

MR1414973 (98e:17043) 17D92 92D10

Reed, Mary Lynn

Algebraic structure of genetic inheritance. (English summary)

*Bull. Amer. Math. Soc. (N.S.)* **34** (1997), no. 2, 107–130.

The paper is a good survey of the algebras (nonassociative) which arise in genetics. In 1966 M. Bertrand published a little book [*Algèbres non associatives et algèbres génétiques*, Gauthier-Villars Éditeur, Paris, 1966; MR0215885 (35 #6720)] with the same inspiration. The subject has its origin in several papers (1939–1945) of I. M. H. Etherington and at present is growing very rapidly. A comprehensive reference of work up to 1980 for the research done in this area is the book by A. Wörz-Busekros [*Algebras in genetics*, Lecture Notes in Biomath., 36, Springer, Berlin, 1980; MR0599179 (82e:92033)].

Alberto Pérez de Vargas

### References

1. V.M. Abraham. Linearizing quadratic transformations in genetic algebras. *Proc. London Math. Soc. (3)*, 40:346–363, 1980. MR0566495 (82c:92013a)
2. S. Bernstein. Demonstration mathématique de la loi d’hérédité de Mendel. *Comptes Rendus Acad. Sci. Paris*, 177:528–531, 1923.
3. . Principe de stationarité et généralisation de la loi de Mendel. *Comptes Rendus Acad. Sci. Paris*, 177:581–584, 1923.
4. . Solution of a mathematical problem connected with the theory of heredity. *Ann. Sci. de l’Ukraine*, 1:83–114, 1924. (Russian).
5. Burgueño C., M. Neuberger, and A. Suazo. Totally orthogonal Bernstein algebras. *Arch. Math.*, 56:349–351, 1991. MR1094421 (92f:17042)
6. T. Cortes. Modular Bernstein algebras. *J. of Algebra*, 163:191–206, 1994. MR1257313 (95d:17038)
7. R. Costa and H. Guzzo Jr. Indecomposable baric algebras. *Lin. Alg. and its Applications*, 183:223–236, 1993. MR1208207 (94a:17023)
8. . Indecomposable baric algebras II. *Lin. Alg. and its Applications*, 196:233–242, 1994. MR1273986 (95e:17030)
9. I.M.H. Etherington. Genetic algebras. *Proc. Roy. Soc. Edinburgh*, 59:242–258, 1939. MR0000597 (1,99e)
10. . Duplication of linear algebras. *Proc. Edinburgh Math. Soc. (2)*, 6:222–230, 1941. MR0005113 (3,103b)
11. . Non-associative algebra and the symbolism of genetics. *Proc. Roy. Soc. Edinburgh*, 61:24–42, 1941. MR0003557 (2,237e)
12. H. Gonshor. Special train algebras arising in genetics. *Proc. Edinburgh Math. Soc. (2)*, 12:41–53, 1960. MR0124367 (23 #A1680)
13. . Special train algebras arising in genetics II. *Proc. Edinburgh Math. Soc. (2)*, 14:333–338, 1965. MR0194215 (33 #2428)
14. . Contributions to genetic algebras. *Proc. Edinburgh Math. Soc. (2)*, 17:289–298, 1971. MR0302218 (46 #1371)
15. . Contributions to genetic algebras II. *Proc. Edinburgh Math. Soc. (2)*, 18:273–279, 1973. MR0325173 (48 #3522)
16. S. González and C. Martínez. Idempotent elements in a Bernstein algebra. *J. London Math. Soc. (2)*, 42:430–436, 1990. MR1087218 (91m:17048)

17. S. Gonz'alez, C. Martinez, and P. Vicente. Idempotent elements in a 2nd-order Bernstein algebra. *Comm. Alg.* 22(2):595–609, 1994. [MR1255883 \(94m:17033\)](#)
18. H. Guzzo Jr. Embedding nil algebras in train algebras. *Proc. Edinburgh Math. Soc.*, 37:463–470, 1994. [MR1297315 \(95h:17043\)](#)
19. . The Peirce decomposition for commutative train algebras. *Comm. Alg.*, 22(14):5745–5757, 1994. [MR1298748 \(95h:17042\)](#)
20. J.B.S. Haldane. Theoretical genetics of auto-polyploids. *J. Genetics*, 22:359–372, 1930.
21. I.R. Hentzel, L.A. Peresi, and P. Holgate. On  $k$ -th order Bernstein algebras and stability at the  $k + 1$  generation in polyploids. *IMA J. of Math. Appl. in Med. & Biol.*, 7:33–40, 1990. [MR1069427 \(91k:17039\)](#)
22. P. Holgate. Sequences of powers in genetic algebras. *J. London Math. Soc.*, 42:489–496, 1967. [MR0218413 \(36 #1499\)](#)
23. . Genetic algebras associated with sex linkage. *Proc. Edinburgh Math. Soc. (2)*, 17:113–120, 1970. [MR0307738 \(46 #6858\)](#)
24. . Characterisations of genetic algebras. *J. London Math. Soc. (2)*, 6:169–174, 1972. [MR0314930 \(47 #3479\)](#)
25. . Genetic algebras satisfying Bernstein's stationarity principle. *J. London Math. Soc. (2)*, 9:613–623, 1975. [MR0465270 \(57 #5175\)](#)
26. . Selfing in genetic algebras. *J. Math. Biology*, 6:197–206, 1978. [MR0647287 \(83b:92037\)](#)
27. Y.I. Lyubich. Basic concepts and theorems of the evolutionary genetics of free populations. *Russian Mathematical Surveys*, 26(5):51–123, 1971. [MR0446581 \(56 #4906\)](#)
28. C. Martinez. Isomorphisms of Bernstein algebras. *J. of Algebra*, 160:419–423, 1993. [MR1244920 \(94i:17037\)](#)
29. D. McHale and G.A. Ringwood. Haldane linearisation of baric algebras. *J. London Math. Soc. (2)*, 28:17–26, 1983. [MR0703460 \(84f:17012\)](#)
30. G. Mendel. Experiments in Plant-Hybridization. In James A. Peters, editor, *Classic Papers in Genetics*, pages 1–20. Prentice-Hall, Inc., 1959.
31. L. Peresi. On baric algebras with prescribed automorphisms. *Lin. Alg. and its Applications*, 78:163–185, 1986. [MR0840174 \(87i:17034\)](#)
32. R.D. Schafer. Structure of genetic algebras. *American J. of Mathematics*, 71:121–135, 1949. [MR0027751 \(10,350a\)](#)
33. S. Walcher. On Bernstein algebras which are train algebras. *Proc. Edinburgh Math. Soc.*, 35:159–166, 1992. [MR1150961 \(92m:17055\)](#)
34. A. W"orz-Busekros. The zygotic algebra for sex-linkage. *J. Math. Biol.*, 1:37–46, 1974. [MR0371977 \(51 #8194\)](#)
35. . The zygotic algebra for sex-linkage. II. *J. Math. Biol.*, 2:359–371, 1975. [MR0409587 \(53 #13339\)](#)
36. . *Algebras in Genetics*. Lecture Notes in Biomathematics, vol. 36, Springer-Verlag, New York, 1980. [MR0599179 \(82e:92033\)](#)
37. . Bernstein algebras. *Arch. Math.*, 48:388–398, 1987. [MR0888867 \(88d:17024\)](#)

*Note: This list, extracted from the PDF form of the original paper, may contain data conversion errors, almost all limited to the mathematical expressions.*