THE BEARD OF THE WILD TURKEY

BY A. W. SCHORGER

THE appendage on the breast of the Turkey (*Meleagris gallopavo*), commonly called the beard, is unique in its development. Previous investigators have examined the beard of the domestic bird. Nitzsch (1867) stated that the bristles of which the beard is composed are hollow and devoid of barbs. A more detailed examination by Ficalbi (1891) led to the conclusion that the bristle is intermediate between a feather and a hair. De Meijere (1895), in his excellent discussion of filoplumes, considered Ficalbi's conclusion to be weak and called attention to the fact that structures somewhat analagous to the beard are fairly common in the Galliformes. The most thorough study of the morphology of the bristles and the histology of the prominence from which they arise was made by Bulliard (1926).

No prior investigation of the beard of the Wild Turkey appears to have been made. It was hoped that the shape of the cross section or some other character of the bristle would be found that would permit distinguishing between the wild and domestic birds, and between races of the wild bird. While this did not prove to be the case, the beard nevertheless has some interesting features.

A significant characteristic is the extent to which the bristles are arranged in bundles to give the appearance of branching (Plate 23). This is not true branching, since by the aid of a needle it is easily possible in most cases to separate the bundle into its components, the cementing material being detached as scales. Occasionally, however, two bristles were found so tightly cemented for distances up to 190 millimeters that mechanical separation was impossible. An extreme case of adhesion was found in a bristle of the Domestic Turkey (Plate 23). Here separation was accomplished with difficulty even with the use of sodium hydroxide. The extent of branching varies with the individual and has no relation to race. The four bundles illustrated, taken from the beard of a Florida Turkey (*M. g. osceola*), show from 3 to 14 bristles, the latter number being the maximum found in any beard. A beard of Merriam's Turkey (*M. g. merriami*) contained 459 bristles of which only 134 (29 per cent) were singles, the remainder being in bundles of two to nine. In each bundle, the bristles issued from a single follicle.

The total number of bristles in a beard shows considerable variation and has no relation to race or to the length of the beard, hence age. The number of bristles and their maximum length are shown in Table 1. One specimen of a double beard was examined, Nos. 3a and 3b representing respectively the upper and lower beards.

TABLE 1

NUMBER OF BRISTLES AND MAXIMUM LENGTH

Race	*Number*	*Area*	*Number of bristles*	*Maximum length (mm.)*
	1	Thomas Co., Ga.	254	273
	2	Cumberland Co., Va.	677	260
M. g. silvestris	3a	Stone Co., Miss.	254	255
	3b	Stone Co., Miss.	152	273
	4	Perry Co., Miss.	514	305
	5	Pocahontas Co., W. Va.	476	178
M. g. osceola	6	Glades Co., Fla.	347	193
	7	Glades Co., Fla.	514	325*
	8	Kerr Co., Texas	569	210
M. g. intermedia	9	Kerr Co., Texas	279	236
	10	Kerr Co., Texas	476	222
M. g. merriami	11	Navajo Co., Ariz.	213	139
	12	Navajo Co., Ariz.	459	238

* Single bristle. The next longest was 275 millimeters.

The Turkeys from the Thomasville, Georgia, area are considered to be intermediate between the Eastern and Florida races. Herbert Stoddard, from whom specimen No. 1 was obtained, informs me that the diagnostic characters favor the Florida race. I have placed it under the Eastern race since it resembles the latter in the coarseness and rectangular shape of the bristles.

The diameters of the bristles are shown in Table 2. The measurements are based on five bristles taken from each specimen. The greatest width was taken as the basis for comparison. Before the measurements were taken, the base of the bristle was drawn through a fold of fine emery cloth to remove the white scale-like coating. The readings were taken one centimeter from each extremity. There is no consistency in the diametric data. The bristles of the Florida Turkey appear to the naked eye to be decidedly more slender than those of the other races, yet the measurements can be matched by a specimen of the Eastern Turkey (No. 2) and Merriam's Turkey (No. 11). The consistently slight tapering of the bristles is believed to be due to their rubbing against each other and to contact with vegetation through which the Turkey passes.

Difficulty was encountered in making thin cross sections. The bristle is hard and brittle. A conchoidal surface is obtained by sectioning in the dry condition, and it is almost impossible to cut a

TABLE 2

DIAMETERS OF BRISTLES (IN MILLIMETERS).

Race	*Number*	*Average length of bristles measured*	*Diameter*					
			Base		*Middle*		*Tip*	
			Range	*Average*	*Range*	*Average*	*Range*	*Average*
M. g. silvestris	1	210	0.22–0.33	0.29	0.22–0.29	0.26	0.18–0.27	0.23
	2	241	0.17–0.24	0.21	0.16–0.20	0.18	0.15–0.18	0.16
	3a	237	0.22–0.29	0.26	0.17–0.26	0.21	0.16–0.23	0.19
	3b	232	0.26–0.29	0.28	0.23–0.26	0.24	0.18–0.26	0.22
	4	263	0.22–0.29	0.25	0.18–0.28	0.22	0.18–0.22	0.20
	5	167	0.20–0.24	0.22	0.15–0.22	0.18	0.11–0.22	0.16
M. g. osceola	6	135	0.15–0.22	0.19	0.14–0.22	0.17	0.11–0.18	0.14
	7	217	0.16–0.23	0.19	0.15–0.22	0.18	0.14–0.17	0.16
M. g. intermedia	8	215	0.26–0.28	0.27	0.18–0.23	0.21	0.17–0.20	0.18
	9	192	0.17–0.26	0.20	0.16–0.20	0.17	0.13–0.20	0.16
	10	187	0.18–0.22	0.20	0.15–0.22	0.19	0.12–0.19	0.16
M. g. merriami	11	130	0.15–0.18	0.16	0.13–0.17	0.15	0.11–0.15	0.13
	12	197	0.21–0.29	0.25	0.20–0.27	0.24	0.16–0.23	0.20
	13*	208	0.22–0.22	0.22	0.22–0.22	0.22	0.17–0.22	0.20

* Two bristles only.

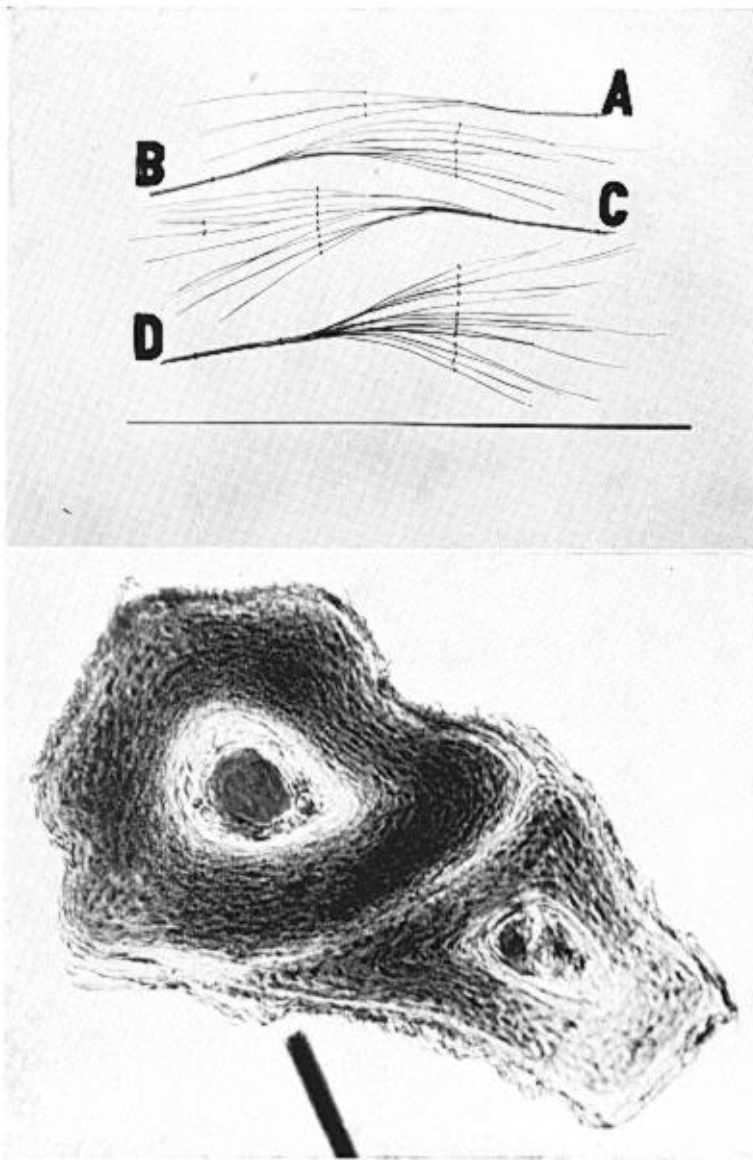
thin section without fracture. Dilute alkalis swell and soften the bristle readily, but the section on drying seldom returns to its original shape. The problem was solved by using wetting compounds, which are generally the sodium salts of organic sulphonates. They are available as commercial washing compounds. If a section of a bristle is left in a one per cent solution of a wetting agent for 24 to 48 hours, only a small amount of water is absorbed but it is sufficient to permit satisfactory cutting.

The bristle treated with a wetting agent is not sufficiently soft to be sectioned satisfactorily by embedding in paraffin. Mathiak (1938) has described a method of sectioning hairs by embedding them in collodion applied to the surface of a strip of balsa wood. With the bristles, the amount of collodion required to hold them firmly was too great to permit easy cutting. A modified technique, however, gave satisfactory results. Two strips of balsa wood, 25 × 5 × 3 millimeters, were coated on one surface with collodion. As soon as this coating turned white, a second thin layer of collodion was applied. The softened bristle was placed on the collodion of one strip of balsa wood, the second strip superimposed, a small paper clamp applied, and the bristle allowed to stand for 30 minutes. Very thin sections, with practice, could then be cut by hand with a Gillette razor blade. The section was then placed on a glass slide and the excess wood cut away. Application of a lacquer solvent and teasing with a needle freed the section of bristle from the magma.

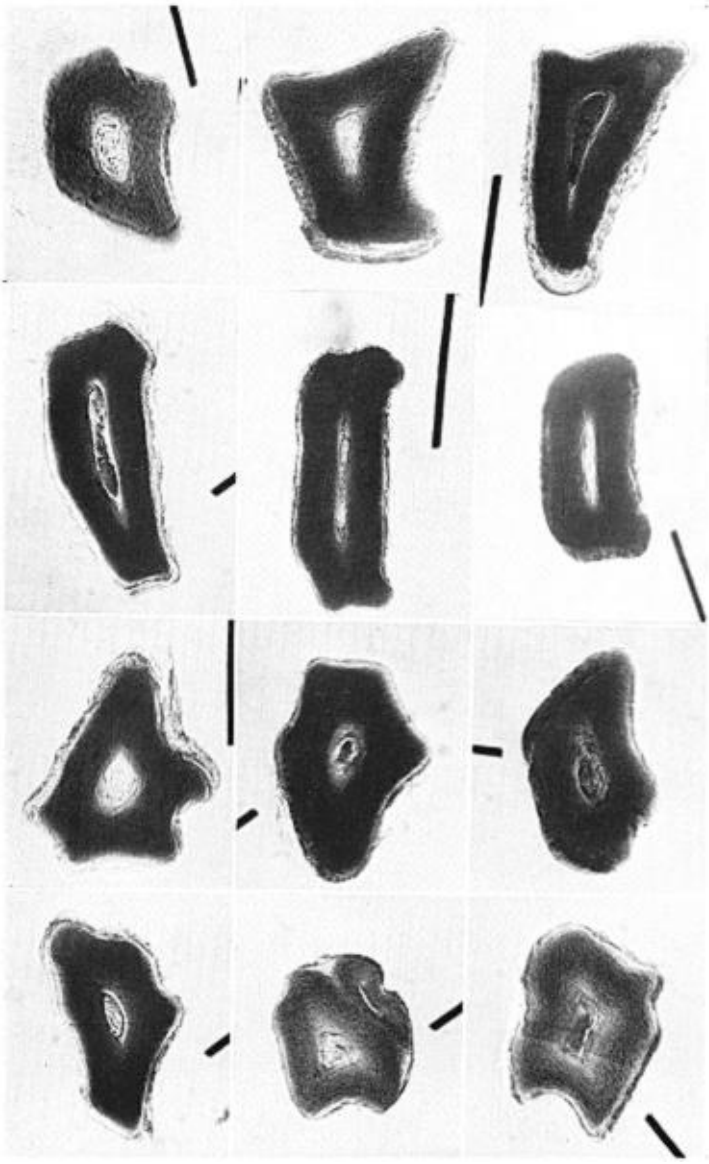
Hundreds of cross sections were made, but no regularity in shape could be found (Plate 24). The shape varies in a single bristle and between bristles from the same specimen. No such irregularity exists in contour feathers and mammalian hairs. In general the cross section of a bristle from the Eastern Turkey is roughly rectangular, but cross sections are found the shapes of which can be matched quite well by those of other races.

No chemical or mechanical method was found for isolating the structural units of the bristle. Under the microscope these are crescent-shaped and arranged in circles. Most of the melanin is deposited at the points of overlap.

There are other peculiarities of the bristles to which attention should be called. They grow continuously. On April 2, 1956, two male domestic Bronze Turkeys, eleven months of age, were secured from Professor John L. Adams and placed in the Vilas Park Zoo for the purpose of determining the rate of growth of the beard. The beards of both specimens had a maximum length of 64 millimeters. They were clipped to a length of 25 millimeters to minimize wear of



TURKEY BRISTLES. (*Above*) Bundles of Bristles from the Florida Wild Turkey. (*Below*) Intergrowth of Two Bristles of the Domestic Bronze Turkey.



CROSS SECTIONS OF BRISTLES FROM FOUR RACES OF THE WILD TURKEY. (*Left to right*) Base, middle, and tip of bristles (*Top to bottom*) *M. g. merriami*, *M. g silvestris*, *M. g. osceola*, and *M. g. intermedia*.

the new growth. A year later, April 18, 1957, the beards showed growths of 130 and 133 millimeters respectively. All the bristles in the beard of one specimen showed full growth. On the other hand, with the second bird, the lower half of the beard, comprising approximately 50 per cent of the bristles, showed no growth at all. I have no explanation for this phenomenon. Maximum growth of the bristles cannot be determined accurately because of wear and breakage at the ends. A length of 311 millimeters recorded for a male Wild Turkey in Virginia appears to be close to the maximum attainable.

Nearly every beard, regardless of its length, will show an occasional comparatively young bristle. The latter is easily recognizable, since the tip is sharp-pointed and colored light buff in contrast with the black color of the remainder of the bristle. Unless protected by being situated in the interior of the beard, the tip soon breaks off. Bristles with tips intact, ranging from 11 to 135 millimeters, have been observed. It is not known whether they result from infrequent shedding, from cessation of growth, or from the formation of new papillae in the follicle.

Usually only one beard is present on an individual, but multiple beards are known. I have before me a photograph showing five distinct beards on a male Rio Grande Turkey. This number has also been recorded on a female Domestic Turkey.

The beard is a poor sex character. Castration of young males does not prevent growth of the beard, and its development is therefore independent of a male hormone. It is usually found on the male but occurs quite frequently on females, particularly of the domestic strains. Information on the occurrence of a beard in the female Wild Turkey is scanty. According to Audubon (1831), females show a beard after attaining an age of three to four years. Unfortunately there is no reliable method of aging a female that is more than a year old. McDowell (1954) examined 557 female Wild Turkeys killed by hunters in Virginia and found that only four had beards. This is less than one per cent. In contrast, of 230 pen-reared female Wild Turkeys, having an age of 14 months, 17 (7.4 per cent) "bore beards that protruded beyond the contour breast feathers." Since every female has the prominence from which a beard may arise, it is necessary to part the breast feathers to determine whether a beard is present.

Incidence of beards in female Domestic Turkeys is occasionally high. Stanley J. Marsden of the Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Maryland, in March, 1957, kindly examined 1373 Beltsville Small White females from

6 to 11 months of age. He found that 122 (8.9 per cent) had beards ranging in length from 3 to 63 millimeters, the average being 26 millimeters. Particularly interesting was his discovery of three females with multiple beards, two, three, and five respectively. McDowell (*op. cit.*) has suggested that the high incidence of beards in pen-reared female Wild Turkeys may be due to nutritional or genetic factors.

The classification of the bristles offers a problem. The absence of barbs and the presence of a pithy central cavity do not permit them to fall within the commonly accepted definition of a filoplume. On the other hand, seemingly of more importance is the fact that several bristles, as in the filoplumes, emerge from a single follicle. It would be difficult not to accept de Meijere's (*op. cit.*, pp. 569–570) opinion that filoplumes are rudimentary and that a central filoplume developed into a modern feather at the expense of its neighbors. It is inconceivable that the present contour feather arrived full-blown. The first feather was probably a solid shaft. In the next stage the pithy medulla developed, producing a *mesofiloplume*, of which the Turkey bristle is an example. It will be noted from the cross-sections that the medulla of the bristle is still very narrow in comparison with that of a contour feather. The final stage would be the development of barbs, barbules, and barbicels. De Meijere has suggested that birds were at one time covered entirely with filoplumes, and Bulliard expressed the belief that the bristles of the Turkey are allied to contour feathers.

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LITERATURE CITED

AUDUBON, J. J. 1831. Ornithological biography. Edinburgh, Adam Black, 1: 15.

BULLIARD, H. 1926. La brosse du dindon (Meleagris gallopavo L.). Comp. Rend. Ass. Anat. Nancy, **21**: 132–145.

DE MEIJERE, J. C. H. 1895. Über die Federn der Vögel, insbesondere über ihre Anordnung. Morph. Jahrb., **23**: 562–591.

FICALBI, E. 1891. Sulla architettura istologica di alcuni peli degli uccelli con considerazioni sulla filogenia. Mem. Soc. Tosc. Sci. Nat., **11**: 227–266.

MATHIAK, H. A. 1938. A rapid method of cross-sectioning mammalian hairs. Journ. Wildl. Mgt., **2**: 162–164.

MCDOWELL, R. D. 1954. Productivity of the wild turkey in Virginia. Ph.D. Thesis, Va. Polytechnic Institute, p. 45.

NITZSCH, C. L. 1867. Pterylography. London, R. Hardwicke, p. 114.

College of Agriculture, University of Wisconsin, Madison 6, Wisconsin, May 2, 1957.