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Research Article

DATA ON FEATHER CURVATURE OF THE OSTRICH

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Abstract:

In terms of white feathers of an ostrich male, we showed that average length of a feather, measured in stem arc, is equal to 71.20 ± 3.65 cm, and chord length is equal to 49.20 ± 1.83 cm. Curvature index, equivalent to ratio between these values, was equal to 1.47 ± 0.12 on average. Variation of curvature index falls within limits from 1.21 to 1.83, which are figures based on feather configuration, where minimal value points to medium arched stem, in the same time maximal value is typical for feathers with spiral bending.

Keywords: *Ostrich Struthio camelus; male feather; curvature index; spiral symmetry.*

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INTRODUCTION:

Industrial using of the ostrich feathers are characterized by wide variety due to some of their anatomical features and commodity-technological properties [1], [2], [3], [4], [5]. For example, a feather stem has a natural curvature, which gives it special aesthetic properties. The graceful curvature of the natural materials is usually taken into account when creating feather products [2]. Besides, the feather of this category has spiral bending at its tip, which allows typifying these feathers as an example of spiral symmetry [6].

The aim of this work is to present a morphometric method, which helps to define the degree of curvature of a feather. Previously this method was proposed to study the curvature of manatee's (*Trichechus manatus*) ribs [7].

MATERIAL AND METHODS:

We obtained the material for research from ostriches living in the farm "Russian Ostrich" (the Starie Kuzmenki village in Serpukhovsky district of Moscow region). Five white primary wing feathers ($n = 5$) of an adult male of the ostrich *Struthio camelus* Linnaeus, 1758 were studied, using a flexible ruler to measure linear parameters of a stem. Curvature index (I_c), which is dimensionless, was calculated by the formula $I_c = L / \ell$, where L – feather length, measured in a stem arc, cm; ℓ – feather length, measured in a stem chord, cm (Fig. 1). The measurements are mentioned in Table 1. To analyze the results we use methods of variation statistics [8]. Raw data were statistically processed in the computer program "STATISTICA 10" (StatSoft, USA).

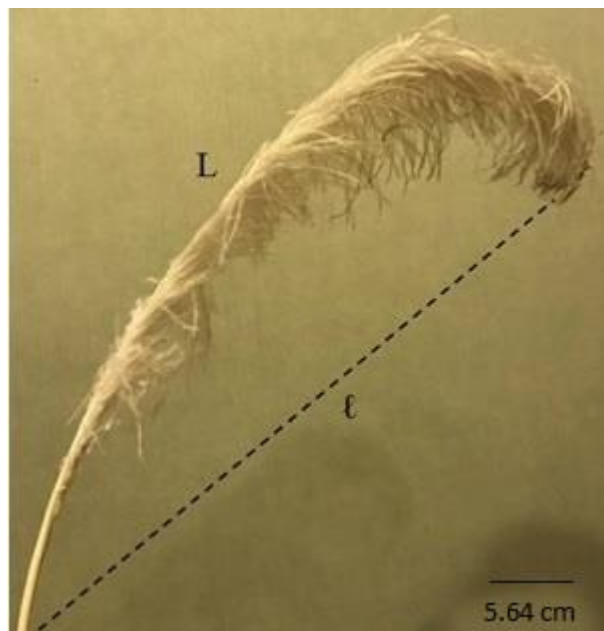


Fig. 1. Determination of white feather curvature of Ostrich *Struthio camelus*: L – feather length in the stem arc; ℓ – feather length in the stem chord. Photo by A.B. Kiladze

Table 1

Elementary measurements of primary wing feathers' length of the Ostrich *Struthio camelus* (related to Table 2)

Number of a feather	Length of the feather, cm		Feather curvature index ($I_c = L / \ell$)
	in the stem arc (L)	in the stem chord (ℓ)	
1	84	46	1.83
2	74	44	1.68
3	65	53	1.23
4	64	53	1.21
5	69	50	1.38

RESULTS:

White primary wing feathers of the male have the large size and wide vane. To determine feather curvature,

we defined length of the stem arc and chord. Calculation of ratio between both parameters allowed us to calculate the feather curvature index (Table 2).

Table 2

Morphometric parameters of a white feather of Ostrich *Struthio camelus*

Features of the feather	Statistical parameters ($n = 5$)*			
	M \pm m	Lim	$\pm \sigma$	Cv, %
Length in the stem arc (L), cm	71.20 \pm 3.65	64.00 – 84.00	8.17	11.47
Length in the chord (ℓ), cm	49.20 \pm 1.83	44.00 – 53.00	4.09	8.31
Curvature index ($I_c = L / \ell$)	1.47 \pm 0.12	1.21 – 1.83	0.28	19.05

*Note: n is the number of measurements; M \pm m is the arithmetic mean with the error of the arithmetic mean; Lim, limits of the parameter; $\pm \sigma$ is the standard deviation; Cv is the coefficient of variation.

Feather curvature index differs by specific dispersion. However, the minimal value ($I_c = 1.21$) is typical for medium-arched feathers, which are not spin at the tips. The maximal value of curvature index ($I_c = 1.83$) is typical for feathers, which have natural bending throughout stem and clear spiral bending of the tips. Average length of stem arc is 1.47 times larger than chord's one.

DISCUSSION:

These scientific data have practical value. (i) It is necessary to consider the data on morphological and biological studies in comparative taxonomic analysis and forensic biological expertise [9]. (ii) The data are important in engineering and manufacturing, as the ostrich's feather products from farming constitute a significant raw of material base for light industry [4]. (iii) Data on feather curvature is essential in performing logistic and production operations (transportation, storage, package, feathers' selection into production crew by straightness degrees, etc.) [3].

CONCLUSION:

Thus, the study of feather curvature allows not only to add knowledge about the morphology of these derivatives of ostrich skin, but also to analyze this property from a technological point of view.

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