Rushton, J. P. (1990). Sex, ethnicity and hormones. Behavioral and Brain Sciences, 13, 194-195. (Comment).

Sex, ethnicity, and hormones

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Benbow (1988a) has documented sex differences in mathematical ability in various ethnic groups and has reviewed putative physiological correlates of high scores, including sex hormones and myopia. Several commentators raise the question of whether there are ethnic differences in neurohormonal mechanisms, including Kimura (1988) who states that this interface is an "important area of research that has been largely ignored." Here I review the ethnic differences that have been found in mathematical precocity, myopia, hormone levels, and other related variables. By enlarging the network of correlated items of evidence we stand a better chance of finding more feasibly and rigorously testable hypotheses than those we had entertained at the outset. Many items of evidence – each of which, when viewed singly, allows only quite limited inference – may permit much broader inferences when viewed together.

In the United States the proportion of Asian-American students who achieve high mathematics scores (above 650) on the Scholastic Aptitude Test (SAT) is twice the national average, whereas the proportion of black students is less than one-fourth the national average: internationally, fifth- and twelfth-grade level students in both China and Japan score higher than equivalent white Americans (Steen 1987). Epidemiological studies of myopia have also long shown that Orientals > whites > blacks (Post 1962), with a reverse ordering occurring with gonadotropins, particularly follicle-stimulating hormone (Soma, et al. 1975).

More intriguing still, the same pattern of whites scoring *between* Orientals and blacks is to be found across multifarious indices of reproductive restraint such as gamete production (dizygotic birthing frequency per thousand: Orientals < 4; whites = 8; blacks > 16), intercourse frequencies (premarital, marital, extramarital), sexual precocity (age at first intercourse, age at first pregnancy, number of pregnancies), primary sexual characteristics (size of penis, vagina, testes, ovaries), secondary sexual characteristics (salient voice, muscularity, buttocks, breasts), and biologic control of behavior (periodicity of sexual response, predictability of life history from onset of puberty). Concomitant differences are observed with other intellectual functions, social rule following, and temperamental restraint (see Rushton 1988, for review). The pervasiveness of the pattern suggests that the underlying mechanisms are powerful.

It is worth considering whether the ethnic pattern occurs for reasons related to the causes of the sex differences, for mean male/female differences in sexual-social behavioral traits appear to overlap ethnic ones, with females more often being in the "Oriental" direction and males more often being in the "black" direction. Females > males in sexual moderation (gamete production, intercourse frequencies, permissive attitudes) and personal restraint (anxiety, altruism, dependency, sensitivity to social cues, social desirability, social rule following) with, concomitantly, males > females in aggressiveness, activity level, competitiveness, dominance, achievement motivation, curiosity, exploration, strength of self-concept, and confidence level on tasks (Rushton 1984). Curiously, with longevity, the patterning is also female > male, and Orientals > whites > blacks. That myopia and gonadotropin levels are related to sex and ethnic group does not, however, order the data in any simple manner, for they appear to occur in the direction *opposite* to what might be expected given their apparent relationship to mathematical ability. Thus, with myopia, females > males (Post 1962), and in gonadotropin levels, blacks > whites > Orientals (Soma et al. 1975). A complete theory will need to explain all these correlations.

Because almost all the traits being considered show evidence of at least moderate heritability, including spatial IQ (Ashton & Borecki 1987), evolutionary explanations may be applicable. Post (1962) argued that myopia and complex culture evolved together because selection pressures on refractive aberrations are reduced in more developed habitats. This argument received support from within-population comparisons. Thus, among Mongoloids, Eskimos who were hunter-gatherers until recently have less myopia, and among Caucasoids, Jews who have a long cultural tradition, have more myopia. Rushton (1985; 1988; following Wilson 1975) suggested a trade off between gamete production and intellectual functioning with both relating to other characteristics, including longevity. Irrespective of particular theories, it would be highly informative to gather additional data on hormone levels, across populations and between sexes, and to relate them to life history components including mathematical ability and IQ.