algebraic geometry] could be handled had already been developed... ([34], p. 32).[1])

Emmy Noether was a visiting professor in Moscow in 1928-1929. Alexandrov described the impact she has had on Pontryagin's work in the theory of continuous groups (topological algebra):

> It is not hard to follow the influence of Emmy Noether on the developing mathematical talent of Pontryagin; the strong algebraic flavour in Pontryagin's work undoubtedly profited greatly from his association with Emmy Noether ([2], p. 175).

I will give the last word to Garrett Birkhoff who, in an article in 1976 describing the rise of abstract algebra from 1936 to 1950, said the following ([5], p. 81):

> If Emmy Noether could have been at the 1950 [International] Congress [of Mathematicians], she would have felt very proud. Her concept of algebra had become central in contemporary mathematics. And it has continued to inspire algebraists ever since.

BIBLIOGRAPHY

[1] ADAMS, W. W. and L. J. GOLDSTEIN. *Introduction to number theory.* Prentice-Hall, 1976.

[2] ALEXANDROV, P. S. In memory of Emmy Noether. In: *Emmy Noether, 1882-1935,* by A. Dick, Birkhäuser, 1981, pp. 153-179.

[3] ATIYAH, M. F. and I. G. MACDONALD. *Introduction to commutative algebra.* Addison Wesley, 1969.

[4] BIRKHOFF, G. Current trends in algebra. *Amer. Math. Monthly 80* (1973), 760-782.

[5] —— (a) The rise of modern algebra to 1936. (b) The rise of modern algebra, 1936 to 1950. In: *Men and institutions in American mathematics,* ed. by D. Tarwater et al, Texas Tech Press, 1976, pp. 41-63 and 65-85.

[6] BOURBAKI, N. Historical note. In his *Commutative algebra,* Addison-Wesley, 1972, pp. 579-606.

[7] BREWER, J. W. and M. K. SMITH (eds). *Emmy Noether: a tribute to her life and work.* Marcel Dekker, 1981.

[8] CARTAN, H. and S. EILENBERG. *Homological algebra.* Princeton Univ. Press, 1956.

---

[1]) To put this statement in perspective, van der Waerden precedes it with the following comments: "In the beginning of our century, many people felt that the theory of invariants was a mighty tool in algebraic geometry... I soon discovered that the real difficulties of algebraic geometry cannot be overcome by calculating invariants and covariants" ([39, p. 32).

[9] CHEVALLEY, C. *Introduction to the theory of algebraic functions of one variable.* Amer. Math. Soc., 1951.

[10] CRILLY, T. (a) The rise of Cayley's invariant theory (1841-1862). (b) The decline of Cayley's invariant theory (1863-1895). *Hist. Math. 13*(1986), 241-254, and *15*(1988), 332-347.

[11] CURTIS, C. W. and I. REINER. *Representation theory of finite groups and associative algebras.* Wiley, 1962.

[12] DICK, A. *Emmy Noether, 1882-1935.* Birkhäuser, 1981.

[13] DIEUDONNÉ, J. The work of Nicolas Bourbaki. *Amer. Math. Monthly 77* (1970), 134-145.

[14] —— *History of algebraic geometry.* Wadsworth, 1985.

[15] DUBREIL, P. Emmy Noether. *Cahiers du Sém. d'Hist. des Math. 7* (1986), 15-27.

[16] EICHLER, M. *Introduction to the theory of algebraic numbers and functions.* Academic Press, 1966.

[17] EVANS, R. J. *The feminist movement in Germany,* 1894-1933. Sage Publ., 1976.

[18] FLEXNER, A. *Universities: American, English, German.* Oxford Univ. Press, 1930.

[19] GILMER, R. Commutative ring theory. In: *Emmy Noether: a tribute to her life and work,* ed by J. W. Brewer and M. K. Smith, Marcel Dekker, 1981, pp. 131-143.

[20] HAWKINS, T. Hypercomplex numbers, Lie groups, and the creation of group representation theory. *Arch. Hist. Ex. Sc. 16* (1976/77), 17-36.

[21] JACOBSON, N. *Basic algebra, I and II.* Freeman, 1974 and 1980.

[22] —— (ed). *Emmy Noether: collected papers.* Springer-Verlag, 1983. (Contains an introduction by Jacobson to Emmy Noether's works.)

[23] KAPLANSKY, I. Commutative rings. In: *Proc. of Conf. on Commutative Algebra,* ed by J. W. Brewer and E. A. Rutter, Springer-Verlag (Lecture Notes in Mathematics, No. 311), 1973, pp. 153-166.

[24] KIMBERLING, C. H. Emmy Noether and her influence. In: *Emmy Noether: a tribute to her life and work,* ed. by J. W. Brewer and M. K. Smith, Marcel Dekker, 1981, pp. 3-61.

[25] KLEINER, I. A sketch of the evolution of (noncommutative) ring theory. *L'Ens. Math. 33* (1987), 227-267.

[26] KLINE, M. *Mathematical thought from ancient to modern times.* Oxford Univ. Press, 1972.

[27] LAM, T. Y. Representation theory. In: *Emmy Noether: a tribute to her life and work,* ed. by J. W. Brewer and M. K. Smith, Marcel Dekker, 1981, pp. 145-156.

[28] MACLANE, S. History of abstract algebra. In: *American mathematical heritage: algebra and applied mathematics,* ed. by D. Tarwater et al, Texas Tech Press, 1981, pp. 3-35.

[29] —— Mathematics at the University of Göttingen (1931-1933). In: *Emmy Noether: a tribute to her life and work,* ed by J. W. Brewer and M. K. Smith, Marcel Dekker, 1981, pp. 65-78.

[30] MERZBACH, U. Historical contexts. In: *Emmy Noether in Bryn Mawr,* ed. by B. Srinivasan and J. Sally, Springer-Verlag, 1983, pp. 161-171.

[31] MODENOV, P. S. and A. S. PARKHOMENKO. *Geometric transformation,* 2 vols. Academic Press, 1965.

[32] MONNA, A. F. *L'algébrisation de la mathématique, réflexions historiques.* Comm. Math. Inst., Rijksuniversiteit, Utrecht, 1977.

[33] PARIKH, C. *The unreal life of Oscar Zariski.* Academic Press, 1991.
[34] POLLARD, H. and H. G. DIAMOND. *The theory of algebraic numbers.* Math. Assoc. of Amer. (a Carus monograph), 1975.
[35] SMITH, M. K. Emmy Noether's contributions to mathematics. Unpublished notes (13 pp, ca 1976).
[36] SRINIVASAN, B. and J. SALLY (eds). *Emmy Noether in Bryn Mawr.* Springer-Verlag, 1983.
[37] VAN DER WAERDEN, B. L. Obituary of Emmy Noether. In: *Emmy Noether, 1882-1935,* by A. Dick, Birkhäuser, 1981, pp. 100-111.
[38] —— The foundations of algebraic geometry from Severi to André Weil. *Arch. Hist. Ex. Sc. 7* (1970-71), 171-180.
[39] —— On the sources of my book *Moderne Algebra. Hist. Math. 2* (1975), 31-40.
[40] —— The school of Hilbert and Emmy Noether. *Bull. Lond. Math. Soc. 15* (1983), 1-7.
[41] WEYL, H. Memorial address. In: *Emmy Noether, 1882-1935,* by A. Dick, Birkhäuser, 1981, pp. 112-152.
[42] —— Universities and science in Germany. In his *Gesammelte Abhandlungen,* Vol. 4., ed. by K. Chandrasekharan, Springer-Verlag, 1968, pp. 537-562.

(Reçu le 12 août 1991)

Israel Kleiner

Dept. of Mathematics and Statistics
York University
4700 Keele Street
North York, Ontario
Canada M3J 1P3