this case asserts that if A is a complete local ring with maximal ideal m and if the characteristic of A/m coincides with that of A, then there is a subfield C of A such that C forms a complete set of representatives for A/m. Thus, A is a homomorphic image of a formal power series ring over the field C.

Cohen's structure theorem in these forms was a remarkable development in the theory of local rings, and some of the results derived from it are given in §4. Namely, §4 contains applications of the structure theorem to the theories of Japanese rings and Nagata rings; a Japanese ring is a neotherian integral domain A such that for any finite algebraic extension L of its field of fractions, the integral closure of A in L is a finite A-module. A Nagata ring is a noetherian ring A such that, for any prime ideal P of A, A/P is a Japanese ring, namely a pseudogeometric ring in the sense of Nagata [8]. At the end of the chapter there is an appendix in which a special type of extension of a local ring—roughly speaking, residue field extension—is discussed. If A is a local ring with maximal ideal M and if B is an extension discussed here, then MB is the maximal ideal of B and B is flat over A.

REFERENCES

1. W. Krull, *Dimensionstheorie in Stellenringen*, J. Reine Angew. Math. **179** (1938), 204–226.

2. C. Chevalley, *On the theory of local rings*, Ann. of Math. (2) **44** (1943), 690–708.

3. ______, *Intersections of algebraic and algebroid varieties*, Trans. Amer. Math. Soc. **57** (1945), 1–85.

4. I. S. Cohen, *On the structure and ideal theory of complete local rings*, Trans. Amer. Math. Soc. **59** (1946), 54–106.

5. M. Samuel, *La notion de multiplicité en algèbre et en géométrie algébrique*, J. Math. Pures Appl. **30** (1951), 159–274; These, Paris, 1951.

6. J.-P. Serre, *Sur la dimension homologique des anneaux et des modules noetherian*, Proc. Internat. Sympos. (Tokyo-Nikko, 1955), Scientific Council of Japan, Tokyo, 1956, pp. 175–189.

7. M. Nagata, *The theory of multiplicity in general local rings*, Proc. Internat. Sympos. (Tokyo-Nikko, 1955), Scientific Council of Japan, Tokyo, 1956, pp. 191–226.

8. ______, *Local rings*, Wiley, New York, 1962; reprint, Kreager, Huntington.

M. NAGATA

BULLETIN (New Series) OF THE
AMERICAN MATHEMATICAL SOCIETY
Volume 12, Number 1, January 1985

0273-0979/85 $1.00 + $.25 per page

Classical potential theory and its probabilistic counterpart, by J. L. Doob, Grundlehren der mathematischen Wissenschaften, vol. 262. Springer-Verlag, New York 1984, xxiii + 846 pp., $58.00. ISBN 0-3879-0881-1

It had been known for more than ten years that Doob was writing a book on this subject. Now that it has appeared, it entirely fulfills our expectations: it is a great work. Great by its dimensions, written with extreme love and care, concentrating the knowledge of a generation which was supreme in the history of potential theory, it also represents the achievement of Doob's own epoch-making research on the relations between classical potential theory and the theory of Brownian motion.