does seem that the occipital condyle of Spinophorosaurus may be oriented more or less posteriorly, but I'm not great at reading braincases. The ventral view of the reconstructed scanned-and-printed skull at https://rpt.de/portfolio/spinophorosaurus-nigerensis/ seems to corroborate this.

Anyway, I think the present wording is fine despite occasional exceptions.

> > Neither are [atlas ribs] present in the current Carnegie mount (detail in Figure 1, pers. obs.)
>
> Shit! I must've missed this when we were doing the remount back in the mid-2000s. (If indeed atlantal ribs should in fact be there, I'm not clear on this.)

It looks like they should, yes: see https://svpow.com/2022/11/23/putative-atlantal-ribs-of-diplodocus/ and marvel at the subtle differences between mounts!

And it's possible that the dinky axis ribs on the mount are wrong. Hatcher (1901:20) says "A short cervical rib without anterior process springs from the side of the [axis] centrum near its inferior margin and anterior extremity" and his figure 6 bears that out, but compare with the Holland 1906 illustrations reproduced in that blog-post. The axis ribs there are way bigger than what Hatcher described and illustrated.

> I don't think this is correct, as Hatcher's (1901) plate I (the D. carnegii quarry map) shows a number of (I count seven) chevrons articulated or at least closely associated with the anterior caudal vertebrae of what's clearly CM 84.

> Consequently, I suspect Holland's statement earlier in this sentence is in fact correct.

Ha! I think you're right. What makes this humiliating is that I carefully coloured in those seven CM 84 chevrons for Figure 4 of this paper that came out two years ago: https://peerj.com/articles/12810/

I have amended the text accordingly.

> Although only middle and posterior caudal vertebrae of CM 94 were used in the mount, its vertebral column as found was complete from C7 through to Ca39
>
> Is this definitely true, especially with respect to the tail?

Stupidly, I didn't include a reference here, so I don't know what my source was. I can't find it in Hatcher 1901, Holland 1906 or McIntosh 1981, and I don't know where else it could be from. I agree this claim doesn't seem to fit the facts, and it's not crucial to our argument, so I have simply removed it.

> > Nine or ten chevrons of CM 94 remain in the Carnegie Museum collection today.
>
> Do we know which number this is, i.e., nine or ten? Amy or I can count them if you'd like. (Apologies if I was supposed to do this long ago but spaced out and forgot.)

No, I don't know how many, and I would be grateful if you could find out! (My guess is that the phrase "nine or ten" is quoted from an email from you, Amy or Linsly, but if so I can't find that email.)

> I just re-read p. 3 of Hatcher (1901) pretty carefully, and I can't find any mention of CM 94 having included five chevrons (at least on that page). Are you sure you cited the correct page number here?

You are right that Hatcher 1901:3 doesn't say this. Infuriatingly, I have no idea where else it could be from.

Meanwhile, I found (how did I ever overlook?) an account of chevrons in Hatcher 1901:36-37 and another in Holland 1906:255-256. So I have fairly radically rewritten that section.

> [CM 11161] was certainly available for Serafino Agostini to have used when he "made some excellent moulds [sic] and casts of the skulls of Apatosaurus and Diplodocus" in 1934.

Yes, the annual report spells it "moulds" for some reason.

> I think this [speculation on skull replacement date] is probably correct, given that a photo of the Diplodocus and Apatosaurus mounts side-by-side taken sometime after November 1932 (judging from the fact that the Apatosaurus mount includes a Camarasaurus skull) but before the end of 1936 (based on its appearance as a plate in Gilmore's 1936 Apatosaurus monograph) seems to show the 'old' CM 662/USNM 2673-based skull on the Diplodocus mount. I'll try to remember to send the pic when I send my comments on the manuscript, but here it is just in case. (I have it at higher resolution if you want it.)
>
> Conversely, a later (though still old; probably 1950s or 1960s given the presence of Ottmar von Fuehrer's T. rex mural, painted in 1950) clearly shows the CM 11161-based skull on our Dippy mount (you can see the sclerotic ring in the left orbit). Please remind me and I'll see if I can find a definitive date for this photo.

Could you please send these photos? Neither was attached with the manuscript.

> Incidentally, Berman and McIntosh (1994) state that the incorrect Camarasaurus skull replica was mounted on our Apatosaurus skeleton CM 3018 in December 1932, not sometime in 1934 as implied in our text here.

I don't see how that can be right, if the Annual Report for 1934 mentions that (presumably during that year) Agostini made the Camarasaurus-like skull that was used in the recapitation.

> Berman, D.S, and J.S. McIntosh. 1994. The recapitation of Apatosaurus. Paleontological Society Special Publications 7:83–98.

I don't seem to have that one. Could you please send a PDF?

> A breaking news update to my previous comment: the CM 11161-based skull was in place by 1947, as indicated by this photo in an article from that year (on Serafino Agostini) in our museum's member magazine, Carnegie. (Check out that sclerotic ring!)

Ah, great spot! I'd read that article, but not spotted the significance of the photo. Thank you!

... and, ridiculously, looking back over previous emails I see that on 28 July 2023 you wrote "Note that the second photo in this article demonstrates that the CM 11161 skull replica was in place on our Dippy mount by 1947. (You can see the sclerotic ring in the left orbit.)". Somehow we both forgot!

> Was the neck definitely raised? Or was the support pole simply replaced by suspension cables? In comparing our Figure 13 to our Figure 11 (and also to the Carnegie magazine photo from 1947 referenced above, which happily was taken from a perspective similar to that shown in our Figure 13), I don't see any obvious difference in neck posture…

You are right. I have modified the text, and heading, accordingly.

> > The Jurassic section, including Diplodocus and the Apatosaurus louisae holotype CM 3018, was opened for ticketed previews at 6 am [sic] on Saturday 17 November 2007.
>
> If there's a grammatical error here, why don't we just correct it, as opposed to including a "[sic]"? (I ask because we don't seem to be directly quoting from one of these sources here.)

Because otherwise people will think it's a typo for 6 pm!

> Bummer. I wonder why Ray apparently didn't tell me this back in the day? Perhaps he thought that the humerus, radius, and ulna of BYU 681 were all Diplodocus (and potentially associated with each other), but that the femur belonged to Apatosaurus? In other words, that BYU 681 on the whole was a chimera, but the humerus, radius, and ulna that bear this number all belong to a single, fairly small-bodied Diplodocus individual? Who knows… ¯_(ツ)_/¯

Those three forelimb elements are indeed all assigned to *Diplodocus* in Wilhite 2003, and the femur to Apato. I don't know the evidence of their association, though, and have emailed to request clarification.

> It's a bit unusual in my experience to include a question in a paragraph of scientific text such as this – but I also can't think of a better way to express this thought (except as a different question, e.g., "How could he have arrived at this number?") so I guess the question can stay.

I like to write simply and directly, and have little patience with the circumlocutions that are customary in "scientific" writing. In this case, the question is a question, and I think best expressed as one.

> I just found some photos of the 2005 disarticulation in case you want them; please just let me know. They were in a folder of pics that Mindy McNaugher gave me back in the day. (Also, I may have said this above, but I have lots of photos of the mount in progress at Phil Fraley's studio too; again, they're yours if you want them.)

Yes please and yes please!

> Maybe [the installation of the wooden caudals] happened sometime between 1981 (the date of publication of Jack's catalog of our dinosaur collection) and 2003 (when Jerry Harris took pics of the original CM 307 caudals in our collection area)?

Maybe; but how would Jack have known that had happened to include in his 1981 write-up? I don't think his silence on the subject tells us anything.

> And a blue whale skeleton, if memory serves, though I believe that's suspended from the ceiling and so it doesn't technically occupy the same space that 'Dippy' did.

Exactly. There is absolutely no possible justification for the removal of the cast that has long been the icon of the London NHM. It's a desecration, with corporate event space the only possible rationale. See https://svpow.com/2015/02/10/the-planned-vandalism-of-the-natural-history-museum-a-modest-proposal/

> See previous comment. I'm relieved that I'm not the only one who doesn't remember everything related to their museum's dinosaur mount renovation.

It's understandable; at the same time, how I wish that those responsible for such projects kept more comprehensive notes!

> > This makes the Paris mount an important and perhaps unique historical artifact in its own right, and it is to be hoped that the MNHN resists the temptation to modernize it.
>
> I can see why you feel this way, but I'd end this sentence at "right," since I personally am cautious about suggesting what other museums should do with their exhibits/specimens.

I understand your reticence here, given that you're in charge of a rival museum's dinosaurs. But unless you insist (which I would honour), I want to keep this. I think it's reasonable to be opinionated about such matters, and you can reasonably that the opinion expressed is that of the lead author.

> According to Wikipedia, "Skulls from this cast (i.e., 'second-generation') are on display in museums in Milan and Naples."

This is interesting, but the Wikipedia article gives no reference and we can't cite Wikipedia itself. So I think this has to be omitted.

> Just calling out (as I believe I also did above) that we seem to alternate between using the 'native-language' names of the museums in question (e.g., Museum für Naturkunde) vs. their English translations/transliterations (e.g., here). I'd choose just one style and stick with it.

I take your point, but I have never heard the MfN called anything else. I think the general rule here is not necessarily consistency, but following the most used name for each institution.

> > Finally, it was buried in soft peat for three months and recycled as firelighters.
>
> WTF? Meaning that the cast was destroyed (i.e., recycled)? Like, it no longer exists? I had no idea. (Or did you put this in here to make sure I was reading carefully?)

As you rightly guessed, I put that in mostly to check you were all paying attention by the midpoint of a fairly exhausting manuscript! I was heartened that all four co-authors spotted and commented on this, but disappointed that not one of you spotted it as a Hitch Hiker reference:

"[Vogons] are one of the most unpleasant races in the galaxy. Not actually evil, but bad-tempered, bureaucratic, officious, and callous. They wouldn't even lift a finger to save their own grandmothers from the ravenous bug-bladdered beast of Traal without orders signed in triplicate, sent in, sent back, lost, found again, subjected to public inquiry, and finally buried in soft peat for three months and recycled as firelighters."

> > Carnegie had an honorary position as the Rector of the University of St Andrews, 50 miles northeast of Edinburgh.
>
> Maybe you mean 50 km? According to Google Earth, St. Andrews is about 50 km/30 miles northeast of Edinburgh.

As the crow flies, yes; but it's a 50-mile journey. What an irritatingly pedantic point to have to make in this paper!

> Weird question, but does this size discrepancy between original bones and casts produced from them potentially 'scale' with the sizes of the elements in question? For example, would the difference in length between the original bones and their respective casts be greater in giant sauropod limb elements than in, say, limb bones of a housecat? I think it might, though I can't say for sure (nor can I really explain why I suspect this).

My intuition says that the fossil-to-case size ratio is probably unrelated to the size of the element, but that's only saying that my intuition is different from yours. I don't know of any study at all into the cast-shrinkage phenomenon, and now I'm thinking someone ought to do that study!

> Meaning that the total length of the recently added real fossil caudal vertebrae was substantially longer than that of the casts they replaced? I think that’s possible, though 1.2 m seems a stretch. [snip]

Useful thoughts here, thank you! I have sigificantly modified the manuscript to include much of this material.

> I know Brian Curtice went to RCI to look at this during its remount and will have some interesting observations to write up as a result.

Yes, I've seen a few of Brian's photos and witnessed some of his despair at the state of the material. Unfortunately, I am not at all optimistic that he will write up what he discovered, so all that rediscovered information will be lost once more.

> Agree, but again, dinosaur mount renovations are intense, pressure cooker-type affairs [...]

I am sympathetic to this and I think it's important enough to include something along these lines in the manuscrpt. What do you think of this version?

> Every mounted dinosaur skeleton is an important scientific and historical artifact: those of large and generally incomplete dinosaurs such as sauropods arise from complex scientific and political processes involving myriad controversies and decisions. We urge those who have the privilege of working on them to write up their choices for publication before memories evaporate and records are lost.
>
> We recognize that dinosaur mount renovations are intense projects, often executed under ambitious schedules, and typically overseen by scientists who have numerous other responsibilities competing for their attention. One of us (Lamanna) was the scientist in charge of the 2005–2007 renovation of the Carnegie Museum's dinosaur galleries, and says without reservation that this was the most demanding project he has ever been involved in. Had those involved in the *Diplodocus* remount realized at the time that the decisions they made would be important for posterity, they would have kept running notes, material lists, and a correspondence archive.

> > Anonymous. 1907. A Diplodocus for Frankfurt Museum. American Museum Journal 7:98–100. https://digitallibrary.amnh.org/handle/2246/6331
>
> This link didn’t work for me.

It does for me. Did you have a transitory failure? Please try it again.

> > Holland, William. 1910d. Letter to Andrew Carnegie, 5 July 1910. http://digitalcollections.powerlibrary.org/cdm/compoundobject/collection/acamu-acarc/id/14064/rec/1
>
> This link didn’t work for me.

Sigh. Those total idiots at Carnegie Mellon have evident changed all their URLs -- as though we didn't all know what best practice was quarter of a century ago: https://www.w3.org/Provider/Style/URI.html

It genuinely astonishes me how constantly and consistently apparently reputable organizations do it. So avoidable, so painful.

I have tried quite hard to re-locate https://digitalcollections.library.cmu.edu/ but without success. Even the unique ID, 14064, has apparently changes. I trusted Carnegie Mellon not to completely screw this up, so I didn't download a copy of the letter for our archives. I think the only thing to do is leave the URL as it is, and if anyone asks tell them what CM did.

> [Arthur S. Coggeshall] was also on the expedition that discovered the holotype (CM 84). Also, I might be able to find a clearer version of the photo in question if you want [for Figure 2].

Yes, please! And also, if you can, of the Agostini photo.

> Anterior? I think I see prezygapophyses facing toward(-ish) the camera if I zoom way in; also, the neural spines appear to be inclined away from the camera.

Good catch! Thank you.

> ... possibly from the Diplodocus carnegii paratype CM 94
>
> I'm a bit skeptical of this given the morphology of the caudal ribs/transverse processes (i.e., not aliform) and neural spines (i.e., lower than I'd expect for diplodocine anterior caudals).

Right again! And the centra are not nearly long enough.

> It honestly doesn't look noticeably more elevated to me (not to mention that this would've been an expensive and complex undertaking given that the steel or iron rod that extends underneath the cervical series would've needed to have been altered to accomplish this). Obviously, I think the tripartite support pole was removed, and the suspension cables added, but I don't think the neck was repositioned per se.

I think you're right. I have modified the text here and elsewhere accordingly.

> Is it just me or do A, B, and C here show two carpal elements, whereas our current mount has only one? If so, I guess I must've decided to jettison a carpal at some point, though I can't remember when or why.

Oooh, sharp eyes. But I think it's even weirder than that: looking closely at your photo of the current mount's forefeet, there is only a single carpal for the right forefoot in the foreground, but it looks very much as though there are two in (what I assume must be) the left forefoot in the background. Can you please inspect the mount and confirm or deny?

> I might end this sentence at "relatively spartan ones." After all, research has continued here from Carnegie's death to the present day (though in Vertebrate Paleontology it shifted from dinosaurs to non-dinosaurian vertebrates [particularly fossil mammals] through at least Dave Berman's hiring in the 1970s). Moreover, with the exception of SUE the T. rex, our dinosaur exhibitions far surpass the Field's. Of course, the AMNH has (and will likely always have) a larger, more diverse dinosaur collection than we do (especially as regards Cretaceous taxa), but more than one colleague has said to me, "I like your dinosaur gallery better than theirs." (Obviously these people could just be saying that to be nice, but I do think that one could make the case. After all, our gallery contains the holotypes of D. carnegii, A. louisae, and T. rex, and moreover I think our dinos are generally presented in a more up to date, engaging way.)

Not really relevant to the manuscript but for what it's worth I do agree. The Carnegie's public galleries are by some distance my favouries of those I have seen.