Campos, Tania M. M.; **Holgate, Philip**
Algebraic isotopy in genetics. (English) Zbl 0628.92018
IMA J. Math. Appl. Med. Biol. 4, 215-222 (1987).

The object of this paper is to show that the algebras corresponding to certain important families of genetic mechanisms are isotopic, and to examine the reasons for, and consequences of, this relation. Three theorems are proved:

The genetic algebra for a single locus with multiple alleles, with all possible nonsingular mutation matrices are isotopic. They admit a common weight function ω, and the principal power of $\mathcal{K} = \ker \omega$ are identical in every member of the isotopic class. In each case, the powers of $\mathcal{K}$ are ideals and $\mathcal{K}$ is nilpotent and hence all algebras of the isotopic class are special train algebras.

The polyploid gametic algebras for chromosome segregation, chromatid segregation, and mixtures of them, are special isotopes. The powers of $\mathcal{K}$ are the same for all algebras of this class, they are ideals, and $\mathcal{K}$ is nilpotent. Hence, all algebras of the isotopic class are special train algebras.

The zygotic algebras for inheritance at k loci, with arbitrary crossover distribution, are specially isotopic. The subspaces IdL are ideals in all algebras of the class, $\mathcal{K} = Id_2$ is nilpotent, all its powers are ideals, and hence all algebras of the class are special train algebras.

Reviewer: M.Bertrand

MSC:

92D10 Genetics and epigenetics
17D92 Genetic algebras

Keywords:

nonselective genetics; recombination; Schafer algebra; Gonshor algebra; multiple alleles; nonsingular mutation matrices; ideals; nilpotent; train algebras; polyploid gametic algebras; chromosome segregation; chromatid segregation; mixtures; isotopes; powers; zygotic algebras; inheritance