59. Probability-theoretic Investigations on Inheritance.
X₁. Non-Paternity Concerning Mother-Child-Child Combinations.

By Yûsaku KOMATU.

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

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1. Non-paternity against a distinguished child.

Problems discussed in the preceding chapter [1] have exclusively concerned two children belonging to the same family, that is, possessing a father also in common. There arise analogous problems concerning two children possessing a mother alone in common, which will be discussed in the present chapter. While the former problems have depended on *mother-children combinations*, the latter ones depend on *mother-child-child combinations*.

Now, consider a triple consisting of a mother A_{ij}, her first child A_{hk} and her second child A_{fg}, both children being assumed not to possess a common father. The probability of an event that such a triple appears and then a man chosen at random can assert his *non-paternity against second child at any rate* is, corresponding to a former expression (2.3) of IX, represented by

(1.1) $P_0(ij; hk, fg) \equiv \pi_0(ij; hk, fg) V(ij; fg);$

the π_0's denoting the probabilities of mother-child-child combination defined in (5.9) of IV and V's the quantities introduced in (2.1) of VII. This is a basic quantity and can, in view of (5.7) of IV and (2.2) of VII, i.e.,

$$\pi_0(ij; hk, fg) = \pi(ij; hk)\pi(ij; fg)/\bar{A}_{ij}, \quad \pi(ij; fg) V(ij; fg) = P(ij; fg),$$

be expressed also in the form

(1.2) $P_0(ij; hk, fg) = P(ij; fg) \cdot \pi(ij; hk)/\bar{A}_{ij};$

1) Y. Komatu, Probability-theoretic investigations on inheritance. I. Distribution of genes; II. Cross-breeding phenomena; III. Further discussions on cross-breeding; IV. Mother-child combinations; V. Brethren combinations; VI. Rate of danger in random blood transfusion; VII. Non-paternity problems; VIII. Further discussions on non-paternity problems; IX. Non-paternity concerning mother-children combinations. Proc. Japan Acad. **27** (1951), I. 371-377; II. 378-383, 384-387; III. 459-464, 466-471, 472-477, 478-483; IV. 587-592, 596-597, 598-603, 605-610, 611-614, 615-620; V. 689-693, 694-699; **28** (1952), VI. 54-58; VII. 102-104, 105-108, 109-111, 112-115, 116-120, 121-125; VIII. 162-164, 165-168, 169-171; IX. 207-212, 213-217, 218-223, 224-229. These papers will be referred to as I; II; III; IV; V; VI; VII; VIII; IX.