119. Probability-theoretic Investigations on Inheritance.
XVI₁. Further Discussions on Interchange of Infants.[1]

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1. Preliminaries.

A problem discussed in the preceding chapter has concerned a triple consisting of parents and an apparent infant as a unit of observation. On the other hand, we may consider an analogous problem if the type of one of parents in a triple, a father say, is unknown. The doubt on interchange of infants being very important for a family concerned, if such an affair happens, the data will be collected in detail as possible, and one of the most strong reference will be the father's inherited type. The previous discussions have just concerned such a circumstance. However, if a father's type cannot be known, for instance, on account of his death or disappearance, or when a rapid judgement must be brought, then there will arise a problem of detecting the interchange *without taking the father's type into account*; namely, a unit of observation is now a pair of a mother and an apparent infant. In the present chapter such a problem will be treated.

We first introduce a quantity analogous to (4.1) of XV. Let us designate by

(1.1) $\psi(-ij, +hk)$ $(i, j, h, k=1, \ldots, m;\ (ij)\neq(hk))$

the probability of an event that a mother unable to produce A_{ij} appears and her child is A_{hk}. Notation analogous to (4.2) of XV will also be availed. Though in order to detemine an explicit

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. Brethern ocmbinations; VI. Rate of danger in random blood transfusion; VII. Non-paternity problems; VIII. Further discussions on non-paternity; IX. Non-paternity problems concerning mother-children combinations; X. Non-paternity concerning mother-child-child combinations; XI. Absolute non-paternity; XII. Problem of paternity; XIII. Estimation of genotypes. XIV. Decision of biovular twins; XV. Detection of interchange of infants. Proc. Japan Acad., 27 (1951), I. 371-377; II. 378-383, 384-387; III. 459-465, 466-471, 472-477, 478-483; IV. 587-592, 593-597, 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; X. 249-253, 254-258, 259-264; XI. 311-316, 317-322; XII. 359-364, 365-369, XIII. 432-437, 438-443; XIV. 444-449; XV. 517-520, 521-526, 527-532, 533-537.