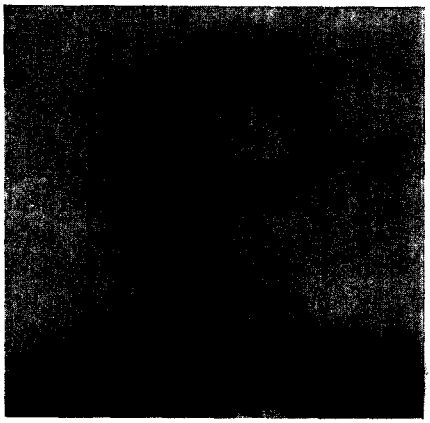
JOURNAL OF NUMBER THEORY 7, 1–4 (1975)

Obituary



Sigekatu Kuroda

(November 11, 1905–November 3, 1972)

Professor Sigekatu Kuroda died in 1972 at the age of 67. He was a mathematician whose role in the mathematical community and whose influence on its development cannot fully be measured by the amount of his published work done. Deeply devoted to our science, he was constantly prepared to serve his cause, the promotion of mathematics.

A long and painful illness overshadowed his last years, but for him, who was then deeply engaged in the editorial preparation of the collected works of Takagi, the illness seemed to exist only as a reminder of the shortness of time left to complete the task.

He began his studies of mathematics at the Imperial University of Tokyo where he received the bachelor degree in 1928 and the doctorate in 1945 after long periods of service to his country away from his field of studies. The University of Nagoya at which he was made professor in 1942 owes much to him and his efforts in building up its Department of Mathematics over a period of more than twenty years. In 1953–1954 he served Nagoya University as Dean of the Faculty of Science. In 1962 he moved to College Park, Maryland, to a special chair in the Department of Mathematics of the University of Maryland. At the time of his death he was professor emeritus of both universities.

Kuroda's publications deal with logics and the foundations of mathematics at least as much as with algebraic number theory which, however, remained his prime field of interest. I shall give here only a brief summary of his papers on the foundations of mathematics, not feeling competent to discuss them in detail. They begin with a series of papers "Zur Algebra der Logik" in the early thirties. There follows a book on the foundations of mathematics in Japanese. He takes up the subject again after the war in "Intuitionistische Untersuchungen der formalistischen Logik" and in another paper. In 1955–1956 he went to Princeton, where among others Gödel took interest in Kuroda's work. Perhaps there and then the idea was born whose realization dominated the following years: he introduced a new system, suitable for the logical foundation of mathematics, which may be regarded in some sense as a modified and drastically simplified Gentzen system. It has been published in a series of thirteen papers under the common title "An investigation of the logical structure of mathematics." Not all parts of this series, in which his work on logic culminates, are yet published. The subtitle of its last part, however, which in some sense is independent of the others, indicates already the shift of interest determining Kuroda's work in subsequent years; he calls it "A method of programming of proofs in mathematics for electronic computers."

His papers on algebraic number theory are less numerous and apparently do not cover all of his results in this field. Based on a very careful earlier investigation "Über den Dirichletschen Zahlkörper," mostly along traditional lines of class field theory, he obtained in 1951 one of the earliest examples of a nonabelian decomposition law. It is published in his last paper on this subject "Über die Zerlegung rationaler Primzahlen in gewissen nicht-abelschen galoisschen Körpern." Though there are by now some more dramatic ones, examples of nonabelian decomposition laws are still extremely rare and the general task of finding such laws may perhaps be called the most mysterious problem in the whole field of algebraic number theory. Another one of his more influential papers to be mentioned here is "Über die Klassenzahlen algebraischer Zahlkörper" of 1950. Generalizing classical results of Dirichlet, Herglotz and others, Kuroda gives here for the first time—and still restricted to the case of an abelian extension K/k—the general shape of the class number relations, which arise from multiplicative relations between the zeta-functions $\zeta_{L/k}(s)$ of the subfields L/k of K/k by taking their residues at $s = 1$. The restriction to the abelian case has been removed by R. Brauer only a few years later, who worked with a different set of generic relations. As recent investigations have shown, much more precise information is accessible for large classes of Galois groups. Depending on the class of

groups considered, these results more or less closely resemble the type of information which is implicit in Kuroda's work on the abelian case.

Beginning in the early sixties he became very interested in the use of computers in number theory. He did a considerable amount of work in this area himself; unfortunately only a small part of it has appeared in print so far. But he also tried to establish a system of communication and cooperation for the various groups working in this area, thereby giving invaluable advice and practical help to anybody asking for it.

His devotion to mathematics together with his extraordinary patience made him a successful and even inspiring teacher, highly respected by his students as well as by his colleagues and friends.

H. W. LEOPOLDT

PUBLICATIONS

(since 1930)

1. Zur Algebra der Logik, *Proc. Imp. Acad. Tokyo* **6** (1930), 220–223.
2. Zur Algebra der Logik II, *Proc. Imp. Acad. Tokyo* **6** (1930), 299–302.
3. Zur Algebra der Logik III, *Proc. Imp. Acad. Tokyo* **7** (1931), 33–36.
4. Ueber die Approximation quadratischer Irrationalzahlen durch rationale, *Proc. Imp. Acad. Tokyo* **12** (1936), 325–328.
5. Ueber den Dirichletschen Körper, *J. Fac. Sci. Imp. Univ. Tokyo Sect. I* **4** (1943), 383–406.
6. Ueber die Pellsche Gleichung, *Proc. Imp. Acad. Tokyo* **19** (1943), 611–612.
7. Ueber die Klassenzahlen algebraischer Zahlkörper, *Nagoya Math. J.* **1** (1950), 1–10.
8. Intuitionistische Untersuchungen der formalistischen Logik, *Nagoya Math. J.* **2** (1951), 35–37.
9. Über die Zerlegung rationaler Primzahlen in gewissen nicht-abelschen Zahlkörpern, *J. Math. Soc. Japan* **3** (1951), 148–156.
10. On the intuitionistic and formalistic theory of real numbers, *Proc. Int. Congr. Math.* 1954, **1** (1954), 538–539.
11. An investigation on the Logical Structure of Mathematics.
    - I. A logical system, *Abh. Math. Sem. Univ. Hamburg* **22** (1958), 242–266.
    - II. Transformation of proof, *Abh. Math. Sem. Univ. Hamburg* **23** (1958), 201–227.
    - III. Fundamental deductions, *Nagoya Math. J.* **13** (1958), 21–52.
    - IV. Compendium for deductions, *Nagoya Math. J.* **13** (1958), 123–133.
    - V. Contradictions of Russell's type, *J. Symbolic Logic* **23** (1958), 393–407.
    - VI. Consistent V-system, *Nagoya Math. J.* **14** (1959), 95–107.
    - VII. Set-theoretical contradictions, *Nagoya Math. J.* **14** (1959), 95–107.
    - VIII. Consistency of the natural number theory $T_1(N)$, *Nagoya Math. J.* **14** (1959), 129–158.
    - IX. Deductions in the natural number theory $T_1(N)$, *Osaka Math. J.* **11** (1959), 7–42.

IX. Deductions in the natural number theory $T_1(N)$, *Osaka Math. J.* **11** (1959), 7–42.
X. Concepts and sets, *Osaka Math. J.* **11** (1959), 213–248.
XI. Unpublished.
XII. The principle of extensionality and of choice, *Proc. Japan Acad.* **34** (1958), 400–403.
XIII. A method of programming of proofs in mathematics for electronic computing machine, *Nagoya Math. J.* **16** (1960), 195–203.

12. "On Sieves and Primes" (with J. Maryak). University of Maryland Tech. Report 2, Computer Science Center, 1963.
13. Moscow congress report (Japanese), *Sugaku* **19** (1967), 6–10.

Books and Monographs Written in Japanese

1. "Sugaku Kisoron" ("Foundations of Mathematics"). Iwanami Publishing Co., Japan, 1933.
2. "Shugoron" ("Set Theory"). Kyoritsu Publishing Co., Tokyo, Japan, 1938.
3. "Number Theory — Fundamentals of Algebraic Number Theory" (with Tomio Kubota), pp. iii, 1–309. Asakura Publishing Co., Tokyo, Japan 1963.