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I. J. GOOD

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Topics in group rings, by Sudarshan K. Sehgal, Monographs and Textbooks in Pure and Applied Mathematics, vol. 50, Marcel Dekker, New York and Basel, 1978, vi + 251 pp., $24.50.

The theory of the group ring has a peculiar history. In some sense, it goes back to the 1890's, but it has emerged as a separate focus of study only in relatively recent times. We start with the early development of the theory of representations of finite groups over the complex field. Most people familiar with this think immediately of Frobenius and Burnside, who used approaches that seem unsuitable and even bizarre in the light of modern treatments. Admittedly, Frobenius' group determinant and Burnside's Lie-theoretic approach both yielded the basic properties of complex *characters*. However, they said much less about the *representations* themselves. For this reason, they have little application to the important problems of finding properties of representations over other rings–representations over fields of finite characteristic and over rings of algebraic integers have very important applications in group theory, algebraic number theory and topology. Hence, a more flexible approach was needed. In fact, the groundwork was being done by the little-known Estonian innovator Theodor Molien. Molien developed a theory of algebras over the complex field that included many of the features of the more general theory later developed by Wedderburn. He applied his theory to the case of representations of groups as follows: the Cayley representation of a finite group G as a permutation group on itself can be linearized to obtain a faithful representation of G in $GL(n, \mathbf{C})$, where n is the order of G. The linear span of the image of this representation is a subalgebra of the algebra of $n \times n$ matrices. When it is analyzed by Molien's methods, the basic properties of the irreducible characters are deduced from properties of the irreducible representations.

This useful point of view lay dormant until the late 1920's, when Emmy Noether considered group representations as an illustration of her results on