Sur les algèbres de Jordan génétiques. (French. English summary) [On genetic Jordan algebras]


Certain problems in the mathematics of inheritance give rise to nonassociative algebras. Their study has led to the definition and analysis of various classes of nonassociative algebras such as the train algebras, the special train algebras, Gonshor algebras, Schafer algebras, Bernstein algebras, and generalisations of some of these. In general, however, the classes of algebras are much wider than the range of situations occurring in biological genetics. For instance, although a very wide class of systems of inheritance lead to Gonshor algebras, “almost all” Gonshor algebras do not correspond to any system in genetics. It has also been found that among the algebras describing the most elementary concept in genetics, the inheritance of the characteristics controlled by a single locus, both the “gametic” and the “zygotic” algebras are Jordan algebras. In some sense, therefore, these Jordan algebras can be said to be the building blocks of genetic segregation. It must be noted, however, that neither the algebras relating to more than one locus, nor those describing polyploidy, are Jordan. Because and in spite of the above facts, there has been considerable interest in the intersections of the class of Jordan algebras with the various classes of “genetic” algebras mentioned above.

This article is a comprehensive exposition and survey of this field. It has sufficient basic material on genetic algebras to be self-contained. It began life as the written version of two talks at different colloquia in 1985, the first initiating the study of “genetic algebras that satisfy some other mathematical condition”. However, its appearance was delayed by publication problems, and it has been developed to review the many results obtained since 1985, both by the authors (some of these have been published elsewhere) and by other writers on the subject.

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