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(*b*. Garrelsweer, Netherlands, 7 May 1914; *d*. Rotterdam, Netherlands, 11 September 1972)

mathematics.

De Groot was the son of Maria Margaretha (née Kuylman) and Johannes de Groot, a minister who later became professor of Near Eastern languages at the University of Groningen and subsequently professor of theology at the University of Utrecht. De Groot attended Christelijk Gymnasium in The Hague for two years, and Willem Lodewijk Gymnasium in Groningen for two years. In 1933 he enrolled at the University of Groningen to study mathematics, with minors in physics and philosophy. He was awarded the doctorate in 1942 with a dissertation titled *Topologische Studiën*. His supervisor was G. Schaake.

For the next several years de Groot taught mathematics at secondary schools in Coevorden and The Hague. In 1946 he became a researcher at the Mathematical Center in Amsterdam. In 1947 and 1948 he was lecturer of mathematics at the University of Amsterdam, from 1948 to 1952 professor of mathematics at the Delft Technical University, and from 1952 until his death he was professor of mathematics at the University of Amsterdam. From 1960 to 1964 he was head of the Pure Mathematics Department of the Mathematical Center.

De Groot held guest positions at several universities in the United States; in 1959 and 1960 at Purdue University, in 1963 and 1964 at Washington University in St. Louis, and in 1966 and 1967 at the University of Florida at Gainesville. From 1967 he combined his professorship at Amsterdam with a position of graduate research professor at the University of Florida at Gainesville. In 1969 de Groot became a member of the Royal Dutch Academy of Sciences.

De Groot's early research dealt with general topology and with problems in algebra, mainly in group theory. His early topological research was strongly influenced by Hans Freudenthal. This is noticeable in his dissertation, in which he obtained a number of results in compactification theory and introduced the interesting cardinal invariant's compactness deficiency and compactness degree. In group theory de Groot obtained results on equivalence of Abelian groups and effective construction of indecomposable abelian groups and rigid groups. Rigid structures, that is, structures with only trivial automorphisms, interested him; he later constructed rigid graphs and rigid spaces.

Subsequently, de Groot concentrated his attention on topology, although around 1960 he made good use of his group-theoretical expertise in several papers on groups of homeomorphisms of topological spaces. In the same period he introduced some new topological cardinal invariants, height and spread, which have turned out to be quite useful in settheoretic topology.

In the last ten years of his life, de Groot was involved with new general approaches, mainly in set-theoretic topology. His early work in compactness and its generalizations, combined with new interest in Baire spaces, led him to introduce concepts like subcompactness, cocompactness, and cotopological properties in general. He elaborated a new compactification method through the use of so-called superextensions. He introduced and studied topological operators that change a given topology into another one by assigning as a closed subbase for the new topology all sets in the first topology with a specific property (for instance, all compact sets, or all connected closed sets). In his last few years, de Groot also began to do research in infinitedimensional topology and in the topology of manifolds.

De Groot had many students and coworkers. Twelve dissertations were prepared under his supervision, and many of his papers were written with others. A number of his ideas and several of his conjectures were later taken up by others, while he himself, after launching them, went on to new fields. De Groot's influence on his coworkers and students, and through them on the development of general topology, was considerable.

BIBLIOGRAPHY

I. Original Works. De Groot published about ninety papers, including *Topologische Studiën* (Assen, Netherlands, 1942), his dissertation; "Decompositions of a Sphere," in *Fundamenta mathematicae*, **43** (1956), 185–194, written with T. J. Dekker; "Rigid Continua and Topological Group Pictures," in *Archiv der Mathematik*, **9** (1958), 441–446, written with R. J. Wille; "Groups Represented by Homeomorphism Groups 1," in *Mathematische Annalen*, **138** (1959), 80–102; "Discrete Subspaces of Hausdorff Spaces," in *Bulletin de l' Académie polonaise des sciences*, ser. Sciences Mathématiques, astronomiques et physiques, **13** (1965), 537–544; and' Inductive Compactness as a Generalization of Semicompactness, ' in *Fundamenta mathematicae*, **58** (1966), 201–218, written with T. Nishiura.

II. Secondary Literature. A complete list of de Groot's papers and a survey of his scientific work is in P. C. Baayen and M. A. Maurice. "Johannes de Groot, 1914–1972," in *General Topology and Its Applications*, **3** (1973), 3–32. De Groot's contributions to algebra are more fully discussed in L. C. A. Leeuwen, "Some Problems and Results in Abelian Group Theory," in *Niuw archief voor wiskunde*, **22** , no. 2 (1974), 143–155.

P. C. Baayen