



Beyond the tyranny of lateral view

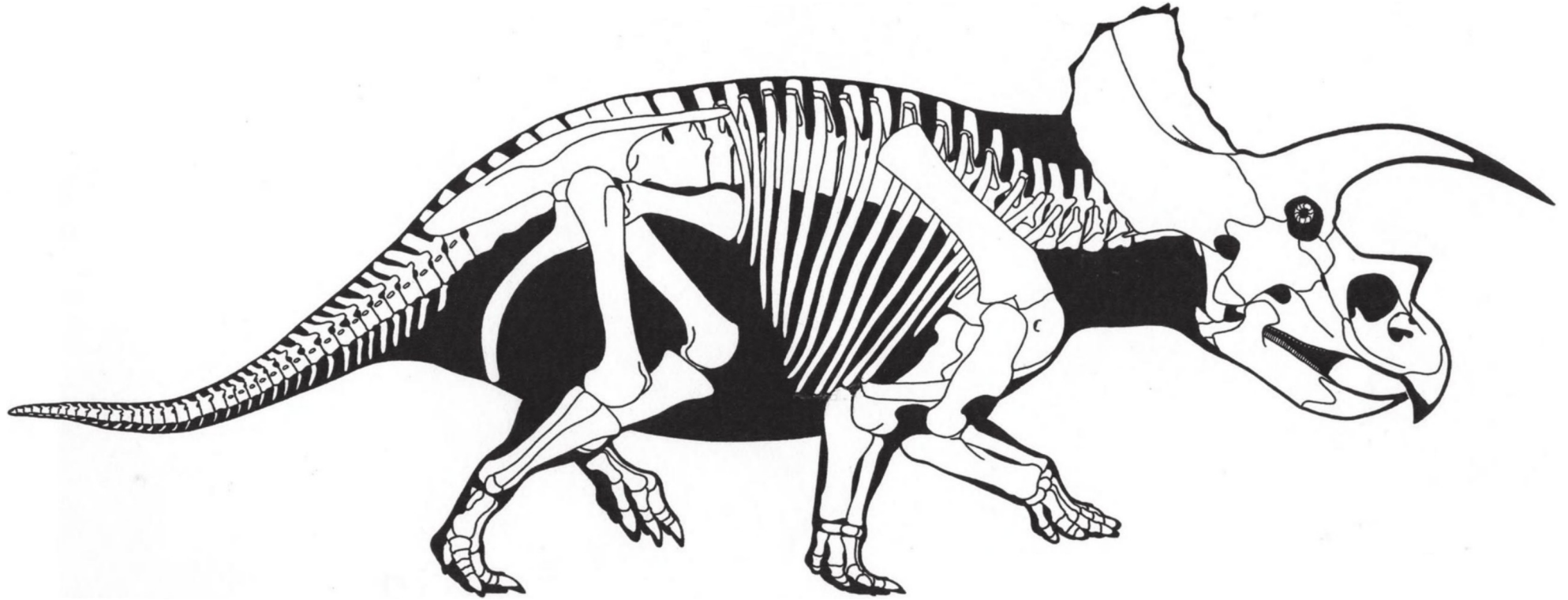
Michael P. Taylor,
University of Bristol, UK.
Mathew J. Wedel,
Western University of Health
Sciences, California, USA.

***Tyrannosaurus* skeletal reconstruction**

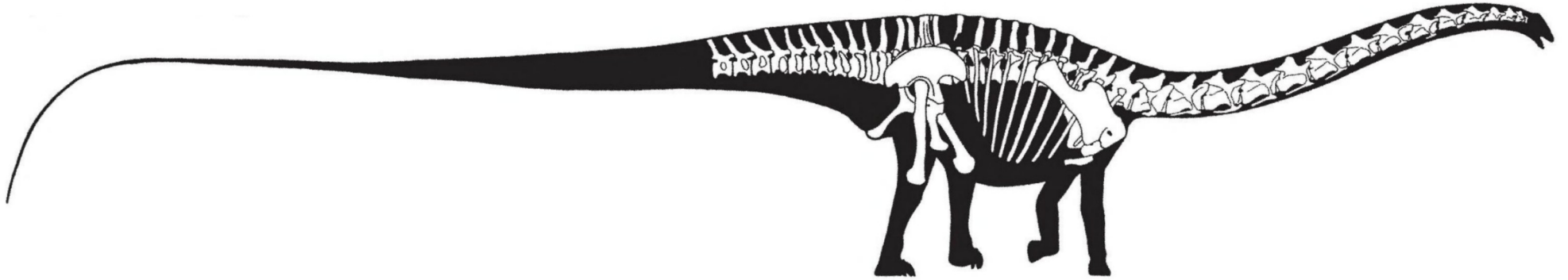


This and following skeletal reconstructions
by Gregory S. Paul.

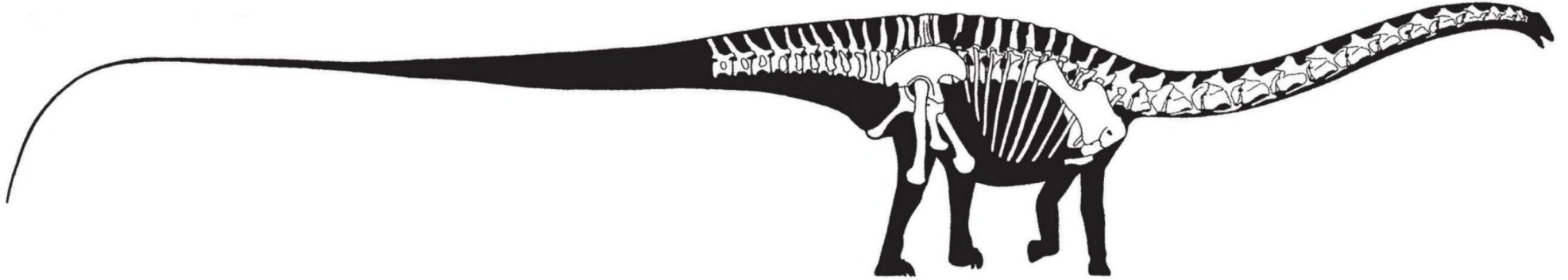
Triceratops skeletal reconstruction



***Diplodocus carnegii* holotype CM 84**

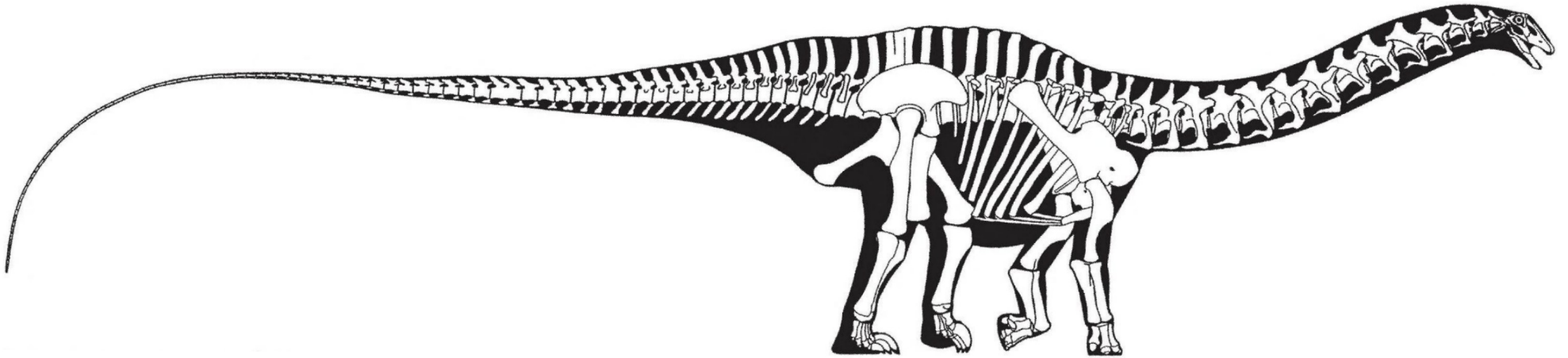


***Diplodocus carnegii* holotype CM 84(*)**

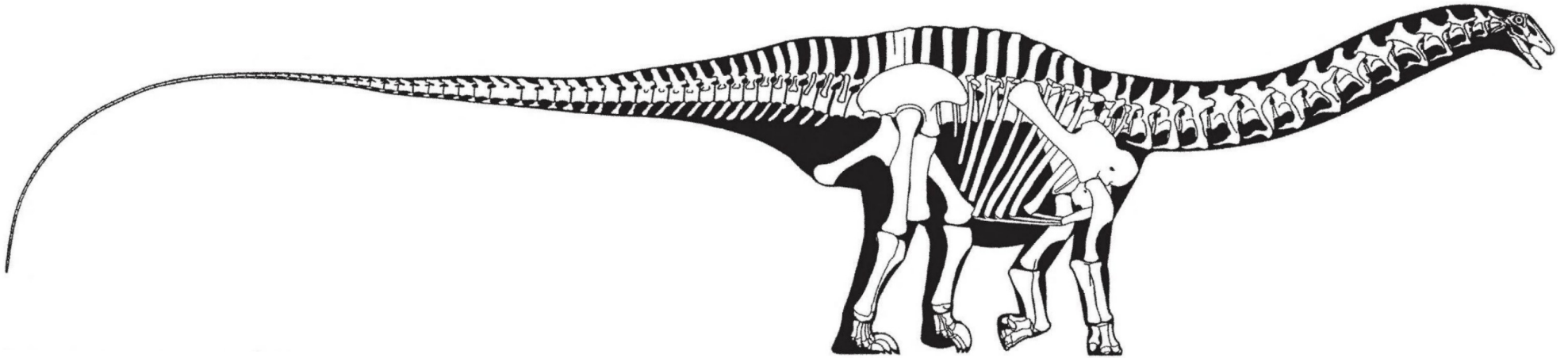


(*) Original mounted skeleton also contained bones from CM 94, CM 307 and CM 21775, and casts/sculptures from CM 622, AMNH 965, CM 33985 and USNM 2673.

***Apatosaurus louisae* holotype CM 3018**

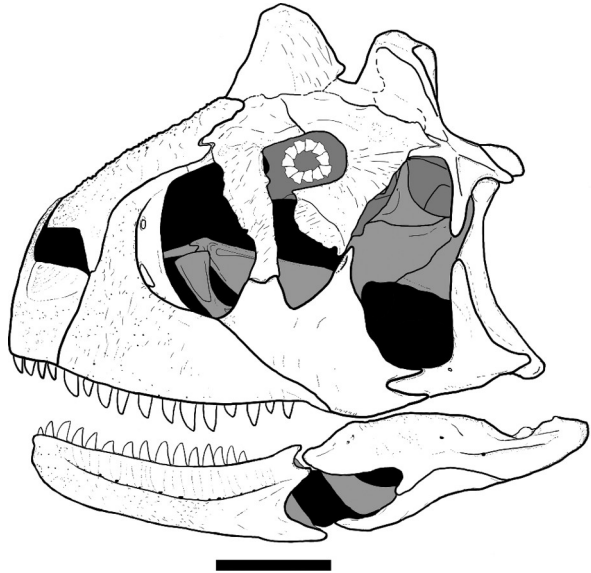


***Apatosaurus louisae* holotype CM 3018**



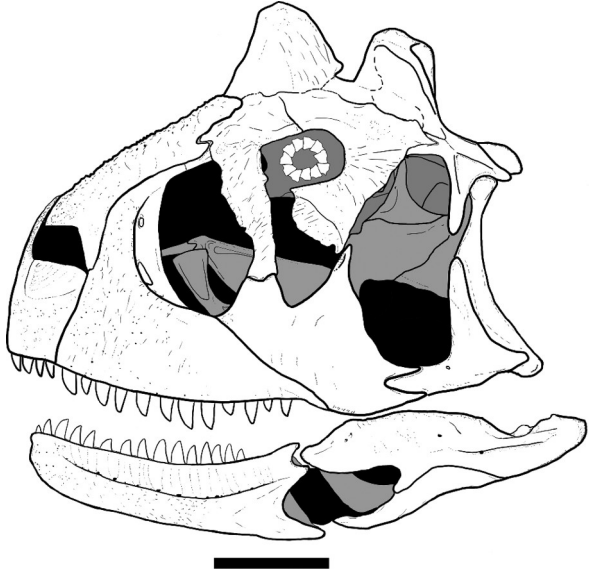
All real bone from one individual with sculptured fills,
except skull, cast from CM 11162.

Carnotaurus skull



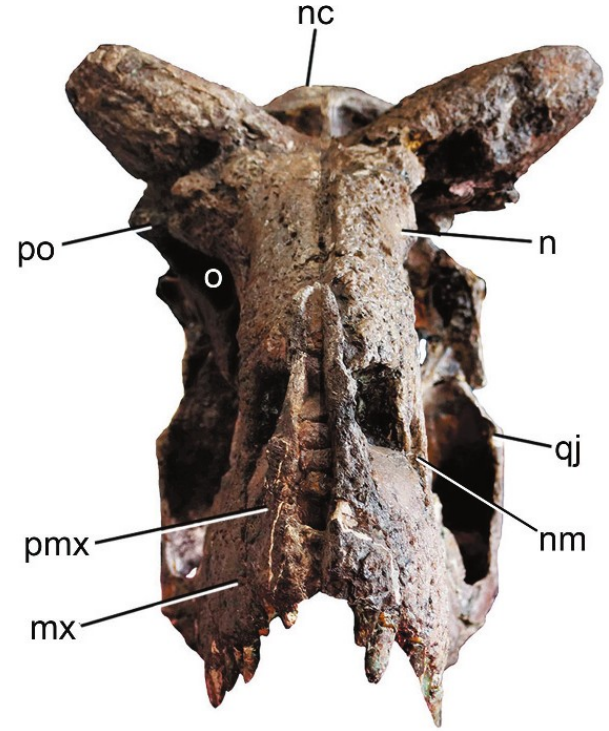
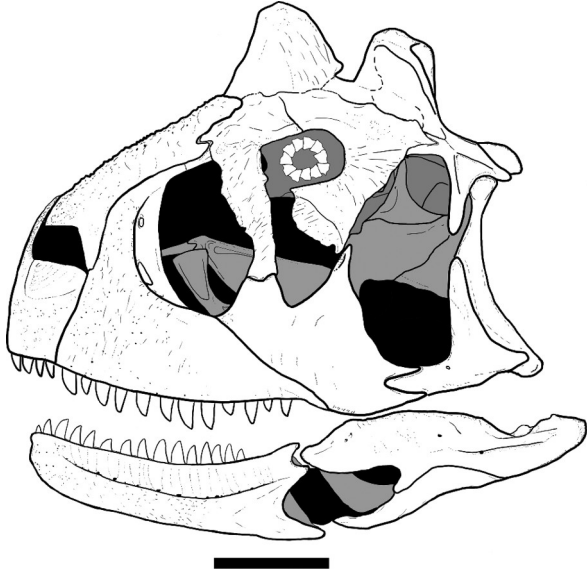
Cerroni et al. 2021: figure 1

Carnotaurus skull



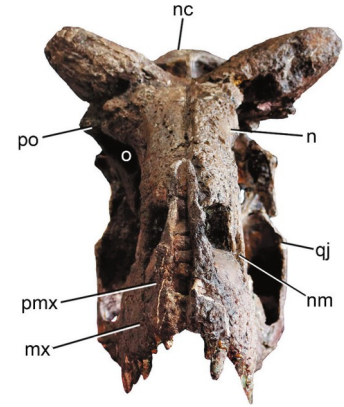
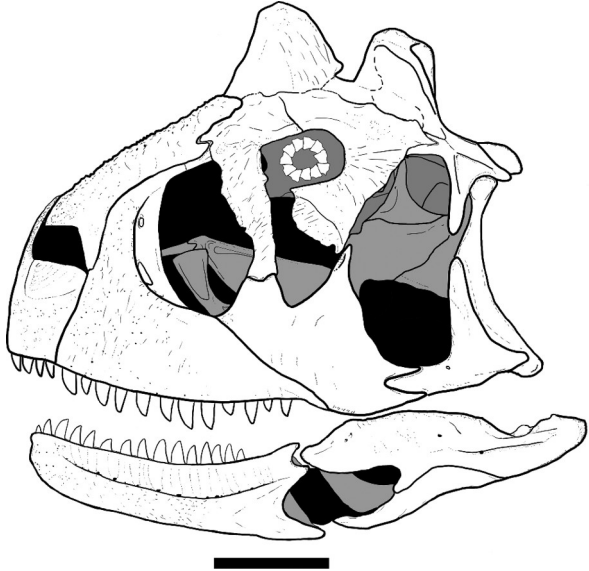
Cerroni et al. 2021: figure 1; Disney

Carnotaurus skull



Cerroni et al. 2021: figure 1; Disney; Cerroni et al. 2021: figure 2e.

Carnotaurus skull



Cerroni et al. 2021: figure 1; Disney; Cerroni et al. 2021: figure 2e.

Carnegie Museum Jurassic gallery



Above the Jurassic gallery



Above the Jurassic gallery



The route to the balcony



The balcony is *high*



The balcony is *high*

Apparently only 15.8 meters above floor

It feels *a lot* higher.



The balcony is *high*



Carnegie Museum Jurassic gallery



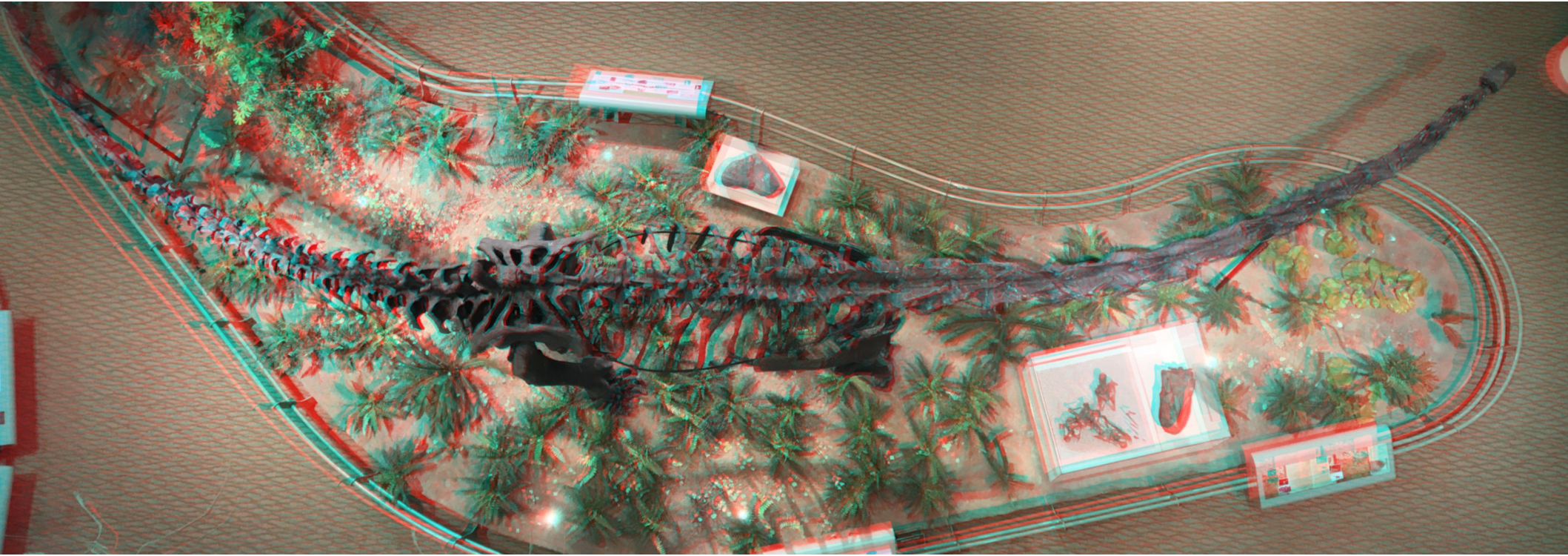
Carnegie Museum Jurassic gallery



Diplodocus from above



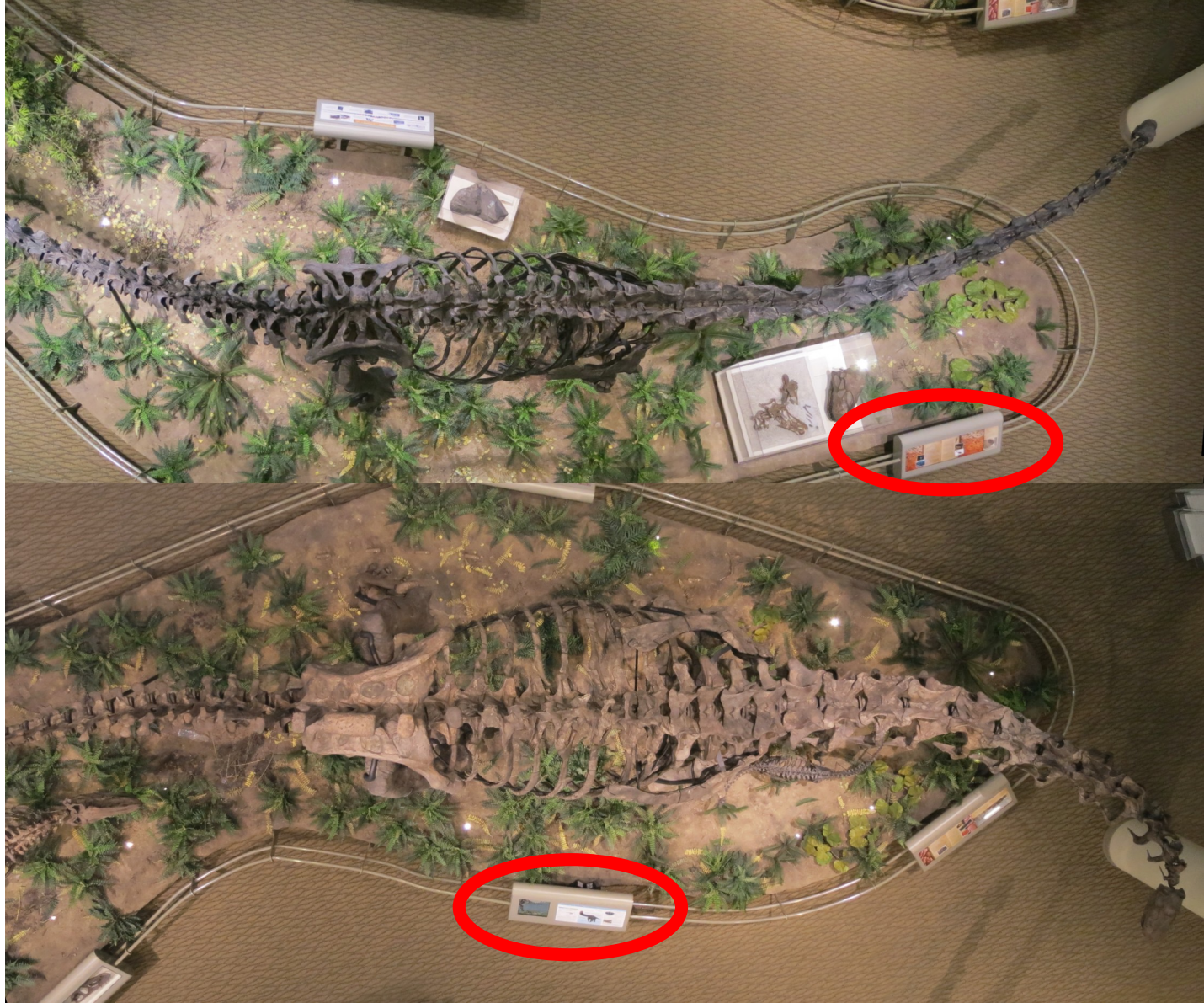
Diplodocus anaglyph



Apatosaurus from above



Torso size

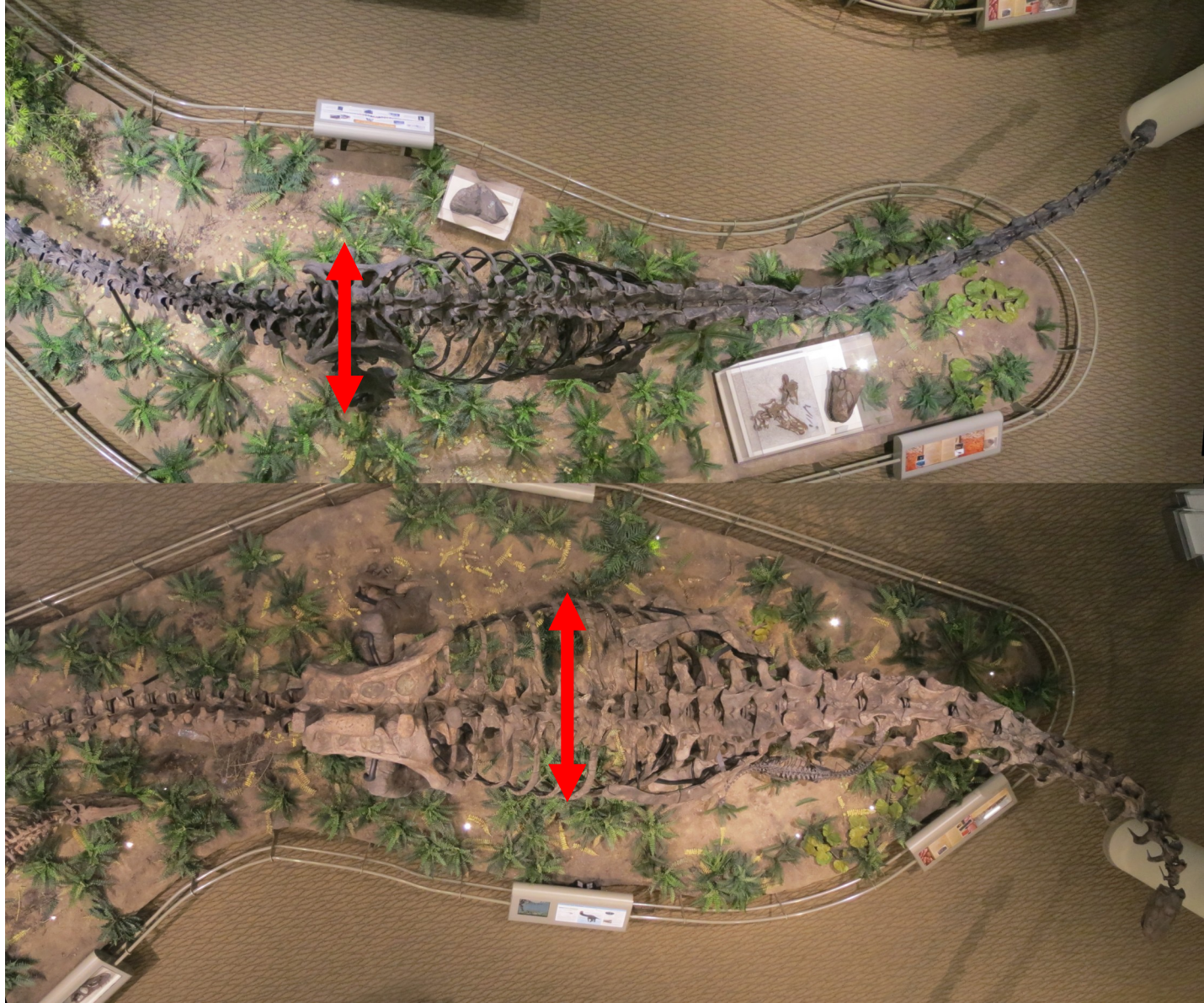


Torso width

Diplodocus
425 pixels

Apatosaurus
626 pixels

1.47 times wider



Torso width

A more intuitive approach.



Torso length

Diplodocus

1178 pixels

Apatosaurus

1307 pixels

1.11 times longer



Torso length

Diplodocus

1178 pixels

Apatosaurus

1307 pixels

1.11 times longer



Torso area

Diplodocus

450181 pixels

Apatosaurus

760791 pixels

1.69 times bigger

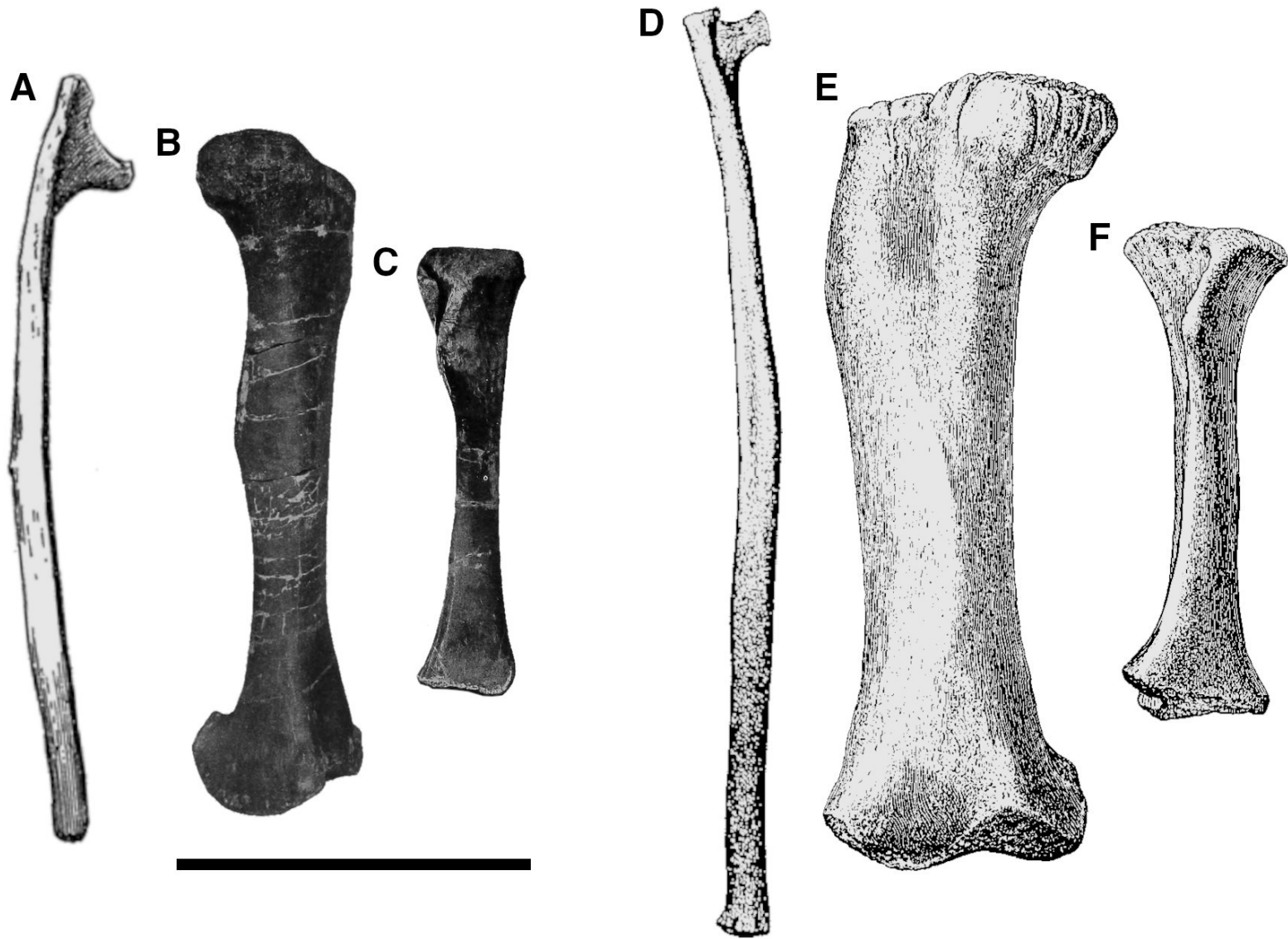


Height

Longest rib,
femur and
tibia.

Diplodocus
(left)

Apatosaurus
(right)



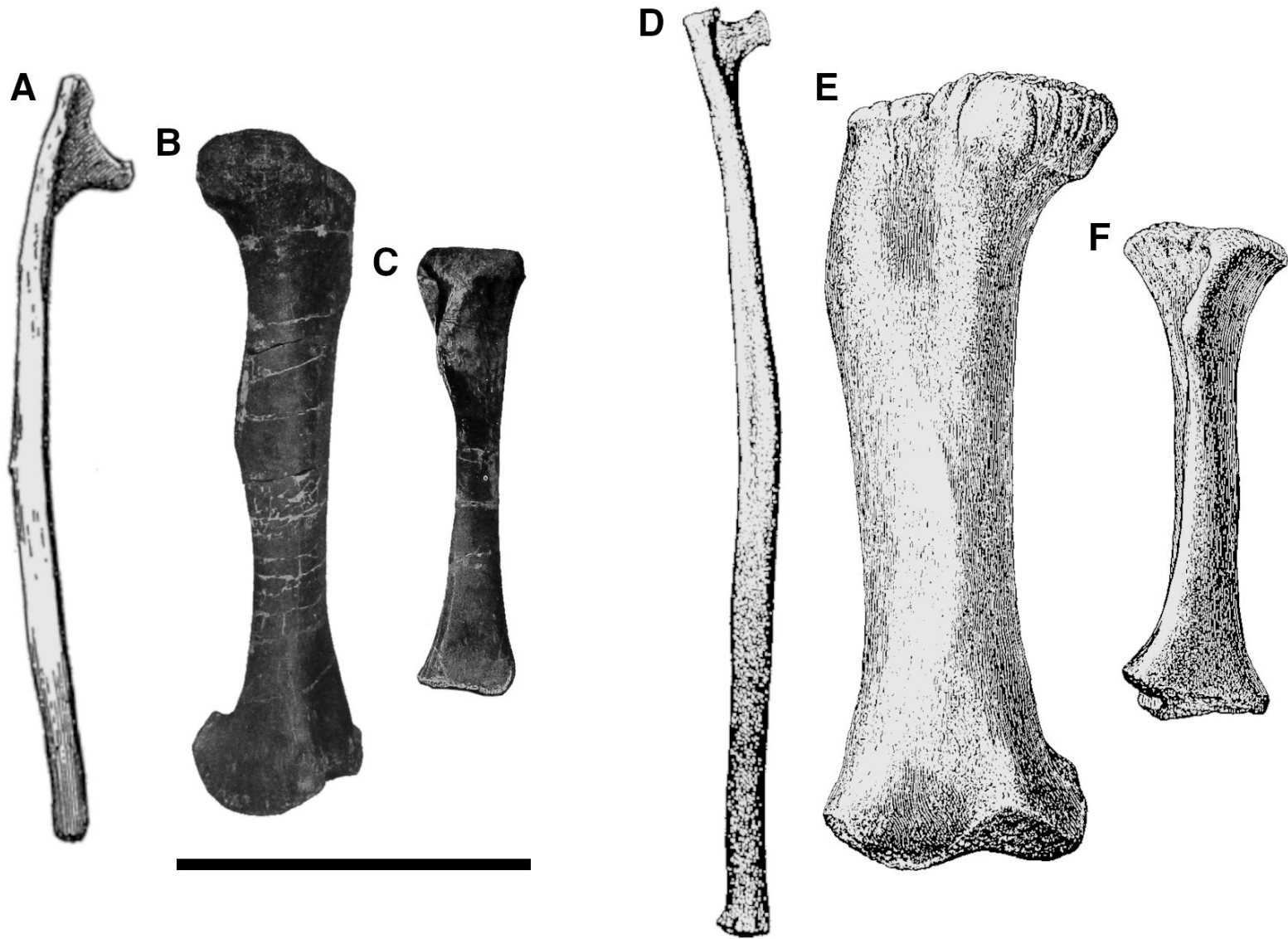
Height

Longest ribs

Diplodocus
1727 mm

Apatosaurus
2075 mm

1.20 times
deeper



Relative body masses

Apatosaurus torso is 1.69×1.20 times as voluminous

— 2.03 times as voluminous as *Diplodocus*

— 2.03 times as massive

What does this mean for whole-body mass?

Relative body masses

TABLE 4. Volumes and masses of *Brachiosaurus* and *Giraffatitan*, estimated by Graphic Double Integration

Body part	<i>Brachiosaurus</i>		<i>Giraffatitan</i>	
	Volume (l)	%Total	Volume (l)	%Total
Head	140	0.39	140	0.48
Neck	4117	11.48	4117	14.11
Forelimbs (pair)	1344	3.75	1344	4.61
Hindlimbs (pair)	1462	4.08	1462	5.01
Torso	26469	73.81	20588	70.58
Tail	2328	6.49	1520	5.21
Total volume	35860		29171	
Total mass (kg)	28688		23337	

Volume ratio indicates *Brachiosaurus* volumes as a proportion of corresponding *Giraffatitan* volumes

(Taylor 2009:Table 4)

Relative body masses

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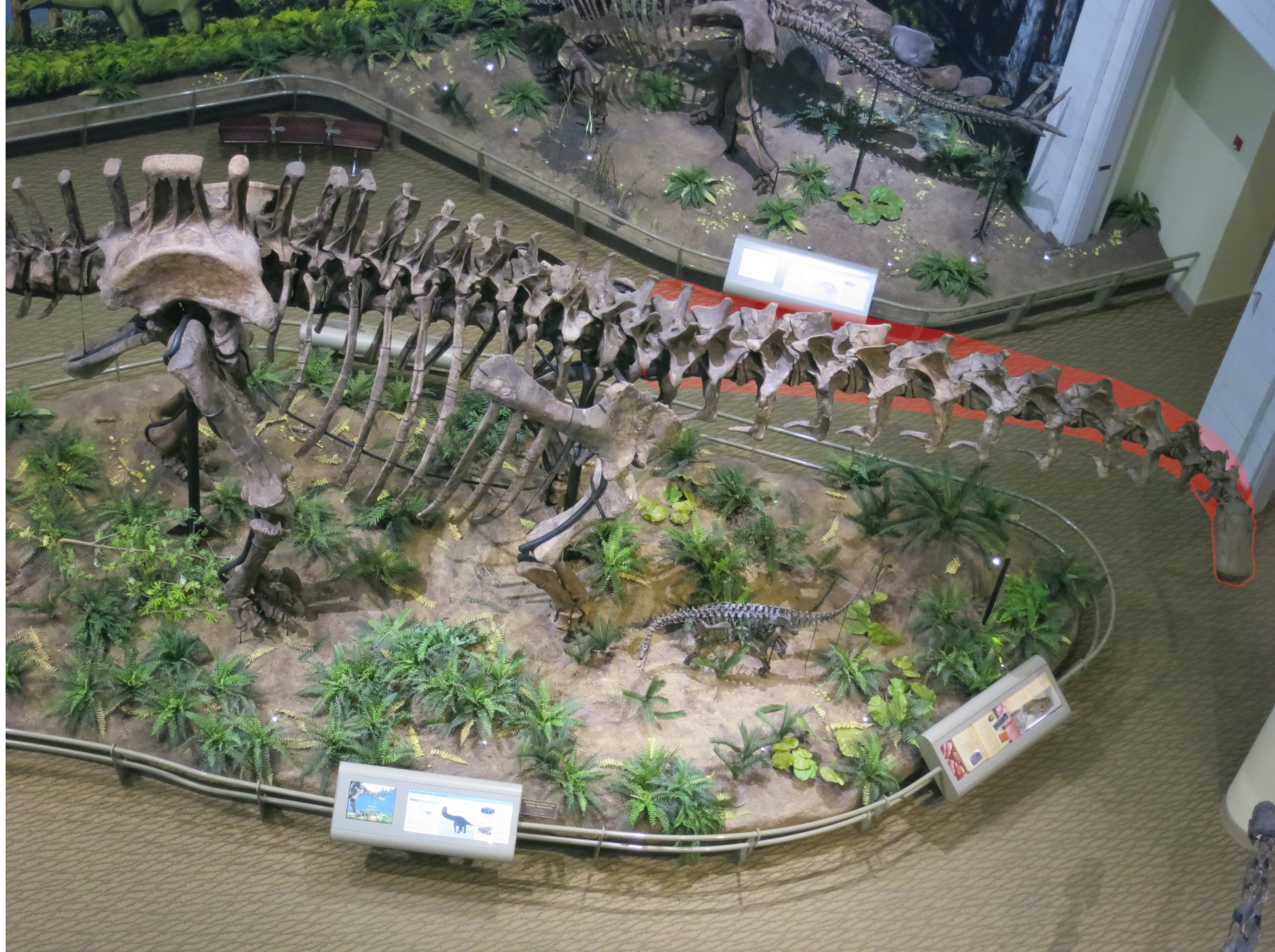
Torso mass dominates whole body mass

Fat neck



Fat neck

As shown in
most models,
illustrations.



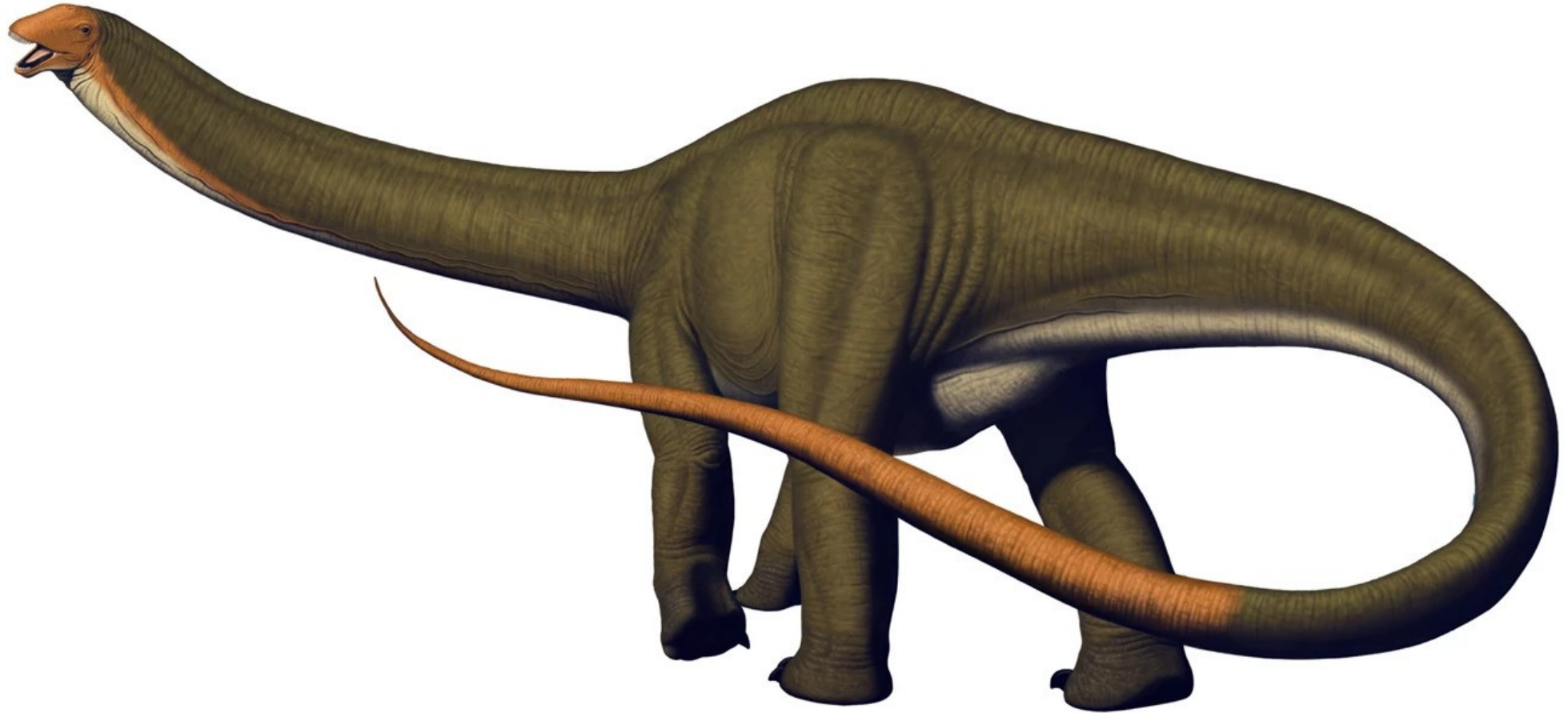
Zallinger mural at YPM



Zdeněk Burian



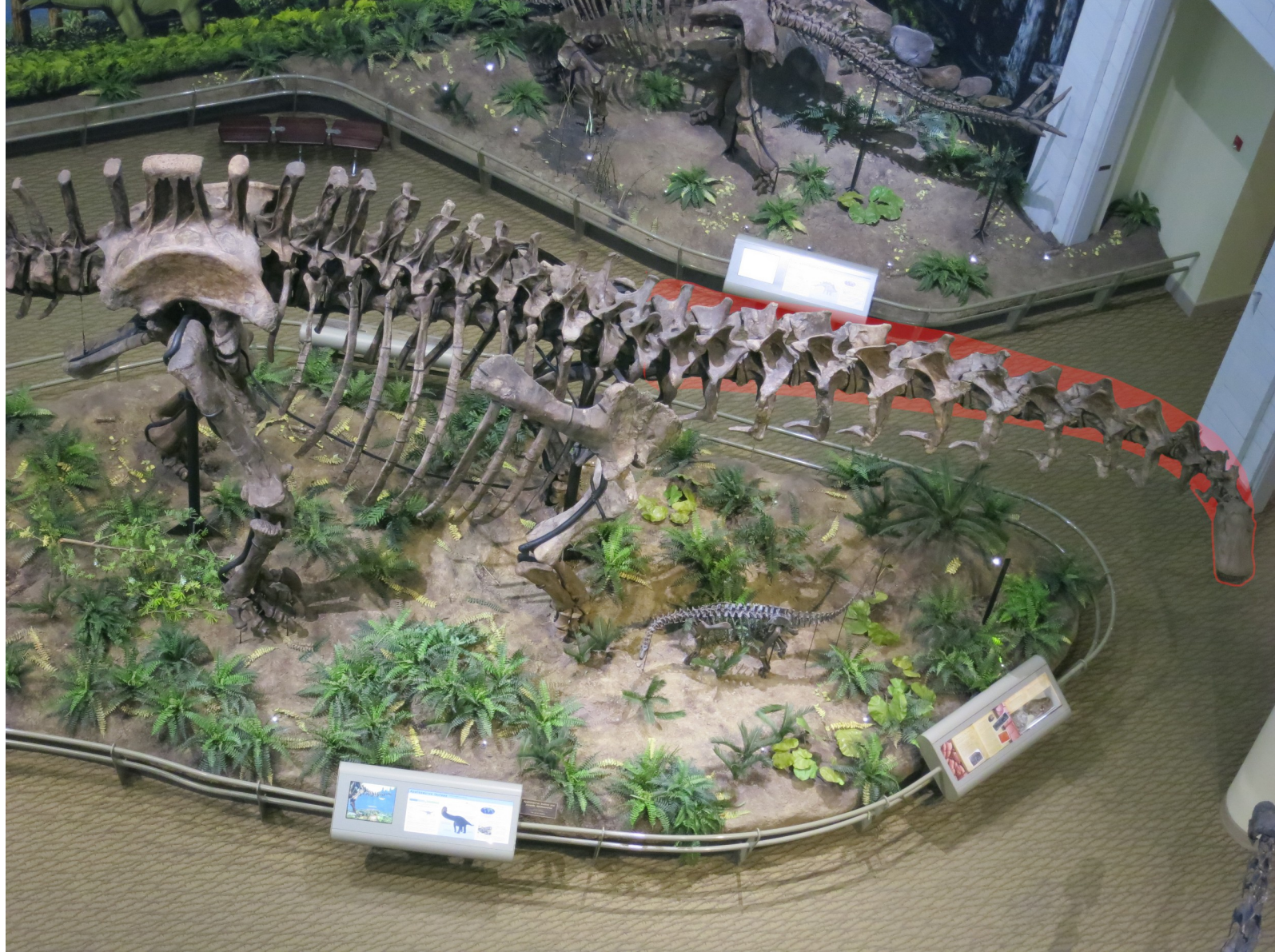
Bob and Tess Walters on NPS website



Fat neck

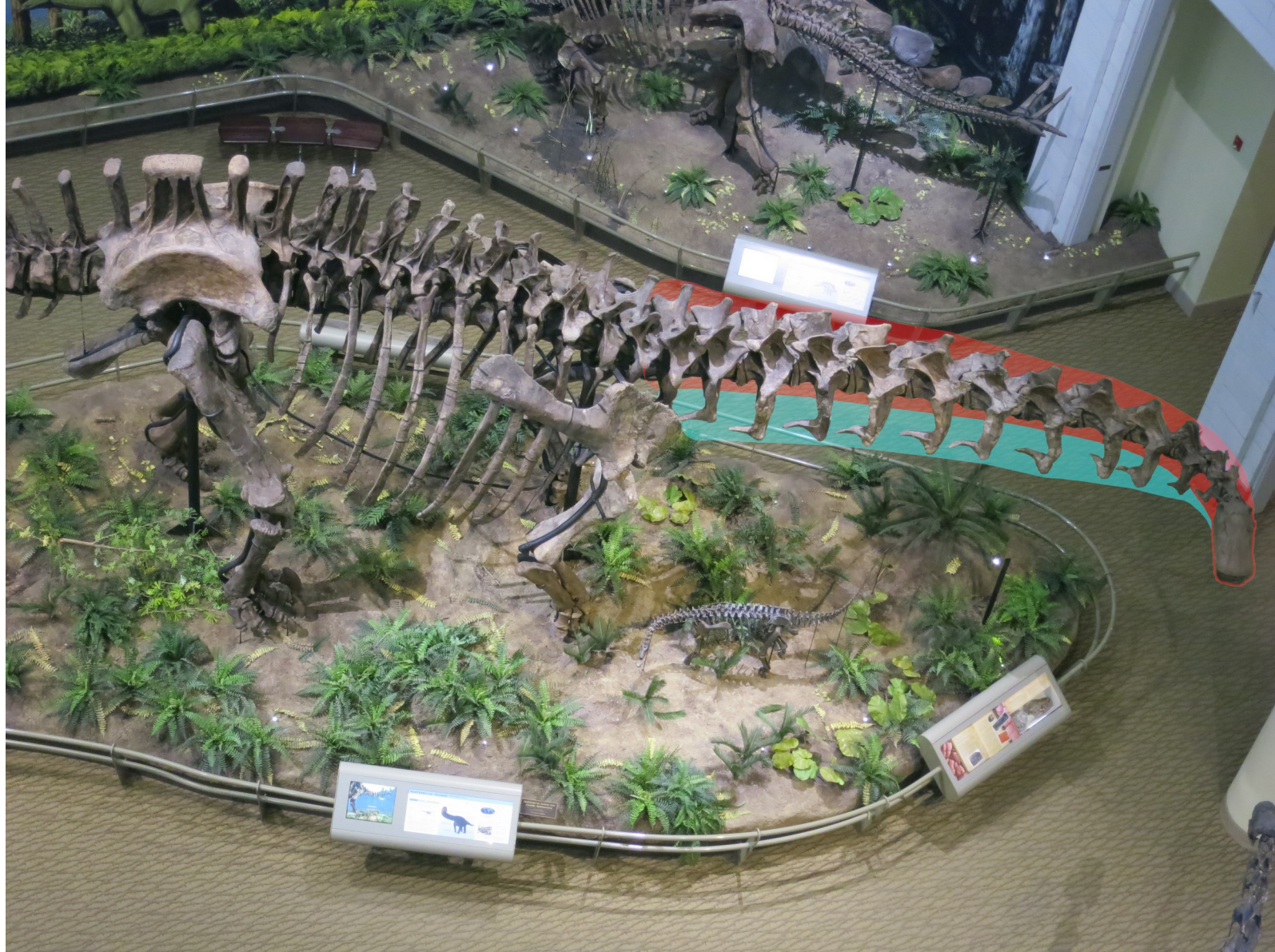
“If you can't fit the skeleton inside the model, the model is wrong.”

— Tom Holtz.



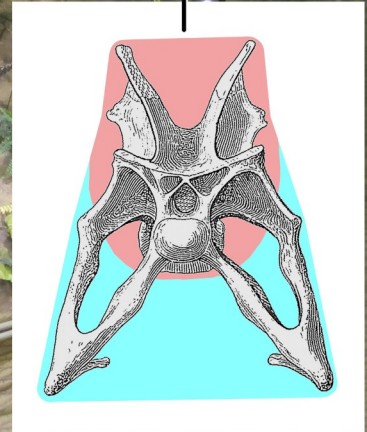
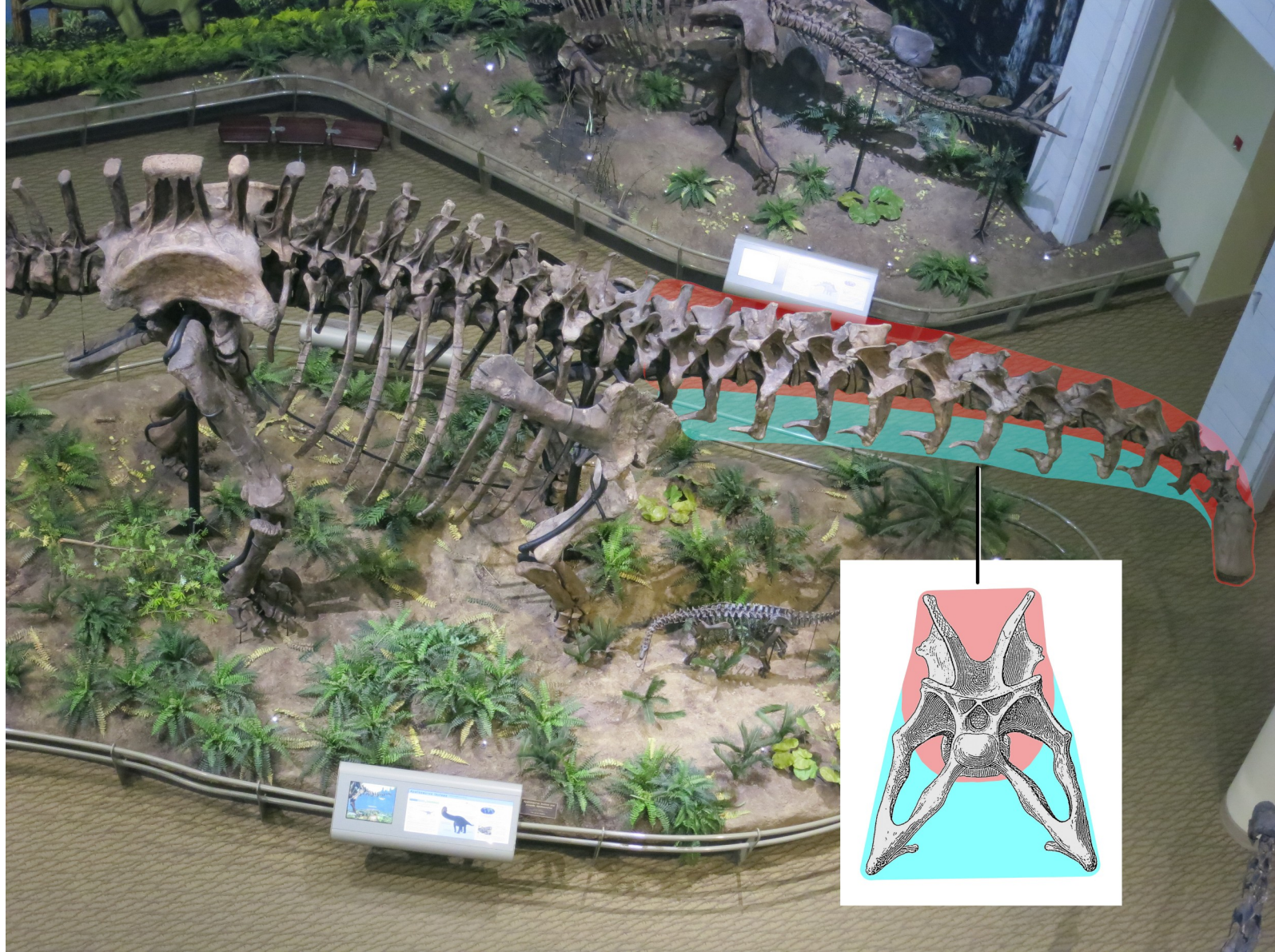
Fat neck

*Minimal
flesh envelope*



Fat neck

This neck is
weird in
cross-section



John Conway



Is *Apato* twice as heavy as *Diplo*?

Reference	Apato mass	Diplo mass	Ratio	Method
Colbert (1962)	27870	10560	2.64	Model
	32418		3.07	
Anderson et al. (1985)	35000	5000	7.00	Limb metrics
		12538	2.79	

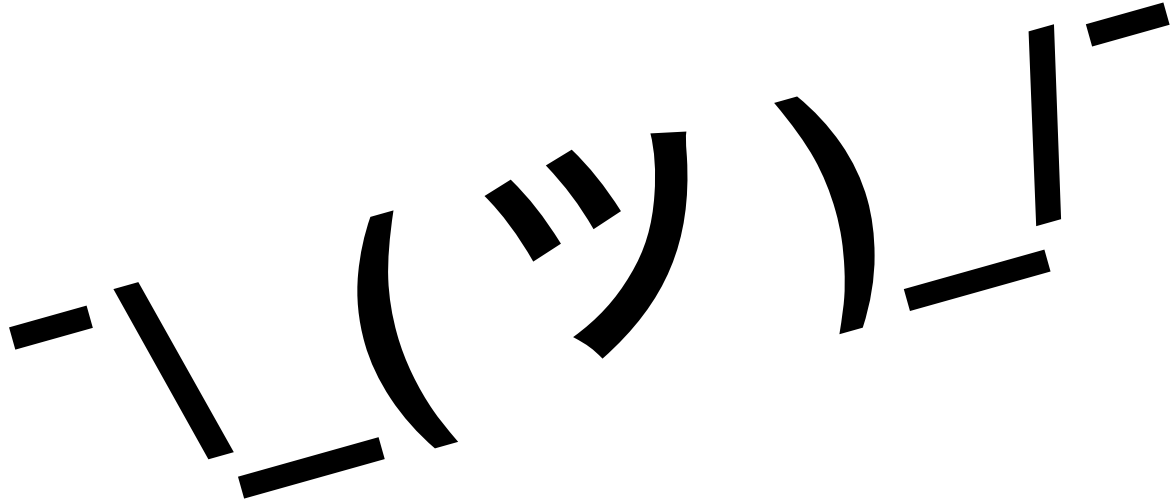
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Paul (1988)	17500	10700	1.64	Model
Christiansen (1997)	19500	15200	1.28	Model
Henderson (2003)	17273	12099	1.43	Model
Henderson (2006)	16381	11449	1.43	Model
Henderson (2013)	16400	11900	1.38	Model

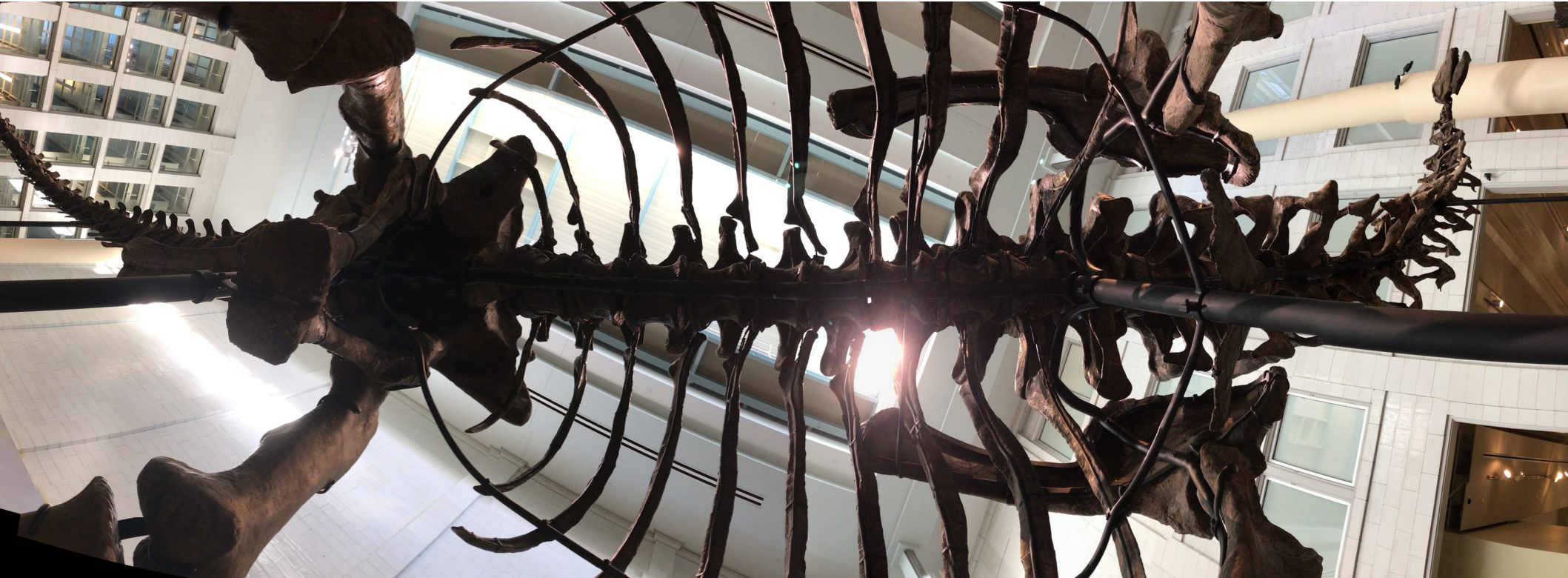
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Benson et al. (2014)	41269	13801	2.99	Limb metrics

Is *Apto* twice as heavy as *Diplo*?



Apatosaurus from below (composite)



Apatosaurus from below (composite)

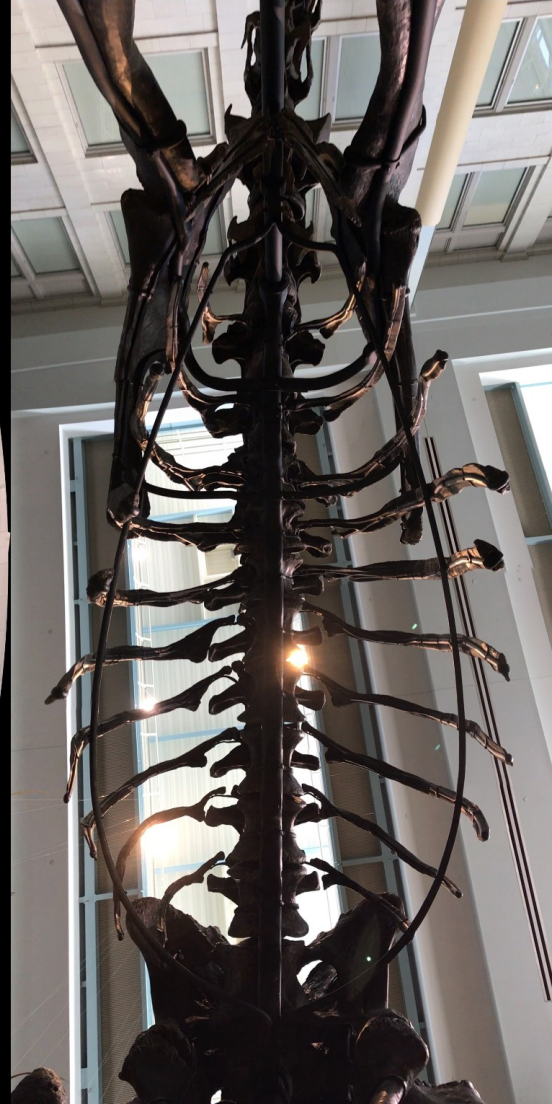




Columbian mammoth



Apatosaurus



Diplodocus



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