

HAIR FROM PARACAS INDIAN MUMMIES

MILDRED TROTTER

Department of Anatomy, Washington University, Saint Louis, Missouri

TWO FIGURES

During his visit to Peru in 1941 Dr. T. D. Stewart examined a small series of Paracas Indian mummies collected by Dr. Julio C. Tello in 1925.¹ These mummies are preserved in the Museo de Antropología at Magdalena Vieja, a suburb of Lima, and are identified as yet only by the collector's numbers. In connection with his examination Doctor Stewart secured pieces of scalp from ten of the mummies. These hair samples form the basis of the present report.

Examination of hair from mummies is not a new field of study. Peter Browne (1853) who first suggested a correlation between race and the shape of the cross section of hair may have included hair from mummies among his material. In a contribution made later (1860) to a collective study on the American Indian, Browne examined hair from ten individuals of whom six were mummies. Woodbury and Woodbury ('32) studied differences between certain of the North American Indian tribes; of these, two were prehistoric tribes, viz., the Basket Maker and Mesa Verde Indians.

The present series is comprised of two females (234 and 310-77) and eight males; one individual in each group had been classified as "young" (38 and 310-77) and there was some evidence that the others were old since the sample in each case was interspersed with very light yellow hairs which may be assumed to have been white. In general, the color was a rusty brown and gave the appearance of having faded.

¹ Doctor Stewart's findings are given on pages 47-64 of this number of the Journal.

These hairs fluoresced; the lightish or yellowish ones more brilliantly than the darker hairs (Figge, '42). In all cases the hairs were extremely brittle and had to be handled with greatest care. With one exception, the samples were generous, consisting of pieces of scalp with diameters of approximately 4 or 5 cm. bearing hairs which in half the cases including the females were as long as 20 cm. or more, and very much shorter in the remainder. In all samples the hair had cut ends. There was no indication of, and no way was found to determine, the region of the head from which the samples were taken. The hair of mummies 94 and 310 was quite definitely wavy; that of the others appeared to be straight.

The determination of shape and size of the hair shaft may be made on the cross section of the shaft. It was found that these fragile hairs could be sectioned transversely with the Hardy device. This instrument has been described by Doctor Hardy ('35) and its application to the study of human hair was made by Steggerda ('40). The procedure used on the hairs from the Paracas mummies was as follows: a lock of the hair was cut at a distance of approximately $\frac{1}{2}$ –1 cm. from the scalp; washed in ether-alcohol and allowed to dry; sectioned transversely near the proximal end with the aid of the Hardy device; and mounted on a slide in Canada Balsam.

The slide was projected onto a sheet of "Kodaloid." This is a celluloid-composition material whose weight-area ratio is known and has been used before in the study of hair (Trotter, '30). The projection was made from an inverted microscope at a distance which produced a magnification of 355x. The outlines of the cross sections of the hairs were drawn on the Kodaloid and the scale from a slide micrometer was projected at the same distance. Thus, the measurement of the diameters of the hairs could be made directly by means of the projected scale. Finally the cross section outlines were cut out and weighed and the area equivalent to the weight was determined.

On each slide the entire number of cross sections was considered and all, with the exception of number 243, afforded a



Fig. 1 Photographs of hair samples from Paracas mummies, number 234 and number 310, showing on the one hand hair which is relatively straight and, on the other, hair which is definitely wavy. Magnification approximately $\times 4$.

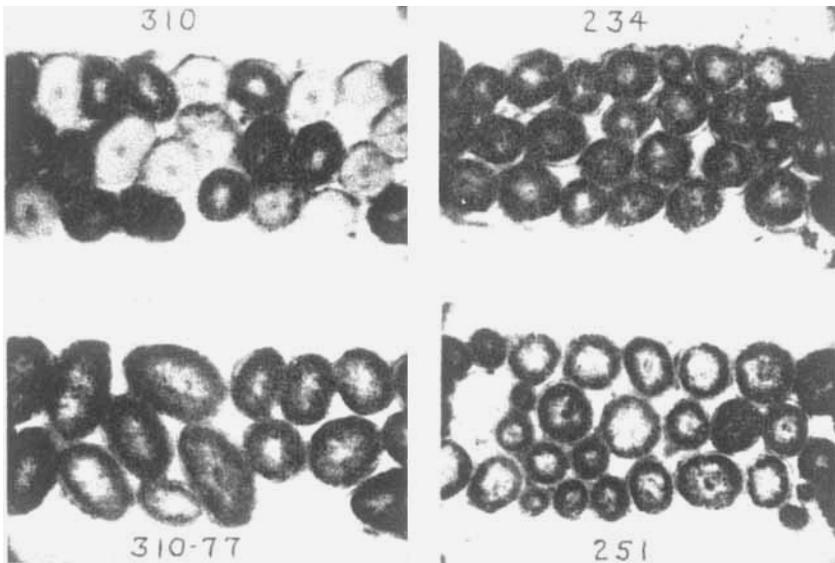


Fig. 2 Cross sections of hair from four Paracas mummies, numbers 234, 251, 310 and 310-77, showing variations in size and shape. Magnification approximately $\times 100$.

reasonable number for statistical consideration. It has been assumed that these mummies are all from one racial stock, therefore this analysis must necessarily be one of individual variation from an intraracial standpoint.

FORM

The means for the indices $\left(\frac{\text{smallest diameter} \times 100}{\text{greatest diameter}}\right)$ of the ten samples in the series shown in table 1 indicate a range of 16 points, viz., from 70 to 86. This spread covers all divisions of hair form according to Martin ('28) who considered hair with an index of 50-75 to be curly; 75-80 wavy; and 80-100 to be straight. It is of interest that two samples (94 and 310) were wavy, if not curly, in the gross specimen and that two other samples, whose indices were even lower (392 and 310-77) appeared to be straight. The range of means for the indices of ten Negroes found by Steggerda and Seibert ('41) amounted to 17 points.

However, the hair of the total group of Paracas mummies shows a mean of 81.81 for the index which stands midway between Woodbury and Woodbury's findings for the Mesa Verde Indians of 79.77 and for the Basket Maker Indians of 82.81. It is within the range of indices reported by Steggerda and Seibert for the Maya, Hopi, Navajo and Zuni Indians (85.04, 82.98, 82.53, 80.46, respectively).

AREA

The means of the areas of the cross sections of these hairs are recorded in square millimeters in table 2.

The range of the means is wide (.002049-.004740). The square units by which Steggerda and Seibert ('41) have expressed cross section area may be compared directly with the present table by moving the decimal points in their tables four places to the left. Thus, Steggerda and Seibert found a range between the individual Negroes of .002254 sq.mm. (.002845-.005096); these Paracas mummies show a range of .002691. The mean of the cross section areas of the hairs from all these ten mummies is only .002910 sq.mm. or approxi-

mately 30% less than the average mean areas found for the four Indian tribes by Steggerda and Seibert and for the adult French Canadians (.00325-.00423 sq.mm.) by Trotter and Dawson ('34).

Woodbury and Woodbury ('32) followed the suggestion of Martin ('28) and determined the texture of hair by the formula of $\frac{\text{greatest} + \text{least diameters}}{2}$.

TABLE 1
Mean indices of the hair of Paracas mummies.

| INDIVIDUAL | NO. HAIRS | MEAN | S.D. | C.V. |
|------------|-----------|--------------|--------------|--------------|
| 38 | 118 | 84.04 ± .66 | 10.64 ± .47 | 12.66 ± .56 |
| 94 | 77 | 78.66 ± .92 | 11.88 ± .65 | 15.10 ± .82 |
| 190 | 89 | 82.61 ± .82 | 11.40 ± .58 | 13.80 ± .70 |
| 234 | 141 | 85.58 ± .58 | 10.27 ± .41 | 12.00 ± .48 |
| 243 | 15 | 80.10 ± 2.04 | 11.74 ± 1.45 | 14.65 ± 1.80 |
| 251 | 163 | 85.60 ± .49 | 9.34 ± .35 | 10.91 ± .41 |
| 310 | 61 | 77.65 ± .92 | 10.71 ± .65 | 13.79 ± .84 |
| 382 | 133 | 85.09 ± .69 | 11.72 ± .48 | 13.77 ± .57 |
| 392 | 75 | 76.42 ± .89 | 11.46 ± .63 | 15.00 ± .83 |
| 310-77 | 83 | 69.83 ± 1.07 | 14.50 ± .76 | 20.77 ± 1.09 |
| Total | 955 | 81.81 ± .27 | 12.19 ± .19 | 14.90 ± .23 |

TABLE 2
Mean areas (in square millimeters) of the cross sections of the hair of Paracas mummies.

| INDIVIDUAL | NO. HAIRS | MEAN | S.D. | C.V. |
|------------|-----------|--------------------|--------------------|--------------|
| 38 | 118 | .002981 ± .000038 | .000617 ± .000027 | 20.70 ± .91 |
| 94 | 77 | .002607 ± .000064 | .000826 ± .000045 | 31.69 ± 1.72 |
| 190 | 89 | .002864 ± .000075 | .001052 ± .000053 | 36.71 ± 1.86 |
| 234 | 141 | .002339 ± .000035 | .000611 ± .000025 | 26.13 ± 1.05 |
| 243 | 15 | .004358 ± .000175 | .001004 ± .000124 | 23.03 ± 2.84 |
| 251 | 163 | .002049 ± .000044 | .000837 ± .000031 | 40.85 ± 1.53 |
| 310 | 61 | .002966 ± .000050 | .000576 ± .000035 | 19.43 ± 1.19 |
| 382 | 133 | .002437 ± .000040 | .000676 ± .000028 | 27.74 ± 1.15 |
| 392 | 75 | .004582 ± .000106 | .001362 ± .000075 | 29.72 ± 1.64 |
| 310-77 | 83 | .004740 ± .000114 | .001534 ± .000269 | 32.37 ± 1.69 |
| Total | 955 | .002910 ± .0000275 | .001259 ± .0000194 | 43.26 ± .67 |

It has been pointed out (Trotter, '30) that the cross section area is a more critical evaluation of hair texture than the computation of Martin, but for the purpose of comparison with the Woodburys' report on prehistoric Indian tribes the average texture of the hair of each of the Paracas mummies was computed in millimeters. They are as follows:

| INDIVIDUAL | TEXTURE IN MILLIMETERS | INDIVIDUAL | TEXTURE IN MILLIMETERS |
|------------|---------------------------|------------|---------------------------|
| 38 | .06419 | 251 | .05333 |
| 94 | .06188 | 310 | .06594 |
| 190 | .06421 | 382 | .05840 |
| 234 | .05796 | 392 | .08153 |
| 243 | .07667 | 310-77 | .07780 |

Woodbury and Woodbury ('32) found the mean texture of the hair of the Basket Maker Indians to be .08343 mm. and of the Mesa Verde Indians to be .08660 mm.

The hair under examination is small in cross sectional area when compared with hair of both modern and prehistoric Indian tribes and of French Canadians; on the other hand it is larger than the cross section area which Steggerda and Seibert ('41) found for the Dutch (.002250 sq.mm.). The dehydration involved in the process of mummification may have had an appreciable effect on the size of the hair. There is evidence that hair loses some weight after dehydration (Trotter, '36) and such a loss might conceivably be accompanied by a diminution in the cross sectional area of the hair.

SEX DIFFERENCE

The mean indices for the hair of the two females in the group consisted of the lowest and the next to the highest index. Likewise, the mean cross section area was for the female with the high index next to the smallest of the entire group and for the female with the low index the lowest of all the cross section areas. No sex difference is suggested by these extremes.

SUMMARY

The form and size of the hair of ten Paracas mummies showed wide variation. In general, the hair section was

circular and therefore compared favorably with other determinations on both prehistoric and modern Indian hair. The size of the hair was much smaller than has been found for other Indians, but not so small as has been recorded for at least one white racial group. Finally, it should be noted again that along with the small number of individuals in the series there may have been a discrepancy in the part of the scalp from which the samples were derived and that the process of mummification may have reduced the size of the hair.

LITERATURE CITED

- BROWNE, PETER 1853 *Trichologia Mammalia*. Philadelphia.
- 1860 Examination and description of the hair of the head of the North American Indian. In H. R. Schoolcrafts' *Archives of Aboriginal Knowledge*, vol. 3, pp. 375-393.
- FIGGE, FRANK H. J. 1942 Near-ultraviolet rays and fluorescence phenomena as aids to discovery and diagnosis in medicine. *Bull. of School of Med., U. of Maryland*, vol. 26, pp. 165-177.
- HARDY, J. I. 1935 A practical laboratory method of making thin cross-sections of fibers. *Circular 378*, U. S. Dept. Agric., Washington, D. C.
- MARTIN, RUDOLPH 1928 *Lehrbuch der Anthropologie*. Jena.
- STEGGERDA, MORRIS 1940 Cross-sections of human hair from four racial groups. *J. Heredity*, vol. 31, pp. 475-476.
- STEGGERDA, MORRIS, AND HENRI C. SEIBERT 1941 Size and shape of head hair from six racial groups. *J. Heredity*, vol. 32, pp. 315-319.
- TROTTER, MILDRED 1930 The form, size, and color of head hair in American Whites. *Am. J. Phys. Anthropol.*, vol. 14, pp. 433-446.
- 1936 The hair of the Arabs of central Iraq. *Am. J. Phys. Anthropol.*, vol. 21, pp. 423-429.
- TROTTER, MILDRED, AND HELEN L. DAWSON 1934 The hair of French Canadians. *Am. J. Phys. Anthropol.*, vol. 18, pp. 443-457.
- WOODBURY, GEORGE, AND EDNA T. WOODBURY 1932 Differences between certain of the North American Indian tribes as shown by a microscopical study of their head hair. *State Museum, Denver*.