8. *Probabilities on Inheritance in Consanguineous Families*

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In a series of successive papers[1] a unified theory of inheritance has been developed from a probabilistic view-point. In the present Note we consider again a single inherited character which consists of m multiple alleles at one diploid locus denoted by

$$A_i \quad (i=1, \ldots, m)$$

and of which the inheritance is subject to Mendelian law. *Our main purpose is to study the distributions of genotypes in several definite combinations, lineal or collateral, consisting of individuals chosen at random from a consanguineous family;* a population in consideration is supposed to be in *an equilibrium state* unless the contrary is stated. We further suppose that the *panmixie* takes place at any generation except when the consanguineous marriages are appointed. The problem may be regarded as generalizations of those discussed in the previous papers[2].

In the present preliminary Note we confine ourselves to a compendious announcement of the results. The details on the formulas as well as their consequences will be fully discussed in our subsequent paper[3] which will nearly be published.

The definitions as well as the notations concerning several concepts contained in the previous papers will be retained. However, for the sake of brevity, the *frequencies of the genes* A_i $(i=1,\ldots,m)$ will be denoted merely by

$$i \text{ instead of } p_i$$

provided no confusion can arise. Further, the different Latin letters except those designating the running types in summation are supposed, in principle, to indicate the different genes.

I. Simple lineal combination

1. Mother-nth descendant combination

The probability of mother-child combination $\pi \equiv \pi_1$ is now generalized to that of a combination consisting of an individual $A_{\alpha\beta}$ and

1) Y. Komatu, Probability-theoretic investigations on inheritance. I-XVI. Proc. Japan Acad. **27-29** (1951-1953).

2) Cf. especially, IV. Mother-child combinations. **27** (1951), 587-620 and **29** (1953), 68-77; V. Brethren-combinations. **27** (1951), 689-699 and **29** (1953), 78-82.

3) Y. Komatu and H. Nishimiya, Probabilistic investigations on inheritance in consanguineous families. Bull. Tokyo Inst. Tech. (1954).