

We can, perhaps, best treat this section of the subject by means of a series of theses:

1. The properties which distinguish the individual of any race or family from the individual of any other race or family are to be traced back to the constitution of a single cell, the fertilized ovum, from which that individual has been developed.

2. There must, therefore, be something in the constitution of the germ matter of the parent stock which differentiates it from the germ matter of other stocks. Nay, more, no two individuals appear to possess germ matter of absolutely identical constitution.

3. In individuals of gamogenetic origin, resulting from sexual union, the material contributed to the ovum by the paternal spermatozoon and the maternal ovum is, physiologically speaking, of equal value. As demonstrated by Mendel in his observations upon hybrids, like orders of offspring result whether the male cells of stock A be employed to fertilize the ova of stock B, or the female cells of stock A be fertilized by the male cells of stock B.\*

*It is evident, therefore, that matter of like order is contributed to the fertilized ovum by the two parents.*

4. In studying more narrowly the process of fertilization we find that the only matter contributed correspondingly by both parents is nuclear matter. Ovum and spermatozoon are cells of widely different appearance, and the result of fertilization is that the female cell affords the cytoplasm, or cell substance, of the fertilized ovum; the male cell provides the centrosome. The nucleus of the fertilized ovum or new individual is formed of corresponding amounts of nuclear matter (chromatin) from both parents.

5. Not only is this the case, but, most significantly—I shall take up a probable exception immediately—each supplies a like number of chromatin loops or chromosomes, and, as the fertilized ovum undergoes development and proceeds to divide and redivide, the like process of distribution is continued, so that each separate body cell of the fully developed organism contains equivalent parts of chromatin of paternal and maternal origin.

6. We can proceed yet further and recognize that in certain species, at least, the chromosomes supplied by or derived from either parent, while pairing with like chromosomes from the other parent, are not all identical in appearance and size, but vary among themselves, the variation being constant; that is to say, the same types of chromosomes

---

\* In mammals intrauterine existence would seem to introduce a factor of differentiation. From their mother's womb male and female show constant differences.