19. J. von Neumann, *Zur Algebra der Funktionaloperatoren und Theorie der normalen Operatoren*, Math. Ann. **102** (1929), 370–427.

20. T. W. Palmer, *Characterizations of C*-algebras*, Bull. Amer. Math. Soc. **74** (1968), 538–540. MR **36** #5709.

21. C. E. Rickart, *General theory of Banach algebras*, Van Nostrand, University Series in Higher Math., Princeton, N.J., Reprinted (with corrections) by Robert Krieger Publ. Co., 1974. MR **22** #5903.

22. G. E. Šilov, *On the decomposition of a commutative normed ring in a direct sum of ideals*, Mat. Sb. **32** (74) (1953), 353–364; English transl., Amer. Math. Soc. Transl. (2) **1** (1955), 37–48. MR **14**, 884; **17**, 512.

23. I. M. Singer and J. Wermer, *Derivations on commutative normed algebras*, Math. Ann. **129** (1955), 260–264. MR **16**, 1125.

24. I. Vidav, *Eine metrische Kennzeichnung der selbstadjungierten Operatoren*, Math. Z. **66** (1956), 121–128. MR **18**, 912.

25. L. Waelbroeck, *Le calcul symbolique dans les algèbres commutatives*, J. Math. Pures Appl. (9) **33** (1954), 147–186. MR **17**, 513.

26. K. Yosida, *On the group embedded in the metrical complete ring*. Japan. J. Math. **13** (1936), 459–472.

The structure of factors, by S. Anastasio and P. M. Willig, Algorithmics Press, New York, 1974, iii+116 pp.

In a paper appearing in the 1929 Mathematische Annalen (*Zur Algebra der Funktionaloperatoren und Theorie der normalen Operatoren*), von Neumann initiated the study of *Rings of operators* (renamed *von Neumann algebras* in J. Dixmier's classic, *Les algèbres d'opérateurs dans l'éspace Hilbertien*, Paris, 1957). These are algebras, R, of bounded linear transformations (operators) of a Hilbert space H into itself, closed in the strong-operator topology ($A_n \to A$ means that $A_n x \to Ax$, for each x in H) and having the property that A^*, the adjoint of A, is in R if A is. Von Neumann saw two motivating forces behind the study of these algebras: applications to the newly emergent Quantum Physics, and application to the study of infinite groups. Quantum Physics, as it was being formulated, was involved with algebraic combinations of (selfadjoint) operators. It was certain to require (at the mathematical level) a deeper understanding of the structure of algebras of operators. The technique of group algebras had been so useful in the study of finite groups that some corresponding construct for infinite groups was certain to be crucial for their analysis.

The detailed study of von Neumann algebras was undertaken in a series of papers written in collaboration with F. J. Murray. The first appeared in the 1936 Annals of Mathematics, *On rings of operators*. Since noncommutativity was the basic technical problem, Murray and von Neumann moved quickly to the study of those von Neumann algebras, *factors*, whose centers consist of scalar multiples of the unit element.

As in much of Functional Analysis, the statements of results in the theory of operator algebras are algebraic in flavor. The ideas, proofs and