28. *Probability-theoretic Investigations on Inheritance. VII$_4$. Non-Paternity Problems.*

By Yûsaku KOMATU.

Department of Mathematics, Tokyo Institute of Technology and
Department of Legal Medicine, Tokyo University.

(Comm. by T. FURUHATA, M.J.A., Feb. 12, 1952.)

4. Generalization to case of mixed combinations.

We now attempt to generalize the results obtained in the preceding sections. We succeed here to the notations introduced in § 2 of IV; especially, let the distributions of inherited character in polulations to which mothers and fathers belong be denoted by $\{p_i\}$ and $\{p'_i\}$ $(i=1, \ldots, m)$, respectively. Practical case of proving non-paternity against a given mixed mother-child combination will occur almost exclusively in such a manner that a putative father belongs to the same population as that of true father. We shall therefore restrict our discussions to such cases alone.

Let us now denote by

$$(4.1) \qquad V'(ij; hk)$$

the quantity corresponding to (2.1). The quantity corresponding to $\pi(ij; hk)$ in (1.1) of IV being $\pi'(ij; hk)$ as already introduced in (2.2) of IV, there now appears the quantity

$$(4.2) \qquad P'(ij; hk) = \pi'(ij; hk) V'(ij; hk)$$

instead of (2.2). Further, corresponding to (2.3), (2.4), (2.5), we have

$$(4.3) \qquad P'(ij) = \sum_{h, k} P'(ij; hk),$$

$$(4.4) \qquad P'(ij)/\bar{A}_{ij},$$

$$(4.5) \qquad P' = \sum_{i, j} P'(ij) = \sum_{i, j, h, k} P'(ij; hk);$$

respective summation extending over all possible sets of suffices indicated.

Making use of the convention introduced in (1.10), it is evident, by definition, that the interrelation

$$(4.6) \qquad V'(ij; hk) = [V(ij; hk)]'$$

holds good. On the other hand, as already noticed in (2.15) of IV, we have

$$(4.7) \qquad \pi'(ij; hk) = p_i p_j [\pi(ij; hk)/p_i p_j]'.$$