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CUTICULAR SCALE PATTERNS OF THE GUARD HAIR OF SOME GAME ANIMALS

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Patterns of cuticular scales on the shaft of the guard hairs of spotted deer (Axis axis), hog deer (Axis porcinus), samber (Cervus unicolor), roe deer (Capreolus capreolus), neilgai (Boselaphus tragocamelus), black buck (Antilope cervicapra), chinkara (Gazella gazella), and urial (Ovis orientalis) were studied. The cuticular scale patterns were diagnostic and easily led to species identification. Data on the total length and maximum diameter of the shaft of the guard hairs were also documented.

INTRODUCTION

The cuticular scale patterns of the guard hairs have been used by a number of workers (Mathiak, 1938; Mayer, 1952; Stains, 1958) to prepare field guides for the identification of mammals. Such guides are particularly useful in knowing the importance of prey mammals in the diet of their predators. The hair being a keratinous structure passes undamaged through the alimentary canal of predators and hence the cuticular configuration of hairs present in the scats of predators can be used for identifying the mammalian preys eaten by the predators. This paper describes the cuticular configuration of the guard hairs of four cervids, namely, spotted deer (Axis axis), hog deer (Axis porcinus), samber (Cervus unicolor), and roe deer (Capreolus capreolus), and four bovids, namely, neilgai (Boselaphus tragocamelus), black buck (Antilope cervicapra), chinkara (Gazella gazella) and urial (Ovis orientalis).

MATERIALS AND METHODS

The samples of the hair of A. porcinus, G. gazella, A. cervicapra, and O. orientalis were obtained from the animals housed in Lahore Zoo, of A. axis, C. unicolor, and B. tragocamelus from Bahawalpur Zoo, and C. capreolus from a stuffed specimen housed in the Zoology Museum of the University of Agriculture, Faisalabad.

To study the cuticular scale patterns of the hair, impressions of their cuticular surface were obtained in the following manner. The hairs were washed in alcohol and thoroughly dried in air. A film of commercial glue "Pan fix" was prepared on a microscope slide and a hair fiber was put on this film for about 2 to 3 minutes and then was carefully picked up with the help of a pair of forceps. Photographs of the impressions of the cuticular scales of the mid-shaft of the hair thus formed were taken at 315 x magnification.

RESULTS

Spotted deer (A. axis)

Total length of the shaft: Not available.

Max. diameter: $\bar{X}$ = 0.158 mm (R = 0.76 - 0.24; N = 10).

Middle portion: Scales are like flattened and irregular bands (Fig 1a). There is an average of eight scales per .05 mm length of the shaft.

Distal portion: Scales are wavy; an average of 10 scales per .05 mm of the shaft.

Hog deer (A. porcinus)

Total length of the shaft: $\bar{X}$ = 38.9 mm (R = 14 - 65; N = 10).

Max. diameters: $\bar{X}$ = 0.13 mm (R = 0.084 - 0.264; N = 10).

Basal portion: Scales are crenate and look like transversely arranged bands; an average of seven scales per .05 mm length of the shaft.

Middle portion: Scales are flattened and crenate (Fig 1b); an average of eight scales per .055 mm length of the shaft.

Distal portion: Scales flattened with crenate margin; an average of 11 scales per .05 mm length of the shaft.

Samber (C. unicolor)

Total length of the shaft: $\bar{X}$ = 59.2 mm (R = 19 - 92; N = 10).

Max. diameter: $\bar{X}$ = 0.156 mm (R = 0.084 - 0.204; N = 10).

Basal portion: Scales are flattened, wavy and crenate; an average of 12 scales per .05 mm length of the shaft.

Middle portion: Flattened and irregular crenate band like scales; an average of nine scales per .05 mm length of the shaft (Fig 1c).

Distal portion: Flattened and crenate; an average of 12 ales per .05 mm length of the shaft.

Roe deer (C. capreolus)

Total length of the shaft: $\bar{X}$ = 25.3 (R = 18 - 35; N = 10).

Max. diameter: $\bar{X}$ = 0.144 mm (R = 0.096 - 0.0180; N = 10).

Basal portion: Scales are wide and flattened; an average of six scales per .05 mm length of the shaft.

Middle portion: Wide, flattened and denntate scales; an average of six scales per .05 mm length of the shaft (Fig 1d).

Distal portion: Scales are compressed, crenate and irregular in shape; an average of eight scales per .05 mm length of the shaft.

Neilgai (B. tragocamelus)

Total length of the shaft: $\bar{X}$ = 38.1 mm (R = 29 - 45; N = 8).

Max. diameter: $\bar{X}$ = 0.116 (R = 0.096 - 0.144; N = 8).

Basal portion: Transversely arranged crenate scales; an average of 10 scales per .05 mm length of the shaft.

Middle portion: Crenate scales; an average of 10 scales per .05 mm length of the shaft (Fig 1e).

Distal portion: Wavy and crenate; an average of eight scales per .05 mm length of the shaft.

Black buck (A. cervicapra)

Total length of the shaft: Not available.

Max. diameter: $\bar{X}$ = 0.122 (R = 0.072 - 0.150; N = 10).

Middle portion: Scales are wide, flattened and crenate; an average of five scales per .05 mm length of the shaft (Fig 1f).

Distal portion: Scales are like those of middle portion and crenate; an average of five scales per .05 mm length of the shaft.

Chinkara (G. gazella)

Total length of the shaft: $\bar{X}$ = 53.8 mm (R = 35 - 68; N = 8).

Max. diameter: $\bar{X}$ = 0.101 mm (R = 0.084 - 0.144; N = 8).

Basal portion: Scale nearly rhomboid and crenate; an average of seven scales per .05 mm length of the shaft.

Middle portion: Flattened, crenate and irregular in shape; an average of seven scales per .05 mm length of the shaft (Fig 1g).

Distal portion: Simple, coronal and crenate scales; an average of nine scales per .05 mm length of the shaft.

Urial (O. orientalis)

Total length of the shaft: $\bar{X}$ = 48.1 mm (R = 35 - 69; N = 10).

Max. diameter: $\bar{X}$ = 0.236 mm (R = 0.204 - 0.274; N = 10).

Basal portion: Scales are wide and flattened and tend to be rhombodial; an average of five scales per .05 mm length of the shaft.

Middle portion: A mosaic of rhomboidal scales; an average of four scales per .05 mm length of the shaft (Fig 1h).

Distal portion: Flat and dentate scales; an average of five scales per .05 mm length of the shaft.

DISCUSSION

A cursory look at Fig 1 reveals that the configuration of the cuticular scales of the mid-shaft of the hair of C. unicolor,

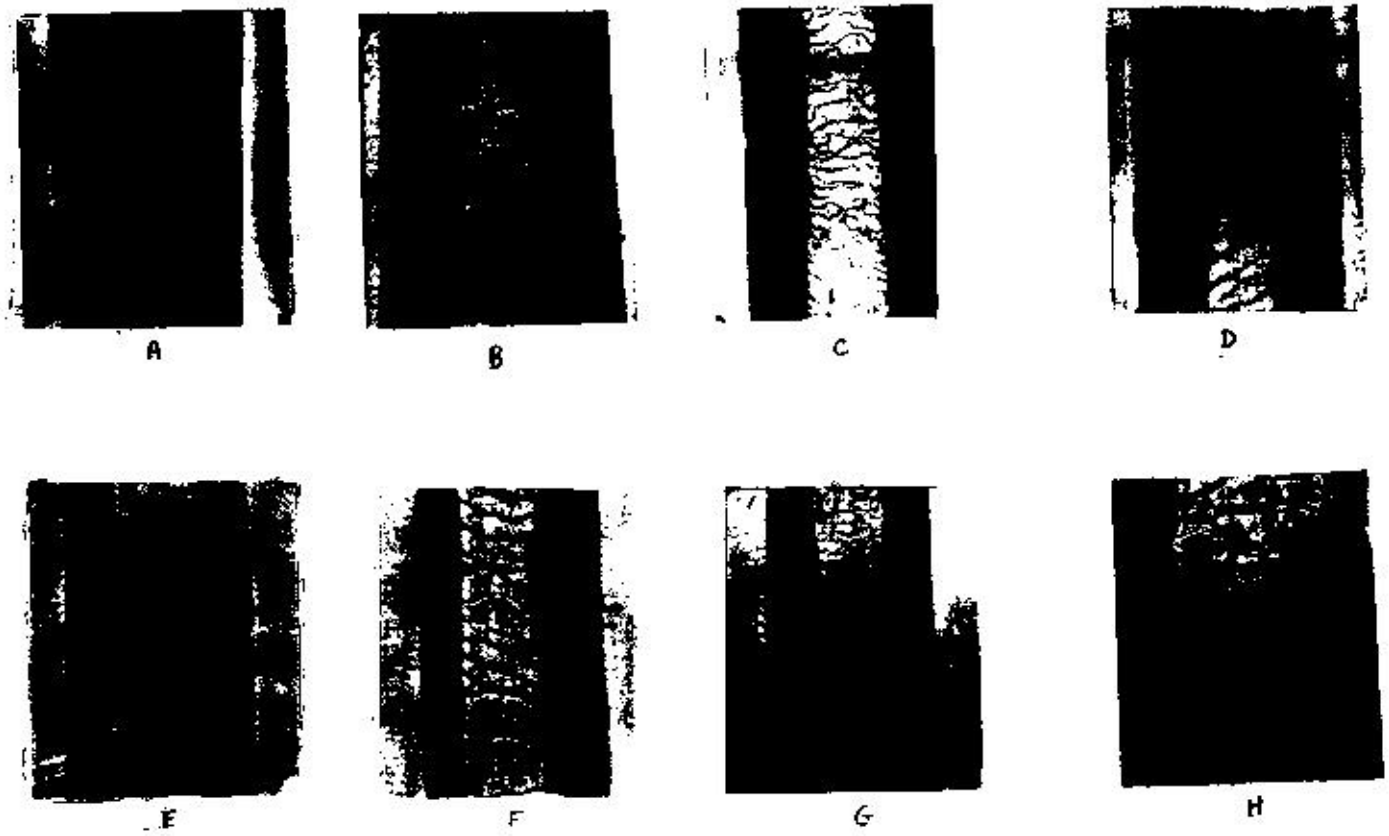

Fig 1. Cuticular scale patterns of the mid-shaft of the guard hairs of spotted deer (a), hog deer (b), samber (c), roe deer (d), neilgai (e), black buck (f), chinkara (g) and urial (h). Magnification 315X.

G. gazella, B. tragocamelus are roughly similar in appearance and thus may confuse an inexperienced eye. However, a closer look at these configurations would reveal differences in the shape, margin and compactness of these scales. Furthermore, the length and the diameter of the shaft may also be helpful in making correct decisions. Being distinctly different, the cuticular scale patterns of the remaining five species pose no problem. Thus, cuticular patterns alongwith other characters of the hairs of the eight artiodactylan species, namely A. axis, A. porcinus, C. unicolor, C. capreolus, B. tragocamelus, A. cervicapra, G. gazella and O. orientalis are sufficiently distinct and as such they are useful in identifying these species.

Some workers (Cole, 1924; Nason, 1948; Benedict, 1957; Miles, 1965) are of the opinion that cuticular scales of the hair of bat are of no taxonomic value below generic level. Homan and Genoways (1978) arrived at the same conclusion after studying the hair of heteromyid rodents. Short (1978) is of the opinion that surface configuration of the hair is useless for identifying the mammalian species and the scale patterns are more related to hair morphology than to taxonomic grouping. But, Trapp (1980) from his studies on cuticular scales of the hair shafts of different species of murid and cricetid rodents concluded that the scales varied in different species and their size was independent of hair length and thickness.

Hess et al. (1985) have reported that the cuticular scale patterns of the hair of Tayassuidae and Suidae did not differ significantly. But, there are workers (Mathiak, 1938; Mayer, 1952 and Adorjan and Kolenosky, 1969) who have used the characteristics of hairs found in the scats of predators for identifying species of mammals eaten by them. As regards the mammalian fauna of Pakistan, there is general paucity of congeneric species and hence the pattern of cuticular scales of hair shaft can be used with confidence for identifying the prey species.

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