99. Probability-theoretic Investigations on Inheritance. XIII₁. Estimation of Genotypes.[1]

By Yûsaku KOMATU.

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

(Comm. by T. FURUHATA, M.J.A., Oct. 13, 1952.)

1. Problems to be discussed.

If there exist dominance relations among genes of an inherited character, a genotype of an individual cannot necessarily be determined uniquely from its phenotype alone. In fact, an individual representing a dominant character may be homozygotic as well as heterozygotic. A clue of deciding its genotype is to examine the characters of its descendants.

For instance, in case of the ABO blood type, if an individual of homozygote AA is accompanied by a spouse O, then any child is necessarily of the type $A(=AO)$, while if an individual of heterozygote AO is accompanied by a spouse O, then its child is either of $A(=AO)$ or O. Hence, if an individual of phenotype A accompanied by a spouse O produces at least one child O, then it is decided to be of the heterozygote AO. But, even when an individual of phenotype A accompanied by O produces merely the children of type A, it is of course yet impossible to decide its genotype as the homozygote AA. However, in the latter case, it will be expected that the more the children A increase, the more probable the individual is to be of AA.

Similar circumstances will also arise without reference to the type of a spouse of an individual. For instance, if an individual is of homozygote AA, then its child cannot have the type O or B, while if an individual is of heterozygote AO, then its child can have the type O or B provided its spouse is of a type containing the

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; IX. Non-paternity problems concerning mother-children combinations; X. Non-paternity concerning mother-child-child combinations; XI. Absolute non-paternity; XII. Problem of paternity. 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.