52. *Probability theoretic Investigations on Inheritance.* IX_2. *Non-Paternity Concerning Mother-Children Combinations.*

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4. Non-paternity against both children separately.

We have discussed hitherto in the present chapter the problem of proving non-paternity, indifferent to a type of first child, against second child at any rate; it has been a matter of indifference whether the proof of non-paternity against first child is possible or not. We now proceed to the problem of proving non-paternity against both children of the same family separately.

For that purpose, we introduce as basic quantities, besides the probability of mother-children combination defined in (3.1) of IV, that of proving non-paternity of a man chosen at random against both children of a fixed triple; namely, given a triple consisting of a mother A_{ij}, her first child A_{hk} and her second child A_{fg}, we ask at how many rate the non-paternity can be established against both first and second children *separately*, i.e., indifferent to types of second and first children respectively. The probability in question be denoted by

$$V(ij;\ hk,\ fg). \tag{4.1}$$

Of course, only the cases are significant where there exist common suffices between i, j and h, k and between i, j and f, g. Thus, *the probability of proving non-paternity against both children separately*, the combination-probability being also taken into account, is then given by

$$Q(ij;hk,fg)=\pi(ij;hk,fg)\ V(ij;\ hk,fg). \tag{4.2}$$

The quantities (4.1) are evidently symmetric with respect to types of both children; namely, we have

$$V(ij;hk,fg)=V(ij;fg,hk). \tag{4.3}$$

On the other hand, since the probabilities of mother-children combination possess an analogous symmetry character, as noticed in (3.4) of IV, we see that the quantities in (4.2) also satisfy a symmetry relation of the same nature, i.e.,

$$Q(ij;\ hk,fg)=Q(ij;fg,\ hk). \tag{4.4}$$

Now, if the proof of non-paternity is possible against both