

# How big did *Barosaurus* get?

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Art by John Conway.





# At the American Museum of Natural History



## YOUTH

I WANT TO SEE YOU GAZE BOYS  
I WANT TO SEE YOU BRAVE AND WAG  
AND I ALSO WANT TO SEE YOU GENTLE  
AND TENDER  
BE FANCY AS WELL AS COURAGEOUS  
IN YOUR IDEALS KEEP YOUR EYES  
ON THE STARS AND KEEP YOUR FEET  
ON THE GROUND  
COURAGE HARD WORK SELF HATRED  
AND INTELLIGENT EFFORT ARE ALL  
ESSENTIAL TO A SUCCESSFUL LIFE  
CHARACTER IN THE LONG RUN  
IS THE DECISIVE FACTOR IN THE LIFE  
OF AN INDIVIDUAL AND OF NATIONS  
ALICE

THEODORE ROOSEVELT

## MANHOOD

A MAN USELESSNESS BECOMES  
UPON HIS LIVING UP TO HIS IDEALS  
INSTEAD AS HE CAN  
IT IS HARD TO TALK BUT IT  
IS WORSE NEVER TO HAVE TRIED  
TO SUCCEED  
ALL BRAVERY AND COURAGE  
ALL BORN ENDURANCE OF SUFFERING  
WEEK FOR A FINEER WORKER TYPE  
OF MANHOOD  
ONLY THOSE ARE FIT TO LIVE  
WHO DO NOT FEAR TO DIE AND NONE  
ARE FIT TO DIE WHO HAVE SHUNK  
FROM THE JOY OF LIFE AND THE  
DUTY OF LIFE  
THEODORE ROOSEVELT

MINERALS  
PEOPLE  
CORPORATE  
RESEARCH

WELCOME



# At the American Museum of Natural History





# At the Utah Museum of Natural History.



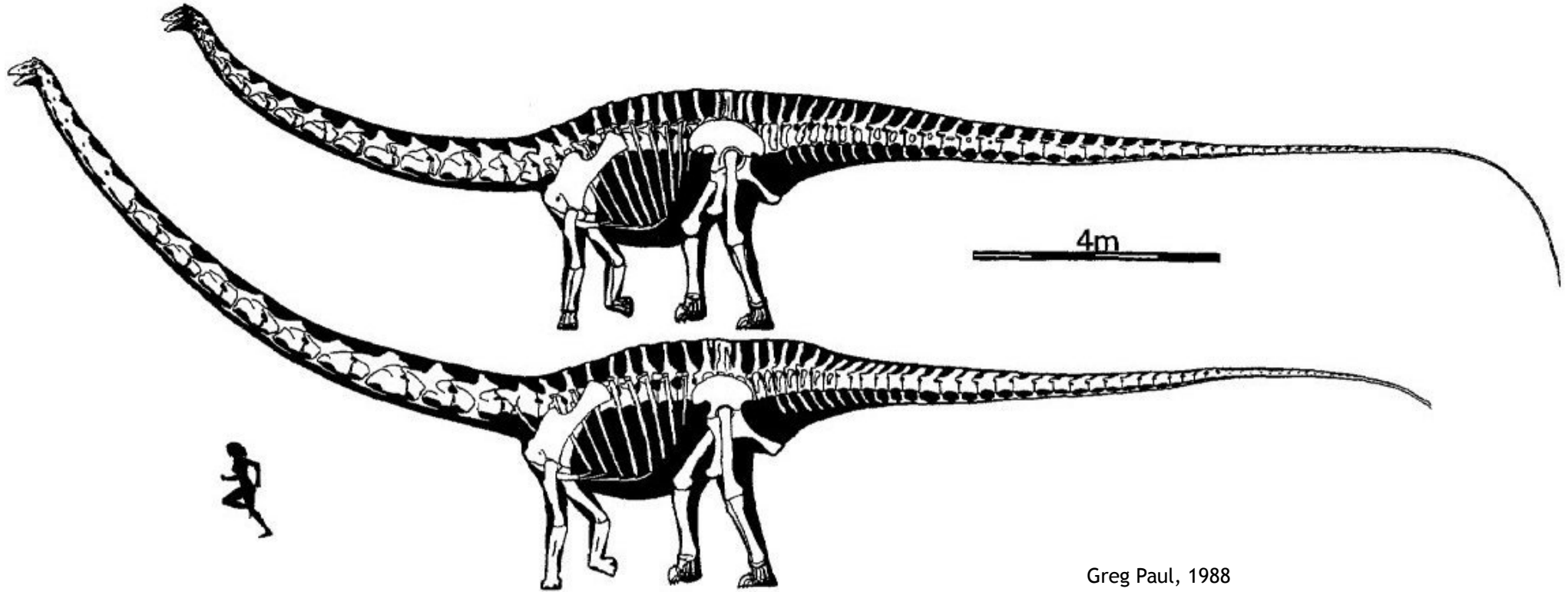


# At the Utah Museum of Natural History





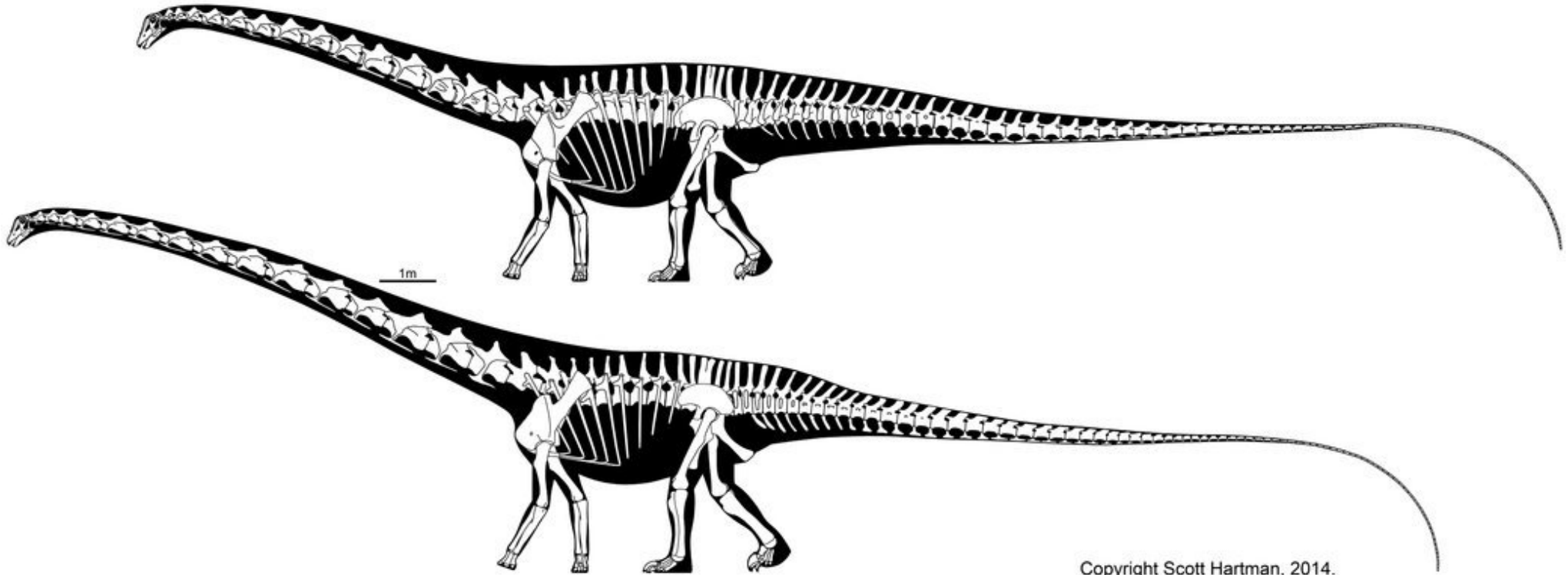
*Barosaurus*: longer neck than *Diplodocus*, otherwise broadly similar



Greg Paul, 1988



*Barosaurus*: longer neck than *Diplodocus*, otherwise broadly similar



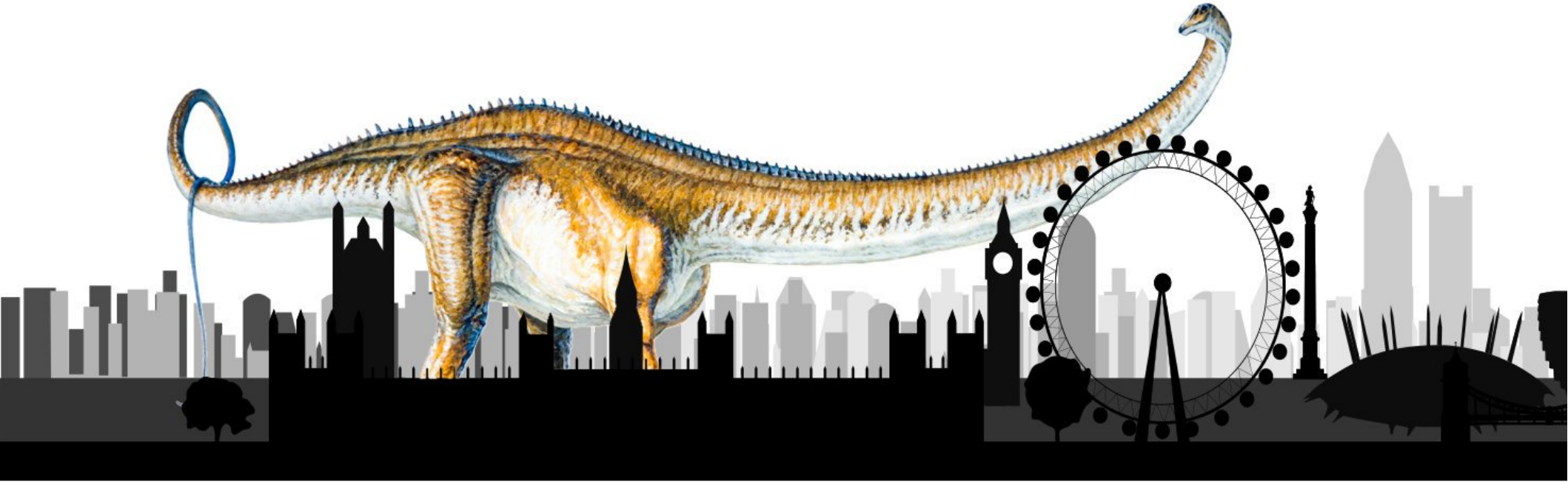


We all know what *Diplodocus* is like — disappointingly small





But did *Barosaurus* get *really* big?





Jensen's Jensen/Jensen quarry, Jensen





BYU field  
jacket 3GR,  
excavated  
1966 from  
Jensen/Jensen



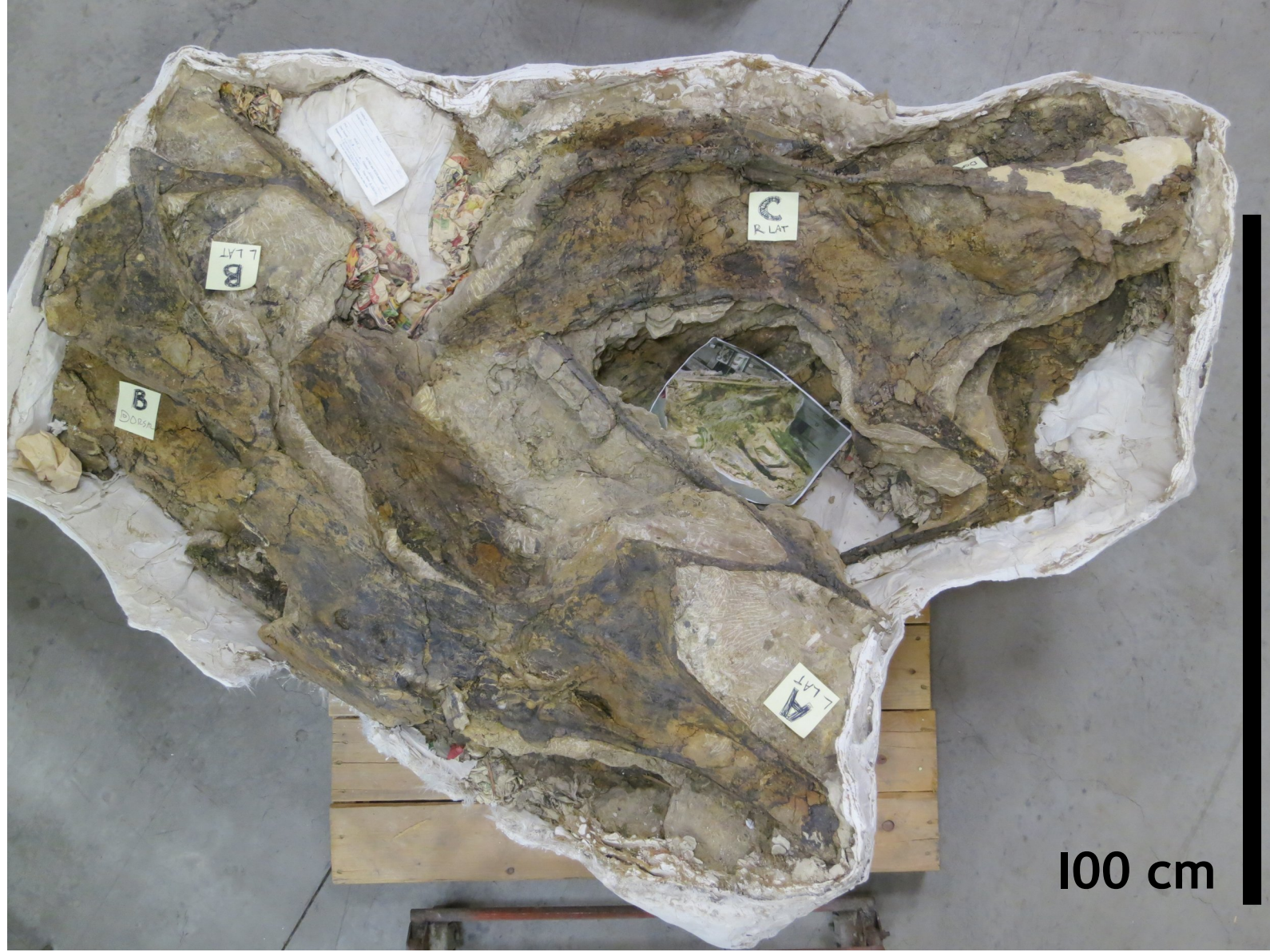


BYU field  
jacket 3GR,  
excavated  
1966 from  
Jensen/Jensen





Contains three  
?consecutive  
*Barosaurus*  
cervicals,  
designated  
A, B and C.



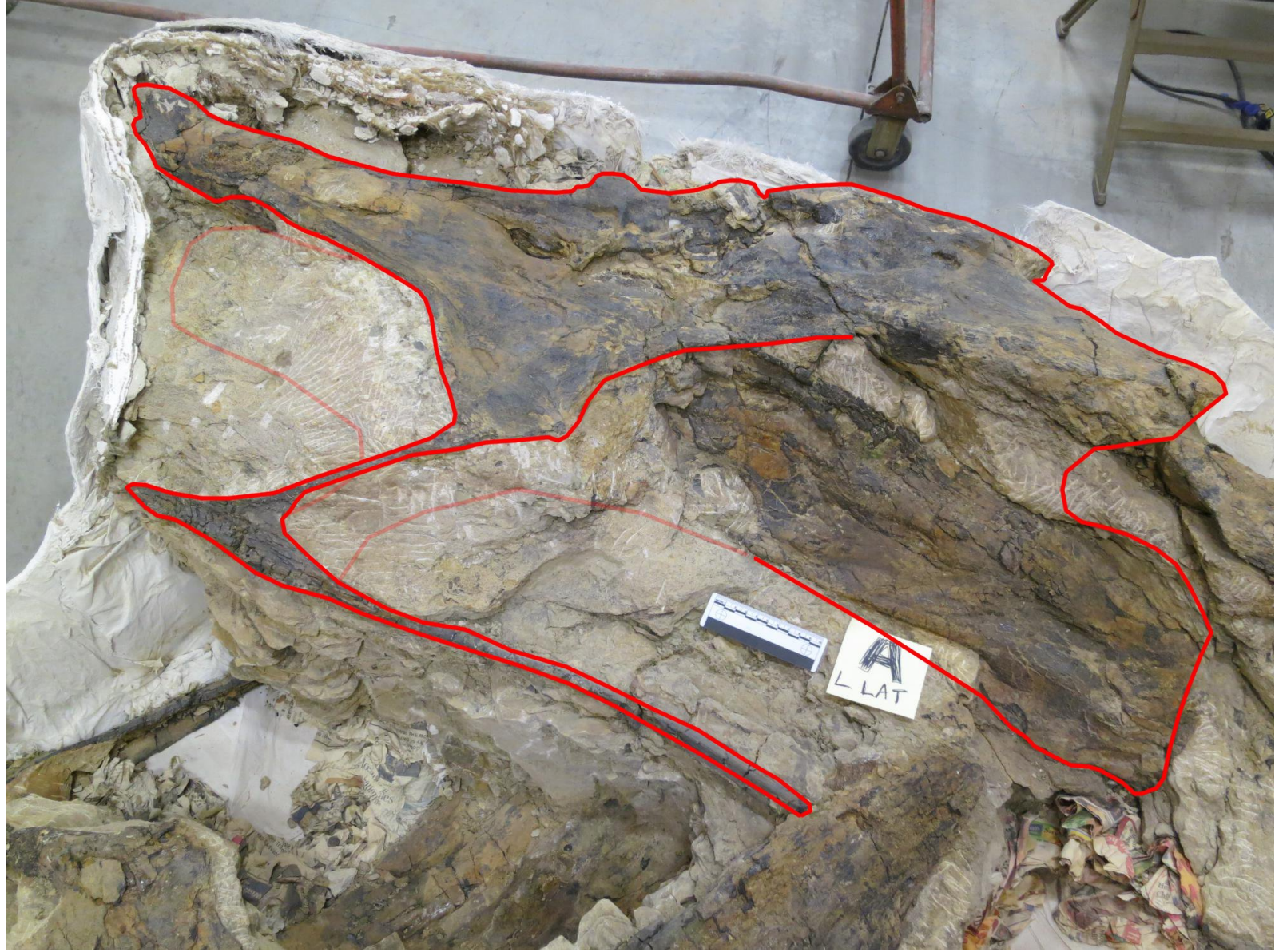


*Barosaurus*  
cervical A,  
left lateral





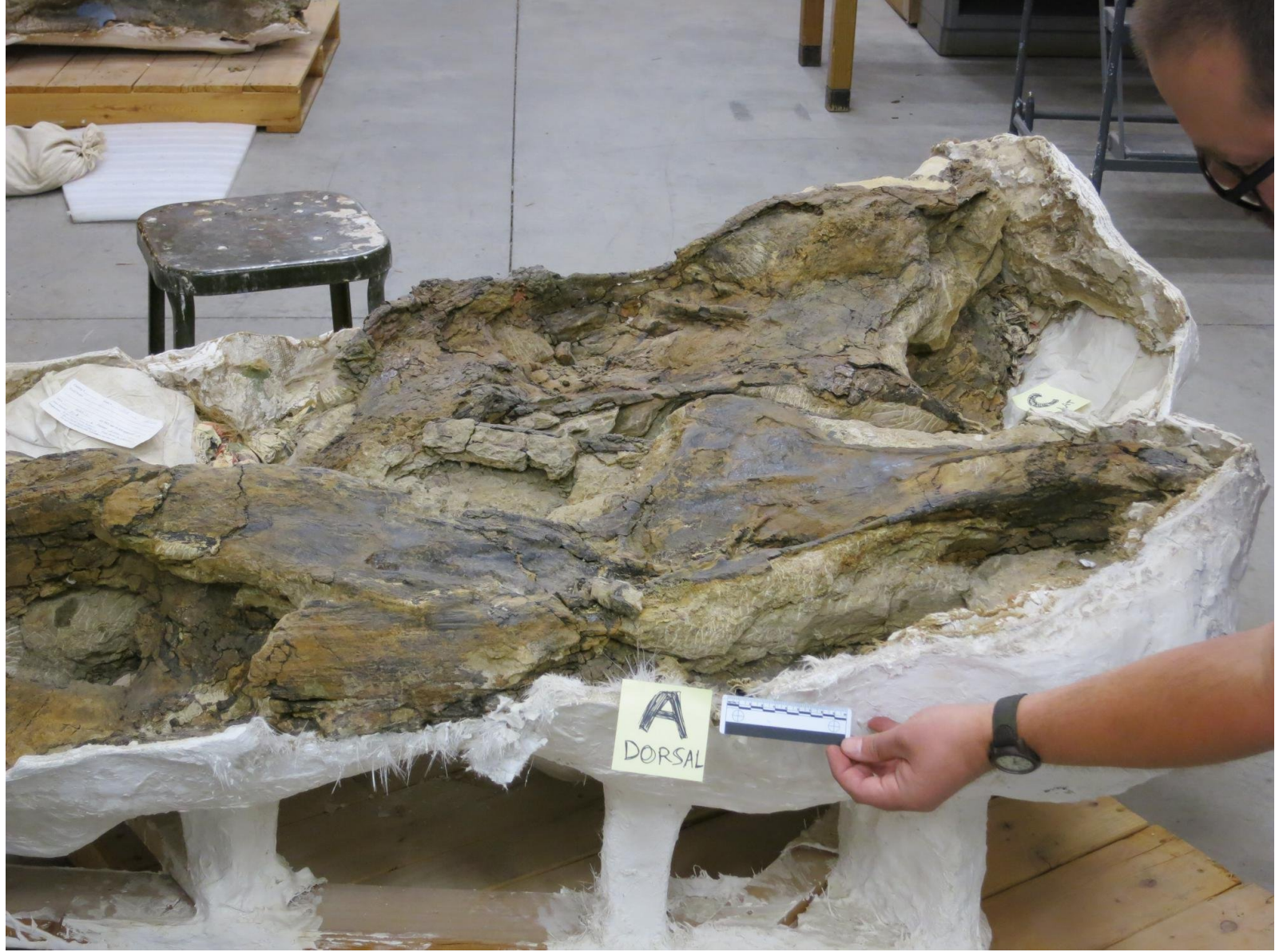
*Barosaurus*  
cervical A,  
left lateral





*Barosaurus*  
cervical A,  
dorsal view

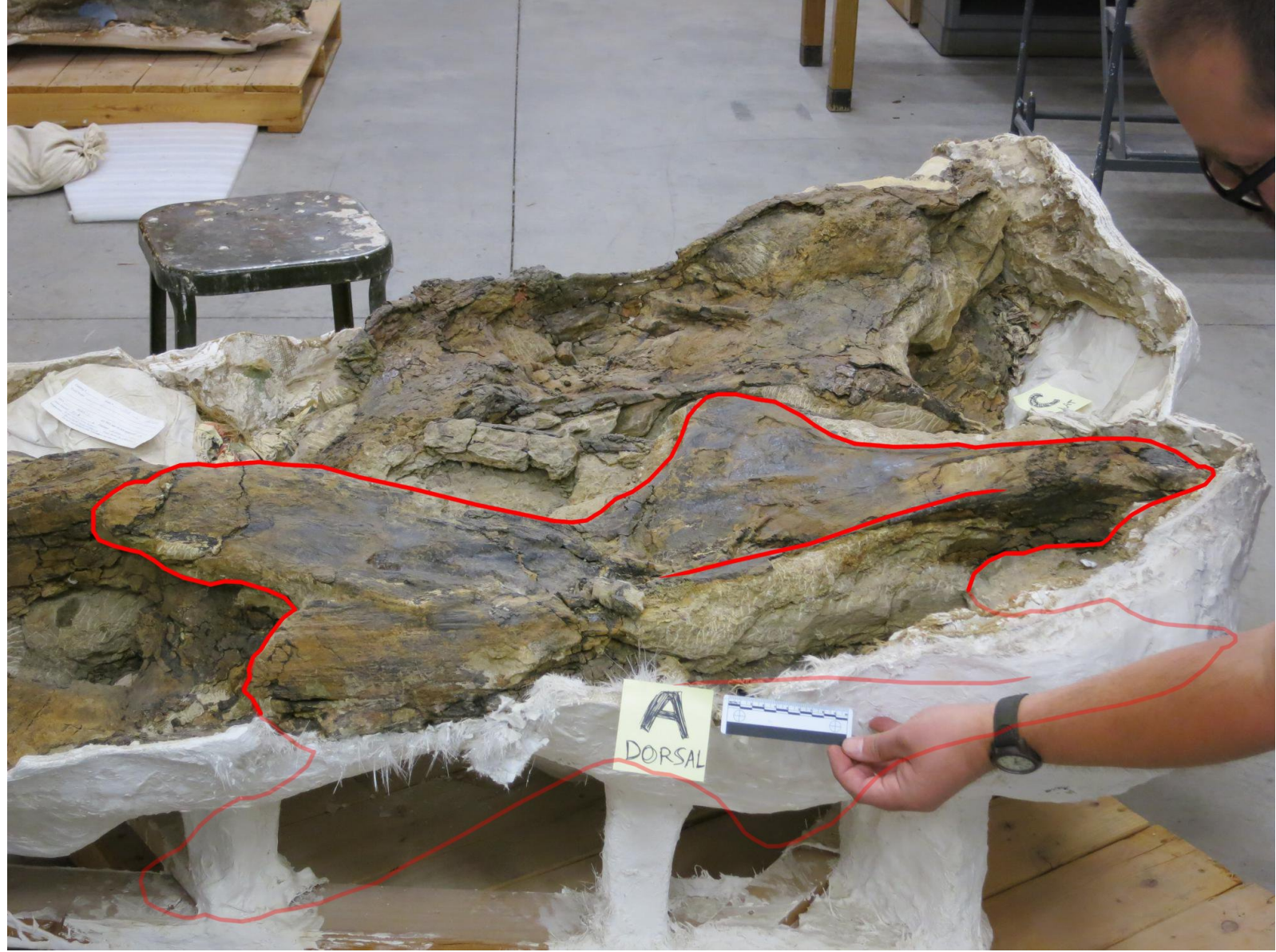
(anterior to  
right)





*Barosaurus*  
cervical A,  
dorsal view

(anterior to  
right)



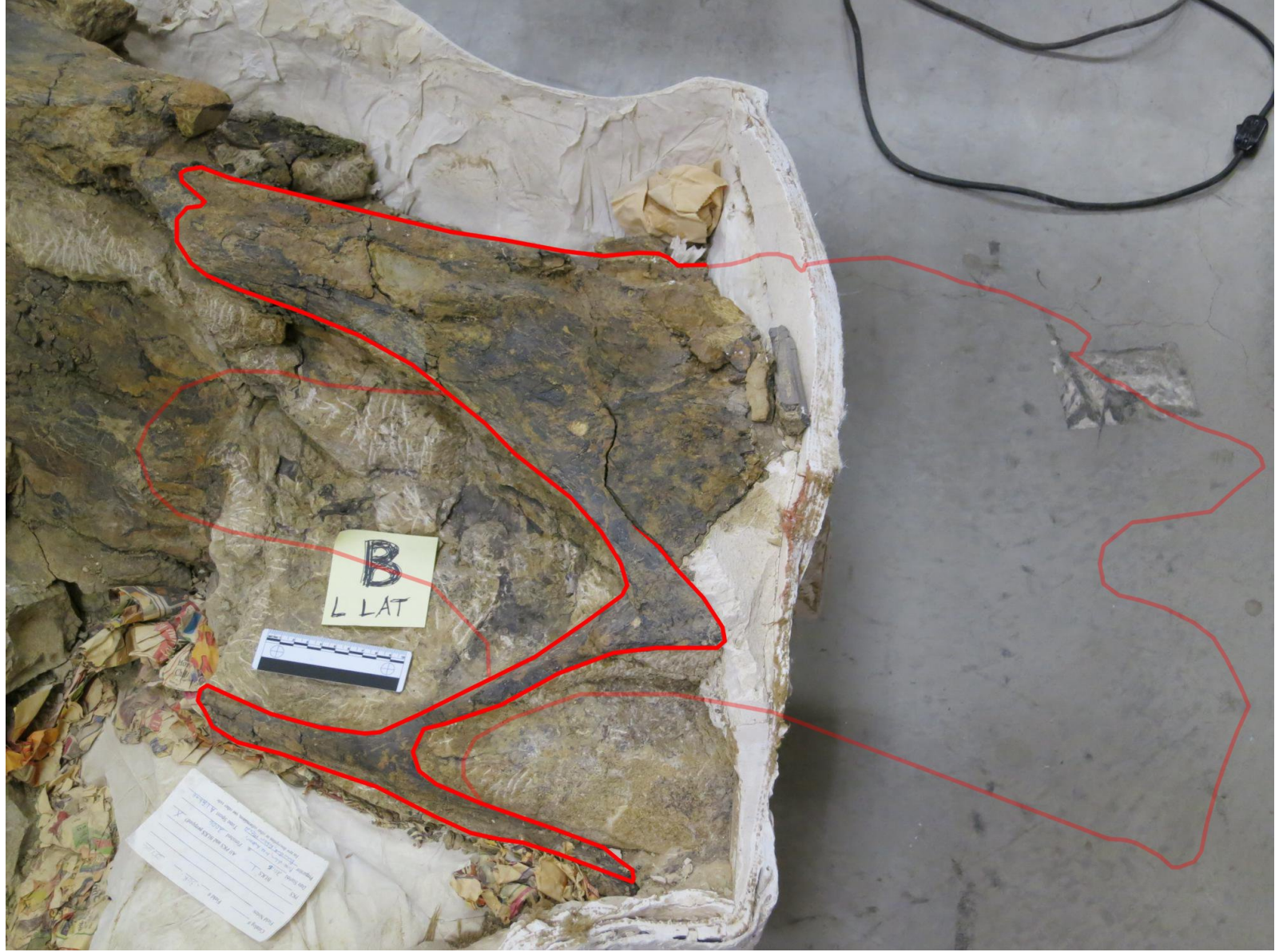


*Barosaurus*  
cervical B,  
left lateral





*Barosaurus*  
cervical B,  
left lateral





*Barosaurus*  
cervical B,  
dorsal view

(anterior to  
right)





*Barosaurus*  
cervical B,  
dorsal view

(anterior to  
right)



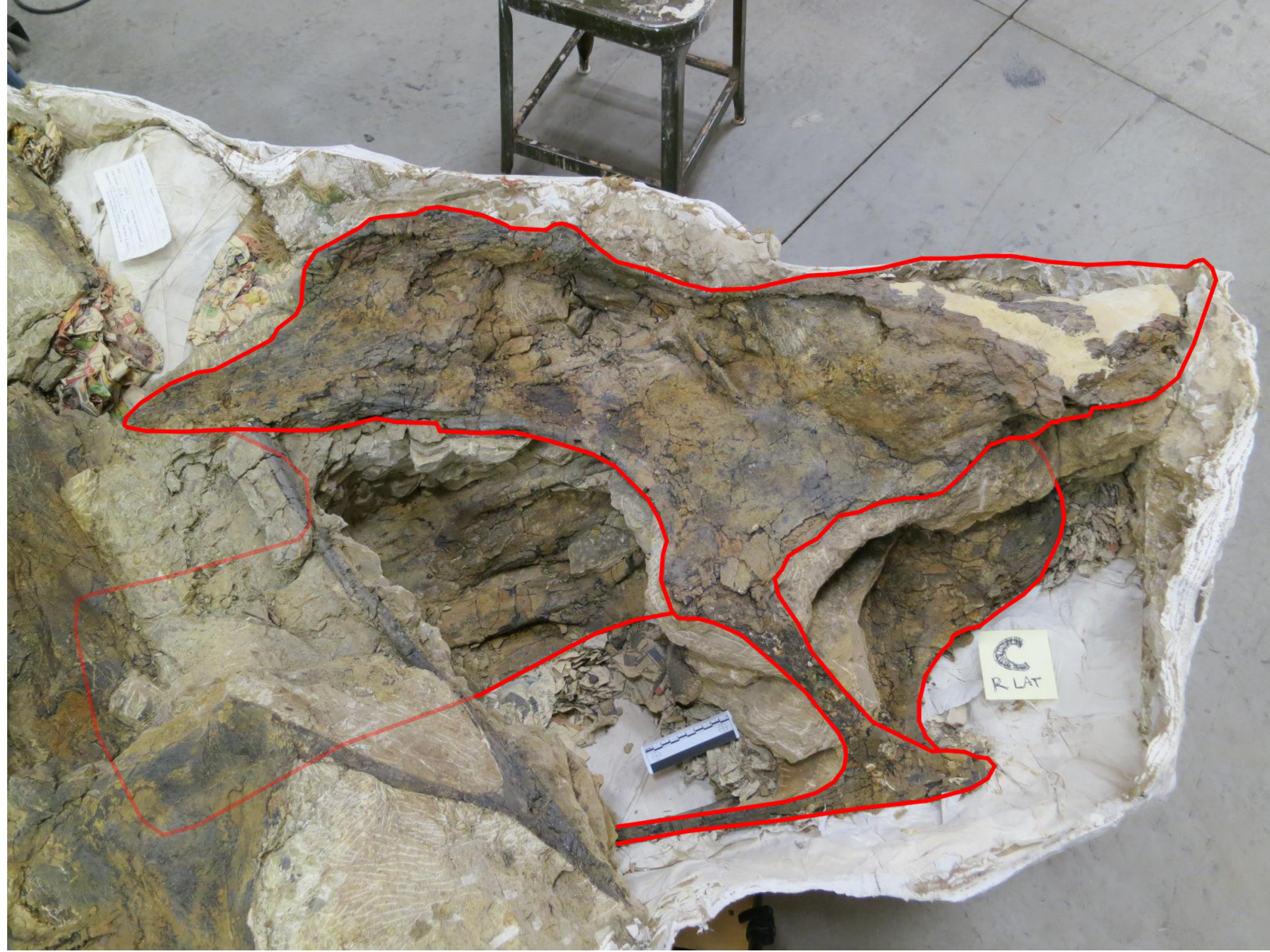


*Barosaurus*  
cervical C,  
right lateral





*Barosaurus*  
cervical C,  
right lateral





*Barosaurus*  
cervical C,  
dorsal view

(anterior to left)





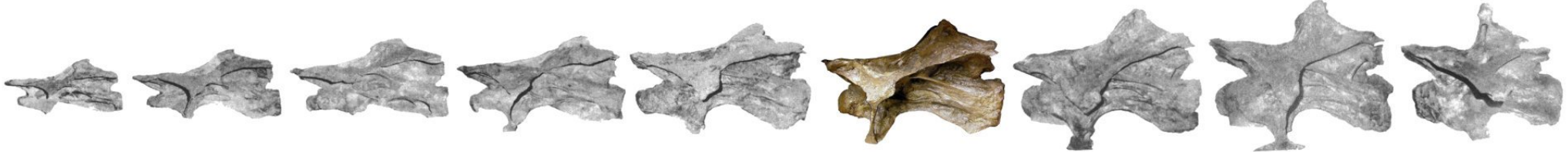
*Barosaurus*  
cervical C,  
dorsal view

(anterior to left)



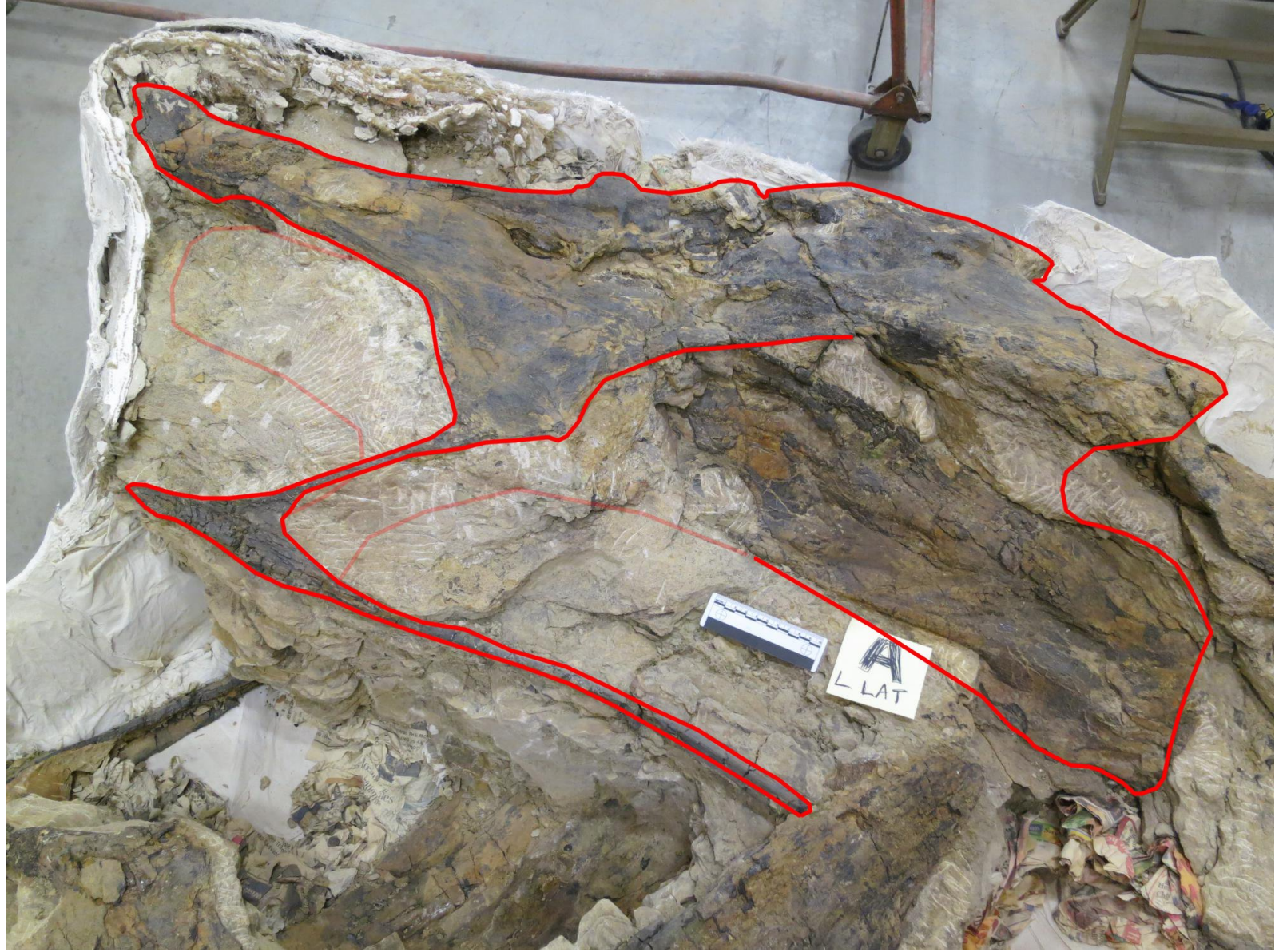


Why do we think  
this is *Barosaurus*?



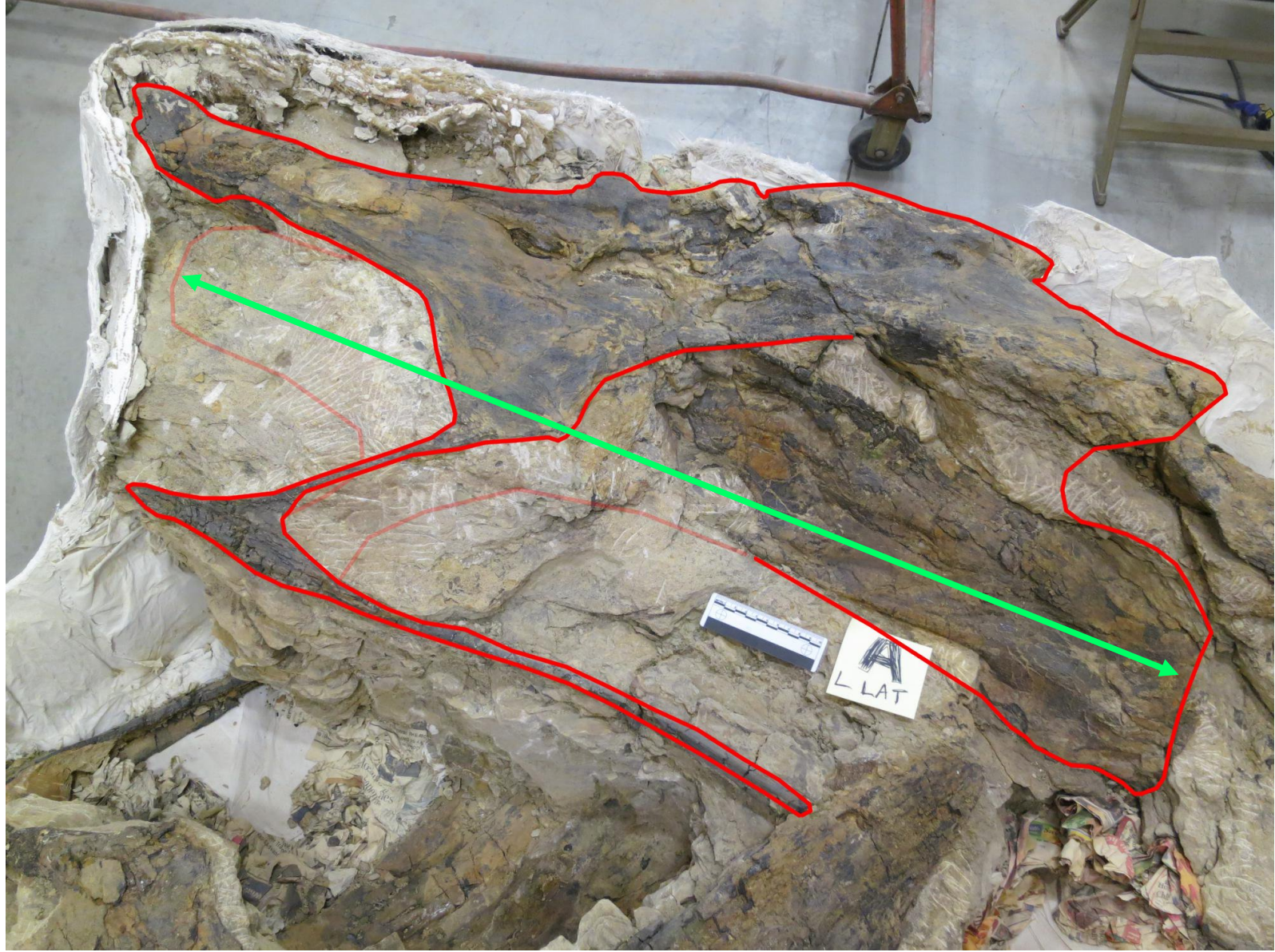


*Barosaurus*  
cervical A,  
left lateral



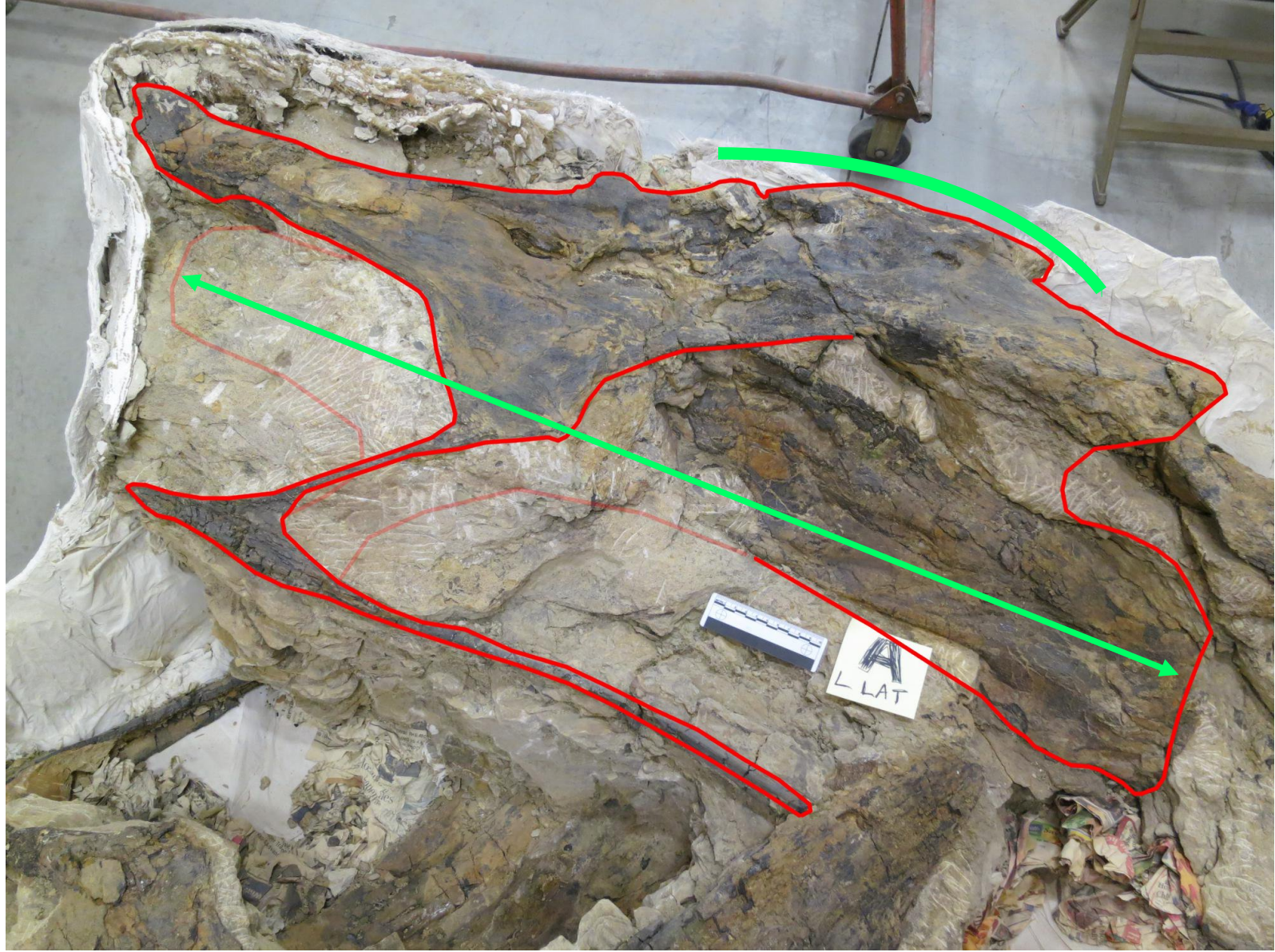


*Barosaurus*  
cervical A,  
left lateral



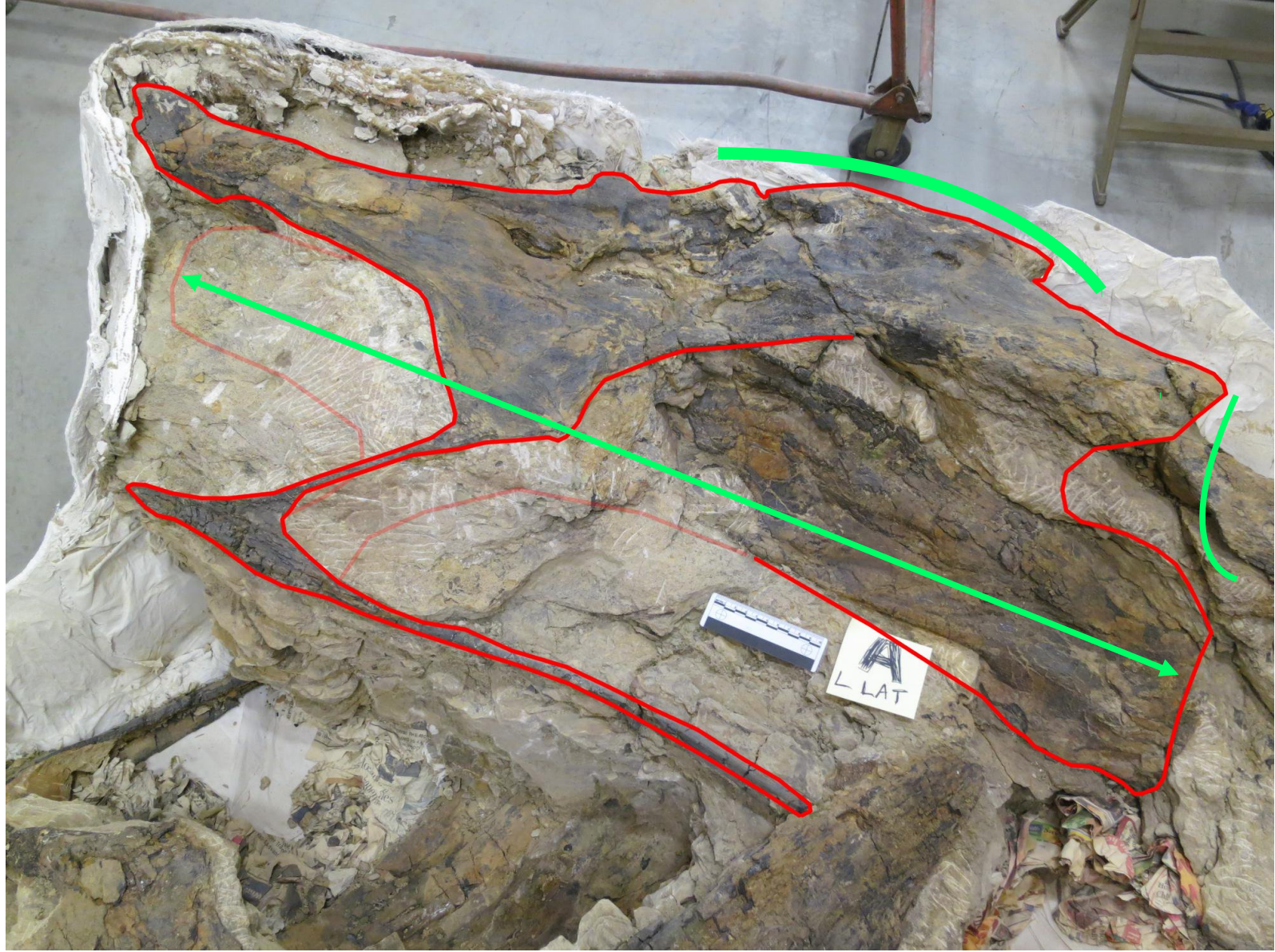


*Barosaurus*  
cervical A,  
left lateral



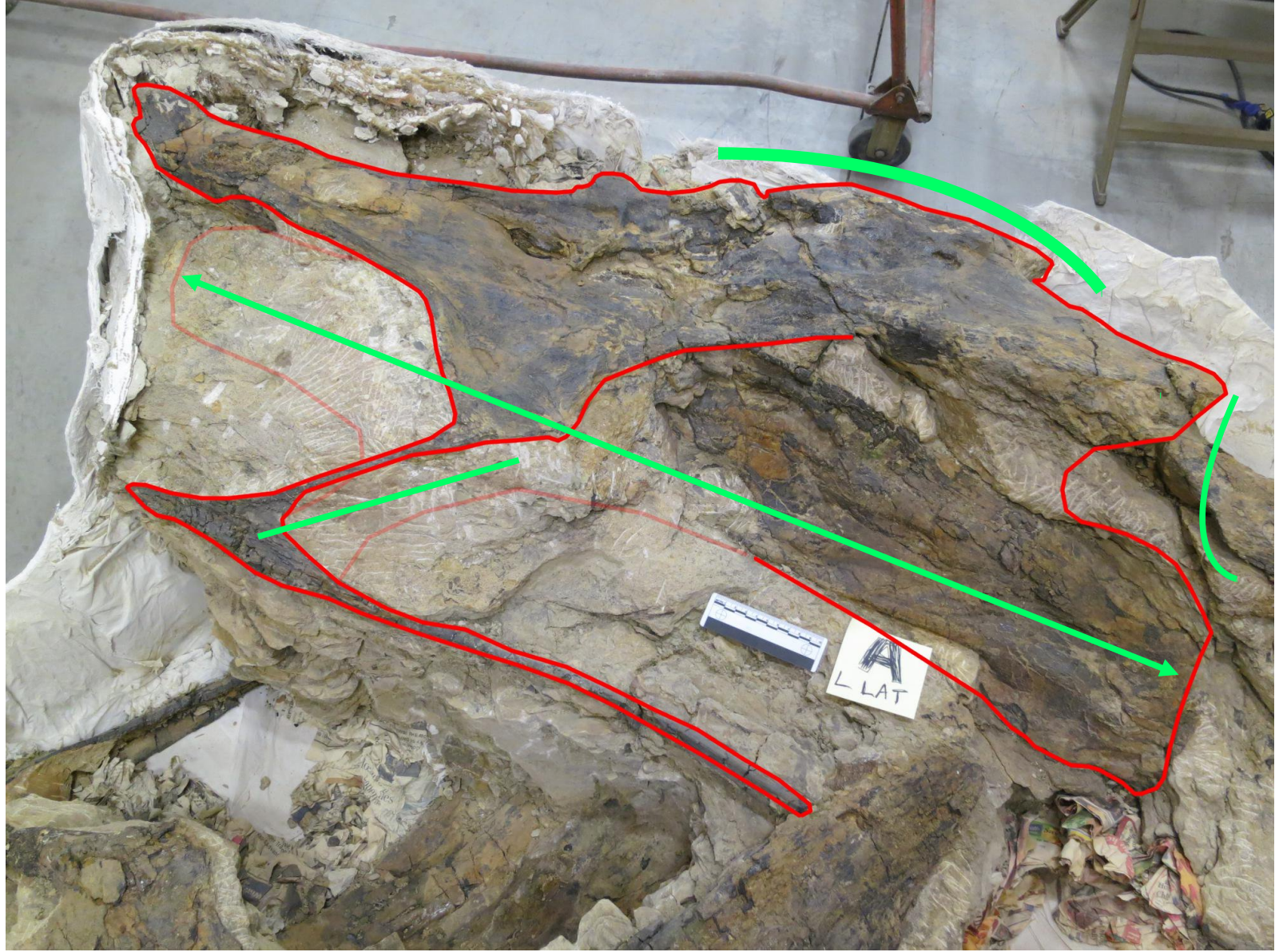


*Barosaurus*  
cervical A,  
left lateral



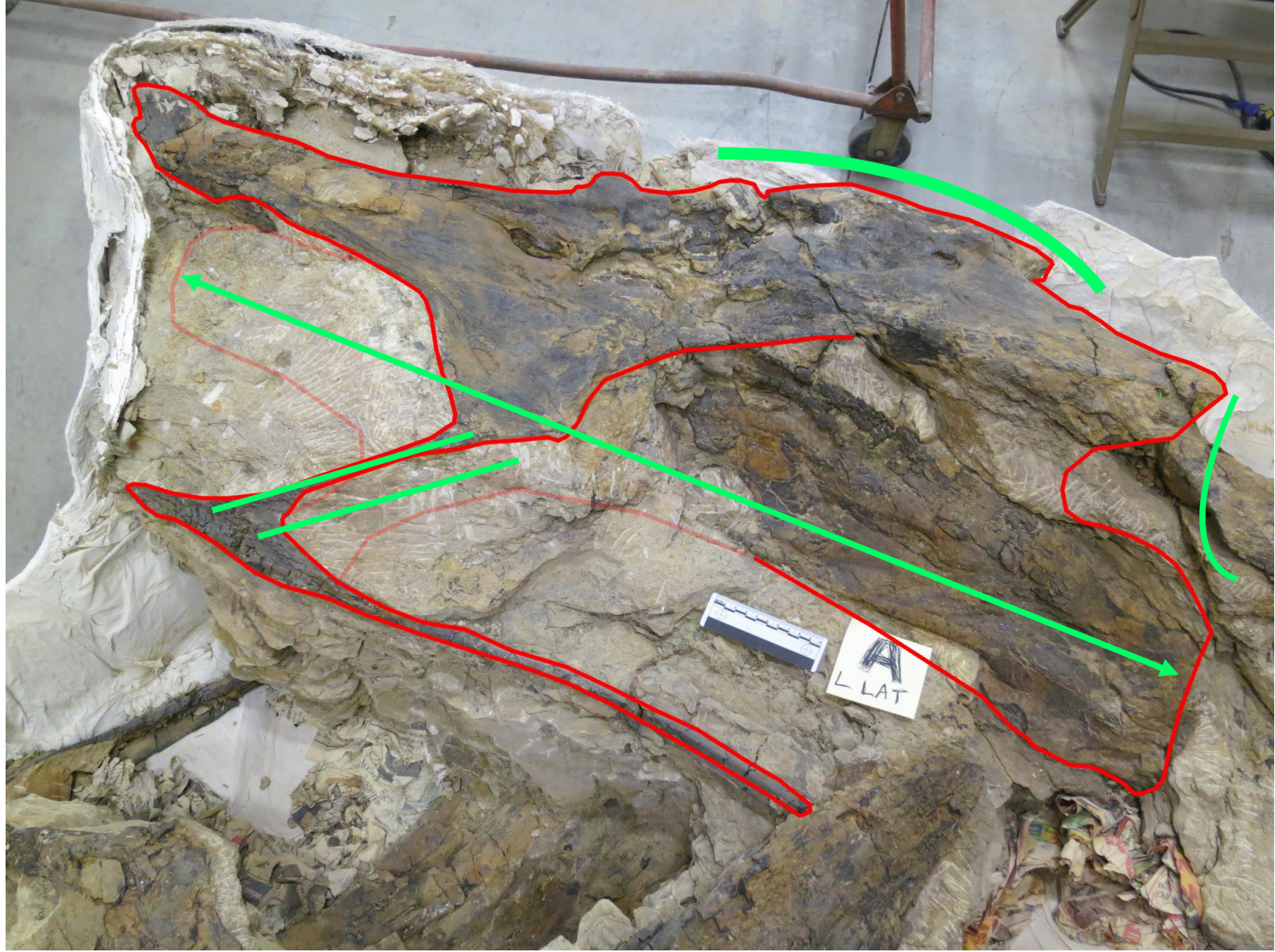


*Barosaurus*  
cervical A,  
left lateral



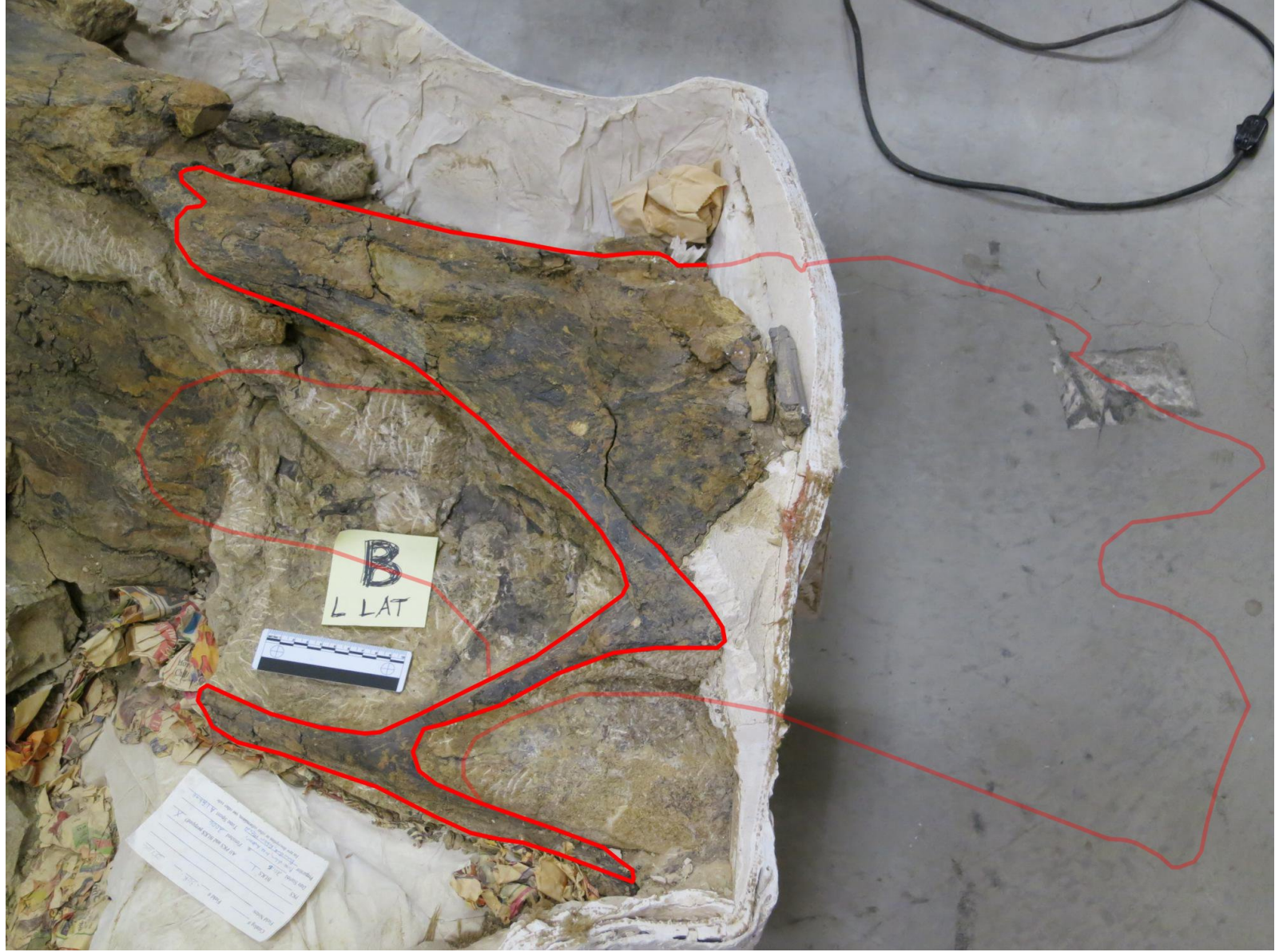


*Barosaurus*  
cervical A,  
left lateral



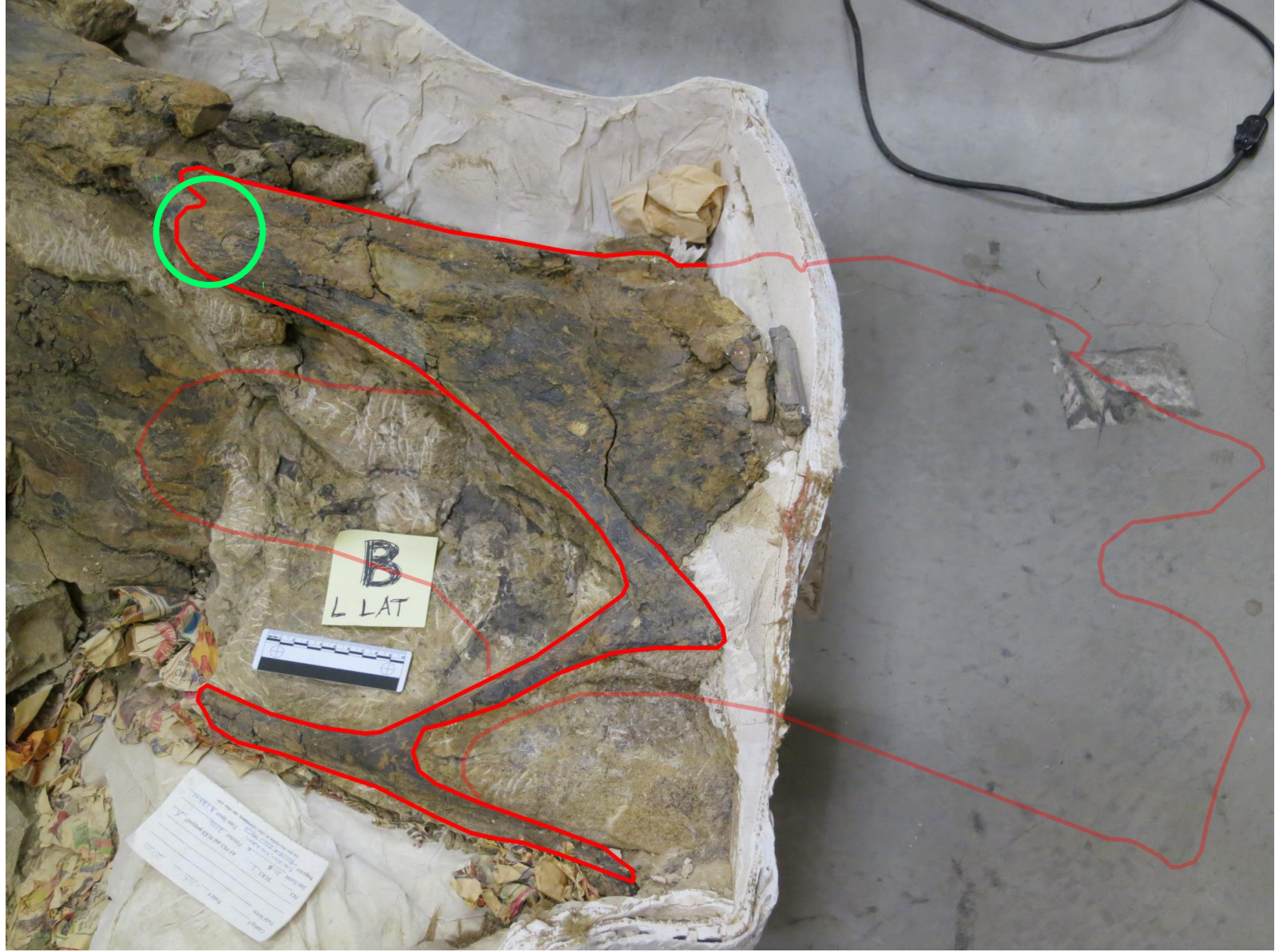


*Barosaurus*  
cervical B,  
left lateral





*Barosaurus*  
cervical B,  
left lateral





*Barosaurus*  
Holotype  
YPM 429,  
Cervical R

“thumb  
groove”





*Barosaurus*  
nice example  
of thumb-slot.

Privately owned  
specimen at  
NAMAL ...

Access courtesy  
Western Paleo Labs





Privately owned  
specimen at  
NAMAL ...

... Not like the nice  
specimen at AMNH  
which is always  
available to  
researchers.





*Barosaurus*  
cervical B,  
dorsal view

(anterior to  
right)





*Barosaurus*  
cervical B,  
dorsal view

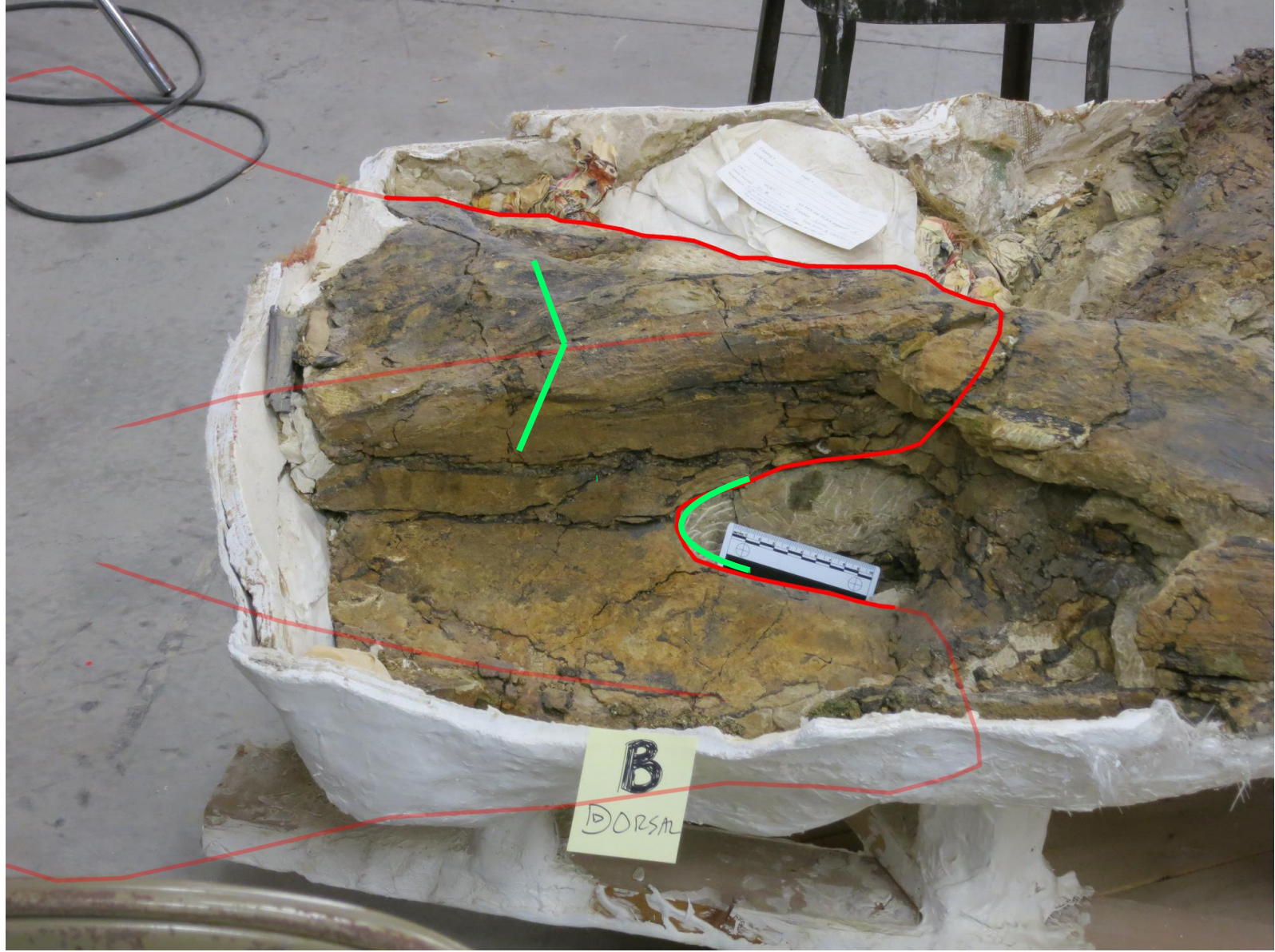
(anterior to  
right)





*Barosaurus*  
cervical B,  
dorsal view

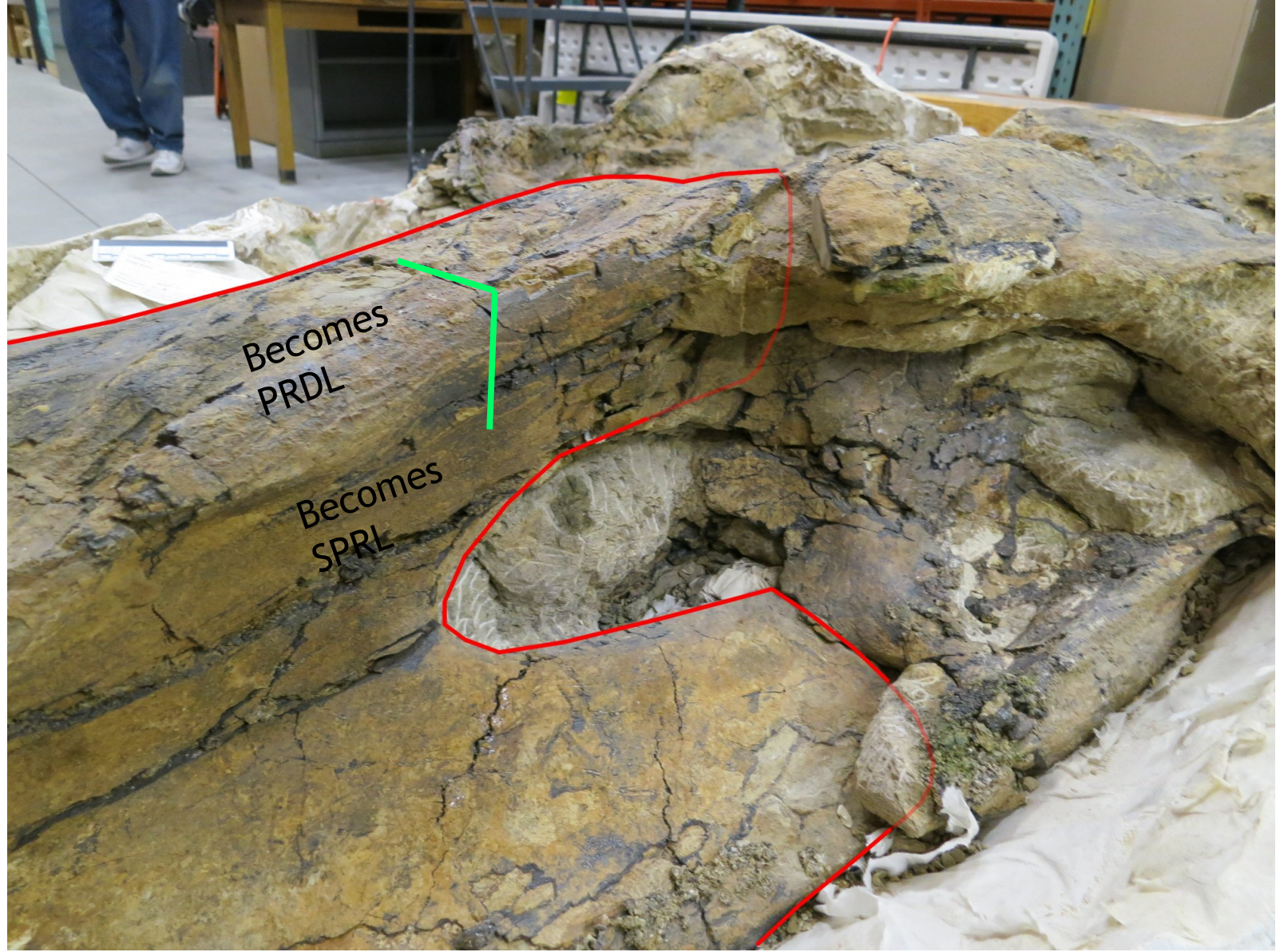
(anterior to  
right)





# *Barosaurus* cervical B, dorsal view

(anterior to  
right)





*Barosaurus*  
nice example  
of “hinges”.

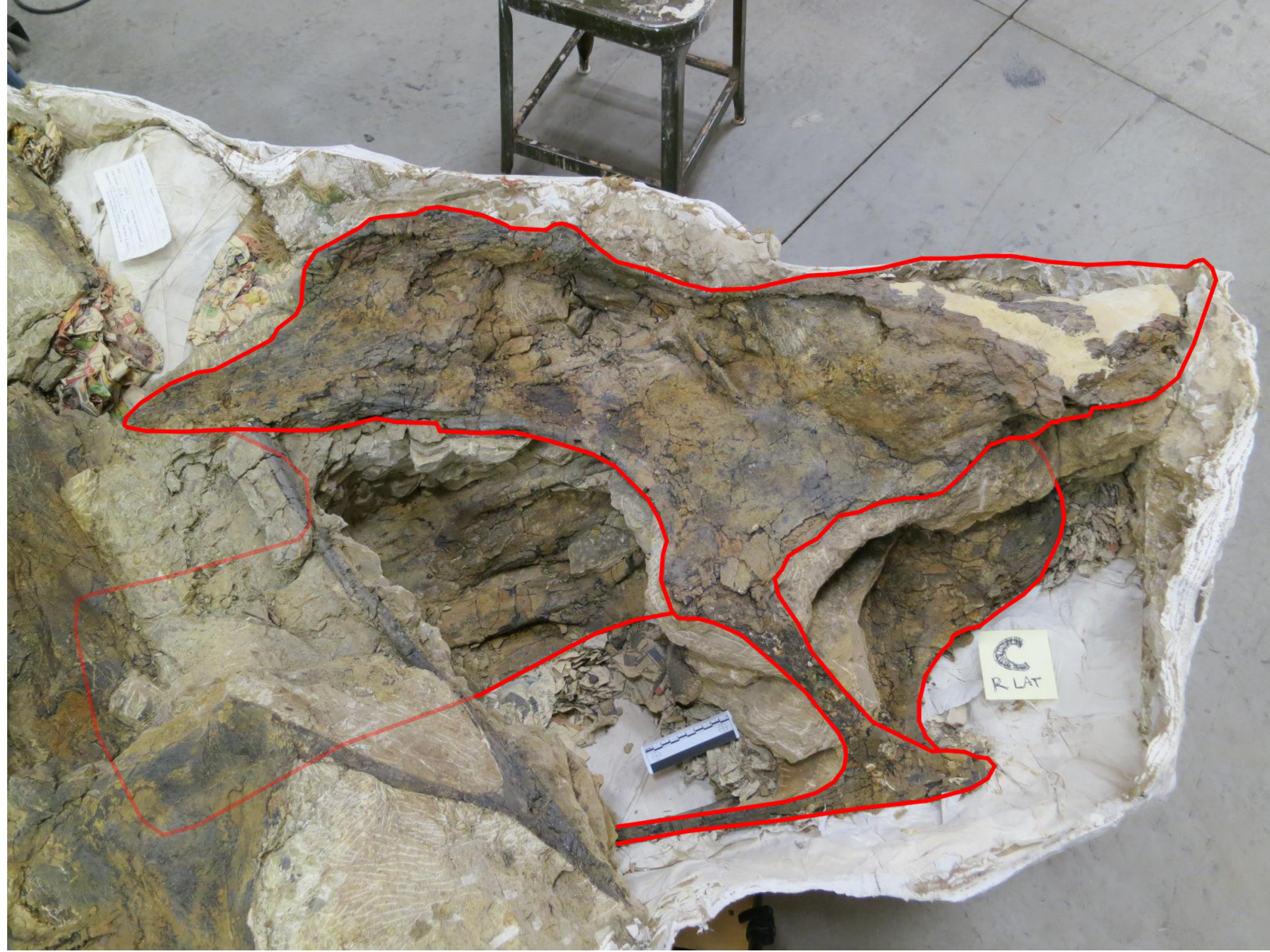
Privately owned  
specimen at  
NAMAL.

Access courtesy  
Western Paleo Labs



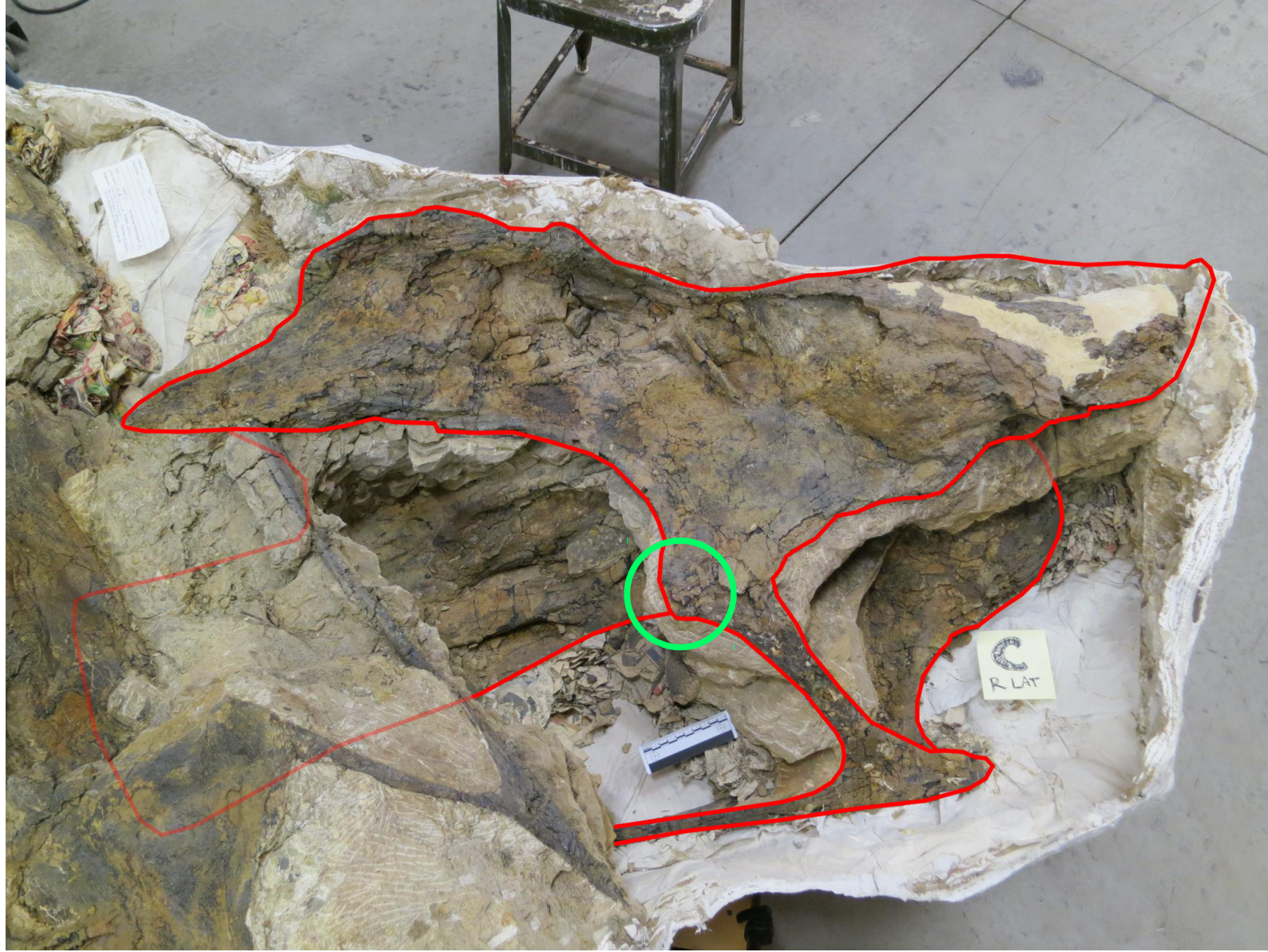


*Barosaurus*  
cervical C,  
right lateral





*Barosaurus*  
cervical C,  
right lateral





*Barosaurus*  
cervical C,  
dorsal view

(anterior to left)





*Barosaurus*  
cervical C,  
dorsal view

(anterior to left)





*Barosaurus*  
cervical C,  
dorsal view

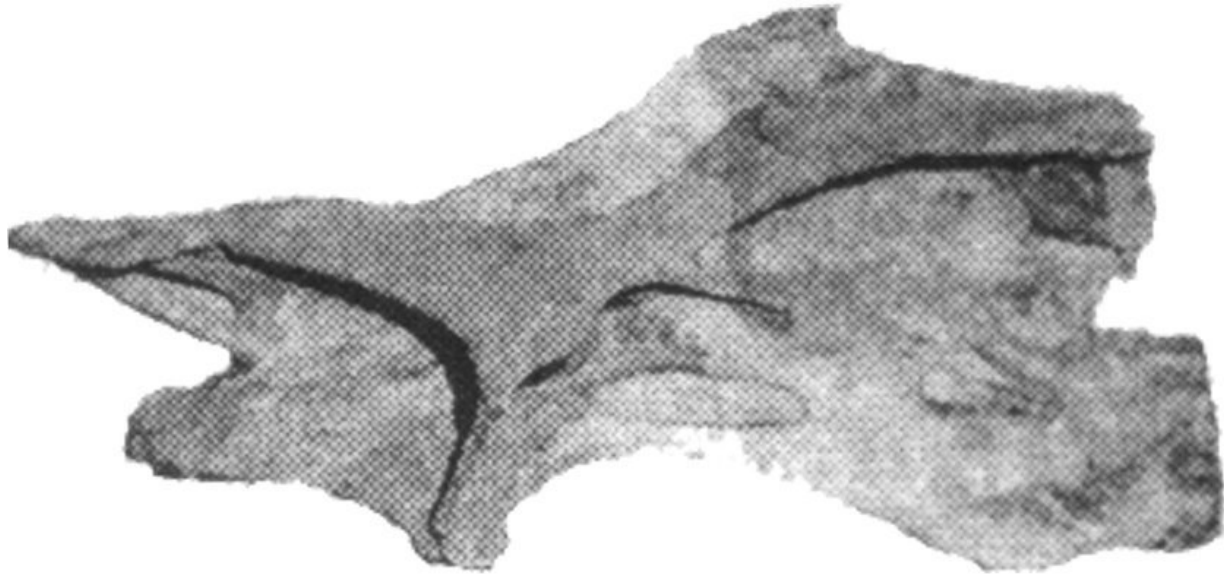
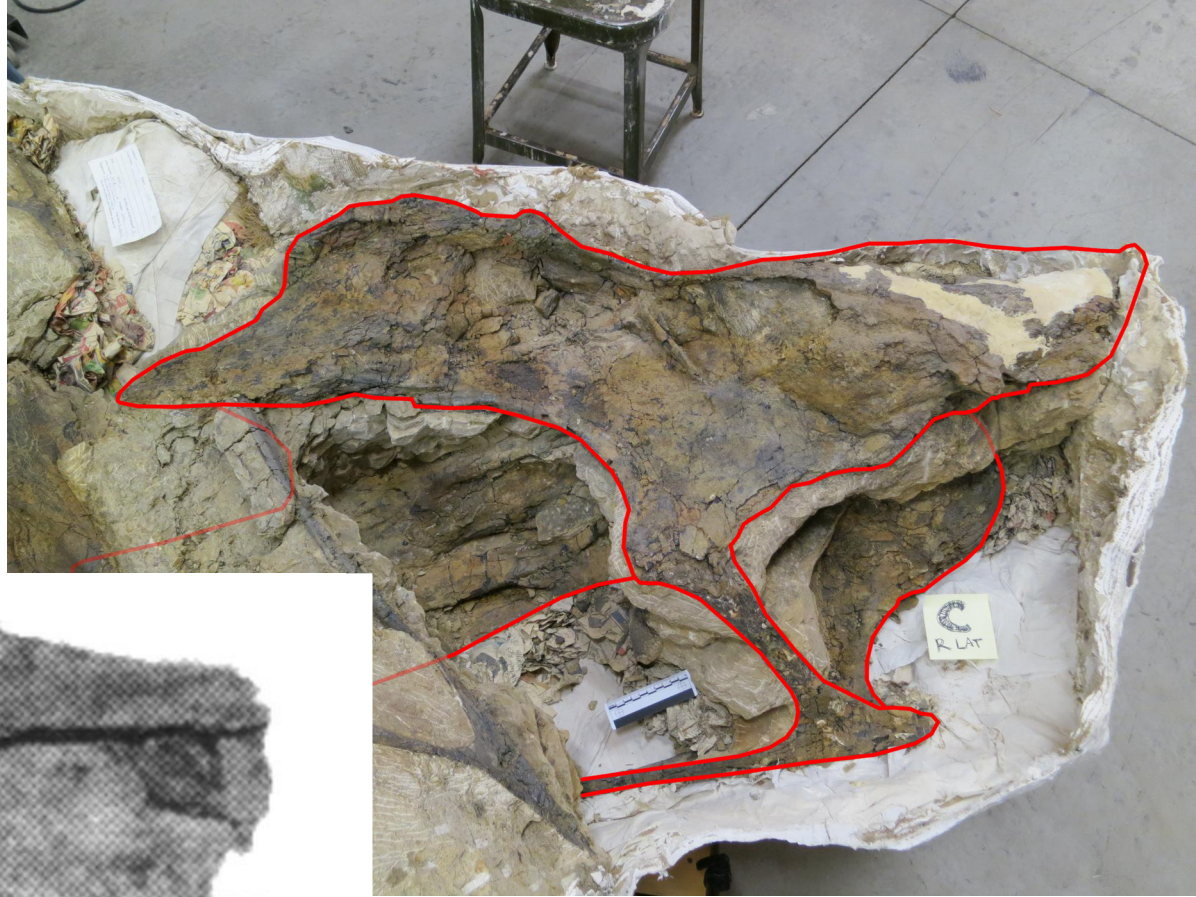
(anterior to left)





Cervical C is probably C9  
based on proportions and  
spine bifurcation.

But could be C10 or C11.





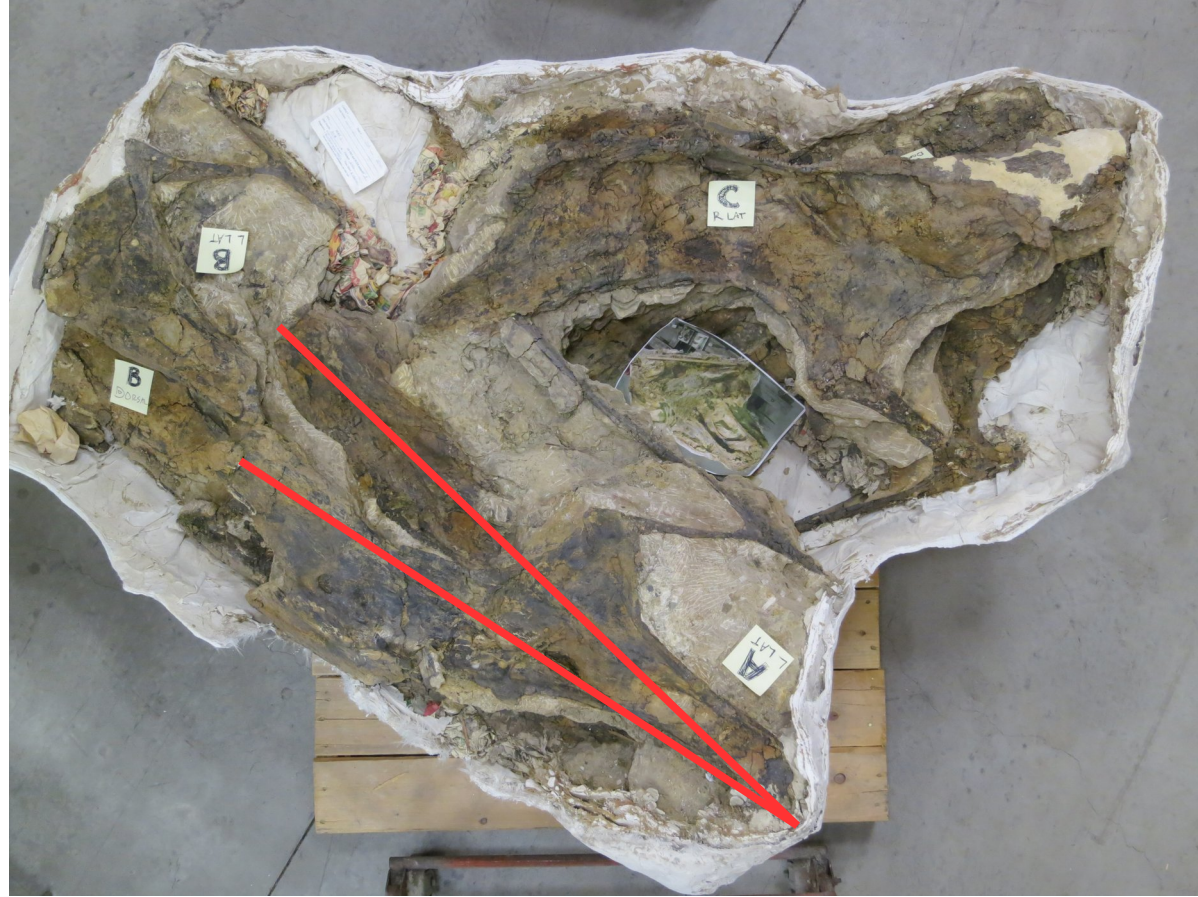
How long are these bones?

## Cervical A

prezyg to postzyg: 102 cm

prezyg to cotyle: 108 cm

=> postzyg to cotyle: 6 cm





How long are these bones?

## Cervical A

prezyg to postzyg: 102 cm

prezyg to cotyle: 108 cm

=> postzyg to cotyle: 6 cm

## Cervical C

condyle to postzyg: 104 cm





**How long are these bones?**

### **Cervical A**

prezyg to postzyg: 102 cm

prezyg to cotyle: 108 cm

=> postzyg to cotyle: 6 cm

### **Cervical C**

condyle to postzyg: 104 cm

=> condyle to cotyle:  $104 + 6 = 110$  cm — in the Top Five





**AMNH centra:**

C9: 685 mm

C10: 737 mm

C11: 777 mm

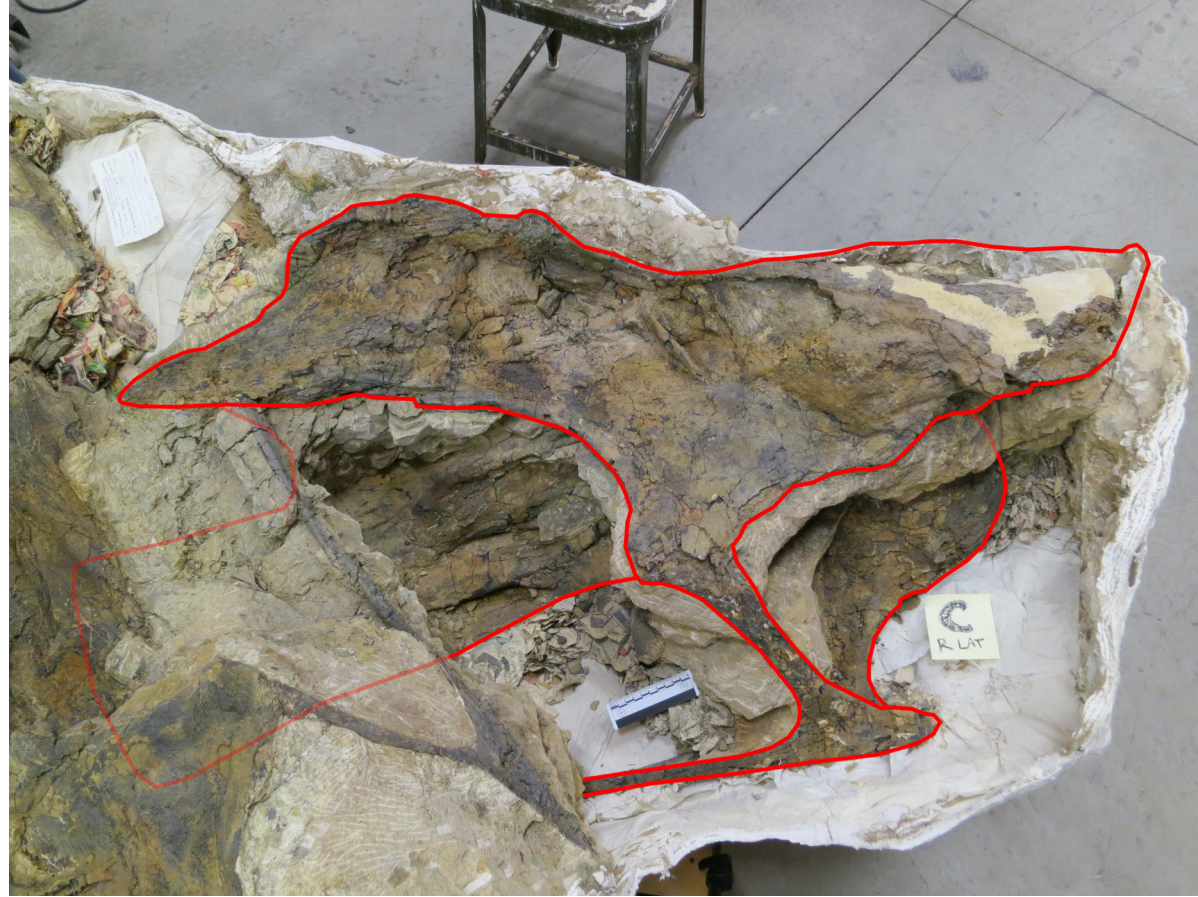
**Cervical C centrum:**

1100 mm (est.)

$1.61 \times C9$

$1.49 \times C10$

$1.42 \times C11$





Based on 8.5 m for AMNH, suggests a neck 12.07-13.69 m long



AMNH 6341



Based on 8.5 m for AMNH, suggests a neck 12.07-13.69 m long



AMNH 6341



Range for  
BYU 3GR



# BYU 9024 “Supersaurus” Cervical

“It's incredible that a beast  
that size could support its  
own weight.”





# BYU 9024

## “*Supersaurus*”

### Cervical

“It's incredible that a beast that size could support its own weight.”

“Yes, and the *Supersaurus* vertebra was from an even bigger animal.”

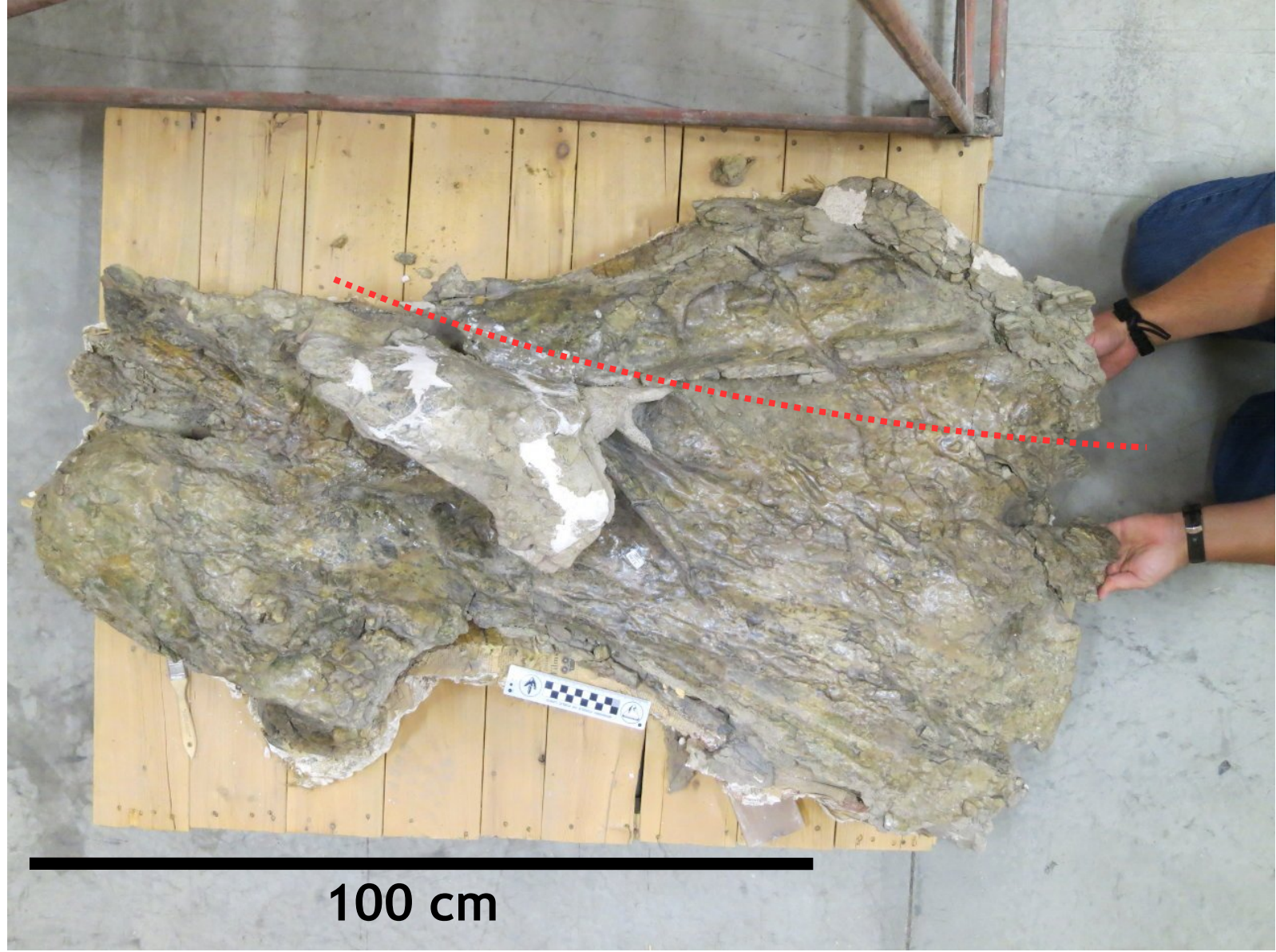




BYU 9024  
“*Supersaurus*”  
Cervical

Left lateral.

Postzyg and  
PODL folded  
upwards.

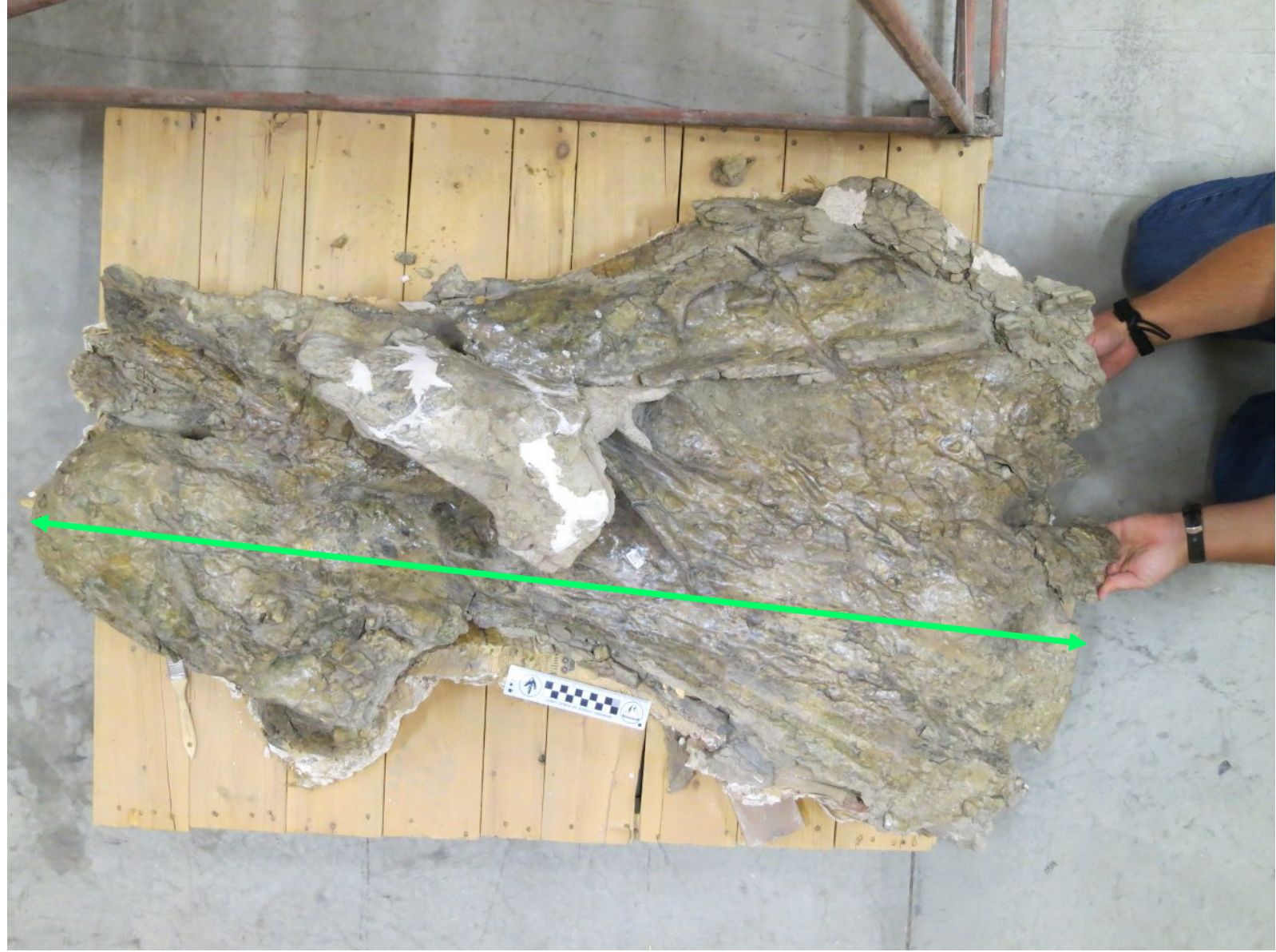




BYU 9024  
“*Supersaurus*”  
Cervical

Left lateral.

We think  
it's *Barosaurus*!

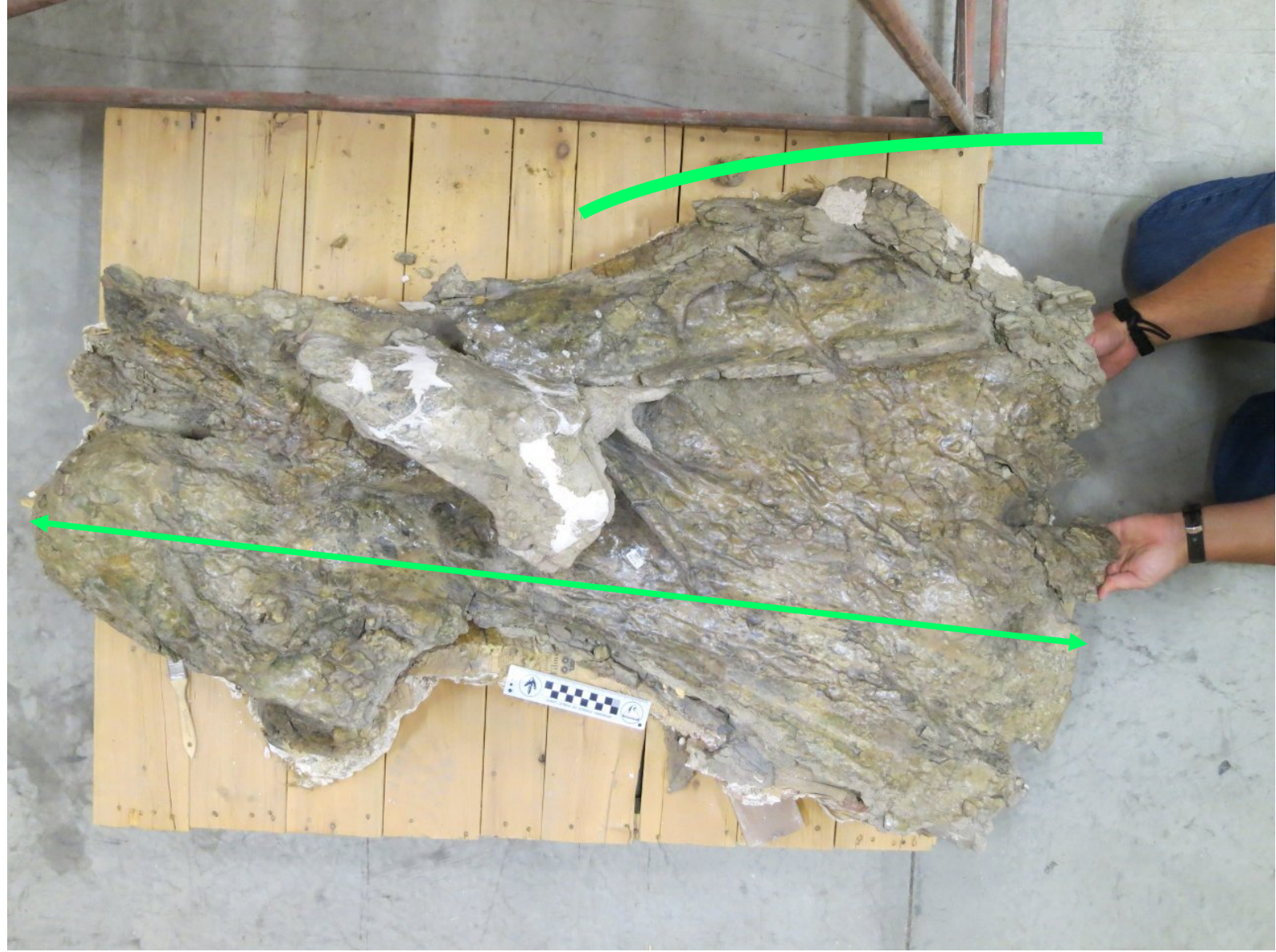




BYU 9024  
“*Supersaurus*”  
Cervical

Left lateral.

We think  
it's *Barosaurus*!

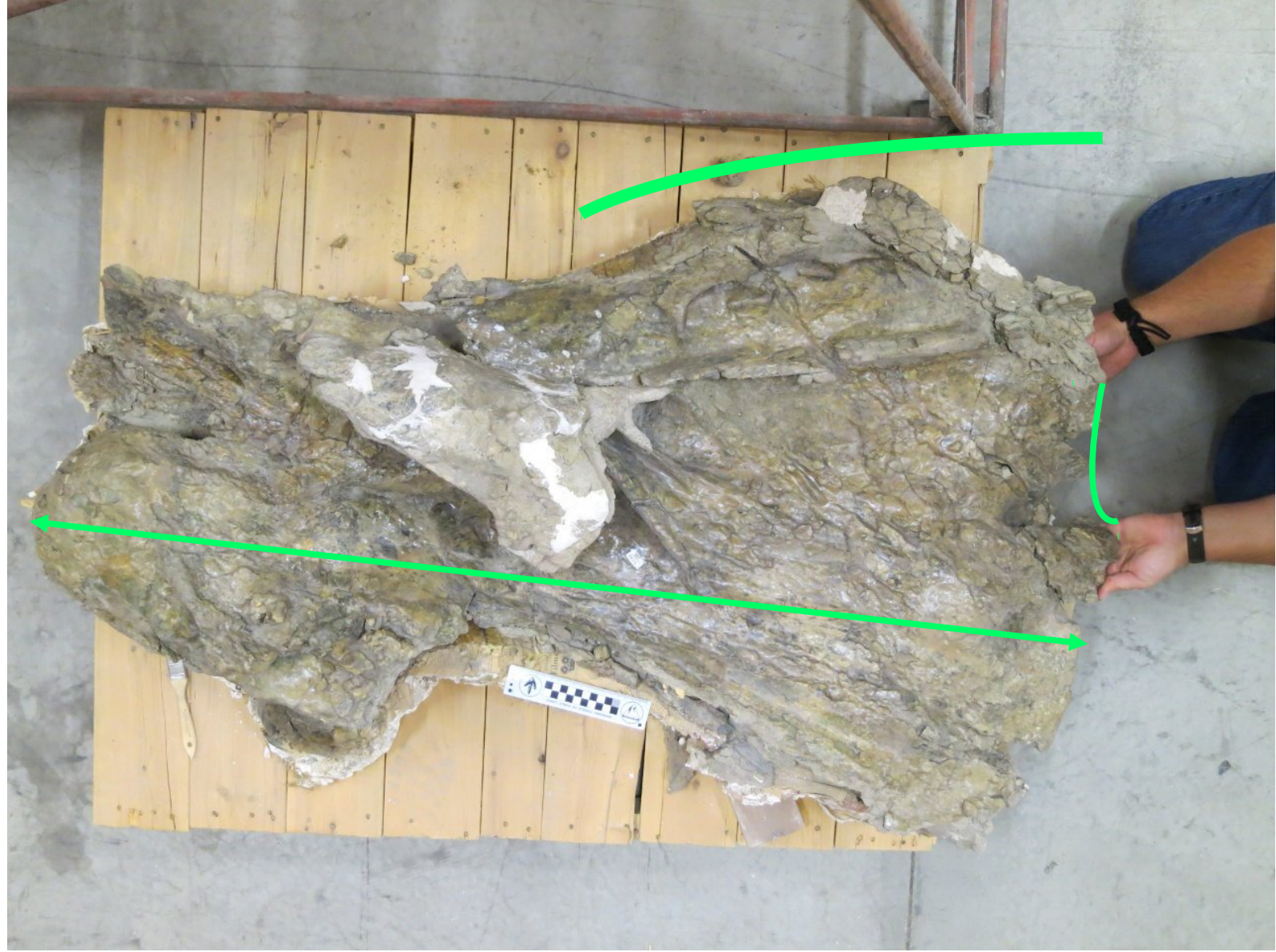




BYU 9024  
“*Supersaurus*”  
Cervical

Left lateral.

We think  
it's *Barosaurus*!

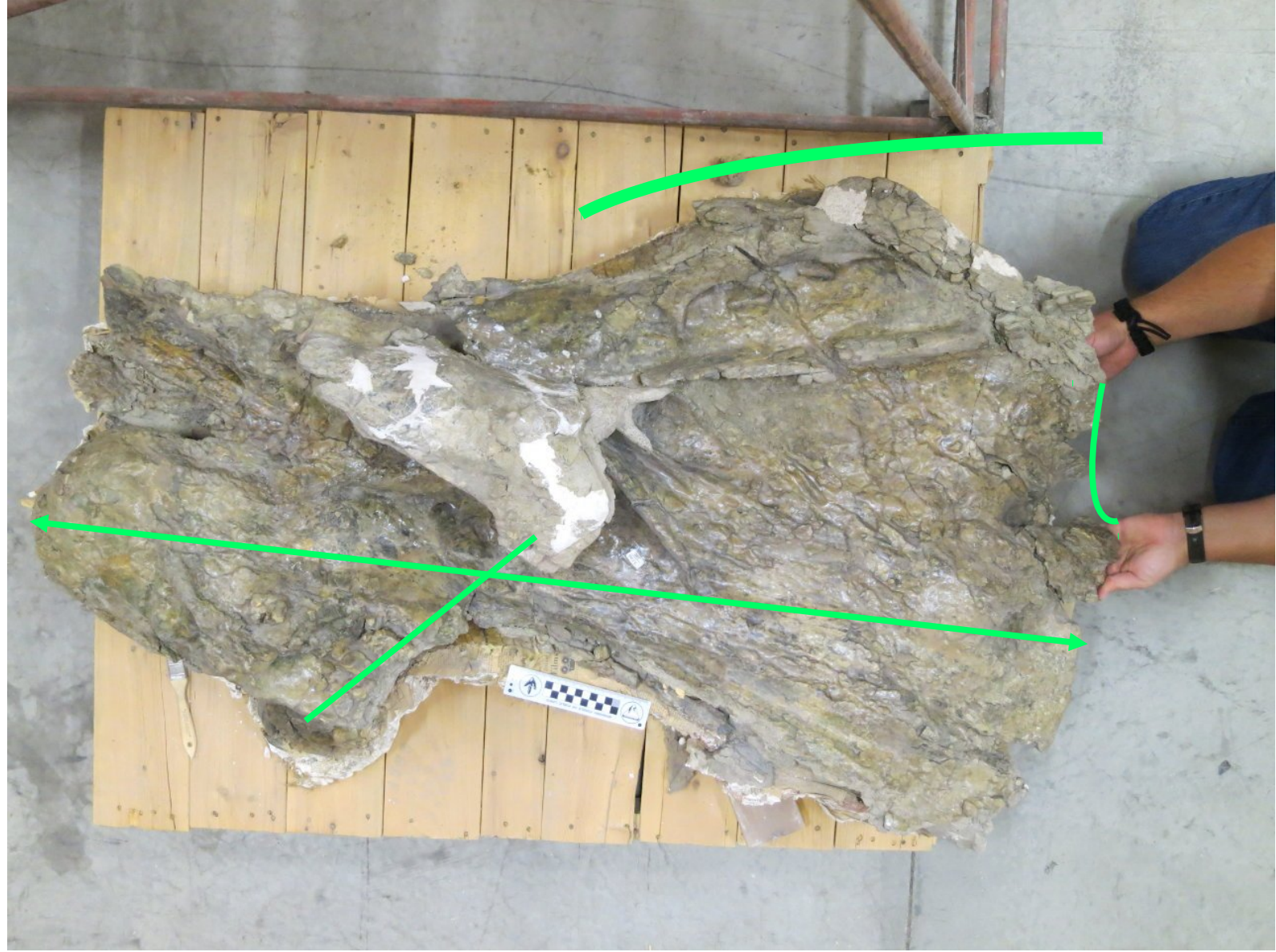




BYU 9024  
“*Supersaurus*”  
Cervical

Left lateral.

We think  
it's *Barosaurus*!

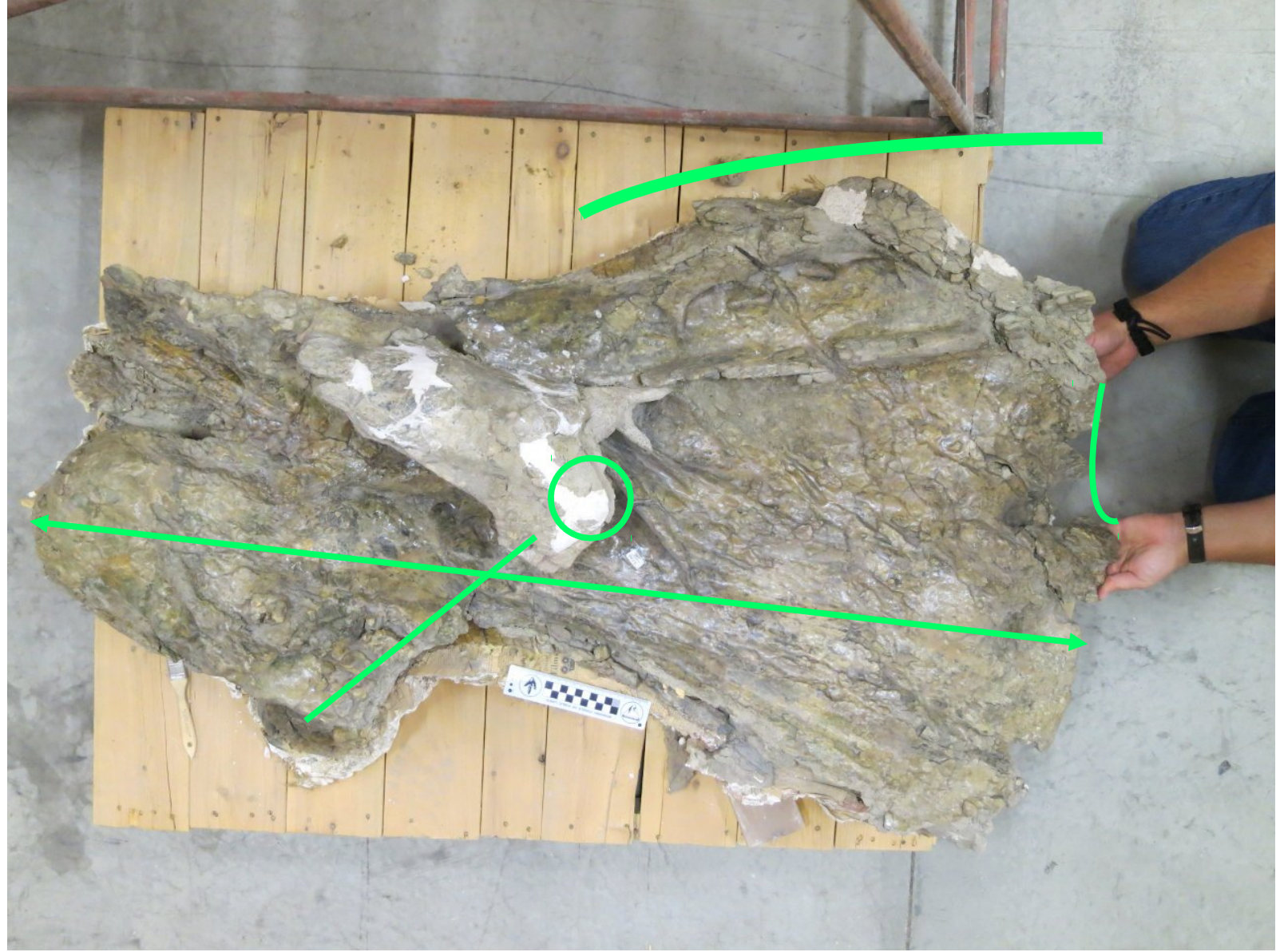




BYU 9024  
“*Supersaurus*”  
Cervical

Left lateral.

We think  
it's *Barosaurus*!

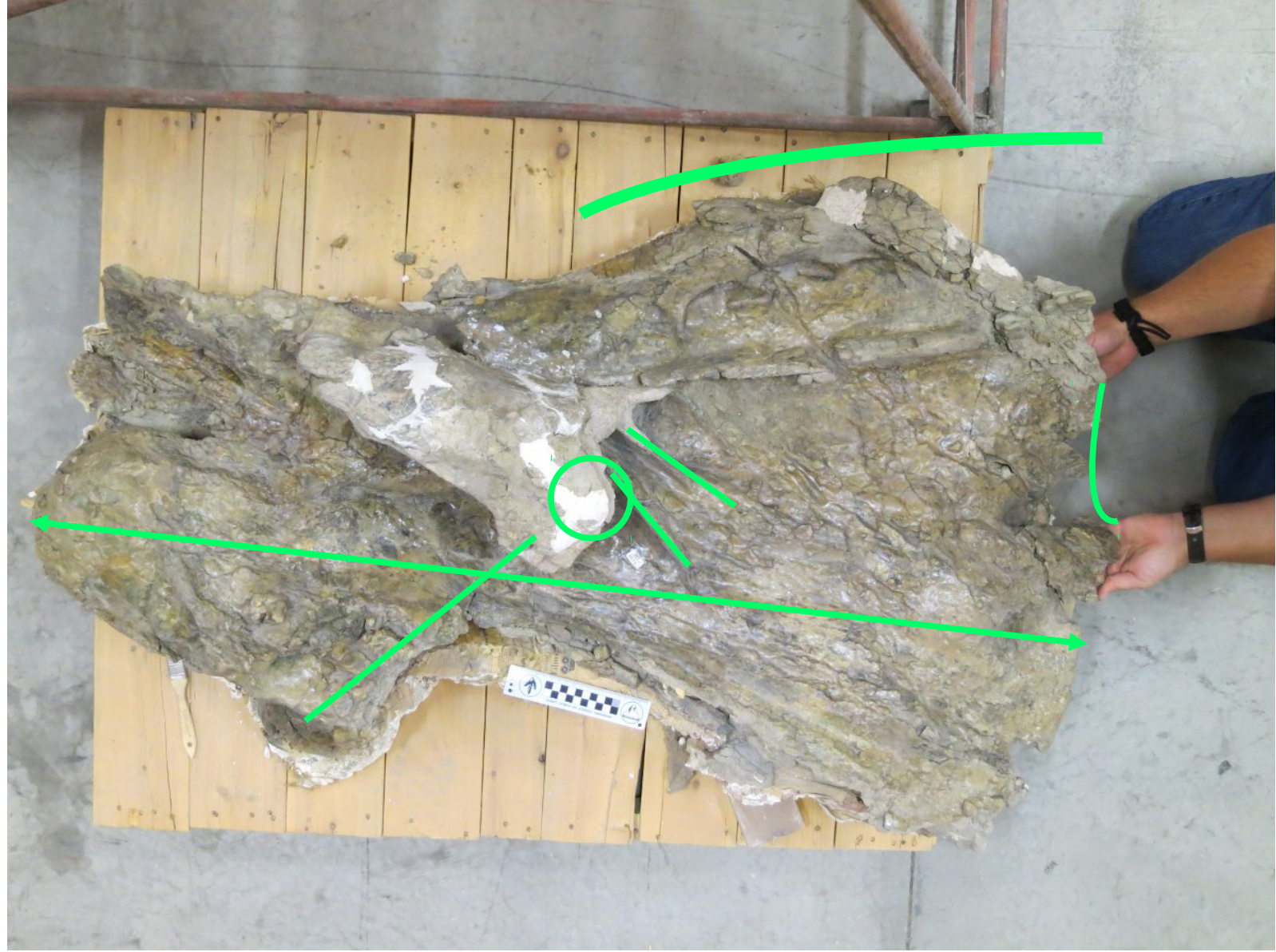




BYU 9024  
“*Supersaurus*”  
Cervical

Left lateral.

We think  
it's *Barosaurus*!





BYU 9024  
“*Supersaurus*”  
Cervical

Anterodorsal,  
anterior to  
right.

We think  
it's *Barosaurus*!





BYU 9024  
“*Supersaurus*”  
Cervical

Anterodorsal,  
anterior to  
right.

We think  
it's *Barosaurus*!

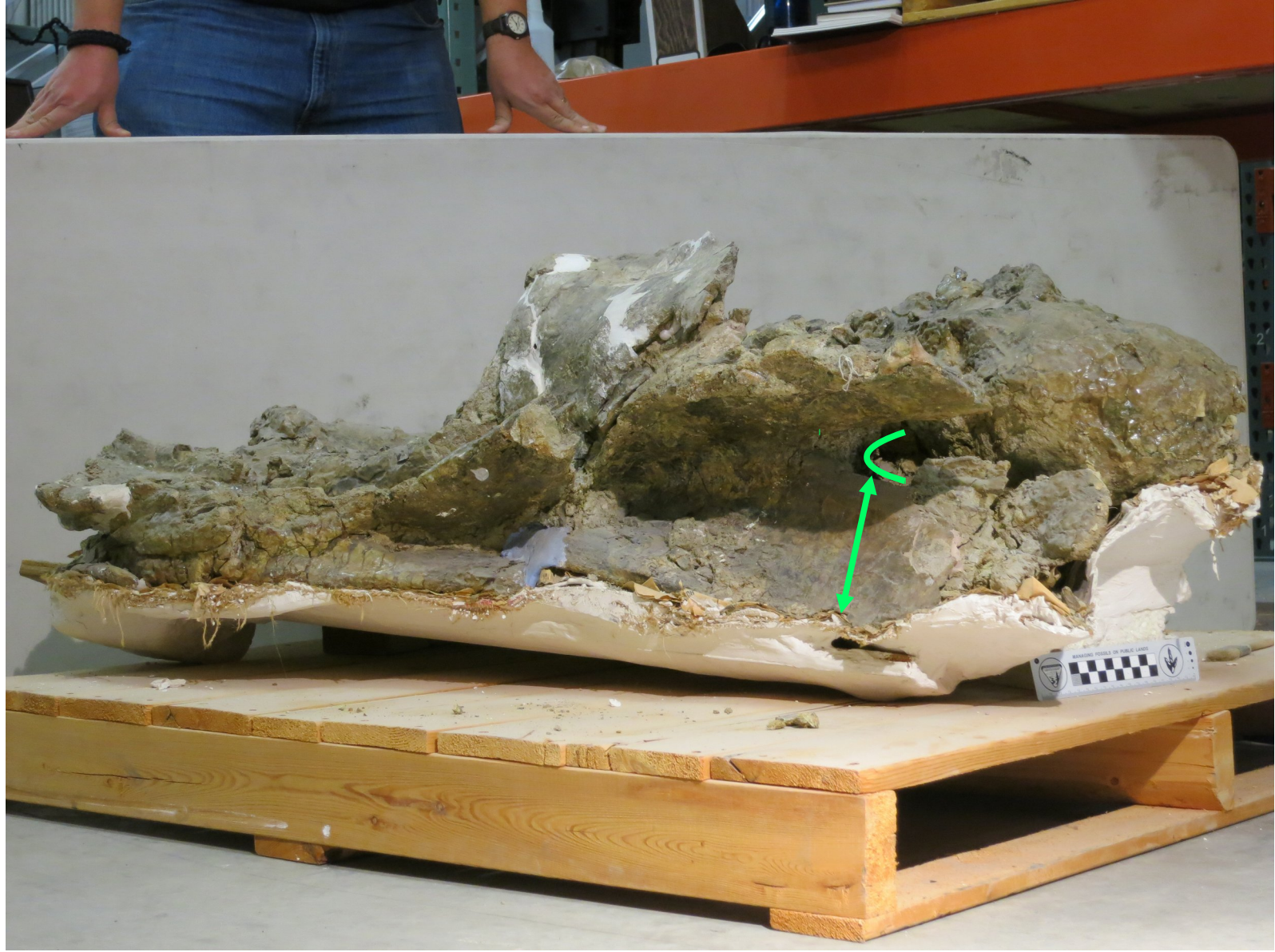




BYU 9024  
“*Supersaurus*”  
Cervical

Anterodorsal,  
anterior to  
right.

We think  
it's *Barosaurus*!

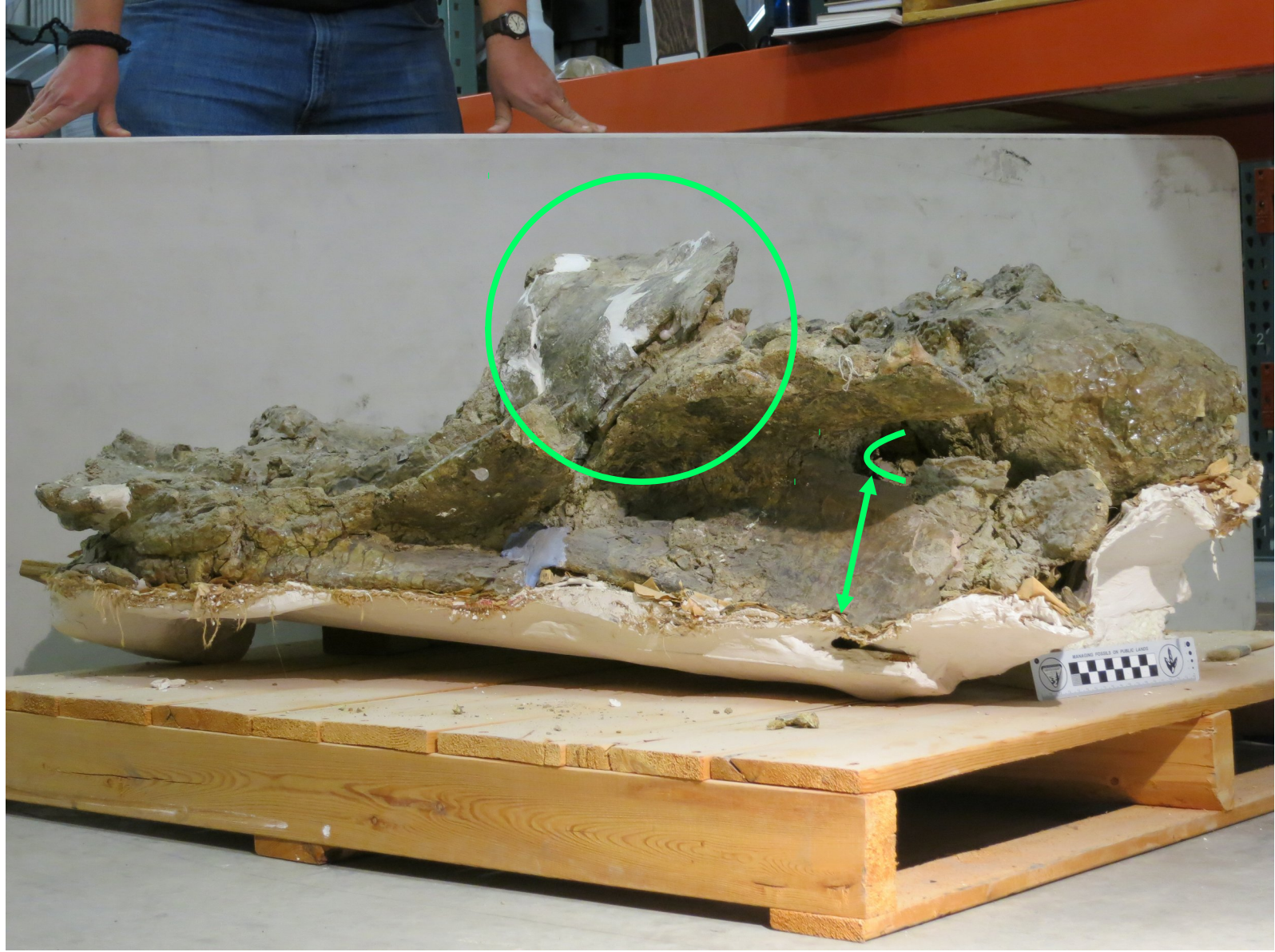




BYU 9024  
“*Supersaurus*”  
Cervical

Anterodorsal,  
anterior to  
right.

We think  
it's *Barosaurus*!

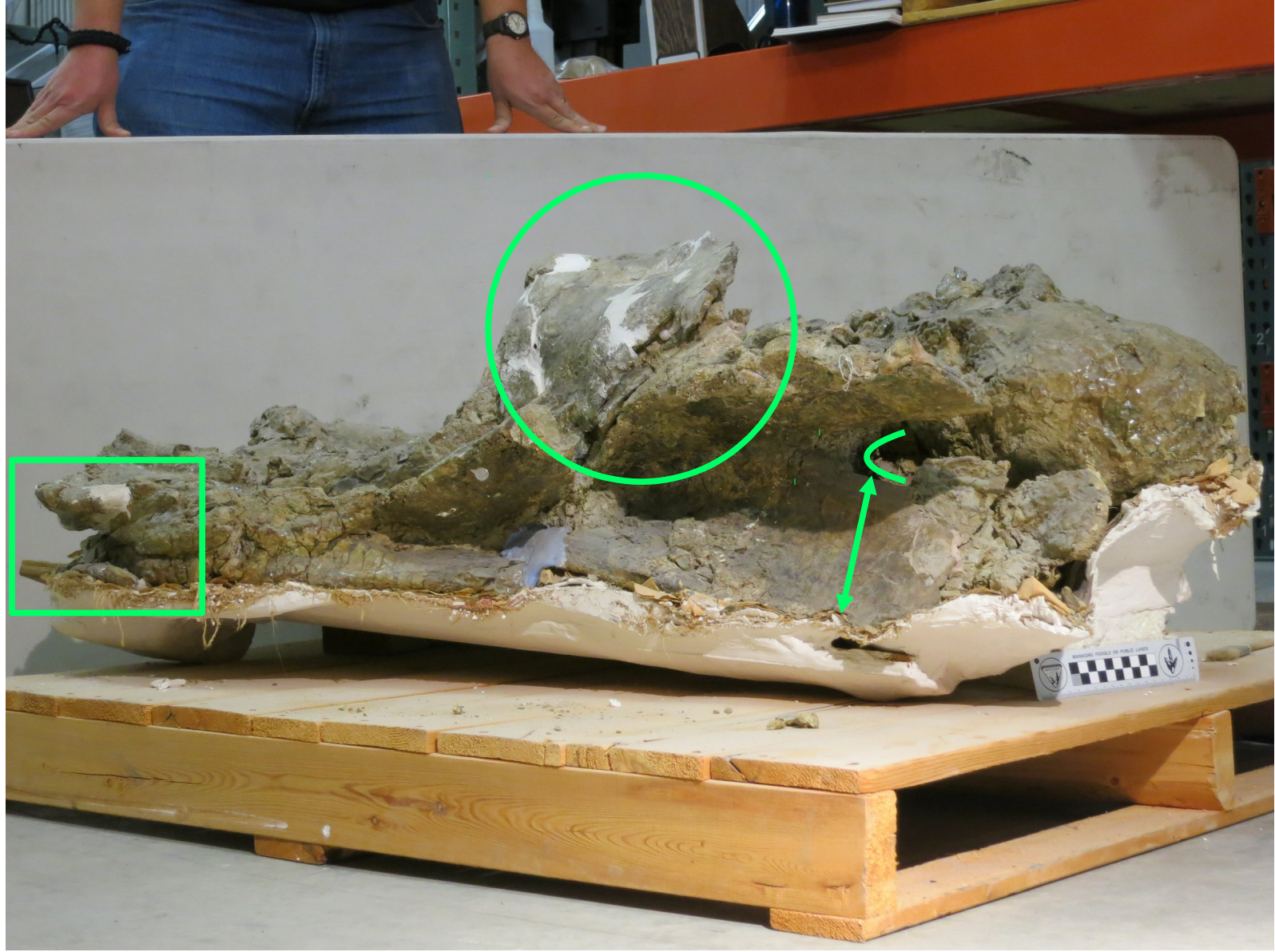




BYU 9024  
“*Supersaurus*”  
Cervical

Anterodorsal,  
anterior to  
right.

We think  
it's *Barosaurus*!





Does this  
mean that  
*Supersaurus*  
is *Barosaurus*?

No, it's not  
that easy.



**Supersaurus scapula and coracoid**

This is the scapula (shoulder blade) that the world saw when the announcement was made of the new animal discovery in 1997. The scapula is the largest bone from a dinosaur ever found. It is the largest of any bone that has been found in the world. The bone was discovered by a team of paleontologists from the University of Texas at Austin. The bone was discovered in 1997. The bone was discovered in 1997. The bone was discovered in 1997.

Specimen on loan from Brigham Young University's  
Earth Science Museum

Life Science: Dinosaur  
100 million years ago



And by the way ...

I don't think the Wyoming “*Supersaurus*” is *Barosaurus*.





Probably C9, based on  
neural spine bifurcation





Probably C9, based on  
neural spine bifurcation

AMNH C9 centrum:

685 mm

“*Supersaurus*” centrum:

1370 mm

Exactly twice as long!





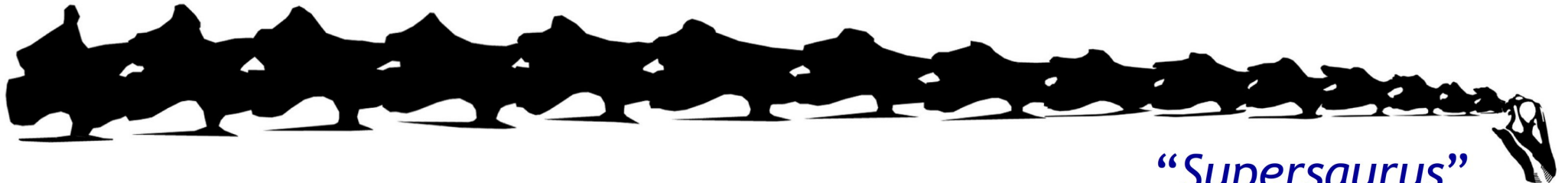
Based on 8.5 m for AMNH, suggests a neck 17 m long



AMNH 6341



} Range for  
BYU 3GR



*"Supersaurus"*

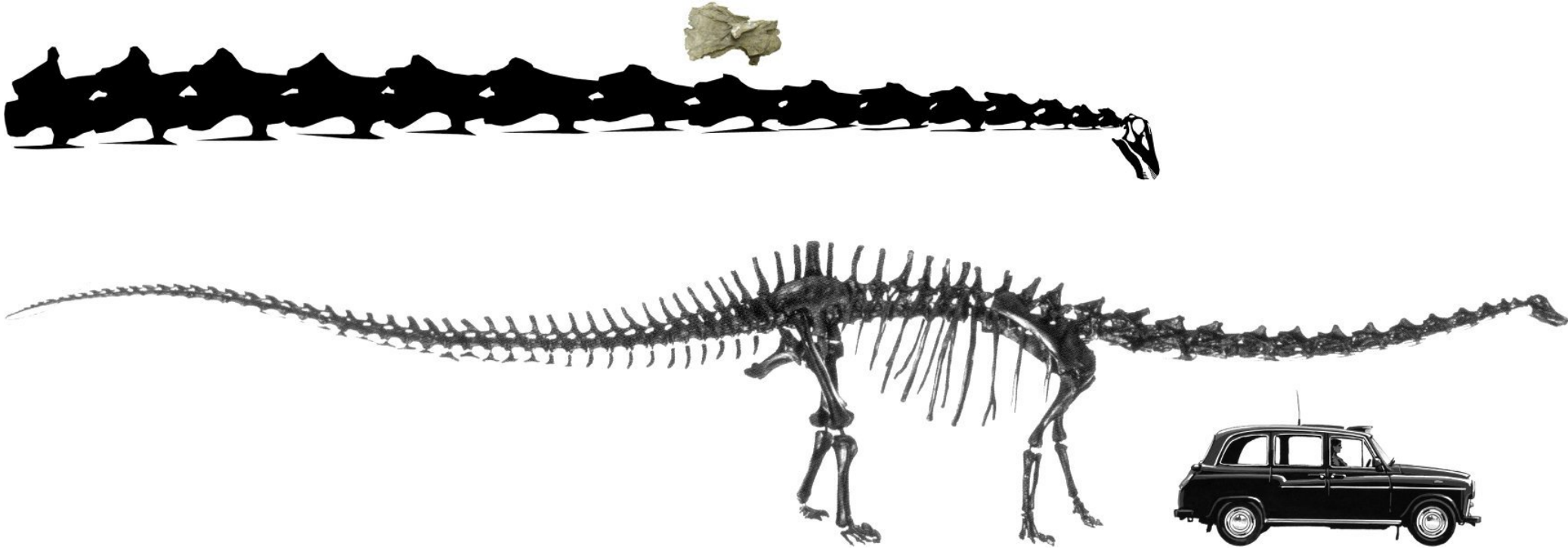


What does a double-sized *Barosaurus* neck look like?





What does a double-sized *Barosaurus* neck look like?

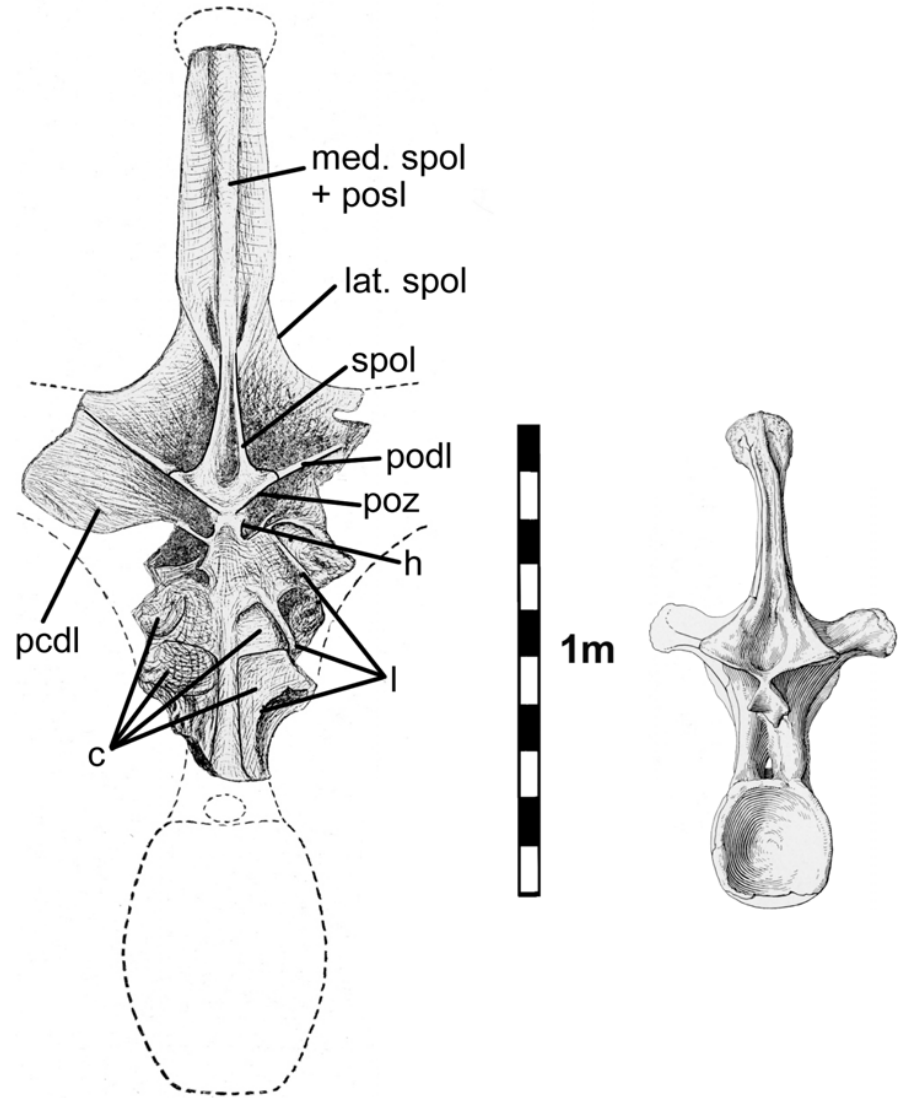




The “*Supersaurus*” cervical is from a double-sized *Barosaurus*.

That might sound familiar.

“*Amphicoelias fragillimus*” is an apocryphal double-sized *Diplodocus*.



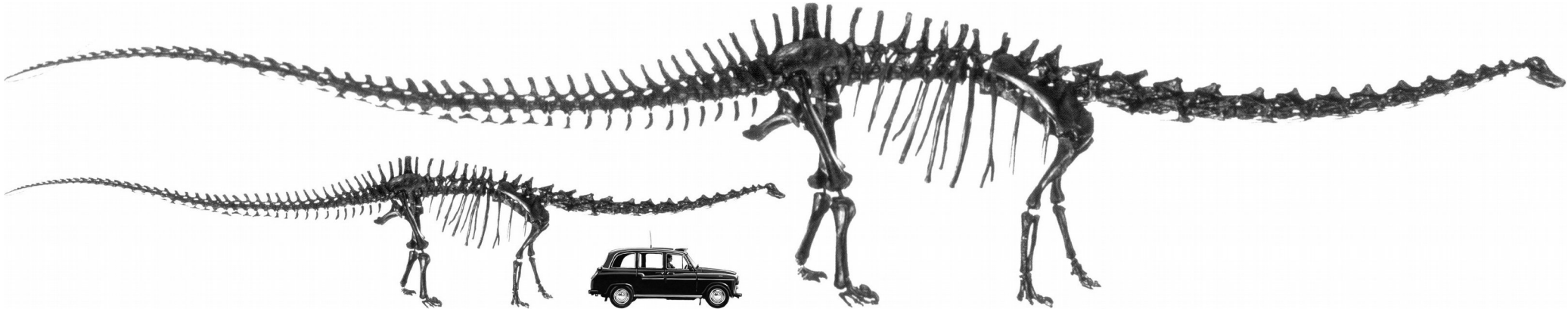


What does a double-sized *Diplodocus* look like?





What does a double-sized *Diplodocus* look like?

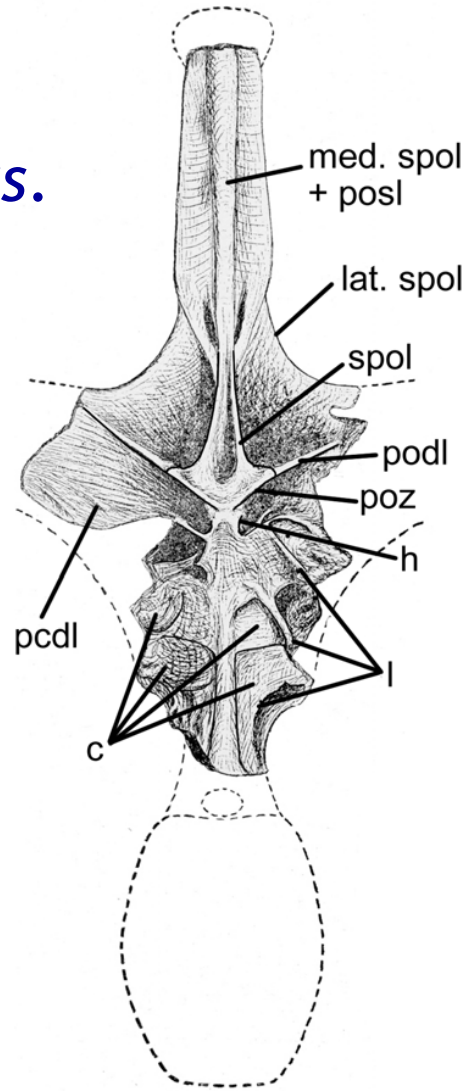




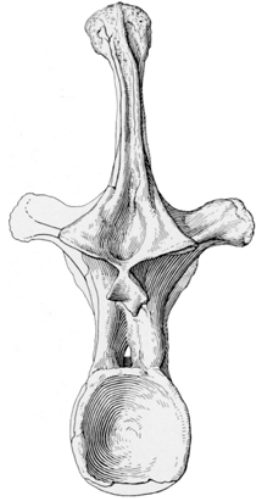
Conclusion: sauropods got *really* big.

“*Supersaurus*”: double-sized *Barosaurus*.

*Amphicoelias fragillimus*:  
double-sized *Diplodocus*.



1m



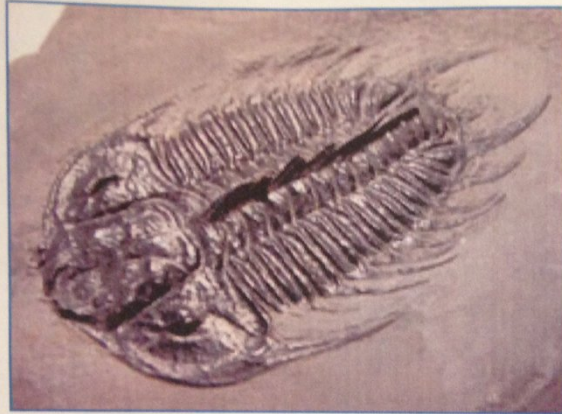


# Acknowledgements

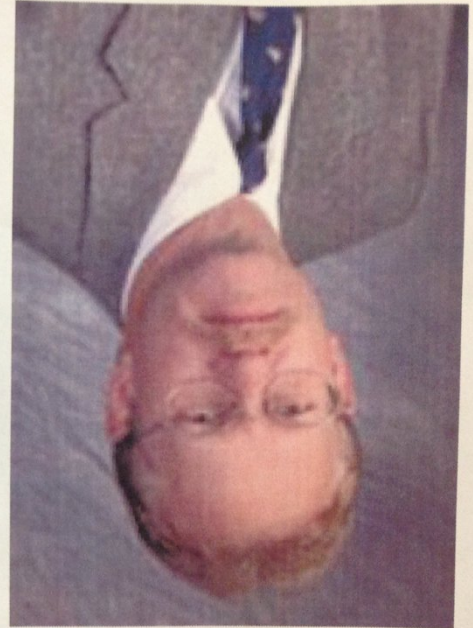
Thanks to Brooks Britt for access to BYU collections.

Rick Hunter for access to Western Paleo's *Barosaurus* material.

Dan Brinkman for access to Yale's *Barosaurus* holotype.



Invertebrate



Inverted Britt



# How big did *Barosaurus* get?

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Art by John Conway.

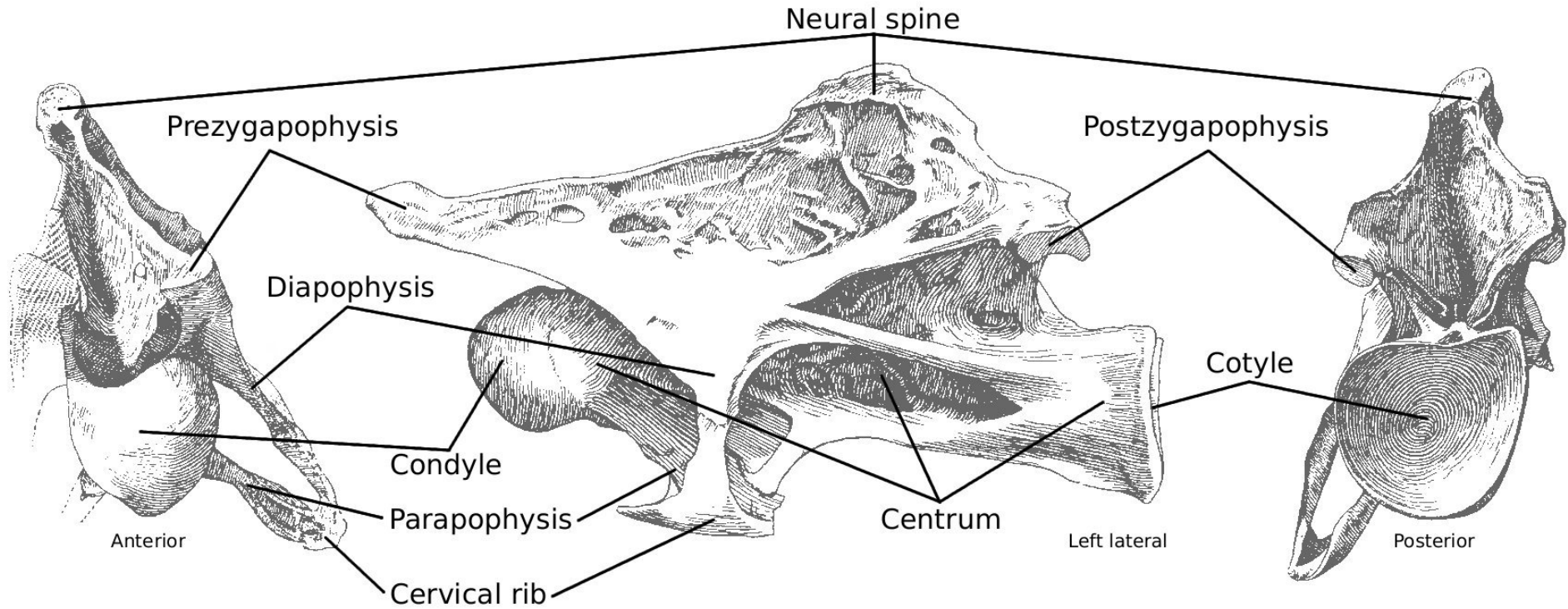








# Basic anatomy of sauropod cervical vertebrae





## BYU 9024 “*Supersaurus*” Cervical

It's not easy photographing  
a bone this size.





BYU 9024  
“*Supersaurus*”  
Cervical

Jim Jensen's  
model of the  
undistorted  
vertebra.

Actually,  
really good.





BYU 9024  
“*Supersaurus*”  
Cervical

Jim Jensen's  
model of the  
undistorted  
vertebra.

Actually,  
really good.

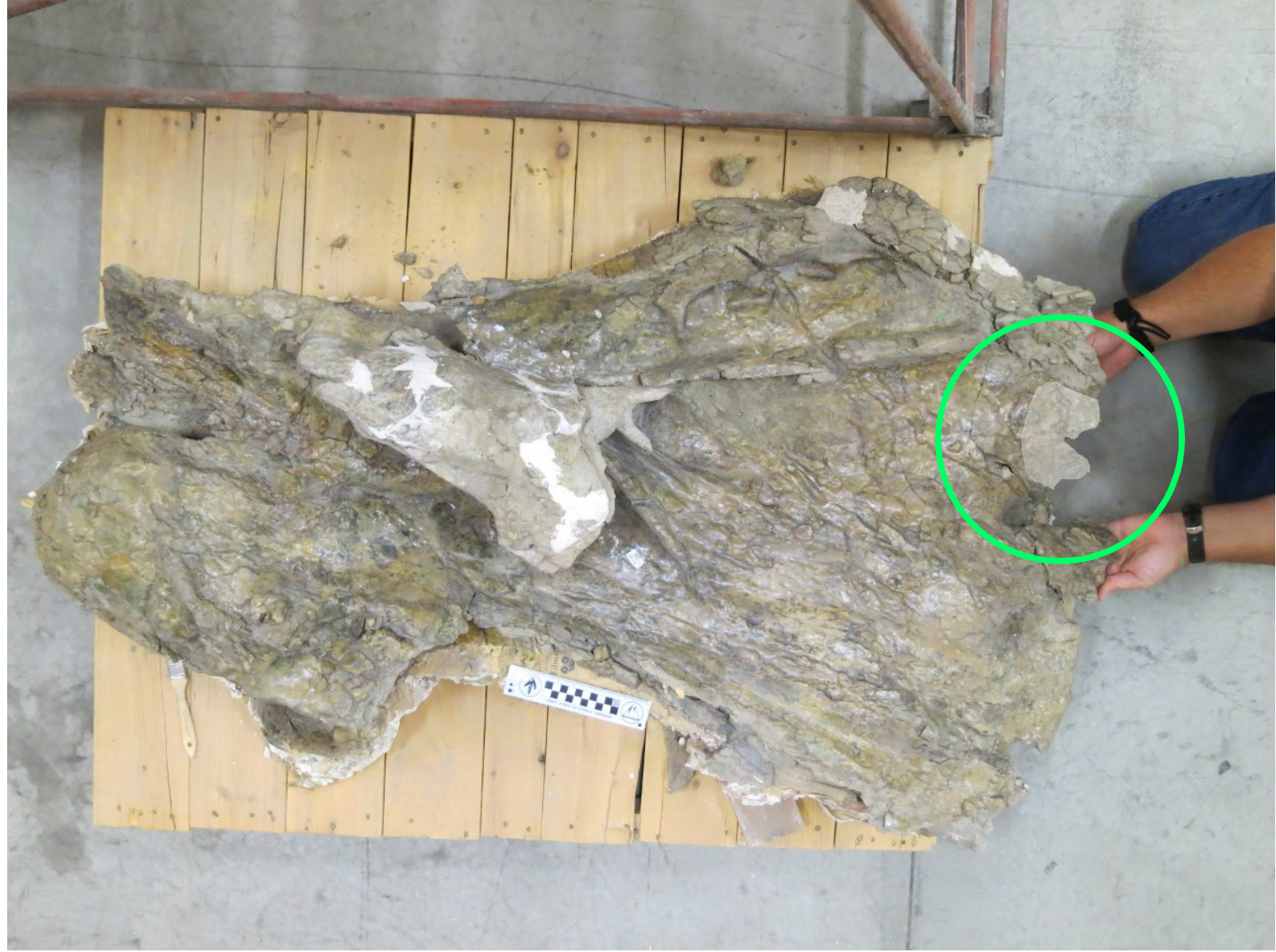




BYU 9024  
“*Supersaurus*”  
Cervical

Left lateral.

Postzyg facet.



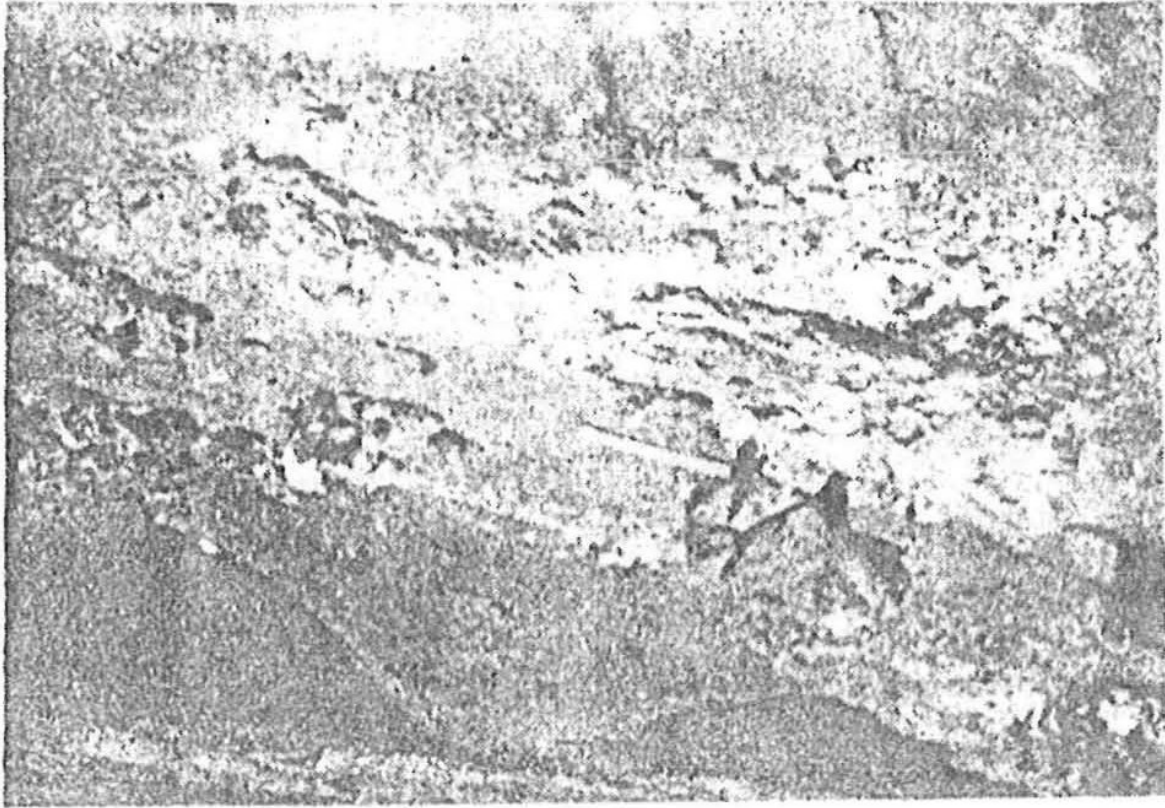


***Bruhathkayosaurus*: the world's biggest titanosaur?**



# *Bruhathkayosaurus*: the world's biggest titanosaur?

Plate-1



a. Ilium in dorsal view.



# *Bruhathkayosaurus*: the world's biggest titanosaur?

a. Ilium in dorsal view.

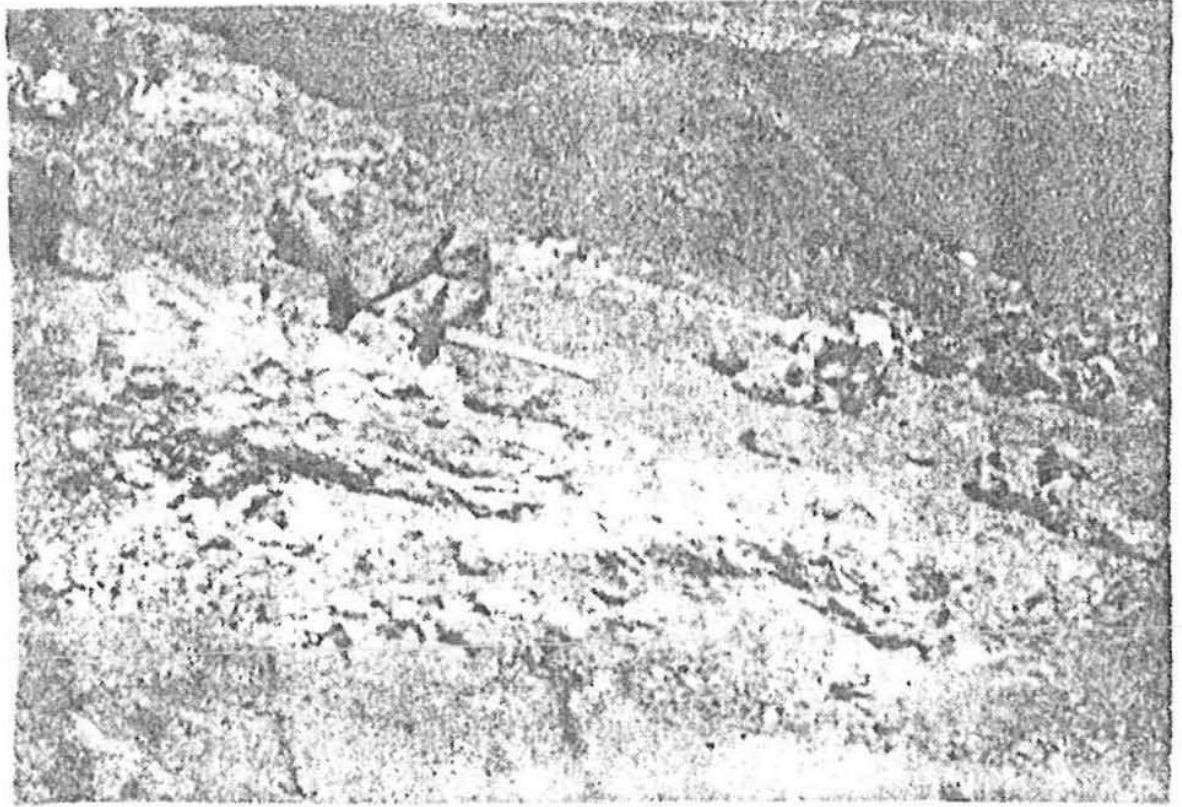


Plate-1

*Bruhathkayosaurus*: the  
world's biggest titanosaur?

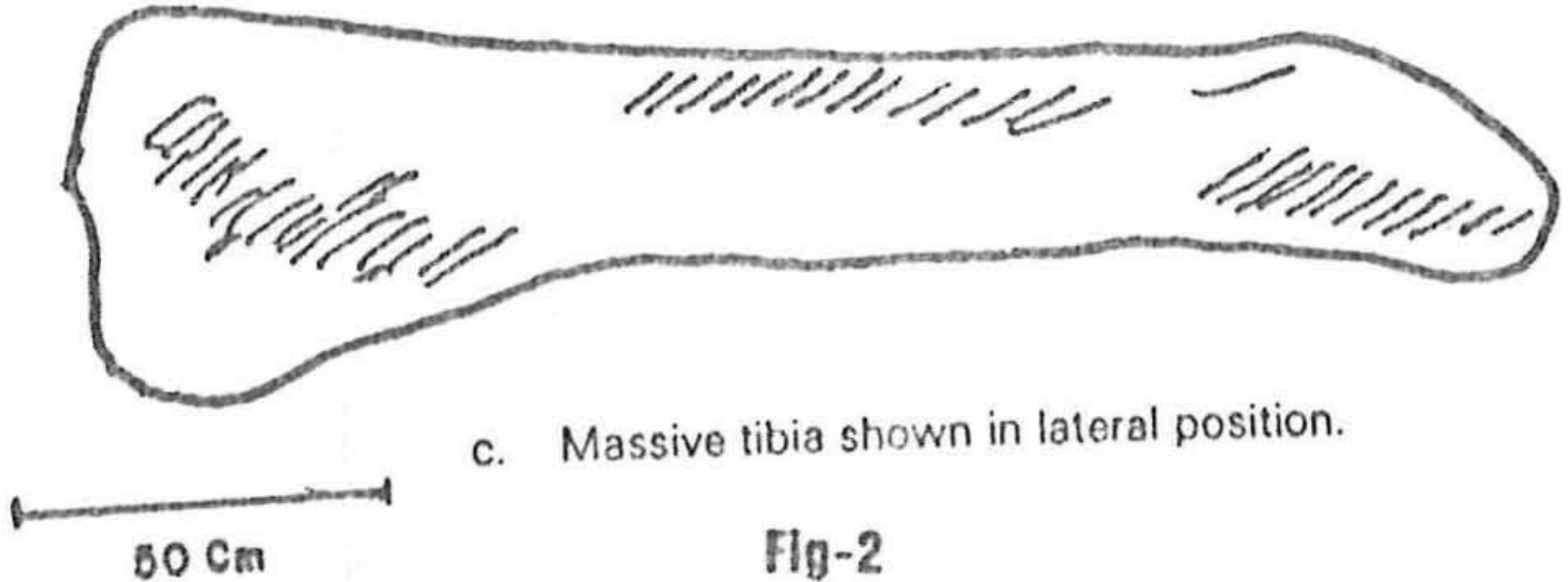




*Bruhathkayosaurus*: the  
world's biggest titanosaur?



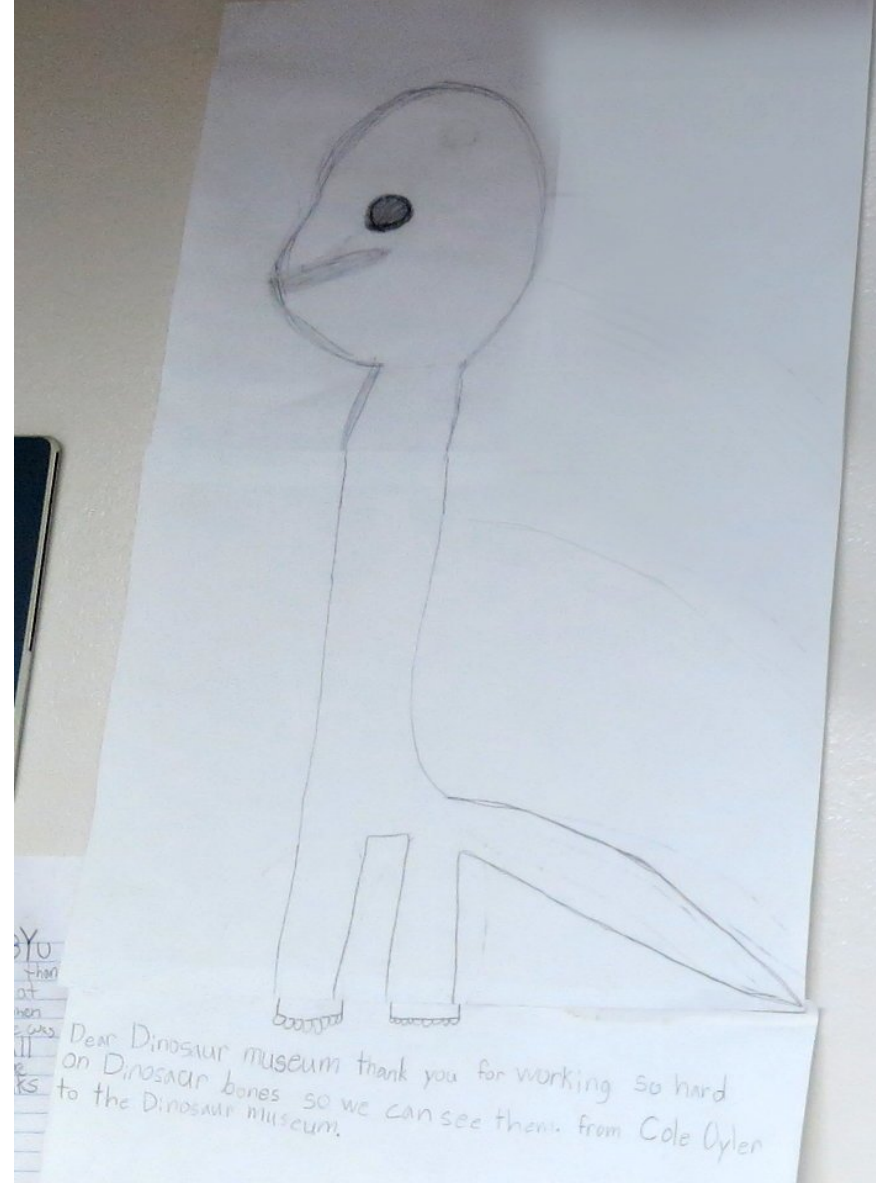
## *Bruhathkayosaurus*: the world's biggest titanosaur?





# *Bruhathkayosaurus:* Actual life restoration.

(Found on the wall at BYU.)



Art by Bob Nicholls.

# *Bruhathkayosaurus*: the world's biggest titanosaur?

*Bruhathkayosaurus* tibia: 200 cm

*Argentinosaurus* tibia: 155 cm  
(based on 155 cm fibula)

$$200/155 = 1.29 \times \text{longer}$$

If isometrically similar,  
 $1.29^3 = 2.15 \times$  more massive

If *Argentinosaurus* massed 73 tonnes (Mazzetta et al. 2004)

*Bruhathkayosaurus* may have massed  $2.15 \times 73 = 147$  tonnes

