

# 3D Muscle Fiber Architecture of Avian Jaw Muscles and their Significance for Avian Cranial Functional Morphology Evolution

Conner Verhulst<sup>1</sup>, Casey Holliday<sup>2</sup>

Belted Kingfisher



<https://www.audubon.org/field-guide/bird/belted-kingfisher#photo4>

Green-wing Teal



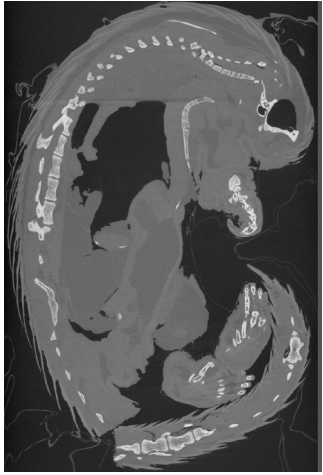
[https://www.allaboutbirds.org/guide/Green-winged\\_Teal/id](https://www.allaboutbirds.org/guide/Green-winged_Teal/id)

Grey Parrot



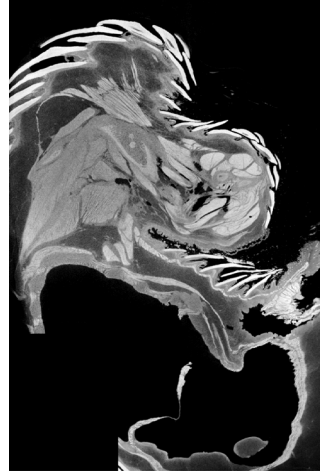
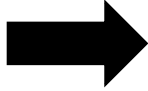
[https://en.wikipedia.org/wiki/Grey\\_parrot#/media/File:Congo\\_African\\_Grey\\_Parrot\\_-\\_head\\_detail.jpg](https://en.wikipedia.org/wiki/Grey_parrot#/media/File:Congo_African_Grey_Parrot_-_head_detail.jpg)

# Materials and Methods



Regular CT Scan

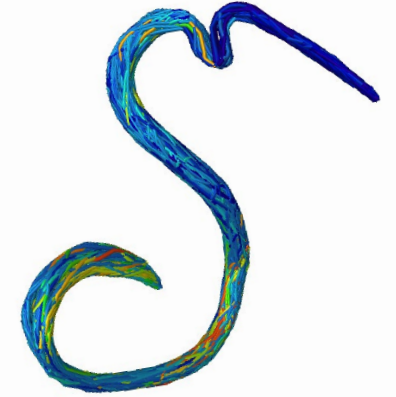
Iodine + time



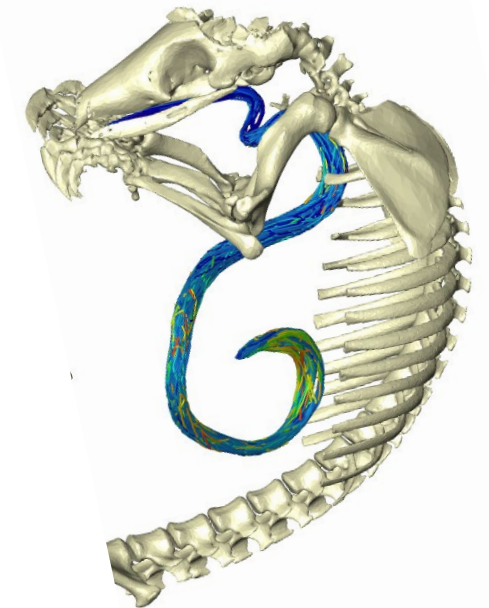
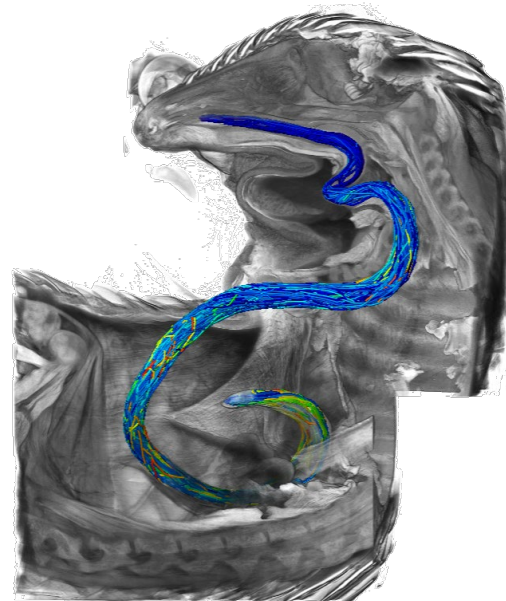
DiceCT specimen



Segmented Muscles



3D Fiber Tractography Model



Belted Kingfisher



<https://www.audubon.org/field-guide/bird/belted-kingfisher#photo4>

Green-wing Teal

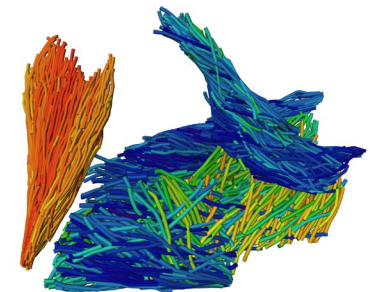
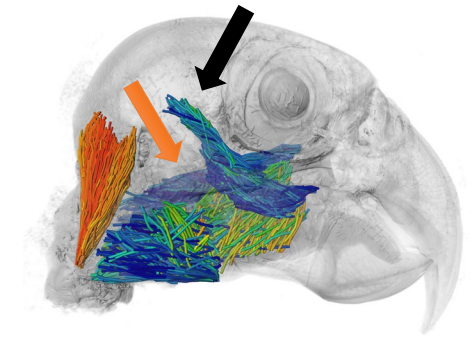
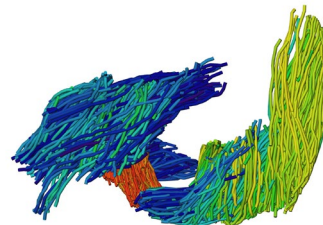
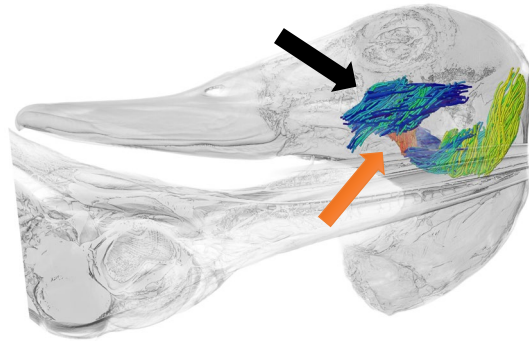
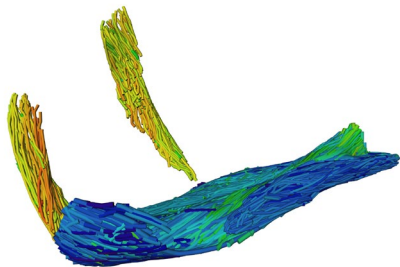
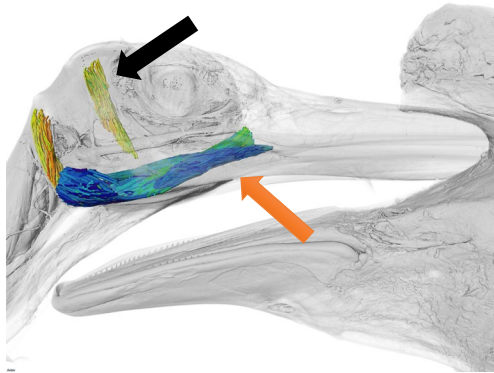


[https://www.allaboutbirds.org/guide/Green-winged\\_Teal/id](https://www.allaboutbirds.org/guide/Green-winged_Teal/id)

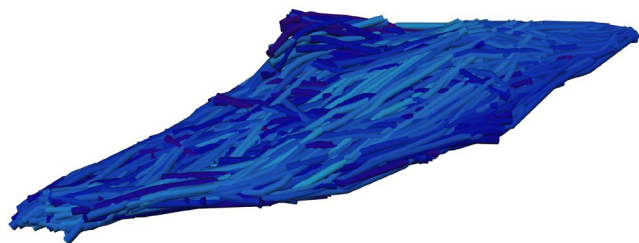
Grey Parrot



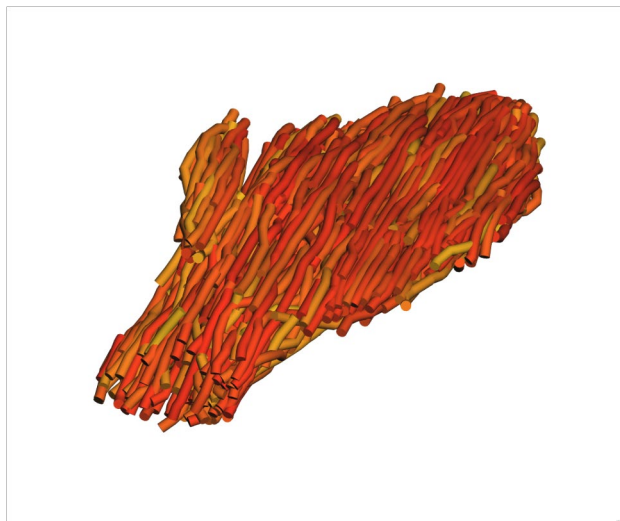
[https://en.wikipedia.org/wiki/Grey\\_parrot#/media/File:Congo\\_African\\_Grey\\_Parrot\\_-\\_head\\_detail.jpg](https://en.wikipedia.org/wiki/Grey_parrot#/media/File:Congo_African_Grey_Parrot_-_head_detail.jpg)



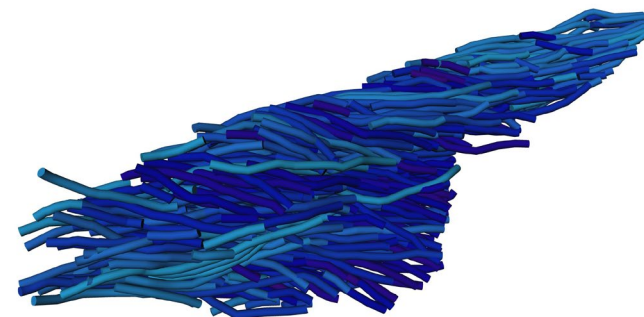
Belted Kingfisher



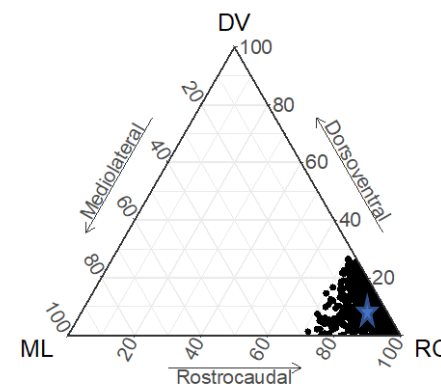
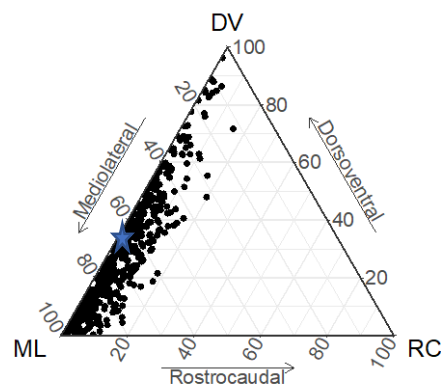
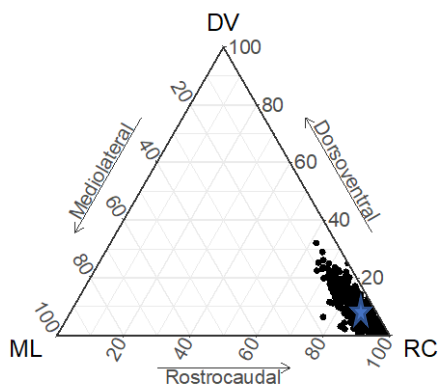
Green-wing Teal



Grey Parrot



Pterygoideus  
Dorsalis

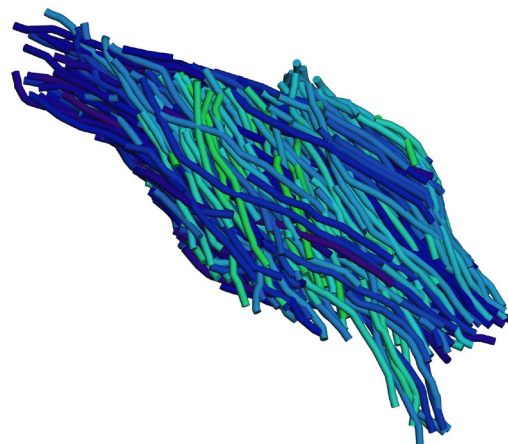


DV = dorsoventral, ML = mediolateral, RC = rostrocaudal

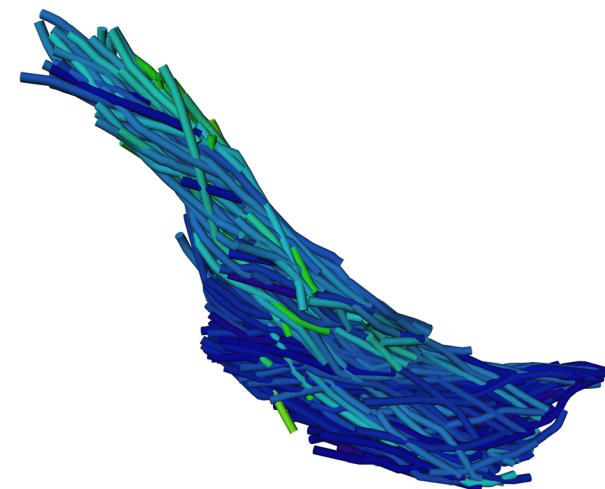
Belted Kingfisher



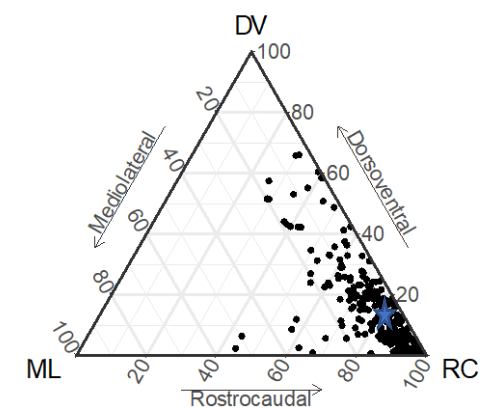
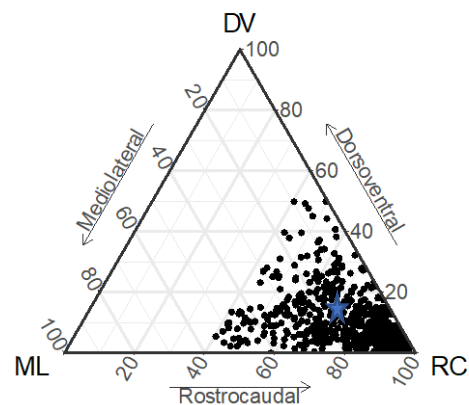
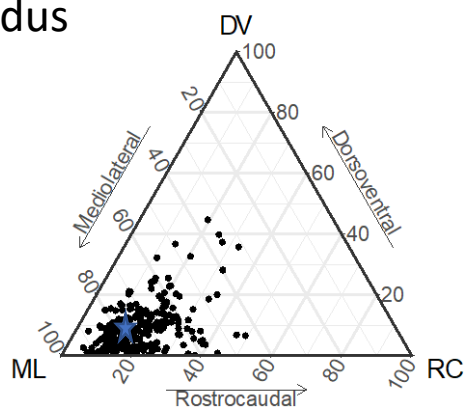
Green-wing Teal



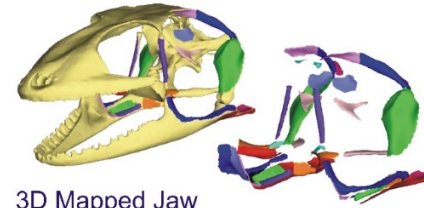
Grey Parrot



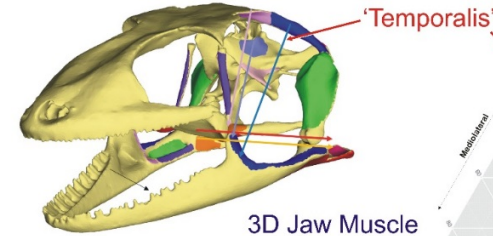
Adductor Mandibulae  
Externus Profundus



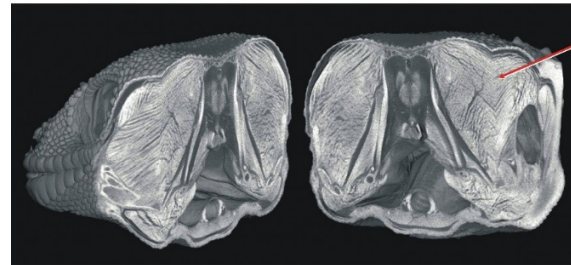
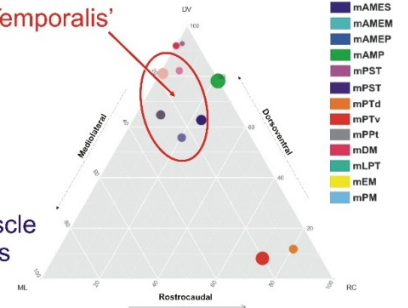
# Uses For Technology



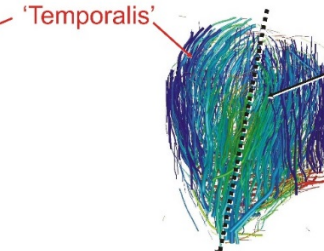
3D Mapped Jaw  
Muscle Attachments



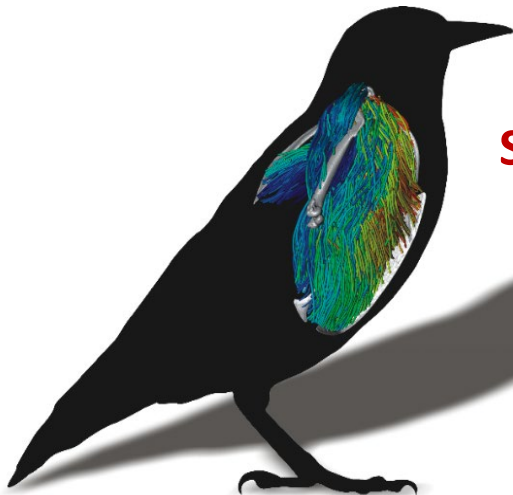
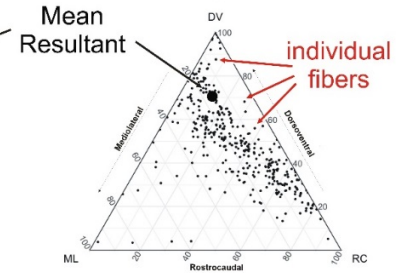
3D Jaw Muscle  
Resultants



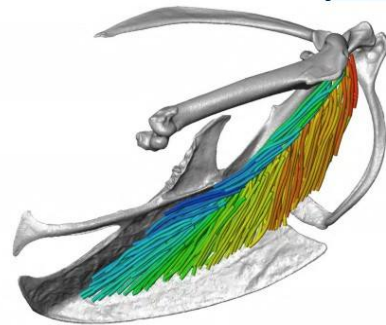
DiceCT x Isolated Jaw  
Muscle Volumes



3D Fiber Tracking using  
Avizo Xfiber



Starling



Integrative  
Organismal  
Biology

A Journal of the Society  
for Integrative and  
Comparative Biology

academic.oup.com/icb



OXFORD  
UNIVERSITY PRESS

