CURRICULUM VITAE

PROFESSOR F R N NABARRO F R S

NAME: NABARRO, Frank Reginald Nunes

PRESENT POSITION: Honorary Research Professorial Fellow, School of Physics, University of the Witwatersrand, Johannesburg and, Consultant and Fellow, CSIR, Division of Manufacturing and MaterialsTechnology.

DATE OF BIRTH: 7th March 1916, London, England

MARRIED: 25th June 1948 - Margaret Constance Dalziel (deceased 2 September 1997), 3 sons and 2 daughters.

EDUCATED: Nottingham High School
State Scholar, Major Open Scholarship, New College, Oxford
(Senior Scholar 1937 - 1938).

Oxford:	- 1st class Honour Moderations in Mathematics	1935
	- 1st class Honours in Natural Science - Physics	1937
	- 1st class Honours in Mathematics	1938
	- BSc	1940
	- MA	1946
Birmingham:	DSc	1953
Witwatersrand:	Hon. DSc	1987
Natal:	Hon. DSc	1988
Cape Town:	Hon. DSc	1988
Pretoria:	Hon. DSc	2003

AWARDS:

- MBE	1946
- Beilby Memorial Award	1950
- FRS	1971
South Africa Medal of the South African Association for the Advancement of Science	1972
- Honorary Fellow of the Royal Society of South Africa	1973
- De Beers Gold Medal, South African Institute of Physics	1980
- Claude Harris Leon Foundation Award of Merit	1983
- J F W Herschel Medal, Royal Society of South Africa	1988
- Honorary Member, South African Institute of Physics	1991
- CSIR Fellow, South Africa	1994-2005
- AIME R F Mehl Award	1995
- Founder Member, Academy of Science of South Africa	1995
- Foreign Associate, US National Academy of Engineering	1996
- Institute of Materials Platinum Medal	1997
- Honorary Member, Microscopy Society of Southern Africa	1998
- Honorary President, Johannesburg Musical Society	1999

OFFICES HELD:

-	Senior Experimental Officer, Ministry of Supply	1941-1945
-	Royal Society Warren Research Fellow, University of Bristol	1945-1949
-	Lecturer Grade I in Metallurgy, University of Birmingham	1949-1953
-	City of Johannesburg Professor of Physics and Head of the Department of Physics, University of the Witwatersrand, Johannesburg, South Africa	1953-1977
-	Professor of Physics	1978-1984
-	Vice President, South African Institute of Physics	1956-1957
-	Honorary Director, Solid State Physics Research Unit, University of the Witwatersrand, Johannesburg	1960-1984
-	Dean, Faculty of Science, University of the Witwatersrand, Johannesburg	1968-1970
-	Member of Council, South African Institute of Physics	1974-1979
-	Senate Representative on Council, University of the Witwatersrand, Johannesburg	1968-1977
-	Deputy Vice-Chancellor	1978-1980
-	Member of Council, South African Institute of Physics	1981-1989
-	President of the Royal Society of South Africa	1988-1991
-	Consultant, CSIR, South Africa	1985-2004

VISITING POSTS:

-	Visiting Professor, National Research Council, Ottawa, Canada	September - December 1956
-	Visiting Professor, University of Bristol	1959-1960
-	Republic Steel Visiting Professor, Department of Metallurgy, Case Institute of Technology, Cleveland, Ohio, USA	September 1964 - March 1965
-	Overseas Fellow of Churchill College, Cambridge	1966-1967
-	British Council Category B Visitor - London and Sussex Universities	December 1969 - February 1970
-	Gauss Professor, University of Göttingen, Germany	April - July 1970
-	Professeur associé, Faculté des Sciences, Université Paris-Sud, Orsay, France	January - July 1971
-	Professeur associé, Faculté des Sciences, Université de Montpellier, France	November 1973 - February 1974
-	Visiting Professor, University of California, Berkeley, California	1977
-	Visiting Fellow, Robinson College, Cambridge	February 1981 - January 1982
-	Visiting Professor, Technion, Haifa, Israel	April - May 1984
-	Visiting Professor, University of Wales Swansea	September - October 1992
-	Professeur Invité, Ecole Polytechnique Fédérale, Lausanne	January - February 1995
-	Visiting Professor, University of Virginia	May 1996

EDITORIAL BOARDS:

-	Associate Editor	:	Acta Materialia	1953 - 2001
-	Associate Editor	:	Scripta Materialia	1967 - 2001

PUBLICATIONS:

- Theory of Crystal Dislocations pp. I-xvii 1-821, Oxford University Press (1967), Dover (1987).
- The Physics of Creep (with H.L. de Villiers), Taylor and Francis, (1995).
- Over 160 scientific papers, mostly on solid state physics and strength of metals and alloys.

EDITOR:
Dislocations in Solids, North-Holland Publishing Co.
Volume 1, 1-350, Volume 2, 1-562, Volume 3, 1-353, Volume 4, 1-463.
Volume 5, 1-421 (1979/1980), Volume 6, 1-534 (1984), Volume 7, 1-434 (1986).
Volume 8, 1-542 (1989), Volume 9, 1-402 (1992), Volume 10, 1-594 (1996) (with M.S. Duesbery).
Volume 11, 1-618 (2002) (with M.S. Duesbery)
Volume 12, 1-550 (1985-2004) (with J.P. Hirth) (2004)

LIST OF PUBLICATIONS
F.R.N. NABARRO

1. N.F. Mott and F.R.N. Nabarro: An Attempt to Estimate the Degree of Precipitation Hardening with a Simple Model, Proc. Phys. Soc., **52**, 86 (1940).
2. F.R.N. Nabarro: The Influence of Elastic Strain on the Shape of Particles Segregating in an Alloy, Proc. Phys. Soc., **52**, 90 (1940).
3. H. Fröhlich and F.R.N. Nabarro: Orientation of Nuclear Spins in Metals, Proc. Roy. Soc., **A175**, 382 (1940).
4. F.R.N. Nabarro: The Strains Produced by Precipitation of Alloys, Proc. Roy. Soc., **A175**, 519 (1940).
5. F.R.N. Nabarro: The Mechanical Properties of Metallic Solid Solutions, Proc. Phys. Soc., **58**, 669-676 (1946).
6. F.R.N. Nabarro: Dislocation in a Simple Cubic Lattice, Proc. Phys. Soc., **59**, 256-272 (1947).
7. H. Fröhlich and F.R.N. Nabarro: Nuclear Ferromagnetism, Phys. Soc. Cambridge Conf. Report, The Physical Society, London. 129 (1947).
8. F.R.N Nabarro: Laszlo's Papers on Tessellated Stresses - A Review, Symposium on Internal Stresses. The Institute of Metals, 61-72 (1947).
9. F.R.N. Nabarro: Diffusion and Precipitation in Alloys, ibid. 237-250.
10. N.F. Mott and F.R.N. Nabarro: Dislocation Theory and Transient Creep, Physical Society Bristol Conf. Report 1-19 (1948); Metallurgia **19,** 199-205 (1949**)**
11. F.R.N. Nabarro: Mechanical Effects of Carbon in Iron, ibid. 38-45.
12. F.R.N. Nabarro: Deformation of Crystals by the Motion of Single Ions, ibid 75-90.
13. F.R.N. Nabarro: Neuere englische Arbeiten über die Versetzungstheorie der Gleitung, Zeits, f. Metallkunde, **40**, 81-89 (1949).
14. F.R.N. Nabarro: Influence of Grain Boundaries on the Plastic Properties of Metals, Some Recent Developments in Rheology, V.G.W. Harrison, editor, United Trade Press, London 38-52, (1950).
15. F.R.N. Nabarro: Restriction of Prismatic Punching to a Limited Class of Crystals, Phys. Rev. **79**, 894 (1950).
16. F.R.N. Nabarro: The Force Acting on a Body Moving Uniformly through a Gas Containing Sound Waves, Phil. Mag. Ser. 7, **41**, 1270-1280 (1950).
17. F.R.N. Nabarro and J.H.O. Varley: La Stabilité des Réseaux Hexagonaux, Revue de Métallurgie, **48**, 681-683 (1951).
18. F.R.N. Nabarro: The Law of Constant Resolved Shear Stress in Crystal Plasticity, Phil. Mag. Ser. 7, **42**, 213 (1951).
19. J.D. Eshelby, F.C. Frank and F.R.N. Nabarro: The Equilibrium of Linear Arrays of Dislocations, Phil. Mag. Ser. 7, **42**, 351-364 (1951).
20. F.R.N. Nabarro: The Synthesis of Elastic Dislocation Fields, Phil. Mag. Ser. 7, **xlii**, 1224 (1951).
21. F.R.N. Nabarro: The Interaction of Screw Dislocations and Sound Waves, Proc. Roy. Soc. **A209:** 278 - 290 (1951).
22. F.R.N. Nabarro: The Mathematical Theory of Stationary Dislocations, Adv. in Phys., **1**, 269-394 (1952).
23. F.R.N. Nabarro and J.H.O Varley: The Stability of Hexagonal Lattices with a Simple Law of Force,
    Proc. Camb. Phil. Soc., **48**, 316-328 (1952).

24. F.R.N. Nabarro: Effect of Radiation on Elastic Constants, Phys. Rev. **87**, 665 (1952).
25. S.C. Hunter and F.R.N. Nabarro: The Origin of Glauert's Superposition Fringes, Phil. Mag., **43**, 538-546 (1952).
26. A.H. Cottrell, S.C. Hunter and F.R.N. Nabarro: Electrical Interaction of a Dislocation and a Solute Atom, Phil. Mag. Ser. 7, **44**, 1064-1067 (1953).
27. S.C. Hunter and F.R.N. Nabarro: The Propagation of Electrons in a Strained Metallic Lattice, Proc. Roy. Soc., **A220**, 542-561 (1953).
28. F.R.N. Nabarro: Modern Atomic Approach to the Mechanical Properties of Solids, Trans. S.A. Inst. Elec. Eng., **46**, 221-230 (1955).
29. F.R.N. Nabarro: The Axial Ratio of Zinc, and of the Eta and epsilon Brasses, Phil. Mag. Ser. 8, **2**, 716-718 (1957).
30. F.R.N. Nabarro: Deformation of NaCl Crystals, Dislocations and Mech. Prop. of Crystals, ed. Fisher et al., 235-237 New York, John Wiley (1957).
31. F.R.N. Nabarro: The Theory of Whisker De-kinking, ibid. 521-536.
32. W.B. Barss, Z.S. Basinski and F.R.N. Nabarro: Filamentary Growth in Irradiated Uranium, Canadian Jour. Phys., **36**, 980-983 (1958).
33. F.R.N. Nabarro and P.J. Jackson: The Climb of a Dislocation in a twisted Whisker, Phil. Mag. (8), **3**, 1105-1109 (1958).
34. F.R.N. Nabarro and P.J. Jackson: Growth of Crystal Whiskers, Growth and Perfection of Crystals, ed. R.H. Doremus et al., 11-99, New York, John Wiley (1958).
35. H.J. Logie, J. Jackson, J.C. Anderson and F.R.N. Nabarro: Effect of Plastic Deformation on Resistivity of Gold-Palladium Alloys, Acta Met., **9**, 707-713 (1961).
36. R.R. Urlau, The Late H.J. Logie, and F.R.N. Nabarro: Energy Levels in the Forbidden Gap of Insulating Diamonds, Proc. Phys. Soc., **128**, 256-274 (1961).
37. F.R.N. Nabarro: The Force on a Moving Dislocation, Phil. Mag., **6**, No. 70, 1261-1266 (9161).
38. F.R.N. Nabarro and J.M. Ziman: The Scattering of Waves by Dislocations, Proc. Phys. Soc., **128**, 1512-1519 (1961).
39. R.K. MacCrone and F.R.N. Nabarro: Behaviour of Broadcast Frequency Waves at Oblique Incidence during an Annular Eclipse, J. Atmos. and Terres. Phys., **20**, 200-205 (1961).
40. F.R.N. Nabarro, Z.S. Basinski and D.B. Holt: The Plasticity of Pure Single Crystals, Adv. Phys. **13**, 192 (1964), Russian translation, Metallurgia Publishing House, Moscow (1967).
41. F.R.N. Nabarro: The Geometry of Disclinations in Crystals, Inter. Conf. on Electron Diffraction and Crystal Defects, Melbourne, Unknown Publisher, 1965 Abstract II L-1. (no page numbers)
42. F.R.N. Nabarro: Extended Dislocations and the Schmid Law of Resolved Shear Stress, Phil. Mag., **14**, No. 130, 861 (1966).
43. C.M. Levitt and F.R.N. Nabarro: The Impact Strength of Diamond under Different Rates of Strain, Proc. Roy. Soc., **A293**, 259-274 (1966).
44. F.R.N. Nabarro and T.R. Duncan: Dissociated Dislocations and the Schmid Law of Resolved Shear Stress in b.c.c. Metals, Canad. J. Phys., **45**, 939-943 (1967).
45. L.M. Levinson and F.R.N. Nabarro: Departures from Linearity in Arrhenius Plots of Vacancy Concentration, Acta Met., **15**, 785-790 (1967).
46. D. Mitchell, C.H. Wyndham, T. Hodgson and F.R.N. Nabarro: Measurement of the Total Normal Emissivity of Skin Without the Need for Measuring Skin Temperature, Phys. Med. Biol., **12**, No. 3, 359-366 (1967).
47. F.R.N. Nabarro: Work Hardening of Pure Single Crystals, Revist dos Estudos Gerais Universitarios de Mocambique, II Serié I, Trip Academica, Lourenco Marques, pp. 9 – 36 (1965).
48. F.R.N. Nabarro: Steady-state Diffusional Creep, Phil. Mag., **16**, No. 140, 231 (1967).
49. L.A. Vermeulen and F.R.N. Nabarro: Electronic Properties of Particle-Counting Diamonds. I. Photoconductivity. II. Particle-Counting Properties, Phil. Trans. Soc., London, Series A, **262**, 251-298 (1967).
50. F.R.N. Nabarro and H. Conrad: Agenda Discussion: Low-Speed Dislocations, Dislocation Dynamics, ed. Rosenfield, Hahn, Bement, Jaffee. McGraw-Hill, 475-484 (1968).
51. F.R.N. Nabarro and Silvana Bartolucci Luyckx: The Theory of the Strength of Tungsten Carbide-Cobalt Compacts, Supplement to Trans. Japan Inst. Metals, **9**, 610-615 (1968).

52. F.R.N. Nabarro: Steady-state Diffusional Creep, Abstract in The Application of Modern Physics to the Earth and Planetary Interiors, ed. S.K. Runcorn. Wiley-Interscience, 251 (1969).
53. F.R.N. Nabarro: The Disclination Structure of Insect Muscle, Physics of Strength and Plasticity, ed. A.S. Argon, M.I.T. Press, Cambridge, Mass. (1969) pp. 97-110.
54. F.R.N. Nabarro: Disclinations in Surfaces, Fundamental Aspects of Dislocation Theory, National Bureau of Standards, Maryland, **1**, 593-606 (1970).
55. R.J.M. McCarter, F.R.N. Nabarro and C.H. Wyndham: Reversibility of the passive length-tension relation in mammalian skeletal muscle, Archives Internat. de Physiologie de biochemie, **79**, 469-479 (1971).
56. F.R.N. Nabarro and A.T. Quintanilha: The Interaction of Superconducting Flux Lines with Dislocations, Mat. Res. Bull., **5**, 669-680 (1970) (Mott Festschrift).
57. F.R.N. Nabarro: The Force Between Misfit Dislocations: Phil. Mag., **22**, 803-808 (1970).
58. E.J.H. Wessels and F.R.N. Nabarro: The Hardening of Latent Glide Systems in Single Crystals of Copper-Aluminide Alloys, Acta Met., **19**, 903-914 (1971).
59. E.J.H. Wessels and F.R.N. Nabarro: A Theory of Unstable Glide in the Presence of a Dense Dislocation Forest, Acta Met., **19**, 915-921 (1971).
60. F.R.N. Nabarro and W.F. Harris: Presence and Function of disclinations in Surface Coats of Unicellular Organisms, Nature, **232**, 423 (1971).
61. Barbara D. Rothberg, F.R.N. Nabarro and D.S. McLachlan: A Tin Whisker With Two Independent Superconducting Phase Diagrams, J. Low Temp. Phys., **5**, 665-681 (1971).
62. F.R.N. Nabarro and Barbara D. Rothberg: The Effect of Stress on the Superconductivity of Tin, Cooperative Phenomena, ed. H.Haken Springer-Verlag, Berlin (1972) pp. 96-107 (Fröhlich Festschrift).
63. F.R.N. Nabarro: The Statistical Problem of Hardening, J. Less-Common Metals, **28**, 257-276 (1972), (Burgers Festschrift).
64. F.R.N. Nabarro: Singular Lines and Singular Points of Ferro-Magnetic Spin Systems and of Nematic Liquid Crystals, J. de Physique, **33**, Nov-Dec. (1972), pp. 1089-1098.
65. Barbara D. Rothberg, F.R.N. Nabarro and D.S. McLachlan: The Effect of Stress on the Magnetic Superconducting Transitions of Tin Whiskers, Proc. 13th Internat. Conf. Low Temp. Phys., **3**, 503-506 (1972).
66. Barbara D. Rothberg, F.R.N. Nabarro, M.J. Stephen and D.S. McLachlan: The Superconductivity of Elastically Strained Tin Whiskers Near $T_c(\varepsilon)$: A 2nd Order Phase Transition With Two Degrees of Freedom, Proc. 13th Internat. Conf. Low Temp. Phys., K.D. Timmerhaus et al, eds, Plenum New York, **3**, 528-531 (1972).
67. B. Rothberg Bibby, F.R.N. Nabarro, D.S. McLachlan and M.J. Stephen: The Magnetic Transition in Moderately Small Superconductors and the Influence of Elastic Strain, Philosophical Transactions of the Royal Society, **278**, 311-341 No. 1282 (24 April 1975).
68. F.R.N. Nabarro and B. Rothberg-Bibby: A Possible Hypo-Critical Point in the Phase Diagram of a Moderately Small Superconductor in a Magnetic Field, Philosophical Transactions of the Royal Society, **278**, 343-349 (24 April 1975).
69. F.R.N. Nabarro: Solution and Precipitation Hardening, The Physics of Metals 2, Defects (ed. P.B. Hirsch), Cambridge University Press (1975) pp. 152-188. (Mott Festschrift).
70. F.R.N. Nabarro: Solution and Precipitation Hardening, The Physics of Metals 1, Defects (ed. P.B. Hirsch), Cambridge University Press (1975) pp. 152-188 (Mott Festschrift).
71. F.R.N. Nabarro: The Theory of Solution Hardening, Phil. Mag., **35**, 3, 613-622 (1977).
72. F.R.N. Nabarro: Surface Effects in Crystal Plasticity - Overview from the Crystal Plasticity Standpoint, Hohegeiss 5-14 Sept. 1975 ed. R.M. Latinision, J.T. Fourie, Noordhoff, Leyden. E., Nato Advanced Studies Institute, Series E. Applied Science No. 17, 49-125 (1977).
73. D. Melzer and F.R.N. Nabarro: Optical Studies of a Nematic Liquid Crystal with Circumferential Surface Orientation in a Capillary, Phil. Mag., **35**, 4, 901-906 (1977).
74. D. Melzer and F.R.N. Nabarro: Cols and Noeuds in a Nematic Liquid Crystal with a Homeotropic Cylindrical Boundary, Phil. Mag., **35**, 4, 907-915 (1977).
75. F.R.N. Nabarro: The Tensile Strength of Cold Water, Short Communication, S. Afr. J. Phys., **1**, No. 1, 33 (1978).

76. F.R.N. Nabarro, Z.S. Basinski and R. Pascual: The Temperature Plateau in the Flow Stress of Solid Solutions, Scripta Metallurgica, **12**, 931-933 (1978).
77. F.R.N. Nabarro and E.J. Kostlan: The Stress Field of a Dislocation Lying in a Plate, Journal of Appl. Phys. **49**, 11 (5445-8) 1978.
78. F.R.N. Nabarro and A.T. Quintanilha: Dislocations in Superconductors, Dislocations in Solids. Ed. F.R.N. Nabarro, Amsterdam, North-Holland Publishing Co., **5**, 193-242 (1980).
79. F.R.N. Nabarro: Recollections of the Early Days of Dislocation Physics, Proc. Roy. Soc. London (1980), **321**, (1744), 131 (1980).
80. F.R.N. Nabarro, A.T. Quintanilha and K Hanson: The Crenation of Lipid Bilayers and of the Membrane of the Human Red Blood Cell, Liquid Crystals of One- and Two-Dimensional Order, Springer Series in Chemical Physics 11, Berlin. Editors W. Helfrich and G. Heppke, 327-343 (1980).
81. D. Melzer, Annemarie van Es, F.R.N. Nabarro and Elsa Godinho: The Disclinations s = 2 at the Air-Nematic Interface, Phil. Mag. A, **44**, No. 4, 835-836 (1981).
82. F.R.N. Nabarro: The Calculation of Thermal Stresses in Cylinders, Int. J. Engng. Sci., **19**, No. 12, 1651-1656 (1981).
83. F.R.N. Nabarro: Stress Equivalence in the Theory of Solution Hardening, Proc. R. Soc. Lond., A, **381**, 285-292 (1982).
84. F.R.N. Nabarro, R. Bullough and J.R. Matthews: The Enhancement of Creep by Irradiation, Acta Metall., **30**, 1761-68 (1982).
85. F.R.N. Nabarro: Yield and Plasticity, in: Mechanical and Thermal Behaviour of Metallic Materials, Proc. Int. School of Physics "Enrico Fermi" Course (LXXXIII, Varenna 1981, eds. G. Caglioti and A. Ferro Milone (North-Holland, Amsterdam, 1982) pp. 35-75.
86. B. Rothberg-Bibby, D.S. McLachlan, H.J. Fink and F.R.N. Nabarro: Superconducting and Fermi Surface Parameters of Strained Tin Whiskers, Physica 107B (1981) 717-718.
87. B.D. Rothberg-Bibby, H.J. Fink, D.S. McLachlan and F.R.N. Nabarro: Ginzburg-Landau Analysis of First-Order Transitions of Elastically Strained Superconducting Tin Whiskers, J. Low Temp. Physics, **53**, Nos. 3/4, 375-404, 1983.
88. F.R.N. Nabarro: Hollow Dislocations in Highly Anisotropic Crystals, S. Afr. J. Phys., **7**, No. 2, 73-74 (1984).
89. F.R.N. Nabarro: Dislocation Cores in Crystals with Large Unit Cells, in Dislocations 1984 eds. P. Veyssiére, L. Kubin, J Castaing. Aussois France 8/17 March 1984 pp. 19-28.
90. F.R.N. Nabarro: Material Forces and Configurational Forces in the Interaction of Elastic Singularities, *in Fundamentals of Deformation and Fracture: Eshelby Memorial symposium, Sheffield 2-6 April 1984, Eds. B.A. Bilby, K.J. Miller, J.R. Willis, 456-459 (CUP) (1985).
91. F.R.N. Nabarro: Material Forces and Configurational Forces in the Interaction of Elastic Singularities, Proc. R. Soc. Lond., **A398**, 209-222 (1985).
92. F.R.N. Nabarro: The Development of the Idea of a Crystal dislocation, in Dislocations in Solids, Eds. H. Suzuki, T. Ninomiya, K. Sumino, S. Takeuchi, Yamada Conference IX Tokyo August 27-31, 1984, pp. 3-13.
93. F.R.N. Nabarro: Solution Hardening, In Dislocations and Properties of Real Materials, Conf. Proceedings Inst. of Metals December 1984 London, Published by British Metals Society, 152-169 (1985).
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94. F.R.N. Nabarro: Thermally Activated Dislocation Glide in Moderately Concentrated Solid Solutions, Phil. Mag. B, **52**, No. 3, 785-793, 1985.
95. F.R.N. Nabarro: Two Paradoxes in Pile-ups of Edge Dislocations, Journal of the Less Common Metals, **114** (1985) 59-64.
96. F.R.N. Nabarro: The Force Between Two Screw Dislocations, Phil. Mag., A **54**, 577-582 (1986).
97. F.R.N. Nabarro: The Glide of a Twist Boundary, Scripta Metall., **20**, 1273-74 (1986).
98. F.R.N. Nabarro: The Force Between Two Edge Dislocations in An Incompressible Medium, Phil. Mag. A., **57** 565-572 (1988).
99. F.R.N. Nabarro: Work Hardening of Face-Centred Cubic Single Crystals, in Strength of Metals

and Alloys ed. H.J. McQueen et al. (ICSMA7), Pergamon, Oxford (1986), Vol. 3, pp. 1667-1700.
100. P.J. Jackson and F.R.N. Nabarro: "The Stress Field of an Isolated Subgrain", Mater. Sci. Engng., **86**, 29-34 (1987).
101. F.R.N. Nabarro: "Pseudocrystals with Fivefold Symmetry", S.A.J. Physics, **10**, 30-40 (1987).
102. F.R.N. Nabarro: "Plastic Deformation in Tension and in Torsion", Phys. Stat. Sol. (a) **104**, 47-50 (1987).
103. F.R.N. Nabarro, G. Vekinis and S. Bartolucci Luyckx: "Precompression, Internal Stresses and Coercivity in WC-Co", Proc. Third International Conference on Science of Hard Materials, Mater. Sci. Engng., A105/106, 337-342 (1988).
104. F.R.N. Nabarro: "The Influence of Lattice Defects on Alloy Phase Diagrams", Alloy Phase Stability, ed. G.M. Stocks and A. Gonis, Kluver Academic Publishers, Dordrecht (1989) pp. 557-584.
105. F.R.N. Nabarro: "Work Hardening and Dynamical Recovery of f.c.c. Metals in Multiple Glide", Acta. Met., **37**, 1521-1546 (1989).
106. F.R.N. Nabarro: "The Mechanism of Harper-Dorn Creep", Acta. Met., **37**, 2217-2222 (1989).
107. F.R.N. Nabarro: "The Peierls Stress for a Wide Dislocation", Mater. Sci. Engng., **A113**, 315-326 (1989).
108. F.R.N. Nabarro: "Scaling Laws and Structural Inhomogeneities in Solids", Journal de Physique, France, **50**, 2519-2523 (1989).
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110. F.R.N. Nabarro: "Kinetics of Mughrabi's Model of Internal Stresses", Acta. Metall., **38**, 637-641 (1990).
111. F.R.N. Nabarro: "On Central-Polar Crystals", in Sir Charles Frank, OBE, FRS ed. R.G. Chambers et al. Adam Hilger, Bristol, 1991, pp. 79-87.
112. F.R.N. Nabarro: "Critical Currents at Small Angle Boundaries and Antiferromagnetism in $YBa_2Cu_3O_{7-\delta}$", Solid State Comm., **71**, 281-282 (1989).
113. F.R.N. Nabarro: "Understanding the Mechanical Properties of Metals and Alloys", S.A.J. Sci., **85**, 589-593 (1989).
114. F.R.N. Nabarro: "The Dependence of Activation Enthalpy on Stress in Shear Processes", Acta Metallurgica, **39**, 187 (1991).
115. S.B. Luyckx, F.R.N. Nabarro, Siu-Wah Wai and M.N. James: "The Anisotropic Work Hardening of WC Crystals, Acta Metallurgica, **40**, 1623-1627 (1992).
116. F.R.N. Nabarro: "A Dislocation Model which Reproduces Some of the Plastic Properties of $L1_2$ Alloy Single Crystals", Scripta Metall., **25**, 739-743 (1991).
117. F.R.N. Nabarro: "The Flow Stress of γ' Alloys", (ICSMA9, Haifa), ed. D G Brandon et al., Freund, London (1991), pp. 211-216.
118. F.R.N. Nabarro: "Planarity of the Anti-phase Boundary in LI_2 Ordered Alloys", Scripta Metall., **27**, 51-53 (1992).
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120. F.R.N. Nabarro: "The Effects of the Core Structure of Dislocations: The Case of LI_2 Alloys", Solid State Phenomena, **35-36**, 19-32 (1994).
121. F.R.N. Nabarro: "When Does the Peierls Stress Determine the Flow Stress of a Single Crystal?" in Advances in Crystal Plasticity: A Symposium in Honour of Professor Z.S. Basinski, ed. D.S. Wilkinson and J.D. Embury, Canadian Institute of Mining, Metallurgy and Petroleum, Montreal, Canada 1992, p. 15.
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ADDITION

During my period as a deputy Vice-Chancellor, my portfolio was described as "academic". This meant that I was responsible for academic staffing, the organization of Senate business, and so on. The more interesting part was academic planning. The Vice-Chancellor, Professor D.J. du Plessis, was already planning, from 1978 on, the "transformation" of the university which would occur once the government allowed us to enroll students of all races. He set up three teams, to consider the academic implications, the finding of land to accommodate a large influx of students, and the financial aspects. I was responsible for the first team. We had to estimate how many new students we could expect, and when, how much accommodation they would need, and how this large number of students could move efficiently from one class to another. This "Academic Plan" was the first to be drawn up by any South African university. We predicted that half of the university's student body would be "black" by the year 2000. Almost everybody laughed at us. In fact, half of our students are "black" now in 1997. We also realized that this influx of new students would suffer from bad schooling; with particular problems in mathematics, science and the use of the English language. With the aid of outside sponsors, we set up activities both within the university and in schools to help with these problems. I played a large part in coordinating these.

BRIEF DESCRIPTION OF SCIENTIFIC ACHIEVEMENTS

With N.F. Mott, Frank Nabarro published [A] the first quantitative estimate of the flow stress of a crystal hardened by a solid solution or a coherent precipitate. They then pointed out [B] the importance of the flexibility and the tension of a dislocation in determining the flow stresses. Nabarro developed these ideas further [C, D, E, F], and greatly clarified our understanding of processes which are driven both by applied stress and by thermal activation [G, H, I, J].

Nabarro made major contributions to the elastic theory of dislocations [K, L, M, N, O, P, Q], and to the theory of work hardening [R, S, T]. He was the first to discuss the effect of elastic energy on the shape of a precipitate particle [U, V], and, guided by the work of Zener, was the first to propose that the contribution of grain boundaries to the flow stress was inversely proportional to the square root of the grain size [W]. He predicted the existence and magnitude of diffusional creep [X]. He corrected Peierls's estimate of the stress required to move a dislocation through a perfect lattice [Y], and showed how the

theoretical and experimental estimates of this stress could be reconciled [Z].

Nabarro then turned his attention to creep-resistant materials. The subject is surveyed in [AA], and the theory of rafting in superalloys is developed in [BB] and [CC]. More recently, he has contributed to the theory of dislocation patterning. (DD, EE, FF). Many current analyses show that a random array of dislocations can reduce its energy by clustering into a pattern at constant mean dislocation density. In practice these patterns are formed in a mechanical test under an imposed stress. Dislocation clustering reduces the flow stress, and the flow stress is raised to the imposed stress by the introduction of new dislocations. The stored energy increases, but this increase is more than compensated by the work done by the applied stress during the formation of the additional dislocations.

The enumeration of the total edge dipole content of an array of dislocations presents unexpected difficulties, which are treated in GG.

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DD. F.R.N. Nabarro: Sequences of Dislocation Patterns, Mater. Sci. Engng. A **317**, 12 – 16 (2001).
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FRANK NABARRO

My early work was done under the guidance of N.F. Mott. We made the first quantitative estimate of the flow stress of a crystal hardened by a solid solution or a coherent precipitate. We then pointed out the importance of the flexibility and the tension of a dislocation in determining the flow stresses. I developed these ideas further, and clarified our understanding of processes which are driven both by applied stress and by thermal activation.

I contributed to the elastic theory of dislocations and to the theory of work hardening, and was the first to discuss the effect of elastic energy on the shape of a precipitate. Guided by the work of Zener, I was the first to propose that the contribution of grain boundaries to the flow stress was inversely proportional to the square root of the grain size. I predicted the existence and magnitude of diffusional creep. I corrected Peierls's estimate of the stress required to move a dislocation through a perfect lattice, and showed how theoretical and experimental estimates of this stress could be reconciled.

Later, I have turned my attention to creep-resistant materials, and in particular to the mechanism of rafting in superalloys, and more recently I have contributed to the theory of dislocation patterning.

Gwise:Prof Nabarro(2)