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INCREASE IN MEDULLARY INDEX OF HUMAN HAIR WITH THE PASSAGE OF TIME

H. S. LONGIA

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Hair primarily consists of a bundle of fibrils, each of which is composed of a chemically inert protein known as keratin or albuminoid, which forms the main part of it, the cortex, and surrounding the inner core, medulla. The outer layer of flat, non-nucleated, pigment-free cells surrounds the cortex—the cuticle or scales. Cortex further contains countless small pigment granules similar to the core found in the medulla. These are melanin granules, varying in size and distribution, and they give color to the hair which is otherwise grey or white. These granules are insoluble in organic solvents but are soluble in strong alkalis such as KOH and NaOH. Another characteristic of these granules is the facility with which they are bleached by strong oxidizing agents such as hydrogen peroxide, acid chlorate, potassium permanganate, ferric chloride, etc. For forensic purposes these melanins carry

important value, as on the basis of their color and distribution, much of the information about identification, origin, comparison, and individualization of hair depends.

The pigments, which are solid bodies, may disappear from hairs due to diseases or old age, leaving in turn small cavities. These cavities, countless in number, squeeze and ultimately fuse to disappear with the passage of time, causing decrease in the girth of the hair as compared to the girth of the same hair when the pigments were present. (Compare figures 1 and 2, hairs from the same person.) This will result in increase of the medullary index, which is the ratio between the width of the medulla and width of the hair at a particular point:

$$\text{Medullary Index} = M/I = \frac{\text{width of the medulla}}{\text{width of the hair}}$$

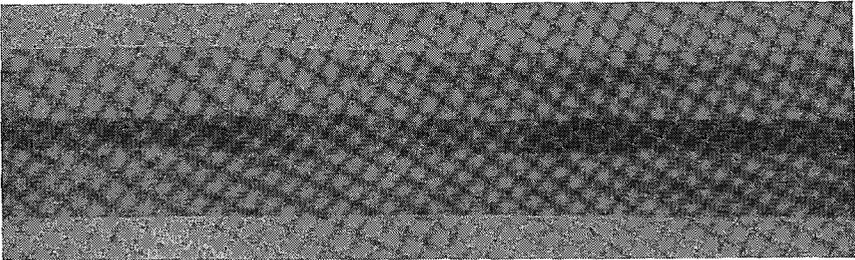


FIGURE 1
Black medullated head hair of Punjabi male.

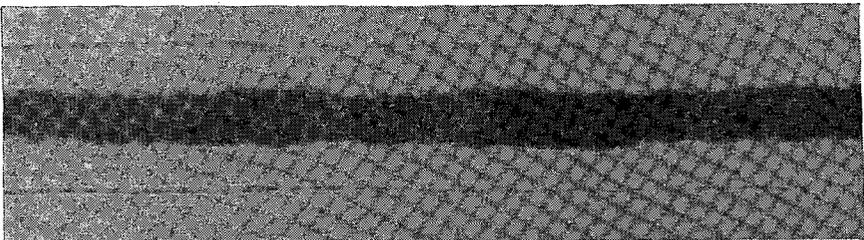


FIGURE 2
Grey medullated head hair of the same Punjabi male.

The recognition of this change in medullary index with the loss of pigments is based on observations drawn from data collected from black and grey crown hair of five Punjabi male individuals of different ages and is given in the table.

The preliminary study was undertaken to suggest the idea of this change in medullary indices with the loss of pigments to other workers engaged in the field of forensic sciences, so that the increase in medullary indices in human hair will not lead to their being erroneously identified as hairs from animals.

Sr. No. of Individuals Examined	Age of Each Individual in Years]	No. of Hair Examined Black/White	Range of Medullary Indices.	
			Black	White
1.	30	20/20	.190-.220	.215-.228
2.	32	20/20	.195-.224	.232-.238
3.	42	15/15	.200-.269	.271-.391
4.	45	22/18	.175-.197	.217-.255
5.	67	15/15	.231-.238	.254-.375

Range of M/I in black hair of all the five individuals .175-.269.

Range of M/I in white hair of all the five individuals .215-.391.