

135. Probabilities on Inheritance in Consanguineous Families. XIV

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XI. General consanguineous lineages

1. Preliminaries

We have considered in the preceding chapter¹⁾ several probabilities on lineages in which consanguineous marriages consist merely of a serial sequence of single ones. In order to generalize them, we first classify all the possible lineages according to a number of consanguineous marriages involved. Lineages of every class are further divided into subclasses according to a manner of intervention of consanguineous marriages.

In general, we designate by a *branching* or *converging position* a position where collateral lines arise or a consanguineous marriage occurs, and by a *critical position* either of them. A lineal part of a lineage will be called a *maximal chain* if it connects two consecutive critical positions. In the following, we suppose that at every branching position there arises a separation into just *two* collateral lines, and that a *panmixia* takes place at any stage of generations. Members at non-critical position as well as spouses coming from other lineages even at branching positions are indifferent to the classification. However, if a number of non-critical members involved in a maximal chain reduces to unity or degenerates to empty, it will be required to make considerably troublesome modifications corresponding to those performed in chapter VI et seq. For the sake of simplicity, we shall restrict ourselves, in principle, to a generic case by omitting these extreme cases.

We first consider a mother-descendants combination $(0; 1, 2) \dots$, in which 0 is a branching member. In a lineage involving t consanguineous marriages, there exist $t+1$ branching positions, t converging positions, and hence $2t+1$ critical positions. Distinguishing all such lineages by means of a manner on consanguineous marriages,

1) Previous parts of the paper have been published in these Proceedings: Y. Komatu and H. Nishimiya, Probabilities on inheritance in consanguineous families. I–XIII. Proc. Japan Acad. **30** (1954), 42–45; 46–48; 49–52; 148–151; 152–155; 236–240; 241–244; 245–247; 636–640; 641–649; 650–654; **31** (1955), 186–189; 190–194. Cf. also a supplementary paper: A remark concerning probabilities on inheritance in consanguineous families. Proc. Japan Acad. **31** (1955), 380–381.