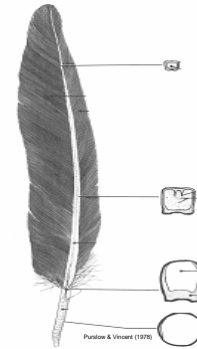


Understanding the Cross Sectional Morphology of Flight Feather Shafts

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ABSTRACT:

In the past, the cross sectional morphology of flight feather shafts was quantitatively non-existent, and any characterizations lacked explicit detail. The ability to mimic naturally found flight necessitates a full understanding of even the most perfunctory flight characteristics of flight feather shafts. Moreover, the onset of technology available today has provided a more accurate means of analysis for such applications. In this investigation flight feather shafts were cut and initially analyzed by means of a Charged Couple Device (CCD). A Computerized Tomography (CT) Scanner was later found to more accurately characterize the cross-sectional morphology of the flight feather shafts.

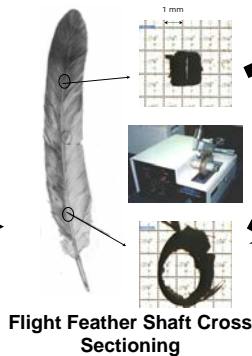


METHODS & MATERIALS:

Ruby-throat Hummingbird
(*Archilochus colubris*)

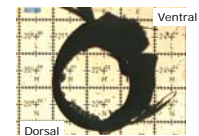


Feather Selection



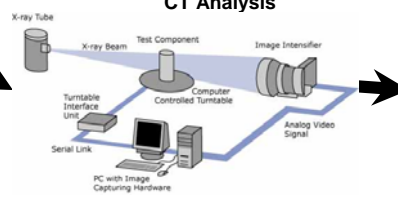
Flight Feather Shaft Cross Sectioning

CCD Analysis



10 x Image

CT Analysis



CTAnalysis® Rendering

RESULTS:

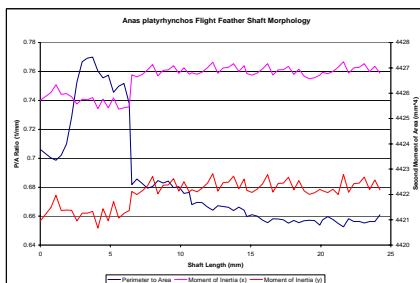


Fig. A. Graphical representation of over a 2cm scan from a primary flight feather of the *Anas platyrhynchos*, displaying specific surface and the x and y second moments of area as a function of length.

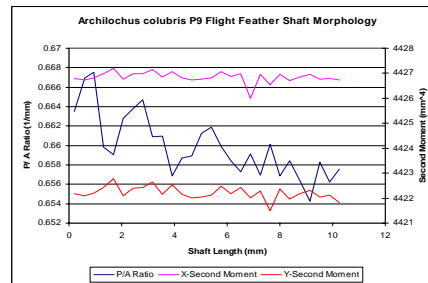


Fig. B. Graphical representation of over a 1cm scan from the 9th primary flight feather of the *Archilochus colubris*, displaying specific surface and the x and y second moments of area as a function of length.

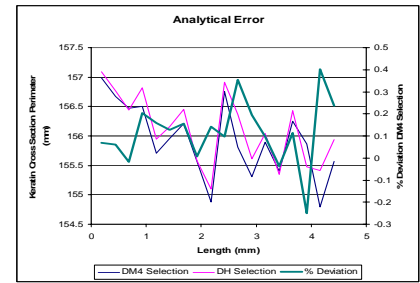


Fig. C. Error discovered when method for attaining data is performed by two separate parties. Two participants (DM4 & DH) attained data to plot cross section perimeter as a function of length, the percent deviation is shown.

CONCLUSION:

In retrospect, the formulated methods developed to conduct this investigation appear to be sound. It was learned that the accuracy of quantifying the cross-sectional morphology of flight feather shafts is largely dictated upon specimen preparation and equipment-software tuning. The results obtained are representative of one method for quantifying the cross sectional morphology of flight feather shafts. The results produced serve to validate the method formulated in this investigation. This investigation fell short of a comparative study among species and inter-species. To further understand and make conclusions about the cross-sectional morphology of flight feather shafts, more data and analysis would be required to reinforce any such claims.